The Potential Role of Strategic Environmental Assessment (SEA) in the Development of Sustainable Energy Policies, Plans and Programmes for Ghana

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Abstract

Ghana's Vision 2020 and the 1990 energy crises have influenced energy sector policy, plan and programme reforms which in turn have affected development actions. Since these strategic level development decisions have ecological, economic and social ramifications, Strategic Environmental Assessment (SEA) has been seen as an effective tool for aligning energy sector policies, plans and programmes with sustainable development principles.

In formulating a theoretical perspective for the study, the two overarching theories, which framed the research, were *ecological rationality* and *institutions*. Flowing from these theories, the concepts of environmentalism, sustainable development, SEA and energy policies, plans and programmes have been discussed within the context of the West, Africa and Ghana. By the application of factor analysis, multiple regression, path analysis, partial regression, reliability models and tests of proportion (chi-square) in a quantitative analysis, the study tested key hypotheses and computed reliability and validity coefficients where appropriate.

The study found that although energy sector SEA in Ghana is essential for promoting sustainable energy policies, plans and programmes, it is not a sufficient condition for the implementation of effective sustainable energy policies, plans and programmes without the complement of other sector SEAs and constantly improving overall legal, social, political, economic and institutional frameworks for Environmental Impact Assessment (EIA) and SEA. The study confirms that context and philosophical convergence provide a common denominator for designing sustainable energy policies, plans and programmes across institutions in Ghana. Furthermore, the study observed that although hierarchically structured institutions such as Ghana's National Development Planning Commission offers the best opportunity for the integration of SEA into sectoral policies, plans and programmes, less hierarchical institutions such as Environmental Protection Agency (EPA) provided a plausible and tangible framework for a joint action and implementation on the basis of equal partnership, cooperation and participation. Within the West Africa sub-region, common needs and mutual benefits, for programmes such as the West Africa Gas Pipeline Project, provided a rallying ground for a common environmental, economic and energy policy.

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List of Acronyms

AADT	Average Annual Daily Traffic
AEA	Atomic Energy Authority
BHEP	Bui Hydroelectric Project
CEZ	Commercialised Electricity Zones
CFL	Compact Fluorescent Lamps
CIOGEN	Industrial Cogeneration
COP	Conference of Parties
CSPGs	Cross-Sectoral Planning Groups
DETR	Department of the Environment and the Regions
DoE	Department of the Environment
DSM	Demand Side Management
DSP	Dominant Social Policy
EAF	Electric Arc Furnaces
EAP	Environmental Action Plan
EC	Energy Commission
ECG	Electricity Company of Ghana
ECOWAS	Economic Community of West Africa
EE	Enabling Environment
EEM	Energy Efficient Motors
ELB	Electronic Ballast
ENESEA	Energy Sector Strategic Environmental Assessment
EPA	Environmental Protection Agency of Ghana
EPC	Environmental Protection Council
EPRP	Electricity Power Restructuring Programme
EPSEP	Emergency Power Supply Expansion Plan
EPZ	Export Processing Zone
ESA	Equivalent Standard Axle
ETU	Electricity Transmission Utility
FMTDP	First Medium-Term Development Plan
FREDA	Framework for Rural Energy Decision Analysis
FRP	Financial Recovery Plans
GHA	Ghana Highways Authority

GHG	Green House Gases
GHK	Good Housekeeping Practices
GLSS	Ghana Living Standards Survey
GNPC	Ghana National Petroleum Corporation
GOG	Government of Ghana
GRI	Ghana Review International
HD	Human Development
HPV	High Vapour Sodium Lamps
ID	Infrastructure Development
IEA	International Energy Agency
IEP	Integrate Energy Planning
IIED	International Institute of Environment and Development
IMPINST	Improving the Institutional Context
IMPSYS	Improving the Existing System
LPG	Liquefied Petroleum Gas
MEP	Macro-Economic Programme
MOFA	Ministry of Food and Agriculture
NCS	National Conservation Strategy
NDPC	National Development Planning Commission
NEAP	National Environmental Action Plan
NEI	Nuclear Energy Institute
NEP	New Environmental Paradigm
NEPA	US National Environmental Policy Act
NIS	National Interconnected System
OECD	Organisation for Economic Co-operation and Development
PEIS	Programmatic Environmental Impact Statement
PER	Preliminary Environmental Review
PF	Power Factor Improvement
PTC	Production, Technology and Competitiveness
PUMPFAN	High Efficiency Fans and Pumps
PURC	Public Utilities Regulatory Commission
RA	Registration Report
RECI	Regional Economic Cooperation and Integration

RUD	Rural and Urban Development
SAP	Structural Adjustment Programmes
SBU	Strategic Business Unit
SDENPL	Sustainable Energy Plan
SDENPOL	Sustainable Energy Policy
SDENPRG	Sustainable Energy Programme
SEAFRA	Strategic Environmental Assessment Framework
SEAGEN	Strategic Environmental Assessment in General
SHEP	Self Help Electrification Projects
SMEs	Small Medium Enterprises
TCP	Transaction Cost Economy
TOR	Tema Oil Refinery
TOU	Time-of-use tariff
TPWPS	Transitional Plan for Wholesale Power Supply
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
VARS	Vapour Absorption Refrigeration Systems
VIP	Village Infrastructure Project
VMT	Vehicle Miles Travelled
VRA	Volta River Authority
VSD	Variable Speed Drives
WBCSD	World Business Council for Sustainable Development
WCED	World Commission on Environment and Development
WSPSM	Wholesale Power Supply Market
WRI	World Resource Institute

List of Laws

Cap 84	Town and Country Planning Ordinance 1884
Act 480	National Development Planning Commission Act, 1994
Act 462	Local Governments Act 1993
Act 479	The National Development Planning (Systems) Act, 1994
L.I. 1652	Environmental Assessment Regulations. 1999
Act 490	Environmental Protection Agency Act, 1994

Act 462	Local Government Act, 1993
NRCD 239	Environmental Protection Council Decree, 1974,
Unnumbered	Minerals and Mining Law, 1986,
Unnumbered	Environmental Protection Council (Amendment) Decree, 1976

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PART

1

CONTEXT

Creating a Theoretical Framework

Chapter

1

Research Context

Chapter Outline

- Introduction
- Problem Statement
- Purpose of the Research
- Theoretical Perspectives
- Adaptation of Theories and Variables to the Study
- Logic of Research/Hypotheses
- Scope and Limitation of study
- Significance and Organisation of study

1 Chapter One: Research Context

1.1 Introduction

Energy production and use have both beneficial and harmful effects on man, the biosphere and nature. As a beneficial resource, energy is an element of national production and socio-economic development, an essential input to other sectors, a component of domestic or household activity and a tradable resource in global economic and political terms (Thérivel *et al.*, 1996:98). Concerns about the harmful local, regional, trans-boundary and global effects of the production and use of energy resources have assumed considerable importance in recent years. On the local level, energy consumption may be associated with a loss of biodiversity and air pollution. On the regional level energy use can cause trans-boundary pollution. Globally, concerns have heightened over carbon dioxide and other greenhouse gas emissions with atmospheric warming consequences. It is estimated that more than 50% of global warming results from energy uses alone (Houghton, 1996). The World Resource Institute's 1998 report indicates that

> Global energy use, which has increased nearly 70 percent since 1971, is projected to increase at more than 2 percent annually for the next 15 years. This increase will bring more energy services such as refrigeration and transportation to people but will raise greenhouse gas emissions about 50 percent higher than current levels, unless a concerted effort takes place to increase energy efficiency and move away from today's heavy reliance on fossil fuels. The low price and familiarity of fossil fuels work against the switch to renewable energy sources, such as wind, solar, geothermal, hydro, and others, but these clean energy sources are nonetheless undergoing considerable expansion and technical progress.

In the light of these concerns, it is argued by the European Commission (1992) that

> a long term strategy must be devised which ensures that solution for one problem does not exacerbate another. The global solution of the future will be to ensure that economic growth, efficient and secure energy supplies and a clean environment are compatible objectives. Energy policy has therefore been seen as a key factor in the achievement of sustainable development.

Recent UN projections relating to world population cited in EC (1992) indicates that population will rise from 5 billion people in 1990 towards 10 billion in 2050.

Corresponding energy projections indicate that energy demand will increase from around 9 billion tons of oil equivalent (toe) in 1990 towards 20 billion toe in 2050 under a conventional wisdom scenario or towards 13 billion toe under a high energy efficiency scenario. These projections are not uniformly distributed throughout the world. The European Commission (1992) observes that

> There might be regional adjustments of the energy shares. The developing countries will account for 46%, the currently developed world 16% (41.6% in 1990) and the Central and Eastern European countries 11% (24% in 1990). Nevertheless, these developments will still have a quite drastic impact on the environment at large. In both energy scenarios the projected use of coal will result in considerably increased emissions of greenhouse gases, in particular CO_2. The lower level (13 billion toe) would result in a 60% increase in CO_2 emissions on global level. The projected future energy growth based on the conventional wisdom scenario would create considerable stresses for security of energy supply. These will be particularly severe for developing countries which do not have indigenous energy resources and the aim would probably be unachievable unless there is a different approach to nuclear power, to greater use of waste related energy sources or unless there is a breakthrough in the development and penetration of alternative energy technologies such as renewables (biomass, solar, wind etc.) the high efficiency scenario will require a dramatic change in attitudes to energy use and would force industrialised countries to achieve even higher efficiency gains.

Global environmental and energy improvements can only be realised if major improvements are also achieved in developing countries and in Central and Eastern Europe. A critical issue in this context is the need to transfer finance, technology and know-how to those countries to help them to control the evolution in their energy demand while safeguarding their right to sustainable development (EC, 1992:31).

These efforts and policy aimed to balance energy needs against quality should not only address traditional goals,[1] it also ought to take account of the environmental implications[2]. Thus depending upon the orientation and priorities of a nation, energy policy may either emphasise the traditional policies of energy security, adequacy and diversity or environmental policies. There might even be a combination of some or all elements of traditional and environmental policies. Ghana and other developing

[1] Traditional policy normally addresses security, diversity and adequacy of the supply energy resources through the use of diverse instruments including the establishment of energy markets, privatisation and encouragement of competition.

[2] Today supply and demand side management, energy efficiency and conservation, economic instruments such as energy tax or subsidy, tradable permits, legislative control and voluntary instruments among others are widely used environmental policies.

countries are not substantial contributors to greenhouse gases, indeed developing countries such as Ghana and Nigeria's per capita carbon dioxide emissions in 1992 were 0.22 metric tonnes (Mt) and 0.8 Mt respectively. For the same period, the per capita carbon dioxide emissions for the US and the UK were 20Mt and 9.2Mt respectively. Thus Ghana's per capita energy consumption is about 1% of that of the US. Affluence, population and technological development drive increased energy resources, which in turn create environmental consequences (Latesteijin and Schoonenboom, 1996). Ghana's future development goal aimed to raise the standard of living coupled with rapid population growth and technological development will lead to higher energy demand. For example, Ghana's vision is to make the country a middle-income economy by 2020. And in pursuit of the World Bank assisted structural adjustment programme and economic reforms, Ghana has since 1983 revitalised many sectors of its economy, embarked on the agenda of rural electrification and consequently experienced a modest economic growth rate of about 5% over the past years. With growth rates of population, GDP, primary energy consumption and carbon dioxide emissions at 2.9%, 4.0%, 5.4% and 0.22Mt respectively, energy bills will rise and so will carbon dioxide emissions (WRI, 1998).

Already, energy consumption per capita in kilogram of oil equivalent rose from 78 in 1980-85 to 96 in 1987-92 (Armstrong, 1996:110-112). The change in total commercial energy consumption between 1973 and 1993 was 55.31%. For the same period, the change in traditional fuel energy consumption was 101.5% (WRI, 1997). Petroleum imports constitute about 13 % of national energy production and the consumption of energy takes up to 24 % of Ghana's export earnings. The growth rate of CO_2 emissions will probably be larger than for industrialised countries (Halsnæs, 1996:918). Meanwhile the hydro-electricity supply from which domestic and sub-regional demands have been met since the 1960s has no longer been reliable due not only to increasing demands but also to periodic draughts apart from the ecological consequences of hydro projects. Moreover, other biophysical and socio-economic impacts, which are not the consequence of project level development actions but also deriving from policies, plans and programmes at strategic levels could not be handled by project environmental assessment. Fortunately, Strategic Environmental Assessment (SEA), which is better suited to tackle policies, plans and programmes impacts at strategic levels, is becoming acceptable world wide as a useful tool. And Ghana has already begun using it in the assessment of rural development and

industrial programmes (See case studies in Chapter 4). This evolution of SEA in Ghana is need-led, occasioned by the inability of project EIA to deal with cumulative effects of mining activities. The lending policy of multilateral institutions such as the World Bank and the Africa Development Bank has also been playing significant roles. Moreover, technical assistance from other institutions such as UK Overseas Development and International Institute for Environment and Development (IIED) led to the production of an assessment guide in 1996 explicitly bringing SEA to the forefront of environmental assessment.

Laws such as the Local Government Act, 1994, Act 462, the Environmental Protection Agency Act, 1994, the National Development Planning (Systems) Act, 1994 Act 479 and the National Development Planning Commission Act, 1994, 480 implicitly places the National Development Planning Commission (NDPC) of Ghana and District Assemblies (DAs) at the heart of plan-based Strategic Environmental Assessment in Ghana. The Environmental Protection Agency has overall oversight for environmental management and for ensuring that sector-based SEA such as energy-sector environmental assessment is carried out. Nevertheless, because of the unreliable nature of hydro-electricity supply to meet the pressing national development goals, energy security, diversity and adequacy policies will probably dominate the agenda for national policy making at the expense of environmental policies unless Ghana is committed to environmental imperatives in practice. Even then, the multiplicity of government agencies charged with different functions and the limitations of environmental impact assessment are likely to give rise to some challenges and problems.

1.2 Problem Statement

Briefly, the key problems to be discussed in this research include lack of strong links between energy policy and environmental policy in the absence of Strategic Environmental Assessment, institutional problems, philosophical divergence, lack of practical demonstration of sustainability, absence of common sub-regional policy context and lack of effective participation. *Firstly*, the establishment of a separate Ministry of Mines and Energy allows for specialisation and efficiency in energy policy-making, planning and programming as energy security matters become the focus of ministerial attention, priority and responsibility. The performance of these functions by the sector ministry in turn generates development actions, socio-economic benefits, economic development and employment as well as environmental

effects. To deal with these effects, environmental impact assessment has been pursued for some time under the direction of the Ministry of Environment Science and Technology through the Environmental Protection Agency. In the future, a newly established Energy Commission of Ghana is empowered to generate an Energy Fund while the Ministry of Mines and Energy has the legislative mandate to promote energy efficiency and conservation through subsidiary legislation[3]

These provisions are in no doubt a very bold attempt to accommodate environmental considerations within the energy sector decisions and development actions. But even if Ghana's energy policy takes environmental considerations on board, the lack of environmental assessment of policies, plans and programmes at a strategic level can be notoriously problematic and ignore the causal link between the environment and energy issues. It is very likely to be indifferent to traditional and environmental policies in terms of prioritisation. Also, there will be inconsistency between energy policy and the national vision, which further raises questions about consistency and compatibility between energy policy goals themselves and the long-term sustainability of decisions, which flow from the policy at one level and between tiers of policy goals and between different policy sectors. Besides, the differentiation of functions between separate energy and environment sectors can easily cause the energy sector to sacrifice environmental qualities on the altar of energy security. Indeed while Ghana's long-term goal, also referred to as Ghana's Vision 2020, takes account of environmental considerations in socio-economic development, the current energy policy, drawing inspiration from the vision, omits the environment. The case of this thesis is that SEA promotes Sustainable Energy Policies, Plans and Programmes.

Secondly, the effectiveness of environmental assessment is predicated on a sound legal, institutional and policy framework influenced by underlying environmental philosophy. Environmental impacts of energy production and use are all pervading and require a comprehensive strategy to deal with impacts at all scales and levels. All

[3] A recent Energy Commission 1997, Act 541, establishes an Energy Fund to be used among other things for the promotion of energy efficiency, productive uses of electricity, natural gas and petroleum products, promotion of renewable resources including solar energy. The Act further authorised the Minister to make regulations in respect of conservation of electricity and natural gas (Sections 42 and 56).

types and tiers of SEA are therefore relevant to energy impacts. For example, land use planning affects energy consumption in the transport sector; decisions and actions in such sectors of an economy as housing equally affect energy consumption: similarly economic policies such as privatisation can impact on energy use. For SEA to deal with different types and scales of energy impacts, it is essential that laws provide for institutions to be well established and structured in scope and scale. While energy-sector institutions are not required by law to carry out SEA, institutions such as the Ghana National Development Planning Commission (NDPC) and the local authorities are mandated currently to carry out some form of SEA. Nevertheless, they seem to have been better shaped to deal with area-based SEA only if institutional capacity exists. The challenge then is for SEA to identify both the constraints and opportunities for institutional restructuring so as to deal not only with area-based SEAs but also with policy and sector SEAs at policies, plans and programmes levels.

Thirdly, the philosophical perceptions held by individuals and nations influence approaches to the environment as well as a direction of institutional reform. The more uniformly the embedding environmental concepts could be held throughout a society, the better are the chances for policies to succeed. While traditional environmentalism may favour an ecocentric view, the nation's constitution holds a technocentric position. But the extent to which these perceptions, philosophies and approaches to the environment are static, dynamic or malleable over time is itself dependent of the context, repeated exposure to external actors and eco-catastrophies. Pleune (1997:733), for instance, argues that perceptions are determined over time to a considerable extent by the dominant framing of the environmental problem in society and this framing context determines strategies adopted for managing the environment. To this view, Berger and Luckmann (1967:97) add the importance of constant repetition and exposure in influencing viewpoints. They argued that 'institutionalisation occurs whenever there is a reciprocal typification of habitualised actions by types of actors. What must be stressed are the reciprocity of institutionalised typifications and the typificality of not only the actors but also the actions in institutions'. Thus the internal conceptual context: embedding philosophy, framing context, intensity of exposure, serious environmental problems or eco-catastrophies, can play a dominant role in successful environmental policy. Indeed the stronger the framing context, the greater the chance to unify diverse philosophical

perspectives and the greater the likelihood for a common strategy (For fuller discussion see Parsons' (1995) discourse on Meso Analysis in public policy).

Fourthly, the early adoption of EIA in Ghana (1974) and the promotion of SEA by the Environmental Protection Agency (EPA) currently coupled with legislative provisions on energy efficiency and conservation may be suggestive of Ghana's concern for sustainability. However, the absence of strong links between policy on energy efficiency and conservation, for instance, questions Ghana's commitment to sustainability in practice. There is a dichotomy between words and deeds. Meyer and Rowan (1977) have suggested that dichotomy between words and deeds or institutional myth is widespread and characteristic of all organisations.

Fifthly, Ghana is pursuing market reforms aimed at having a competitive advantage over other countries in the sub-region, attracting Foreign Direct Investment and privatising some public sector industries. Already, there are reforms in the procurement and sale of oil and electricity. Moreover, there is a sub-regional level initiative towards a common programme for the exploitation of energy resources. But unilateral compliance with environmental directives could lower a country's competitive advantage over others that have no environmental compliance strategies. The questions that arise are whether Ghana will be willing to pay the price, whether SEA will give it an advantage over other countries for donor agencies and whether it will be in their relative advantages to pursue regional environmental policies. In the studies by Meyer and Rowan (1977), Bansal (1994 and 1997) and Bansal and Howard (1997), it is contended that there are strong incentives for compliance including gaining strategic advantage, avoiding strategic disadvantage, acting responsibly and gaining legitimacy.

Sixthly, good environmental assessment thrives when there is strong stakeholder participation. Clark (1994) outlines some benefits of participation in line with an SEA goal of integrating social, economic and environmental objectives of development actions.

> If handled properly, all the evidence suggests that public participation in planning, decision-making and Environmental Impact Assessment has a critical role to play in helping to integrate economic, social and environmental objectives. It is a safeguard against bad or politically motivated decisions, and a mechanism to increase public

awareness of the delicate balance between economic and environmental trade offs. If handled openly, it may ultimately increase public confidence in the decision making-process.

Unfortunately, general participation in decision-making is rather weak in Ghana. This may be as a result of weak democratic structures[4], poor information supply and weak education in environmental issues. Besides, past failures to identify stakeholders, lack of outreach to and dialogue with stakeholders, failure to assimilate public views and lack of feedback from the public may weaken public participation (Clark, 1994). It may well be that because of the quest for survival and the need to meet basic needs vibrant participation is overshadowed. Even where there is a scope for participation and cross-sectoral co-operation, the challenge for managing an organisation with limited time and budget constraints is a limiting factor. Cross-sectoral co-operation is much more challenging. To solicit broader stakeholder participation can be distressing and render joint action and implementation complex. The issue is how SEA can enhance participation. The more opportunities and constraints SEA practice identifies with respect to the culture of democracy, public participation and inter agency cooperation, the greater the ability of SEA to build on those constraints and opportunities to improve participation (Therivel *et al.*, 1996:700-71).

- 1.3 Purpose of the Research

The purpose of this research study is to test the hypothesis that Strategic Environmental Assessment is an effective tool for promoting sustainable development and to show that improvement in the existing system of assessment as well as in the institutional context are essential for achieving sustainable energy policies, plans and programmes. Generally, the study will explain the concepts of SEA and energy policy and sustainable energy policy in Ghana and their interrelationships. At this juncture, SEA of energy policies, plans and programmes as the independent concept, will be defined as the environmental assessment of strategic actions:-of policies, plans or programmes (PPP). Sustainable energy policies, plans and programmes as the dependent concept will be defined as prudent trading between traditional and environmental policies, plans and programmes that ties economic, social and environmental considerations together in a consistent, coherent

[4] O'Riordan and Sewell (1981:4) refers to this culture to include the (i) style of democracy, (ii) political accountability, (iii) interest group activism and influence and (iv) procedures for arbitration of disputes.

and compatible manner. Improvements in the existing system and institutions as the mediating variables are areas in which changes and influence must be exerted, and these mediating variables will be statistically controlled in the study. The testing of hypotheses to be derived from the logic of this research will address the roles of EIA and SEA in Ghana, the constraints and opportunities of the institutional context and the scope for transferability and application of techniques in different politico-cultural contexts.

1.4 Theoretical Perspectives

The above problem context raises some fundamental and complementary issues, namely, the rationale for incorporating environmental assessment in decision-making, the dialectics of the institutional question and the complexity of joint action in implementation. The theoretical perspective for the study of the role of SEA in sustainable energy policies has been formulated based on two dominant and overarching theories of *ecological rationality* (engulfing strategic environmental assessment and sustainable development) and *institutions* (covering the concepts of complexity of joint-action and implementation as evolution) discussed in detail in Chapter Two.

1.5 Adaptation of Theories and Variables to the Study

The central tenets of the theories of ecological rationality and institutions discussed in Chapter Two, as they apply to this research survey study, are based on six classes of concepts including (i) the interdependence of development action derived generally from the concept of ecology, (ii) indirect, multiplicative, interactive and synergistic nature of specific development actions, (iii) ecologically determined framework or parameters within which society may operate, (iv) improving micro-level actions regulated by macro-level constraints, (v) improving functional rationality of structures and (vi) substantive ecologically rational public policy. These concepts are then translated into a general formula for this thesis defined as: *By applying an appropriate tool that recognises and deals with the interdependence of development actions, addresses indirect, multiplicative, interactive and synergistic effects of development actions in specific sectors within an ecologically determined framework, ecologically rational public policy is achievable provided micro-level actions regulated by macro-level constraints and the functionality of structures are improved.*

In this context, the appropriate tool [that recognises and deals with the interdependence of development actions; and addresses indirect, multiplicative, interactive and synergistic effects of development actions] refers to Strategic Environmental Assessment (SEA). Recognising and dealing with the interdependence of development actions generally means applying SEA to all development actions. An operative ecologically determined framework refers to a framework for SEA. Substantive ecologically rational public policy is a sustainable public policy decision rule, which is process oriented and criteria led. This is sustainable energy policies, plans and programmes in this study. Improving micro-level actions regulated by macro-level constraints means improving the existing system for EIA and PPP. Improving functional rationality of structures implies improving the institutional context. With these specific variables a formula for SEA's role in sustainable energy policies, plans and programmes will be adapted to read thus: *By undertaking SEA in general and undertaking SEA specifically in the energy sector, supported by a framework for SEA, sustainable energy policies, plans and programmes can be achieved subject to improvements in the existing system and the institutional context.*

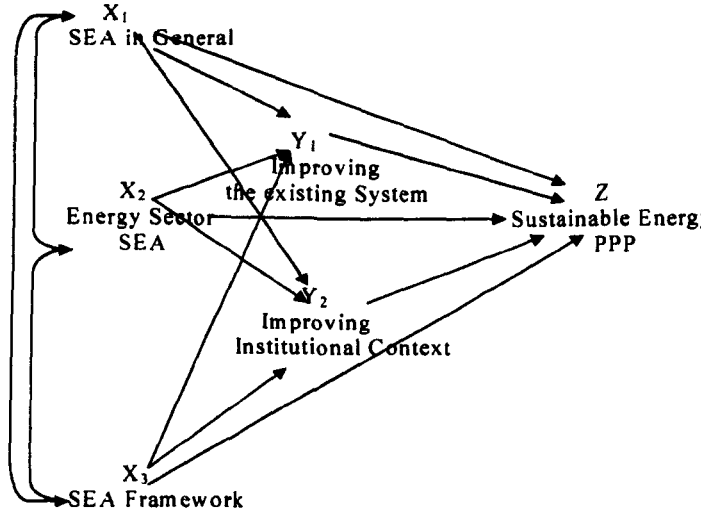

Figure 1.1: Logic of Research

1.6 Logic of Research/Hypotheses and Methodology

The above causal diagram in Figure1.1 and statements/hypotheses represent the underlying logic of this survey research study, which can be expressed mainly by the first hypothesis and followed by five supplementary hypotheses as follows. If (X_1)

SEA is generally undertaken, (X_2) SEA is applied to energy policies, plans and programmes and/or (X_3) there is an operative framework for SEA then (Z) the more sustainable energy policies, plans and programmes will be, provided (Y_1) the existing system of assessment is improved and (Y_2) the institutional context is improved. Thus the first hypothesis essentially means that the more SEA is generally undertaken and/or specifically undertaken in Energy Sector SEA supported by an SEA framework, the more sustainable will be energy policies, plans and programmes. There is also the possibility that either (X_1) SEA in Generally (X_2) SEA in energy sector or (X_3) an operative framework for SEA separately can improve sustainable energy policy.

The following supplementary hypotheses are constructed as follows: (Y_1) improved system and/or (Y_2) improved institutions hold the key for the implementation of (Z) sustainable energy policies, plans and programmes. The second hypothesis therefore states that the more the existing institutions are improved the better the framework for implementation. Third, it is hypothesised that the greater the framing context and philosophical/institutional convergence the better the opportunity for energy sector PPP to be more sustainable. Fourth, (Y_2) an improved institutional context contributes significantly to (Z) sustainable energy policies, plans and programmes. If the achievement of sustainability is as the result of the implementation of SEA, then the implementation of SEA is largely predicated on a top-down institutional model, partnerships and cooperation that are suited to SEA. Fifth, the research asserts that common needs, mutual benefits, resourcefulness and strategic advantages form the basis of sub-regional cooperation, participation and partnership. Sixth, the study hypothesises that whereas participation is essential for effective SEA, SEA in turn facilitates consultation between authorities and increases participation on environmental matters.

The quantitative methodology is adopted to test the above hypotheses. This methodology is extensively discussed in Chapters 7 and 8 preceding the main analyses (Chapters 8-10). The placement of the methodology chapter later in the study (Chapter 7) is to avoid detaching the main analyses (Chapters 8-10) from the methodology. Despite having a separate methodology chapter, each chapter briefly explains the approach it adopts. The earlier sections of the main analyses (Sections 8.4, 9.3 and 10.3) are essentially descriptive statistics. They seek to ascertain the

characteristics of SEA, policies, plans and programmes (PPPs) and their strengths and weaknesses. The latter sections (Sections 8.5, 9.4 and 10.5) of the analyses test the main hypotheses of the study. Although Chapters 11 and 12 are a synthesis of the study, some quantitative analysis (Chi Square) is employed in Chapter 11 to clarify the distribution of neutral scores between public and private sector respondents. Moreover, to clarify and provide a coherent structure for the analysis of the geographical context (Chapters 4-6), the study adopted some qualitative analyses, visual sketches and models. In Chapter 4, for instance, some descriptive qualitative data are tabulated against which some SEA cases in Ghana are analysed. Similarly in Chapter 5, the energy market in Ghana is discussed using a visual sketch (Figure 5.4). In Chapter 6, models of institutional framework (Freeman *et al.*, 1996 and Mitchell *et al.*, 1996) and barriers (Trudgill, 1990) are employed in analysing the Ghanaian energy and environmental institutions.

Throughout the study, literature is primarily used deductively consistent with quantitative paradigm to provide context, key constructs and variables for the research (Chapter 1-3). Detailed literature review is therefore found in the earlier chapters (Chapters 1-3). However, some literature is also used inductively (Chapters 8-10) to clarify data analyses at policy, plan and programme levels. Even so, it is founded on the earlier literature review (Chapter 1-3). And these literature, constructs and variables are cross-referenced appropriately. Throughout the literature review in Chapters 2 and 3 and the discussions of the geographical context in Chapters 4-6, some comparative analyses are undertaken. For example, Ghana is compared with West Africa in terms of environmentalism (Chapters 3 and 8), energy policy (Chapter 5), EIA and SEA (Chapter 4).

1.7 Scope and Limitation of study

The study covers policies, plans and programmes in relation to energy issues such as electricity, petroleum and renewable energy resources in selected sectors in Ghana. These sectors include the environmental sectors such as the Ministry of Environment Science and Technology, the Environmental Protection Agency, energy institutions, non-energy sectors such as housing, industry and transport as well as the private sector comprising the Energy Foundation, private planners and NGOs. In addition, two districts have been selected for the study. Quantitative variables such as CO_2 emissions, energy intensity and per capita energy consumption have not been

elicited, as they are very difficult to obtain. Variables used in this study are descriptive and derived from theory. They are essentially presented in likert format generally (Definitely Not – Definitely Yes type questions). It is possible that other researchers might use slightly different variables to measure the concept measured in this study but based on the context and available data, these less common variables have been adopted. Other limitations of the study are extensively discussed in Chapters 11 and 12. Briefly, however, the low response rate, large neutral responses at policy level and the non-experimental nature of the research constitute some limitations.

1.8 Significance and Organisation of study

The study is very significant not only in terms of it being an empirical study in SEA, but also because it is in the area of energy studies. It is also significant because it is the first study to apply the theory of ecological rationality to SEA. It also discusses the third world context and adds to the global understanding of SEA from the third world perspective. It also adds to the third world research in the area of the environment, environmentalism, energy and SEA studies. It also brings SEA to the focus of other sectors of the economy and fills both an academic and professional void not only in Africa but also in the entire world.

This study is divided into four parts covering theoretical, geographical and analytical as well as evaluation frameworks. The first part comprising Chapters 1-3 deals with the research context and literature review. Specifically, the first chapter introduces the problem, theoretical perspectives, purpose and hypotheses of the study. It then discusses the scope and limitations of the study as well as the significance and the organisation of the study. The second and third chapters review the relevant literature about ecological rationality, institutions, environmentalism, sustainable development, energy policies, plans and programmes as well as and Strategic Environmental Assessment. The second part covers Chapters 4-6. Chapter 4 discusses the evolution of SEA in Ghana within the context of West Africa. The evolving energy policies, plans and programmes in Ghana and their relation to West Africa are the focus of Chapter 5. In Chapter 6, the Ghanaian institutional context is analysed. Part Three consists of Chapters 7-10. It focuses on methodology and the analyses of data at the policy, plan and programme levels. In the fourth part, comprising Chapters 11-12, the study discusses the findings, concluding remarks and recommendations. The Appendices are found at the end of the work.

Chapter

2

Ecological Rationality and Sustainable Development

Chapter Outline

Introduction

Theoretical Perspectives

Environmentalism: Roots of Sustainable Debate

Environmentalism in Ghana

Sustainable Development

Sustainable Development Defined

Sustainable Development from Economic Perspectives

Sustainable Development from Environmental Perspectives

Sustainable Development from Social Perspectives

Sustainable Development from Ethical Perspectives

Application of theory to SEA

Conclusion

2 Chapter Two: Ecological Rationality and Sustainable Development

2.1 Introduction

In Chapter One, the paper argues, *inter alia*, that protecting and managing the environment requires rational ecological decision-making. choices and the use of rational or extra-rational methods and techniques. It also involves interacting with many parties, individuals, groups of people, nation states, business concerns, national and transnational corporations together with their complex internal administrative or organisation machineries. In order therefore to promote consensus among these stakeholders, not only is it important that rational philosophical concepts and values inform policy-making but also to understand the implications of institutions in decision-making. Thus the theories of ecological rationality and institutions have been broadly drawn upon to frame the research problem. There is the need to explore not only the theory of ecological rationality in detail, its relationship to Strategic Environmental Assessment and the theory of institutions but also to examine the often debated and discussed rational philosophical concepts and values of environmentalism and sustainable development. Consequently this chapter begins by examining the theories of ecological rationality and institutions as well as their limitations. It then reviews the general concept of sustainable development, its philosophical roots and its Ghanaian ramifications and application to energy policies, plans and programmes as well as Strategic Environmental Assessment.

2.2 Theoretical Perspectives

To formulate a theoretical perspective for the study of the role of SEA in sustainable energy policies, plans and programmes, two dominant and overarching theories framed the research study and provide useful prototypes: *the theory of ecological rationality* and *the theory of institutions*. Building on the works of Weber (1930), Durkheim (1933), Deising (1962), Mannheim (1940), Simon (1957 and 1979) and Giddens (1971), Bartlett (1986) and Dryzek (1998) developed the theory of ecological rationality and argued that the theory was the basis for the National Environmental Protection Act of 1969 (NEPA) which gave birth to environmental assessment world wide. In this regard, the concept of strategic environmental assessment and sustainable development and the embedding philosophical

perspectives can also be discussed under this dominant framework. Meyer and Rowan (1977), Streeck (1992) and Morton (1998) on their part developed the theory of institutions drawing on the ideas of Weber (1930), Durkheim (1933) and Berger and Luckmann (1966). The works of Pressman and Wildavsky (1969, 1971, 1979 and 1987), Sabatier (1978, 1986, 1987 and 1993), Hill (1969 and 1993), Ham and Hill (1984 and 1993) and Trudgill (1990) can be seen as the extension of institutional theory to cover the concepts of complexity of joint-action and implementation as evolution.

2.2.1 Ecological Rationality

Ecological rationality takes its root from the concepts of rationality and ecology. Rationality is multi-framed and includes technical rationality (instrumental to the preference of policy makers), economic rationality (net utility maximization), and political rationality (consensus among the relevant political actors). It also involves legal rationality (the structure of legal rights), social rationality (social harmony) and ecological rationality (consideration of environmental implications in decision-making) (Deising, 1962; Barlett, 1986; Dryzek, 1995). The primary fact or presumption of ecology, on the other hand, is the interdependence, interaction and the link between the living and the nonliving in a web of interrelationships. Ecological relationships produce causal effects that are indirect, multiplicative and synergistic. Thus ecological rationality, derived from ecology (but not limited to ecology), can be thought of as a rationality of living systems, an order of relationships among living things and their environments. It is a way of thinking about actions, organisations, and ultimate values and ends. Ecological rationality is also the use of interdisciplinary science to deal with environmental issues (Bartlett, 1986). Under certain circumstances, economic rationality, like social, legal and political rationality can be in conflict with ecological rationality by ignoring environmental implications of actions. Bartlett (1986) argues that ecological rationality should not and could not fully supplant economic rationality; any more than ecological rationality should or could replace social, legal or political rationality. Nevertheless, ecological rationality should have a priority over other forms of reason, which over the long run must be subordinate to it.

Deising (1962) and Simon (1957) further explored the distinguishing characteristics

of rationality that applies to ecological rationality as substantial/substantive rationality and functional/procedural rationality. According to Simon, substantive ecological rationality may be an attribute of behaviour or actions, denoting the extent to which such actions are ecologically appropriate within the limits imposed by given conditions and constraints.[1] Functional ecological rationality is the ability to use an appropriate adaptive behaviour in the light of human cognitive powers and limitations; of processes and procedures to make ecologically important choices (procedural rationality).[2] Thus ecological rationality suggests the imposition of constraints. Constraints are a set of ecologically determined parameters within which society may operate as normal.[3] This is to acknowledge our limits, and acknowledge that nature normally does know best (Dryzek, 1882: 5-10).

Managers of the environment must therefore be willing to err on the side of caution in decision-making based on probability judgements, carrying capacity considerations and the precautionary principle. This is why SEA is important as a constraint on project level development actions. Ecological rationality also recognises the use of cognitive powers to set goals and to establish criteria and procedures to deal with environmental problems from their conception to implementation. In this connection, the primary task of policy-making is to adopt plausible methods of analysis based on the criteria of coherence, congruence, cogency, consistency, comprehensiveness and parsimony. Such methods must also be based on framework, information acquisition and the use of techniques (Dunleavy, 1991; Paris and Reynolds, 1983; Greenaway *et al.*, 1992; Parsons, 1995). As discussed in Section 2.2.4 below, SEA methodology meets these criteria.

2.2.2 Theory of Institutions

On the theory of institutions, Morton (1999:11) explains that it is a basic assumption of institutional theory that operative norms in social life are anchored to, and form part of, particular forms of life, and that we cannot properly understand the norms in isolation from those forms. To understand a norm, we must first understand not only

[1] Here, choices are sometimes made intuitively without a though process. This is also akin to making choices in economic terms; because of constraints of limited resources, a choice for object A means foregoing object B.
[2] Here, choices involve a thought process, calculations and the use of procedures.
[3] In economics for example, macro-economic policy instruments are designed to constrain micro-economic forces of the market.

the forms of life in which the phenomenon is created but also of all the forms of life, which constitute the necessary institutional context in which, the phenomenon operates.[4] Quaid (1988) claims that while Burger and Luckmann (1984) pioneered the sociological foundations for institutions, it is Meyer and Rowan (1977) who provided the most influential application of social constructionist analysis to the study of organisations and developed this into what is now known as institutional theory (See also Meyer, Boli and Thomas, 1987; Scott, 1993 and Meyer and Scott, 1983). The application of institutional theory to implementation is explored by Ham and Hill (1993). Any discussion of inter-organisational relationships will cover sociological, political and economic institutionalisms. According to Ham and Hill (1993:126-127), there is a considerable interest in inter-organisational bargaining and negotiation; but as discourses are analysed, it is inevitable that discourses shift back to the macro-level in which those relationships take place in a wider social structure (political institutionalism), and of course, within the narrower structure (sociological institutionalism). Beyond sociology and politics, it is markets that determine inter-organisational relationships (economic institutionalism). In addition to *inter-organisational relationships*, human psychology determines *intra-organisational relationships* within organisations. Intra-organisational relationships is concerned with the conflict between basic human needs and the requirements of work tasks in formal organisations.[5] If organisations are concerned about their internal images and even about their raison d' être, dealing in a wider environmental community requiring interdisciplinary work, co-ordination and integration is notoriously complex. This difficulty is developed into a theory.

2.2.3 Joint Action and Implementation

Pressman and Wildavsky (1973) and Majone and Widavsky (1984) propounded the concepts of complexity of joint action and implementation as evolution. The complexity of joint action model refers to the number of actors, principals and participants whose agreement - either explicitly or implicitly - must be secured

[4] Thus the interaction of society with the media, politicians, elites, professionals, experts, think tanks, pressure groups, lobby groups, power of marketing, associations, academicians, parties, NGOs and globalisation creates a context for setting environmental agenda, raising alarm, defining environmental problems, unifying ideas and compelling action in a desired direction. Thus the stronger the framing context is, the greater the chance to unify diverse philosophical perspectives. The more unified philosophical perspectives are, the greater is the likelihood for a common strategy.

[5] Basic psychological needs, self-actualisation and the orientation towards leadership (Maslow, 1954).

before a policy can be successfully implemented. The concept of implementation as an evolution, on the other hand, characterises implementation as a learning process, exploratory and hypothesis testing, during which an organisation can utilise implementation failure as a route to implementation success. The complexity of joint action model helps to identify the actors and participants in the implementation process, their intent, manoeuvrings, resources at their disposal, and the conflicts generated (Ayee, 1994).

The theory of implementation has undergone considerable review surrounding the merits and demerits of top-down and bottom-up approaches to implementation. Synthesising the critiques about the implementation theory from Sabatier and Mazmania (1979, 1980), Lane (1987), Browne and Wildavsky (1984), Winter (1990) and Ham and Hill (1993) to Kettunen (1994), Hill (1998:382) sees implementation also as learning, coalition and as a responsibility and trust. For extensive discussions on implementation problems specific to the environment, see Stephen Trudgil (1990). There are barriers inherent in both top-down[6] and bottom-up[7] approaches to implementation. Besides, implementation tends to be dependent on others either more powerful or as equals. Because of these barriers, implementation is further conceptualised as a game, evolutionary process, management issue, responding to policy type and inter-organisational context (Aldrish, 1972, 1976; Kochan, 1975; Yutchman and Seashore, 1967; Bish, 1978, Tuite, 1972 and White, 1974 cited in Parsons, 1995:483-484). While some suggested a fusion (hybrid) and synthesis of the top-down and bottom-up models of implementation, others ruled out a synthesis

[6] A top-down approach to implementation is a process of interaction between the setting of goals and actions geared to achieving them. It is based on the potential for hierarchy to confine and constrain implementers to achieve those legal objectives defined in the policy. The key principles are built around effective control, constraint, compliance, tiers and hierarchy. Barriers include lack of neat stages of implementation; discretion of street level bureaucrats, dissipation of energy through conflicts, bargaining, negotiation and compromises; lack of resources; competition of new structure with old ones over limited resources; symbolic nature of some policies and laws and disregard for underlying forces such as economic ones (Parsons, 1995; Ham and Hill, 1993).

[7] A bottom-up approach to implementation on the other hand is predicated upon the significance of relationship between actors involved in a policy or problem area and the limitations of formal hierarchy in such conditions. It focuses on a process of policy making and possibly empowerment of those seen as targets of decisions. The principles are built around interactions, conflicts, power, empowerment, spheres, networks and markets. Limitations of bottom-up approaches[7] (and equally applicable to top-down approaches) include the fact that implementation is often constrained by inter-organisational and intra-organisational environments. The two approaches fail to account for networks, systems, cycles and constant appraisal that implementation entails; the incidence of policy types are not considered. The model also ignores the issues of power and dependence, interests, motivations and behaviour.

between the two approaches, arguing that they are based on incommensurate paradigms. It is therefore necessary to adopt a multiple framework not based on synthesis but on the basis of the sensitivity, value, reality and action judgements of the framework of theories, policy elites and street level bureaucrats. In this regard, while Elmore (1978) suggested that implementation should be categorised around the models of system management, bureaucratic processes, organisational development, conflict and bargaining, Morgan (1993) argued that in the light of postmodernist debates, implementation should be built around metaphors of machine,[8] organism,[9] brain,[10] dominance,[11] culture,[12] psychic,[13] autopoietic[14] and power.[15]

2.2.4 Application of Theories

These theories have had a wide application within the research community. Bartlett (1986:239) argued that both substantive and procedural ecological rationality are crucial in understanding the rationale of and evaluating the success and failure of National Environmental Policy Act, 1969 (NEPA); and changing the way bureaucrats think (Dryzek and Scholasberg; 1998). On the basis of plausibility discussed by Parsons (1995) above, ecological rationality can apply to Strategic Environmental Assessment (SEA) in the sense that SEA emphasises compatibility, coherence, consistency and prioritisation. Furthermore, on account of framework involving key stages of formalisation,[16] search,[17] forecasting,[18] modelling[19] and evaluation[20] discussed in Parsons (1995), ecological rationality applies to SEA in terms of following logical steps and its cyclical approach to assessment. On the point of information, Strategic Environmental Assessment depends on baseline information as well as others sources of information in its analysis and methodology. Some techniques that fit rational policy analysis, according to Parsons (1995: 399)

[8] This is an explanation in terms of chain of commands or with structures and roles.
[9] This is an explanation in terms of human relations or the environment.
[10] This is an explanation in terms of information flow or learning.
[11] This is an explanation in terms of labour/management conflict.
[12] This is an explanation in terms of the culture of the organisation.
[13] This is an explanation in terms of subconscious forces such as groupthink or ego defences.
[14] This is an explanation in terms of self-referencing system.
[15] This is an explanation in terms of power in and around the implementation process.
[16] Formalisation involves clarifying and constraining the problem and determining the objectives
[17] Search is identifying, designing, and screening the alternatives.
[18] Forecasting is predicting the future environment or operational context.
[19] Modelling is building and using models to determine the impacts.
[20] Evaluation is comparing and ranking the alternatives.

and Carley (1980), are impact assessment, cost-benefit analysis, economic forecasting, finance planning, operational research, systems analysis and social indicators. It is not only Strategic Environmental Assessment that shares in these qualities, energy policy also shares in the same characteristics (Maya and Jørgan, 1998; Bose and Shukla, 1999; Shresha *et al.* 1998; Morthorst, 1994). For example, analytical techniques for improving efficiency and value for money, used in the rationalization literature, have the same goals as energy efficiency hence the relationship between Strategic Environmental Assessment, energy policy and ecological rationality.

Giner and Tabara (1998) explored the application of ecological rationality to worship. It has also been applied to institutional arrangements; chemical industry restructuring; traditional ecological knowledge; nuclear reactors; management of public and rural patrimonies; global environmental policy; Marxist analysis of contemporary capitalism; environmental issues and the value of village life (Bluhdorn, 1998; Mol, 1995; Mendoza, 1994; Lucas,1994; Balboa,1992; Marmora,1990; Murphy,1993; Ljuboja, 1988 and Boucher, 1991). Tausig and Subedi (1997:441-447), Kihlstrom (1988:35-55), Ruef, Mendel and Scott (1997), and Montgomery and Oliver (1996:649-671) applied the theory of institutions to the health sector studies. Others adopted the concept in the analysis of prison, educational, banking, philanthropic and religious organisations (Nelson, 1993; Greve, 1998; Anheier, 1995; McCorkle, 1996; Pallas, 1996). Other literature related the theory to Sociology, Politics, Business (Abizadeth, 2001; Piga, 2000; Amenta and Halfmann, 2000; Miller and Chen, 1996; Scott 1995; Scott and Christenten, 1995; Martin and Powell, 1994). Some anchored it to worldviews (Kirby and Kirby, 1996; Hinings, Thibault, Slack and Kikulis, 1996). Still others applied the theory to developed, developing and transitional economies in the interpretation of organisation structure (Taylor, 1989; Nee and Brown, 1992; Kelly, 2001; Hope, 2000). It is also employed in the explanation of organisations, their employment relations, impact of external markets and their welfare policies (Bridges and Villemez, 1986; Arndt and Bigelow 1992; Barley and Tolbert, 1997).

The problems of joint action and implementation have been extensively commented on by Hargrove (1975), Bardach (1977), Douglas (1987), Derthick (1979 and 1990),

Elmore (1979 and 1985) with a focus on the US. Ayee's (1994) work focused on public policy in Ghana. More recently, the theory has been applied to water resource management; human cognitive architecture; the structure of the environment; the structure of heuristics and the match between them and post literate cultures (Dion, 1998; Plumwood, 1998; Bullock and Todd, 1999; Cleaver, 2000: Feddick, Cosmides and Tooby, 2000; Sundalic, 2000; Todd, 2000; Todd, Fiddick and Krauss, 2000; Hertwig and Hoffrage, 2001; Martignon, 2001 and Gigerenzer, 2001).

2.2.5 An Integrated View

Putting the views together, ***first,*** the theorists stress the need to err on the side of caution and the need to use ecologically determined parameters, criteria or rationales to guide decision-making within the public sector or institution. They also tie social/economic, legal/ political and environment issues together. Furthermore, the need to design macro-economic policy instruments, to constrain micro-economic forces of the market, has been buttressed (Streeck, 1992:29-30). The importance of the precautionary principle, carrying capacity, sustainable development, sustainable public policy and the logic of Strategic Environmental Assessment have been underscored. ***Second,*** the importance of context in evaluating institutions and SEA, and interpreting philosophical perceptions was stressed (See also Marsden, 1998; Pleune, 1994). Morton's application of the theory of institutions to law also confirms the viewpoint. Morton (1998:1) argues that understanding law requires taking seriously the institutions, which it inhabits. He also explains that the institutional issue cannot be considered without substantive and procedural aspects of reasoning; and that procedures and structures by themselves do not matter much if they are not effective and if there are no ecologically determined parameters within which society may operate. ***Third,*** by identifying indirect, multiplicative, and synergistic impacts of decisions on the biosphere, the theorists account for the limitations and weaknesses of environmental management tools such as environmental economics (which depends to a large extent on economic rationality) and environmental impact assessment.

2.2.6 Limitations of Theories

The theories, however, have some deficiencies. *First,* they do not address and explain the concepts of sustainable development, strategic environmental assessment

and specific public policy such as energy policy in any detail. ***Second***, they do not establish whether, without SEA, environmental policy such as energy policy can deliver sustainability. The theories fail to explain whether a centralised rather than decentralised institutional framework is more appropriate to deal with SEA within the energy sector. ***Third***, the extent to which the context in Ghana plays a vital role in actors' choices with respect to energy issues has not been discussed. It is not also explained whether influencing and changing national institutional context can deliver sustainability. ***Fourth***, whether properly created awareness about SEA's usefulness and the building of the relevant institutional capacity within all sectors of the economy are sufficient to infuse ecological rationality necessary for sustainable development is not certain. ***Fifth***, the theories fail to adequately explain the extent to which a nation's quest to gain strategic advantage, avoid strategic disadvantage, act responsibly and gain legitimacy over other nations is likely to account for environmental compliance irrespective of the external context. And ***sixth***, it is not quite certain whether meeting basic and felt needs would improve chances of people's willingness to participate in SEA.

Empirical studies on SEA in Ghana (much less those on energy policy) are scanty. There are however some studies such as Wereko-Brobby (1993), Ofosu-Ahenkorah *et al.* (1995), Lobo *et al.* (1995), Government of Ghana (1997), Cole (1994), Turkson (1990), Turkson and Amadu (1999) and Golnaraghi and Kaul (1997) based on energy policy. Others such as Adesida *et al.* (1994), Park and Labys (1994), Davidson (1993), Adegbulugbe and Oladosu (1994), Halnæs (1996), Abdalla (1994), Jones (1991), Hall (1991), Armstrong (1996), Kemp (1992) and Girod and Percebois (1997) focused on Ghana's economic reforms and corresponding global impacts of energy use such as carbon dioxide emissions but do not link the studies to environmental assessment. IIED (1992), Dorm-Adzobu (1996), Allotey (1994), Allotey and Amoyaw-Osei (1996), Baryeh *et al.* (1996), Appiah-Opoku and Mulamoottil (1997), Appiah-Opoku (2001) and Ayee (1994) have discussed environmental management, environmental assessment and the institutional question.

These studies however do not tackle the causal link between energy policy and environmental assessment as they apply to a developing nation such as Ghana. There is therefore the need to address this gap among academics, energy and environmental

professionals, policy makers, NGOs and CBOs to guide policies, plans and programmes, not only in Ghana but also in the wider academic community. Ecological thinking and institutions evolve into new thoughts that guide the environment and development. These new thoughts are the roots of sustainable development that the next sections will address.

2.3 Environmentalism: Roots of Sustainable Debate

The challenges that human progress and development face and the limits of resources to meet the needs of current and future generations of mankind and other life forms lie at the heart of the sustainable development debate. This debate concerns safeguarding man's survival, health and well being within the context of man-nature relationships. While the modern debate about sustainable development gathered serious global momentum after the publication of the Brundtland Commission Report in 1983, environmentalism, limits to resources and their impact on the environment dates back to antiquity[21] (Mebratu, 1998) and draws inspiration from writings[22] on the environment, disasters and crises[23] among others. The roots of the sustainability debate are drawn from diverse organising concepts and sources. The conventional values about nature according to Pepper (1996) are that humans are separate from nature; nature can and should be exploited and dominated for human benefit; and that the laws of nature should be used to exploit and use nature. Green values, on the other hand, posit that humans are part of nature and must respect and protect it for itself regardless of its values to man; man should live in harmony with it; and that laws of nature should be obeyed. Thus the current debate centres around the following: (i) the concepts of ecocentrism (including homocentric) and

[21] According to Glacken (1967) in his *Traces on the Rhodian Shore* the ideas of a designed earth, environmental influence and man as a geographical agent were derived from mythology, theology, philosophy, pharmaceutical, medicine, weather observation and activities and skills of daily life. Mebratu (1998) traces ecological parallels from hunter-gatherers to industrialized society, the collapse of the ancient Babylonian Empire, religious beliefs and traditions, economics and theory of limits, political economy and the scale of organisation with particular reference to Schumacher's *Small is Beautiful*.

[22] Some significant syntheses and writings of Marsh (1894), Hardin's (1968) *Tragedy of the Commons* and indeed Carson's (1962) *Silent Spring* drew an early attention to man's negative impacts on nature with particular reference to agrochemicals. The subsequent Club of Rome's publication *Limits of Growth* in 1972 was quite significant in bringing awareness.

[23] The Dustbowl of the 1950s in the USA, the smog of the 1930s in Britain, disasters such as Torry Canyon of 1967, the Chernobyl disaster of the 1986 and the Oil crises of the 1970 (and now 2000) have brought oil, the environment and sustainable development to the forefront of the global debate. Moreover, the worsening global warming, loss of biodiversity and ozone depletion, coupled with third world poverty, civil wars, deforestation and refugee problems have galvanised pressure and support not only from environmental NGOs and other pressure movements, but also from governments and diverse sources the world over.

technocentrism, (ii) problem and no problems discourses, (iii) institutional, ideological and academic environmentalism, (iv) re-definition of environmentalism in terms of anthropocentrism and sustaincentrism and (v) lessons from some disciplinary perspectives such as sociology and anthropology.

2.3.1 Ecocentrism (including Homocentrism) and Technocentrism,

Two major strands of worldview that underlie sustainable development debate are the concepts of technocentrism and ecocentrism. Pepper (1996:336) defines technocentrism as

> a mode of thought, which recognises environmental problems but believes either unrestrainedly that society will always solve them through technology and achieve unlimited material growth ('cornucopian') or, more cautiously, that by careful economic and technical management the problem can be negotiated (the 'accommodators'). In either case considerable faith is placed in the ability and usefulness of classical science and technology and conventional economic reasoning. There is little desire for genuine public participation in decision-making, in favour of leaving decisions to politicians advised by technical elites ('experts'). It has a belief in retention of the status quo in the existing structures of political power, but demands that there is more responsiveness, accountability and transparency in political, regulatory, planning and education institutions and has optimistic worldview.

Since the industrial revolution in the nineteenth century, the western (including UK) environmental thinking, economic policies and political organisations broadly conform to technocentric philosophy. Today, other developing countries, such as Ghana, which are following western paths of development and democracy, are more or less becoming more technocentric in outlook.

Ecocentrism[24] on, the other hand, draws inspiration from romantic concepts of nature, transcendentalism, deep ecology, preservation movements, animism, fantasy and simplicity, eastern religions and philosophies, new ageism and indigenous

[24] Dryzek notes that the concept is home with a wide variety of ideologies, parties, movements, groups and thinkers. These include Green parties and their factions, animal liberationists, bio-regionalists, eco-feminists, deep ecologists, social ecologists, eco-Marxists, eco-socialists, eco-anarchists, eco-communalists, ecological Christians, Buddhists, Taoists, and pagans, environmental justice advocates, green economists, critical theorists, and postmodernists.

reverence for the earth and nature, Malthusianism and Darwinism (O'Riordan, 1989; Goodin, 1992; Pepper, 1993; Beckerman, 1994). From the point of view of the level of industrialization, Milton and Naess use the terms eco-sphere people and biosphere people to distinguish between ecocentrism and technocentrism. In defining ecocentrism, Pepper (1996:329) notes that it is

> a mode of thought which regards humans as subject to ecological and ecosystems laws. Essentially, it is not human-centred (anthropocentric) but centred on the natural systems, of which humans are reckoned to be just another component. There is a strong sense of respect for nature in its own right (bioethics) as well as for pragmatic reasons. Ecocentrics lack faith in the modern large-scale technology and society, and the technical, bureaucratic, economic and political élites.

Pepper claims that a radical approach to the environment characteristic of ecocentric ethic may be anthropocentric[25] based on Dobson's (1996) view that any concept of sustainable development must be fundamentally anthropocentric or egocentric[26] in the sense that a development action that follows a sustainable path may espouse a homocentric ethic.[27] It is in the sense of indigenous reverence for the earth and nature that ecocentrism is thought to be more at home with the third world than with the West. In the Western society like the UK, the organising principles of Green Parties may have some elements sympathetic to ecocentric thinking. For institutional, ideological and academic versions of; and a discursive approach[28] to environmentalism, see Dryzek (1997:8-9), Merchant (1992), McManus (1996), Dobson (1996) and Mebratu (1998). From materialistic and sociotropic[29] perspectives, see Pirages (1994:197) and McAllister (1994).

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[25] Obligation to nature leading to human welfare (material and aesthetic) is viewed as anthropocentric rather than ecocentric.

[26] This term is equated with goals and methods of development as modernisation in capitalism.

[27] A homocentric ethic sets the fulfilment of human needs as a priority but gives full consideration to non-human nature in the process (Merchant, 1992). Both social ecology and eco-socialism would be included under the umbrella of homocentric environmentalism (Pepper, 1993).

[28] A discourse is a shared way of apprehending the world. Embedding in language, it enables those who subscribe to it to interpret bits of information and put them together into coherent stories and accounts. A discourse rests on the contention that language matters; that the way we construct, interpret, discuss, and analyse environmental problems has all kinds of consequences. Apart from a discourse approach, other analysts look at institutional solutions to environmental problems; some look at policies pursued by governments; other analysts look at political philosophies that apply to environmental problems while others consider case studies that apply to an environmental problem

[29] Societal interest as against individual interest.

2.3.2 Environmentalism Redefined

Buchdal and Raper (1999) use the term *nonanthropocentric subjectivism* as the ethical philosophy that can deliver sustainability as opposed to orthodox anthropocentrism (technocentrism) and radical nonanthropocentrism (ecocentrism). The nature of nonanthropocentric subjectivism is ecocentric, inherentist, anthropogenic prescriptivist, subjectivist and hierarchical. The doctrine assumes ecocentrism because nonhuman entities including inanimate objects can be included in the things to be sustained; inherentism rather than instrumentalism or intrisicalism because while value in nonhuman nature is dependent on human consciousness, some forms of value do not derive from traditional human values; anthropogenic prescriptive because the source of ethical valuing experience is unique to humans who engage in such behaviour through convention. It is subjectivism and hierarchical since most people will presumably wish to rank the ethical status of themselves above other living species and inanimate objects.

Gladwin and Kennelly (1997) on their part coined the term *sustaincentrism* a normative construct of a distinct paradigm based on a nurturing of the earth and its process in contradistinction to technocentrism and ecocentrism. The sustaincentric paradigm represents an emergent synthesis and an attempt at higher and deeper integration. It draws inspiration from claims of the universalism of life, stewardship admonitions to the major religions the field of ecological economics, traditions of conservationism and scientific theories based on nature's dynamic complexity and inherent self-governing properties. For a comprehensive debate of sustaincentrism, see Gladwin and Kennelly (1997).

2.3.3 Lessons from Anthropology and Sociology.

Milton (1997) argues from anthropological perspectives that knowledge of the environment, in the non-developed world, is cultural and generated by ways in which that society 'engages the environment with the physical world and with each other.' In parts of the non-industrial world, the environment is seen as giving, reciprocating, protective and reliable; in other parts, it is dangerous and unpredictable. In the developed world people's understanding of the world varies according to how they organise their social relationships. A distinct sociological development is the swing

from modernism to post-modernism[30] or the supplementing of existing structural and action approaches to environmental action with epistemological relativism.[31] Rather than hooking to Dominant Social Policy (DSP), it calls for the adoption of a New Environmental Paradigm (NEP) that views science and technology with scepticism.[32] Such NEP should also be built on the principles of duty, justice and respect for community of human and non-human life (Milbrath, 1994; Roome, 1997:42-43; Rawls, 1971; Naess, 1993).

2.4 Environmentalism in Ghana

Environmentalism in Ghana focuses mainly on the Ghanaian concept of man and nature and the effects of colonialism and globalisation on the environment. Environmental concerns also seek a redefinition of environmental issues using a post-colonialist critique. This section therefore first addresses the concept of man and nature as it is conceived in Ghana; it secondly considers the colonialism debate and thirdly addresses the debate from a globalisation standpoint. In the fourth section, the post-colonialist critique is reviewed and followed fifthly by the positive aspects of Ghanaian environmentalism before sustainable debates are discussed.

2.4.1 Man and Nature

In Ghana property is conceived of as belonging to the dead, the living and those who are yet unborn (Asante, 1967). But Adesida (1994:884) exhorts that a change from ancestral worship to the worship of future generations is more important in Africa today. Although man's act of worship and turning to God are primarily pragmatic and utilitarian, respect for the spiritual and mythical enables man to have reverence for nature. Indeed some animals, reptiles, amphibians and birds as well some trees may

[30] Citing Beck (1992) refers to post-modernism as reflexive modernisation

[31] This is a form of post-modernism is which suggests that there are as many truths as individual people and that no single truth has any claim to be better than any other. Constructivists can enrich the debate with their critical analyses of claims to truth without automatically supporting the claims of any particular environmental lobby to be in possession of the alternative but truly real 'truth'. The constructivist does not assert that all truth have equal status; Instead he or she asks which claims attract the most significant support and why (Grint, 1998:95)

[32] Because of the limitations of science, environmental discourses are therefore becoming an interaction between diverse ideas and cultural perspectives. One cannot give a blanket label to any particular society as being largely ecocentric or overtly technocentric by virtue of its level of development. As discussed later in this chapter, Africa as a developing nation embraces both ecocentrism and technocentrism in varying degrees.

be considered sacred, messengers of the dead, source of wisdom and a manifestation of God and therefore are treated with reverence. But man seeks to control the universe through magic and rituals. Mtibi (1970:44) sums up the position and nature this way.

> We may say therefore that African people consider man to be at the centre of the universe. Being in that position, he tries to use the universe or derive some use of it in physical, mystical and supernatural ways. He sees the universe in terms of himself, and endeavours to live in harmony with it. Even where there is no biological life in an object, African people attribute (mystical) life to it in order to establish a more direct relationship with the world around them. In this way the visible and the invisible parts of the universe are at man's disposal. Man is not the master of the universe; he is only the centre, the friend, the beneficiary and the user. For that reason he has to live in harmony with the universe, obeying the laws of natural, moral and mystical order. If these are unduly disturbed, it is man who suffers most

From the discussions of the African concept of nature above, it is noted that Ghanaians, like any sub-Saharan African country, attribute (mystical) life even to objects with no biological life, establish direct relationship with the world around them, and seek to live in harmony with nature. They also see man as the centre of the universe and nature; he is also an active creative agent rather than a passive creature; moreover, the universe and the whole world exists for him; he looks at nature including plants, animals and other natural resources from their utilitarian standpoints; furthermore, man is viewed as having control over nature through the rituals, action and word.

The Ghanaian concept of value extends to potential values in nature. According to Dzobo (1996), the potential value in nature is explained by a Ghanaian proverb: 'The shrew mouse (which stinks) says: They say I am no good, but I become good when the juju-man is preparing his medicine... the humanistic value orientation derives its origin from man's devotion to the ultimate or the infinite in the finite.' By espousing an extended view of value, Dzobo has underscored other concepts of value, which environmental economists insist other economists must take account of (Pearce, 1993). Furthermore, by implying that market value is altogether alien to the traditional Ghanaian cultural thinking, he underlines the concept of ecocentrism or of 'units of significance.'- a concept of capital that Dobson (1996) discusses (See

section 2.4.2 below).

Another attitude of man to nature derives from his perceived possession of creative power. Dzobo (1996: 131) argues that life in Ghana is perceived as oriented toward creativity.

> The individual therefore is to grow in the development of a creative personality and to develop the capacity to maintain creative relationships. He is to see his individual life and that of his society as fields that are sown with life's experiences and which should yield fruit. The conception that creativity is the essence of true human personality implies that man is not just a being who thinks but also a being who acts to change his world. This implies that man is free and self-determining and has a say in shaping his history and destiny [as well as] the world and society, and because of his dual nature, he also can release forces, which will destroy society and the world. Thus two forces [of shaping and destruction] are basic to his nature.

Given the spiritual meaning traditional Ghanaians attribute to nature and their desire to live in harmony with it; and having regard to their value orientation, which includes potential values, elements of ecocentrism are displayed. From the premise of man's dual creative potential [of shaping and destruction], the utilitarian concept of nature, and the veneration of man over other life-forms, such as plants and animals, the traditional Ghanaian is also capable of using the environment and its resources wisely as well as destructively. By believing in self-determination and in their ability to shape or change society and the world, the traditional Ghanaian is also likely to develop along the paths of technocentrism, given the chance and the resources. In the current environmental debates, Ghana sees itself hanging in a balance between traditional (ecocentric) values and western (technocentric) values. Thus within the traditional Ghanaian philosophy can be seen conflicting concepts of ecocentrism and technocentrism co-existing and co-evolving. The question that arises is which of the two views now predominates in environmental thinking in Ghana.

2.4.2 Effects of Colonialism

The tenor of this section is that external influences such as colonialism have oriented Ghana towards western scientific and technological ways of reason and doing things,

but have failed to create the enabling climate for the corresponding technological change. Colonialism has changed the dominant Ghanaian view of nature and the environment; it dislodged traditional institutional, humanistic and cultural values and discouraged the spirit of interdependence and interrelatedness. Although Ghana may have lost substantial elements of its traditional values. it has not yet entered the technological and scientific 'promised land.' It may be oriented towards values of western technocentrism - another cause of environmental degradation.

It is important to point out that colonialism is not entirely viewed as evil. It has brought some positive changes to Ghana. Abraham (1997: 27, 28) explained the positive aspects of colonial influence as follows:

> Colonialism brought in the promise of mass literacy, scientific approaches to disease, the infrastructure of modern communication and commerce and religious enrichment, an expanded vision of moral ideas and ideals, the suppression of tribal warfare, party politics, and techniques of management and government unavoidable in the modern state. It brought ideals of constitutional government in contrast with sacred tradition, the ideal of legal egalitarianism and an impartial judiciary intended to pursue it, an efficient though impersonal civil administration and the promise of a free press

The first negative effects of colonialism relates to changing attitudes towards nature and the environment. Kasanga (1997) argues that colonialism, mono-cropping, urbanisation, foreign religions such as Christianity and Islam as well as globalisation influenced Ghanaian environmental thinking. As Abraham (1996) intimated, colonialism brought in new systems of education, an inquisitive and acquisitive attitude towards nature. He said 'these encounters changed in many different ways at one and the same time between individuals and relations with the environment.' Thus fetish groves, shrines, trees, plants, mountains, rivers or streams, forests and other natural resources that protect the physical (through the spiritual) environment are diminishing. Also, see EPA (1998) for an extensive debate on the subject.

Critically examining the claims of traditionalists, it cannot be truly argued that elements of Ghanaian management practices such as preservation of fetish groves and some natural resources were eroded by colonial rule. This is because, although tradition belief enables some resources to be preserved, it did not inspire the

conservation of resources on a large scale in any way in Ghana. Secondly, mystical rather than ecological reasons form the basis of their explanations. Consequently, once the rationale for such preservations become untenable as a result of advancement or changes in societal knowledge, philosophical changes and religious beliefs, society will not be bound to pursue sectarian traditional beliefs. What it needs is the re-articulation of traditional beliefs and practices more practically. On the contrary, it can be argued that colonial rule did better in preserving natural resources such as forests reserved to protect some species, wild life and water sources although the exclusion of local communities from their management did not prove to be sustainable.

The second destructive impact of colonialism relates to its effects on the concept of community, a sense of interconnectedness, interdependence and interrelatedness. There are strong cultural values, mutual support, provision of social security and sustainable livelihood that a sense of community gives.

> These [colonial] encounters altered the force and direction of the host cultures, altered social relations and the rationale underlying the organisation of traditional societies, introduced new ways of doing things and new reasons for doing them, and brought within common territories cultures which before were highly territorial. Whereas the host cultures provided a coherent interconnection between social structure, laws, belief system, work and art, a coherence, providing certitude and trust for harmonious lives, the historical encounters have produced accumulations of cultural fragments still struggling to promote and support unified nations (Abraham, 1997:30).

Dzobo (1996) similarly concurs with Abraham when he said

> The community is seen as a network of relationships of people and creative power is the essence of such personal relationships and the relationship between the individual and the society is mutual and interdependent; each has a mutual responsibility for the other. Inter-dependence and inter-relatedness are therefore very important values in the building of the African humanistic society...and the most devastating effect of western colonization and missionary proselytization on Africa is the removal of genuine capacity for free action from Africans who have been made into objects of history instead of being its subjects.

Thirdly, not only did colonialism dislocated Ghanaian philosophically, it also dislodged it physically from fixing boundaries which limited it to natural resources

which would have been available for its full development. Resources in Togo are not the same resources in Ghana or Cote D'Ivoire. Before colonialism all countries in the sub-region had access to all resources without border limitations. Since colonialism, countries have had access to only those resources within their political boundaries.

> Colonialism put an end to the political hegemony of local cultures, not only by their assumption of the powers of coercion and the introduction of new social institutions, new ways of doing things and new reasons for doing them, but by their juxtaposition of the local cultures within newly defined geographic boundaries, which did not coincide with any previously existing (Abraham, 1996).

The fourth impact of colonialism is on the concept of market value and individualism.

> Colonialism also ushered in unbridled economic exploitation and sapped sub-Saharan cultures of their vitality. They become deprived of direction and internal impetus, and increasingly survived mainly as pageant and ceremonial. New ideas concerning individual accountability and individual reward, the spreading sense of individual vision and the ascendancy of self-interest in contrast with community interest as a basis action, the growing sense of private power arising from self-action rather than clan direction, all of these atomising factors, acting in concert, have loosened the internal bonds and efficacy of lineage-based clans (Abraham, 1996).

Dzobo similarly echoes the same concern

> Market value orientation derives its source from devotion to man's economic and social interests and well-being, which are believed to be the chief ends of life. Instead of being seen as made up of creative humanities, society is viewed as comprising incompatible individual socio-economic interests. There is therefore a constant struggle in society to maintain and safeguard privileges socio-economic interests and positions (Dzobo, 1996: 226).

2.4.3 Impact of Globalisation

If colonialism alienates Ghana from traditional (ecocentric) values and towards technocentric ethics, globalisation alienates Ghana from a meaningful environmental sustainable development. Gyasi et al. (1995) and Owusu (1998) argue that since the early 1980s, most Sub-Saharan African countries have resorted to structural adjustment programs to reform their ailing economies. Adjustment may provide a

convenient means for governments of the adjusting economies and international capital to meet their current economic and political interests. Adjustment unfortunately has huge environmental costs for the adjusting country. Ghana's forestry sector has been characterized by a dramatic increase in wood exports since adjustment (Gyasi *et al.*, 1995; Owusu, 1998). This has involved a rapid and extensive deforestation, resulting from the government's need to meet its increasing external debt: service obligations, and is exacerbated by the series of massive local currency devaluation required under adjustment "to get prices right." The systematic reduction in government revenue from devaluation to amortize the increasing debts, keeps the government and indebted wood processing firms on a treadmill of export-based extraction/deforestation. Changes in the biophysical environment are significantly related to production pressure. Elsewhere, Pepper (1997) succinctly summarises Ghana's position in this way:

> Globalisation of the capitalist market economy destroys local communities, making them compete with faraway people...By removing protection for local agriculture (e.g tariffs against cheap imports), GATT will 'pauperise millions in the South' increasing environmental degradation. Simultaneously the agreement made it easier for Northern firms to relocate in areas of cheap labour and lower environmental standards. ..They require recipients to earn more in foreign revenue and spend less in social welfare and environmental protection, to create more 'efficient' economies. ..Studies of the environmental impact of SAPs ...challenge the notion that 'efficient' economies (in the neoclassical sense) are the most environmentally friendly ones ... SAPs have, for instance, been a key factor in deforestation in the name of increased timber and cash crop exports.

Thus from the foregoing arguments, it is contended that Ghana is unable to remain ecocentric but at the same time less able to see any value in technocentrism.

2.4.4 Post-colonialist Debate

In short, the post-colonial debate seeks to create space for Ghanaians and for that matter Africa to define environmental problems their own way without seeing them through other lenses. For instance, it does not see overpopulation as a major problem facing Africa. At the 1972 Stockholm Conference, Ghana argued that population control, through modern family planning methods is not a priority. In the richest

countries in Africa, 50% of the children born never attain the age of 15; and large family sizes could be a security. Ghana's problems are elementary biological pollution like the disposal of human waste and removal of disease-bearing organic matter from drinking water rather than industrial pollution. Global pollution is caused by the developed world. Similar sentiments echoed at the Nairobi Conference in 1982 sums up Ghana's basic problems as malnutrition, lack of safe drinking water supplies, endemic diseases, inadequate supply of energy for domestic use and lack of proper methods of refuse disposal.

Again, the post-colonialist debate is a critique of enlightenment epistemology, which seeks to question the people whose representation of reality should prevail, and the people who have the authority to represent reality; it also challenges conceptions of science and rational discourse. It argues that reality can be interpreted from other forms of communication such as oral tradition.

> Our theorising...is often in narrative forms, in the stories we create, in riddles and proverbs, in play with language...And women, at least women I grew up around, continuously speculated about the nature of life through pithy language that unmasked the power relations of their world (Christian, 1988:68) cited in Sandercock (1998).

Kwansah-Aidoo (1999) argues that telling stories and/or anecdotes is a normal part of everyday life and communication in Ghana. Anecdotes can be used as epistemological tools that can inform ways of knowing and doing communication research[33] in Ghana. In the context of media studies, it will also enrich the literature on the relationship between media, public opinion and environmental issues. Consequently, using anecdotes narrated by participants in research on people's attitude towards the environment and the role of the media is encouraging environmental awareness. The essence of the postcolonial critique in Ghana environmentalism is to draw the attention of the West to the fact that Ghanaians have a perspective to environmental problems quite different from the way the West sees it. To them it is not simply a problem of climate change, ozone depletion or overpopulation; it is survival and basic necessities of life.

[33] This is a branch of qualitative research discussed in Creswell (1998) as ethnography of communication or simply as ethnography. It is a description and interpretation of cultural or social groups or systems. This is a research in which the researcher examines the group's observable and learned patterns of behaviour, customs and ways of life.

2.4.5 Positive aspects of Ghanaian Environmentalism

Beyond the claims and counterclaims about the effects of colonialism and globalisation is the recognition that the destiny of Ghanaians lies in their own hands and that no nation could solve another's environmental problems for it; consequently policy makers are taking action in many ways. In this respect, a new development in environmentalism is a resurgence of environmental NGOs involved in various environmental activities. As at the time of writing, there are at least 172 environmental NGOs registered with the Environmental Protection Agency (EPA, 2000). It is also pertinent to note that there is high alertness on environment issues evinced by media discussions and free expression of views by professional bodies on environmental issues.[34] These developments have kept governments, environmental officials and manufacturers on their toes. Government is also playing a part. Its belief in science and technology as well as the environment is evidenced in many fronts. It has an established history of promotion of science and technology through the establishment of a University of Science and Technology, (producing the first black UN Secretary General), a Ministry of Environment, Science and Technology, Council for Scientific and Industrial Research and Ghana Atomic Energy Commission among other institutions. Traditional ecological knowledge is not thrown over board. There is a research institute for traditional medicine, a strong department of pharmacognosy[35] in the University of Science and Technology as well as a national Commission on Culture. Politically, policy issues are addressed through relevant government institutions. Hens and Boon (1999) observe that

> Environmental policy in Ghana is a post-Rio phenomenon. Environmental laws, a Ministry of Environment, Science and Technology, an advisory National Committee for the Implementation of Agenda 21, and a fully mandated environmental administration have been established. This ...advocates a progressive attitude towards environmental legislation and points out the specific utility of economic and legal instruments in environmental management in this relatively fast developing country. The choice of instruments for environmental management is increasingly influenced by the specific

[34] This perception is based on the researchers first hand experience about events in Ghana. For example, in 2000, the government tried to introduce some chimps into the wild from the USA. Pressure the press, individuals and the professional bodies prevented government's action when there were doubt about the source of the chimps.

[35] A branch of pharmacology concerned with crude drugs from plant and animal origin. Pharmacology is science of drugs including their characteristics and uses.

state of African environmental and technological capacity and by a call for the recognition of the role of traditional customs in nature conservation. This African perspective on environmental management is further intensified by an unmet need for regional, transboundary cooperation in the West African subcontinent. This specific West African context calls for an elaboration of an effective capacity-building program environmental management in the area.

Within the framework of better understanding between the North and the South, it is hoped that lending institutions will soften lending policies that impede on development in the South. While the debate rages on, the South need to continue their positive actions. Promotion of Traditional Ecological Knowledge must continue with scientific and technological advancements. As countries realise their interconnectedness and take on benign policies that do not hurt the environment, or at least minimise the environment effects of development actions, it will no longer be relevant what philosophy is espoused, the planet earth will hopefully become a better place for mankind and posterity.

2.5 Sustainable Development Defined

Sustainable development, a 'not-easily-defined' term, is perceived as 'confused, vague, inherently self-contradictory and reflecting ambivalent goals' (Toman *et al.* 1997; Redcliff, 1997:438). The World Commission on Environment and Development defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their needs (WECD, 1987:43). Riordan (1996:37) opines that it is a mediating term to bridge the widening gulf between developers and environmentalists. The key issues in the definition include welfare, equity, futurity, socio/psychological, limits, equity, inclusiveness, security, prudence and connectivity. Jacobs ties futurity, welfare and equity together. According to Jacobs (1997:3) *welfare* is an expression of the wider economic factors making up the quality of life. This can be expressed in monetary and non-financial means. Equity is a fair distribution of welfare amongst the present generation while futurity is a fair distribution of welfare between present and future generations. While some people place emphasis on the least advantaged some include obligations to non-humans. Again, while working on the basis of fairness, equity and justice; sustainability should not shift costs of degradation to the present and future generations without proper compensation (Howarth and Norgaard, 1992;

Daly and Cobb, 1989; Pearce *et al.*, 1991; Goodland, Daly and Kellenberg, 1994:154; Adesida, Caiquo and Brito, 1994:903; Blackman, 1994:883; Cole, 1994). Over time, sustainable development debates centre around, substitutability of resources; economic, social and environmental perspectives; and the interaction effects interlaced with ethical considerations. These debates are discussed in Sections 2.5.1-2.5.5 below.

2.5.1 Sustainable Development from Economic Perspectives

The thrust of the sustainability debate from economic perspectives is the extent to which man-made capital and natural capital are complements or substitutes. From the extreme technocentrism perspectives (very weak sustainable development), the ***overall capital stock or base*** should remain constant over time. This is total or aggregate (human-made and natural) capital that has to be sustained. This is so because there are considerable near perfect substitution[36] possibilities among other forms of capital such that one type can compensate for the type in short supply. Besides, there is the possibility of reducing capital needed by every generation into rents or real income, as 'income is the maximum real consumption expenditure that leaves society as well endowed at the end of a period as at the start.' Under this typology the main emphasis is on the human survival and well-being (Common and Perrings, 1992; Turner, 1996; Toman *et al.*, 1997).

From the technocentric perspectives (weak sustainability), it is ***critical natural capital*** that should be sustained. This is because there are no substitution possibilities between human-made and critical natural capital. Critical natural capital is an ecological asset also referred to variously as biogeochemical cycles, ecological processes, ecological glue and ecological foundation. Other terms are ecological health, capacities of the environment, environmental support services and global life support systems (Olson, 1994:156; Goodland, 1994). This is because of uncertainty surrounding the impacts, and the detrimental effects, that the lack of some forms of natural capital can have on ecosystem health. Some natural resources are advocated for conservation because they are critical for human welfare and survival. The

[36] Although the term 'perfect substitution' is found in Pearce's(1993) typology, Dobson (1996) claimed that none of the people to whom the concept is attributed to agrees to their labelling as such. Solow (1992) for example said in respect of substitution that substitution can take place on reasonable terms.

principles that should guide resource use include precautionary principle, the use of a safe minimum standard, imposition of restrictions and constraints on economic activities, and the use of some sets of physical indicators to monitor development actions consistent with ecosystem stability and resilience (See Abernethy, 1994:142-143; Perrings, 1991; Common and Perrings, 1992 and Handerson, 1994).

From the ecocentric perspectives (strong sustainable development), ***irreversible natural capital*** should be sustained. This is because there are no substitution possibilities between human-made and irreversible natural capital. The ozone layer, for instance, is an irreversible natural capital. Other resources such as trees, animal species and fish stocks can be exploited to their irreversible stages. In terms of human welfare (material and aesthetic), irreversible natural capital is synonymous with critical natural capital and has the same reason for its protection. When regard is had to the protection of some natural capital for its own sake, such as a park or waterfall, emphasis is placed on irreversibility for its own sake or as an obligation to nature. 'Here, obligation to nature is added to the maintenance of human welfare as a reason for protecting this type of natural capital' (Dobson, 1996). As Dobson points out, this is 'the point at which economists leave the sustainability debate to be replaced (in yet another form of substitution) by philosophers' (See Dragun and Jakobsson, 1997 and Knetsch, 1997 for more discussions).

From the extreme ecocentric perspectives (very strong sustainable development), it is '***units of significance***' that should be sustained. This is 'maintaining enough of the particular historical forms of association and their historically particular components- all the better if they have the mark of nature on them' and that 'what is handed down and maintained does need to retain in the process something of its original form and of its identity: there need to be a continuity of form...'(Dobson, 1996). Examples would include biological resources maintained for their own sake as obligation to nature; natural environments maintained to support tribal groups and their societies in the developing world, and special places of aesthetic value left undisturbed for their own sakes.

2.5.2 Sustainable Development from Environmental Perspectives

According to Ekins (1997), the contribution of the human economy and to human

life in general can be regarded as taking place through the operation of a wide range of environmental functions, which is the capacity of natural processes and components to provide goods and services that satisfy human needs. Natural processes and components are stocks of and flow from natural capital. Environmental functions can be classified under regulation, carrier, production and information. An alternative classification may include provision of resources for human activity, absorption of wastes from human activities and provision of environmental services independent of or interdependently with human activity. The environmental sustainability of human ways of life refers to the ability of the environment to sustain those ways of life. The environmental sustainability of economic activity refers to the continuing ability of the environment to provide the necessary inputs to the economy to enable it to maintain economic welfare. Both these sustainabilities depend on the maintenance of requisite environmental functions. Which functions are important for which ways of life and which economies and the level at which they should be sustained will vary to some extent by culture and society, although there are obviously basic biophysical criteria for human production, consumption and existence.

2.5.3 Sustainable Development from Social Perspectives

Social sustainability refers to a nation's ability to maintain a shared sense of social purpose to foster connectivity,[37] social integration and cohesion that relates to the question of culture and values as well as the state of the economy. The sense of identity and social purpose of very many people as well as their income derive in a large part from their employment. Unemployment therefore leads to these characteristics, which in turn probably leads to ill health, mental stress and family breakdown. Welfare provided in developed world less than can compensate for these losses. Membership of and involvement in a local community contributes to people's sense of identity. Globalisation can damage a sense of social connectedness, of

[37] Connectivity is the term employed by Gladwin and Kennelly (1997). The notion that the world systems are interconnected and interdependent is carried with this concept of connectivity. Social equity, biosphere respect and human well are inextricably linked together. Social equity and biospheric respect are required for enhanced welfare everywhere; improved human welfare and social equity are necessary to motivate biospheric respect and so are enhanced welfare and biospheric respect needed to facilitate social equity. Efforts aimed only towards ecological health and integrity without poverty alleviation, population stability, and the redistribution economic of opportunity may produce trivial results. A gain may be counteracted by global ecosystem degradation and socio-political instability induced by the poverty-population nexus.

community, while the mismatch between economic and political realities undermines confidence and, according to Clark (1994:180), all must be done to ensure an environmentally sustainable, psychically satisfying and socially more stable society.

The concept of cultural capital and sustainable livelihoods is consistent with social sustainability. The way societies exist from generation to generation, their adaptation to the environment, their self-supporting social security systems, their interdependence on one another, their ability to withstand stress and shocks are dependent partly on their traditional ecological knowledge or worldviews such as technocentrism and ecocentrism. They endure in fragile, marginal and vulnerable environments. This is sustainable livelihood[38] and manifestation of their cultural capital. This cultural capital[39] may be as important as the DNA contained in species. According to Turner (1996), in these are a large number of self-regulating regimes governing access to resources in common property and their scope in limiting the level of economic stress on particular ecological systems is clearly very wide.

2.5.4 Sustainable Development from Ethical Perspectives

How a society uses its environment depends on its worldview, its perception of the nature of the world and the status of human beings and other life forms. When the rights of the present and future generations as well as of non-life forms are guaranteed in decision-making, there is bound to be environmental sustainability. The concept of environmental justice derives from worldviews. There is also a correlation between a society's economic and social justice and environmental justice. A society with a track record of denial of basic civil rights and lack of democracy in a society will not respect environmental rights. The ethics of sustainability will also determine to a considerable extent where the responsibility for promoting environmental sustainability is perceived to lie and the degree of coercion in its enforcement that is justified. The enforcement of principles such as the Polluter Pays Principle, a principle of economic efficiency and a moral responsibility can best be implemented and enforced depending on the social contract between government

[38] According to Turner (1996) it is a livelihood comprising the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets and provide sustainable livelihood opportunities for the next generation: and which contributes net benefits to other livelihoods at the local and global levels in the short and long term.

[39] conservation of rapidly diminishing pool of social experience in adaptability

and the governed; on balances of rights and responsibilities; and the institutions that express and enforce them, argues Ekins (1997).

2.5.5 A System and Co-evolutionary Perspectives of Sustainability.

Turner (1993) also discussed sustainable development from system/hierarchical perspectives. As a system, biophysical systems bind and constrain economic activity with their own internal dynamics. Viewed in terms of a bounded system, both biophysical and economic systems interact and co-evolve[40] with feedbacks that influence economic and social relationships.[41] As Marien (1994) pointed out, 'ecosystems with a multiplicity of interrelated species are more resilient to external changes and shocks that, in more simplified systems, might destroy a vital link.' On the one hand, the idea of a constraint is developed into a notion of hierarchy in which higher tier activities constrain lower tier activities. Even though a biodiversity policy should be operated at a landscape (project) level, it should enable attention to be focused on larger systems in nature away from individual and group interests. In this sense, the value of an individual species (at landscape/project level) should be viewed mainly in terms of its contribution to a larger dynamic such as its ecological health (stability or resilience or creativity). On the other hand, the idea of constraint should put a limit on financial expenditures for biodiversity issues that can be justified (on the basis of its contribution to ecological health). This is a system and co-evolutionary perspective of sustainable development.

2.6 Application of theory to SEA

Putting all these views together, the following key thoughts emerged. *First*, the literature reveals a commitment to the environment and development. *Second*, issues of sustainability address social, economic and environmental dimensions. *Third*, the literature supports public participation. *Fourth*, the literature also shows that international co-operation is important. *Fifth*, the study has implication for written reports. The *sixth* lesson relates to the importance of a suitable framework for

[40] Elgin (1994:136) speaks of fostering the co-evolution of culture and consciousness and used the term co-evolutionary view as integration between materialist and transcendentalist views on the environment.

[41] This economic and social co-evolution will also involve how resource valuation has evolved over the years, taking on board other definitions of value, in response to environmental concerns.

environmental assessment. For the understanding of the concept of SEA to which theory is being linked, refer to Sections 1.1, Section 1.3 and Chapter 3.

From the extreme ecocentric (very strong sustainability) to the extreme technocentric (very strong sustainability) positions, theorists accommodate some levels of 'development' and 'environmental' protection. In fact, the centre-ground concepts of sustaincentrism and nonanthropocentric subjectivism accommodate 'development' and 'the environment' in a more balanced way. Thus, by accommodating both development and the environment, there is a commitment to the principles of sustainability. Besides, the possibility of maintaining different combinations of capital (natural and human) provides the basis for different alternative policy, plan and programme outlooks. Furthermore, critical and irreversible natural capital demands the application of the precautionary principle, safe minimum standards and benchmarks/criteria to resource use. The literature also acknowledges the limits of ecological processes and environmental life support services. While these views provide the rationale for maintaining some critical or irreversible capital, and for improving sustainable livelihoods; they also underscore the need to determine carrying capacity of ecosystems. The 'System and Co-evolutionary' perspectives of sustainable development suggest a notion of hierarchy in which higher tier activities constrain lower tier activities. It also emphasises the operation of development at a landscape (project) level. Moreover, because of uncertainty in co-evolution, it is important to monitor feedbacks from the interactive effects of the components in a system (Sections 2.3.1, 2.5.1 and 2.5.5 above).

The above ideas (of sustainability principles, carrying capacity, benchmarks for sustainable development, imposition of constraints, alternative policies and feedback monitoring) have a direct link with sustainability-led SEA (See Section 3.9). Glasson *et al.* (1999:422) and Thérivel and Partidário (1996:9) have suggested the following trickle-down approach to sustainable development to which the principles relate.

- Commitment to the principles of sustainable development
- Determination of the parameters within which sustainable development is to be achieved
- Determination of carrying capacity

- SEA of all relevant tiers of PPPs and their alternatives
- EIA of specific projects within the constraints established by SEA
- Monitoring and iterative feedback of the earlier processes

Another link between the principles of sustainability and SEA is evidenced by the way stakeholders specify requirements for mitigation measures. A strong sustainability (ecocentrism) position can best be met in SEA by specifying requirements for full impact mitigation for lower tier developments. This can be achieved by avoiding the development altogether, avoiding the impacts at the source or abating the impacts on site. A weak sustainability (technocentric) position can be met in SEA by specifying the requirements for mitigation using measures that are down the mitigation hierarchy.[42] Abating the impacts at the receptor, repairing impacts, compensating for impacts in kind, compensating for impacts by other means and enhancing developments achieve this. A more moderate sustainability position (such as sustaincentrism and nonanthropocentric subjectivism) will specify mitigation measures lying between avoiding the use of natural capital and compensating for the loss of natural capital (See Sections 2.3.1, 2.3.2, 2.5.1 and 3.9).

Similarly, thoughts from the traditional Ghanaian environmentalism reveal a commitment to sustainable development in several ways. By shifting traditional Ghanaian environmentalism away from two extreme polar positions of ecocentrism and technocentrism, colonialism and globalisation have placed Ghana towards the centre ground where both 'development' and 'the environment' can be taken on board in a balanced way.[43] The traditional Ghanaian belief that resources are for 'the living, the dead and those yet unborn,' is, in fact, a statement of intra-generational and inter-generational equity. But the Ghanaian concept of intergenerational equity gives consideration to the dead (who may, for the time being, be living). Because those living today will wish to enjoy the conserved natural resources together with posterity even after their death,[44] it is in their interest to protect the environment. Attribution of spiritual and mythical value to both living and non-living things; and

[42] For discussion on the concept of mitigation hierarchy, see Glasson *et al.*, 1999
[43] A very strong ecocentric ideal has a strong belief in the protection of the environment but no room for development. Conversely, a very strong technocentric view has a strong belief in development with no room for the protection of the environment.
[44] given that the traditional Ghanaian has a strong anthropocentric and utilitarian view

the veneration of nature in its right support the sustainability concept of 'units of significance' (See Sections 2.4.1 and 2.5.1). It can also be argued that the desire to live in harmony and in friendship with nature supports a commitment to a strong sustainability principle. Furthermore, the ability of the traditional Ghanaian to employ magic as a meta-force to constrain nature has dual implications (See Section 2.4.1). Negatively, it can produce destructive tendencies particularly in geographical areas where nature is seen as giving, protective and reliable. Positively, SEA can be seen as a meta-force or meta-tool to constrain lower tier developments if it is well articulated through stories and anecdotes. In this regard, the traditional Ghanaian environmental thought can potentially support the principles of sustainability-led SEA as articulated above.

Sustainable development should cover social, economic and environmental dimensions. From the literature, social sustainability addresses such issues as social cohesion and cultural values, integration, sense of community and inter-connectedness. Others issues addressed include poverty, housing, health, social services and employment. Economic sustainability addresses issues such as job creation, revenue generation, economic growth, private investment, economic sufficiency and inflation reduction. By and large, environmental sustainability addresses issues related to natural resource depletion. It also seeks to improve waste absorptive capacity of the biosphere through proper waste management and energy efficiency. Other means include a greater use of LPG, solar energy and public transport compared with the use of fossil fuel and private transport (See Tables 7.9, 8.6, 9.6 and 10.6). In this connection, it is essential to use techniques that ensure a balance between social, economic and environmental dimensions of sustainability. Fortunately, SEA, as a tool for sustainable development ties economic, social and environmental considerations together in a consistent, coherent and compatible manner. Thus where there is a threat to social, economic and environmental sustainability, there is a strong case for SEA. Indeed, the traditional Ghanaian environmentalism blames colonialism and globalisation for weak community interconnectedness, weak humanistic and cultural values (weak social sustainability). Globalisation is blamed for over-exploitation of natural resources, environmental degradation and deforestation (weak environmental sustainability) and for a strong market value orientation, privatisation and structural adjustment (strong economic

sustainability) (See Sections 2.4.2-2.4.4 above). Since there is a threat to social, economic and environmental dimensions of sustainability in Ghana, a strong case for SEA in Ghana is imperative.

The theory of sustainable development also provides the framework for addressing interaction effects of development. Based on the 'system and co-evolutionary' perspectives of sustainability, biophysical sub-systems interact with socio-economic systems as both systems co-evolve (Section 2.5.5). Morris and Thérivel (1995:297-305) explained the nature of such interactions, in relation to environmental assessment, as follows:

> interactions between impacts can mean both interactions between the impacts of one project and the interaction between the impacts of the proposed project and those of the other projects... The interactions between a specific project's impacts are nothing more than its indirect and cumulative impacts as well as its direct impacts. The interactions between several projects' impacts are cumulative impacts. As such, the definitions overlap to an extent.

Since these interaction effects can be direct, indirect and cumulative (i.e. additive, synergistic and neutralising), a suitable tool that can address such effects is absolutely essential. It is within the context of SEA that these effects are effectively addressed. The theory therefore becomes an organising concept for SEA as a tool for sustainable development.

Since oral tradition plays a strong role in traditional Ghanaian thought, according to the post-colonialist critique, environmental problems and solutions could be framed from the perspectives of the local people; education on environmental issues could take a form of stories and plays rather than written brochures. It is also pertinent to remark that while written SEA reports are invaluable for implementation, emphasis on written SEA reports may not be universally accepted throughout Ghana. The erosion of religious basis for conservation means that policy-makers should canvass other bases for the conservation of critical, irreversible and units of significance. These bases could include scientific basis for conservation and environmental

capital[45] approach to conservation.

The importance of public participation is best reinforced by the lessons from the concept of cultural capital and sustainable livelihood. The concept of sustainable livelihood reveals that there is an adaptive capacity of local people who live on fragile ecosystems; and that the knowledge about their local environments is locked up in their minds. To unlock local people's traditional knowledge, the need to widen the scope for public participation to include these local people cannot be overstressed. Moreover, since the traditional Ghanaian is secretive (Gyeke, 1997), it is his engagement in decision-making that will help tap his secrets. The need to include local people in decision-making is also reinforced by the traditional Ghanaian belief that man is an active creative (rather than a passive) agent (Dzobo, 1996). Again, it is through public participation that his creative talents and skills are tapped. Lessons from the post-colonialist critique also mean that if policy makers wish to understand reality from traditional Ghanaian perspectives, they must include local people in decision-making (See further discussions at Sections 1.2 and 6.2.5).

The effects of geographical dislocation for which colonialism is blamed best illustrate the importance of international co-operation. To benefit from resources locked up in other nations in the sub-region, the scope of SEA should be expanded to take on board issues of transboundary impacts. Other programmes that promote co-operation should also be encouraged (See Sections 1.2 and 6.4). In order to establish a framework for co-operation, issues of law, order and enforcement; concerns for justice, rights and democracy as well as the institutional context of the sub-region of West Africa is important. This is where the ethics of sustainability applies to the study and forms the basis for the variable - *SEA Framework* (See Sections 2.5.4, 8.4, 9.3 and 10.3). Apart from addressing transboundary impacts, the effects of globalisation also imply that the scope of SEA should be expanded to address issues such as privatisation and the World Bank structural adjustment programmes.

[45] Environmental capital methodology describes baseline environment and constraints. Essentially, instead of focusing on environmental features, such as woodland, it asks what attributes of the feature matters for sustainability (e.g. recreation, CO_2 fixing); how much of these attributes matter, to whom and why it matters; what (if anything) could replace or substitute for these benefits if this attributes were damaged or lost. What kind of management actions are needed to protect and/or enhance each attribute to the degree justified by its importance and degree of substitutability (Countryside Commission *et al.*, 1997; Thérivel and Brown, 1999).

2.7 Conclusion

From the above review, development actions are essential for societal survival. Because actions often exert undesirable negative impacts on the environment, ecological rationality should inform development decisions. How such rationality could inform decision-making is often coloured by the nature of environmental views held by society. Ghana like the West holds multiple views on the environment. This is why a common organising concept such as sustainable development to which all stakeholders can relate is important. Sustainable development has become an important concept to evoke when managing the environment. This is partly because it tries to tie economic, social and environmental implications of development actions together in a consistent and coherent manner. The true test of the importance attached to the concept of sustainable development will eventually depend upon the willingness of Ghanaians to translate sustainable principles into action. This is why the study of strategic environmental assessment in the energy sector is important.

Chapter

3

Energy Strategies and Strategic Environmental Assessment

Chapter Outline

Energy Policy

Energy Plan

Energy Programme

Sustainable Energy Policies, plans and programmes

Strategic Environmental Assessment

- Theoretical Background
- Regulation and guidance
- Links to Sustainability
- Links to PPP decision-making and EIA
- Methodology
- Interest Groups and Institutional Framework

Conclusion

3 Chapter Three: Energy Policies, Plans and Programmes

3.1 Introduction

The application of the principles of sustainable development to energy sector policies, plans and programmes can be notoriously complex. As was noted in Chapter 2, Sustainable development takes into account social, economic and environmental issues interlaced with ethical considerations. The definition of sustainable development itself takes as given the inevitability of economic development and security (of supply) issues as well as of environmental protection. Tying development actions with environmental imperatives within policy, programme and plan arenas requires determined and rational decision options and choices. In this regard, energy policies, plans and programmes are normally directed either (i) towards development goals or (ii) towards environmental protection goals. Against this background the paper will now discuss energy policies, plans and programmes. Further discussion of energy policies, plans and programmes and SEA on specific Ghanaian examples will be found in the fourth chapter as well as analyses in Chapters 8-10

3.2 Energy Policy

Policy is not a self-evident term (Hill and Ham, 1993:11). It may usefully be considered as a course of action or inaction rather than specific decisions or actions that consist of a web of decisions and actions that allocate values. It is a set of interrelated decisions concerning the selection of goals and the means of achieving them within a specified situation (Heclo, 1972; Easton, 1953). It is essentially a stance, which, once articulated, contributes to the context within which a succession of future decisions will be made (Jenkins, 1978). Sadler (1996:140) says it is a particular course of action or proposed overall direction that a government is or will be pursuing and which guides ongoing decisions. Energy policy is expressed through legal instruments, economic strategies, choice between energy types[1] and mixes supported by efficiency and conservation[2] measures in a desirable sequence (Prior,

[1] These types are fossil fuel (coal, petroleum, gas and nuclear energy) and fuels from renewable energy.

[2] Energy efficiency is a technical measure of how much useful energy is derived from the input fuel, stated as a proportion of the energy input (Edge and Tovey, 1995:320; Patterson, 1996; Gunn, 1997). It is the energy consumed by an operation or series of operations per unit capacity (e.g. KWh/litre) or per unit of performance (Boardman *et al.*, 1997:92).

1994; Siddayao, 1992; Adegbulugbe, 1991; EC, 2000; Reddy *et al.*, 1997, Bernow *et al*, 1998; EC, 2000; Mills *et al.*, 1991; Abdalla, 1994). The main policy instruments used include legal, economic, combined economic and legal, energy efficiency and conservation, carbon, renewable energy and nuclear. The broad policy objectives and policy instruments are listed briefly in Table 3.1 and Table 3.2 below. For details on legal and economic instruments, see McKibbin and Wilcoxen, 1997; Baumol and Oats, 1988; Becker and Shechter, 1996; Borenstein, 1988; Malueg, 1990; Montgomery, 1972; Hahn, 1997; Tietenberg, 1997 and Kemp, 1992:104. For further discussions of energy efficiency policy in industry, residential/commercial, transport, and electric sectors, see Bernow *et al.*, 1998; Girod et al 1997:26; EC, 2000; Elliot, 1994a and 1997; Worrel *et al.*, 1995 and 1997; Hershkowitz, 1997; Elliot, 1994b; Williams, Larson and Ross 1987; Blok and Farla, 1996; Dougherty *et al.*, 1998; Davidson, 1993; Kartha *et al.*, 1998; Carlson, Wormser and Ulberg 1995; Gan, 1998; Bernow *et al.*, 1998; Golove and Eto 1996; Houghton, 1997:195-196; Bhagavan *et al.*, 1992; Amous, 1994 and Alam, 1998. For details on depletable renewable energy policies, see Hall, 1991:711; Soussan *et al.*, 1992; Adegbulugbe *et al.* 1994; Foley, 1992; Bradley Jr., 1997; van der Plas, 1998. Also, see Bennet and Thomson, 1989; AEA, 1994; Beck, 1994; OECD, 1994; OECD/IEA, 1992; NEI, 1999; Tarjanne and Rissanen, 2000 for more insight into nuclear energy policies and their impacts. For more explanation on carbon policy, see Boardman *et al.*, 2001.

Table 3.1: Energy Policy Objectives

Policy	Policy Objectives
Legal	Legalise green policies; Privatise government monopoly and control; Enforce procedure, Discontinue harmful uses; Promote alternative energy use; and Promote energy efficiency and conservation
Economic	Encourage a fuel switching, energy efficiency take up and investment as well as investment in renewable energy
Combined Legal and Economic	Achieve reasonable energy pricing and efficient tariff structure; Encourage private investment in energy efficiency or renewable energy; Encourage some free energy services, Introduce competition in the energy industry and Improve energy security.
Energy efficiency and Conservation	Reduce anthropogenic emissions; Save energy costs to consumers
Carbon Policy	Provide information; Improve comparison between products, Encourage rational choices; Help set carbon budgets; Facilitate international Protocols
Renewable energy	Reduce anthropogenic emissions; and Reduce pollution
Nuclear	Lessen pollution; and Deliver high efficiency

Table 3.2: Energy Policy Instruments

Policy	Instrument	Sub-instrument
Legal	Ban, Prohibition, Mandatory Minimum standards, Regulation, Deregulation Laws, Acts of Parliament, Decrees, UN Protocols, Convention, EU Laws, Agreements	
Economic	Carbon Tax, Grants, Loans, Neutral Tax: Incentives, Rebates and the Tradable Emission Permit System	Tradable Emission Permit System (Offset, Bubble, Banking)
Combined Legal & Economic	Least Cost Planning or Eco-Energy Planning and Third Party Agreement	
Energy efficiency and Conservation	Improved Industrial, Appliance, Transport, Fuel, and Building Technology, Improved Planning, Land Use Reforms Replacing, Retrofitting and Upgrading Plant and Machinery, R D & D, Development Of Efficiency Standards and Labelling, Recycling, Combined Heat and Power Generation	
Carbon Policy	Local and International Denominators	
Renewable Energy	Non-Depletable Depletable	Wind, Hydro, Solar, Geothermal and Tidal/Wave Energy Solid (Wood, Charcoal, Crop and Forestry Residues, Agro-Industrial and Municipal Wastes and Briquettes) Liquid (Ethanol, Some Vegetable Oils and Methanol) Gaseous (Biogas Anaerobic Digesters, Gasifier-Produced Gases)
Nuclear	Nuclear fission Nuclear fusion	

3.3 Implications of Energy policies and SEA

The study shows that in the SEA process, many alternative energy policies can be examined. Alternative fossil fuel strategies include renewables, economic instruments, legal instrument, energy efficiency and conservation, least cost planning and third party agreement (see Table 3.2). Within each strategy are varieties of alternatives. For example, carbon tax, incentives and tradable emission permits are alternative (and sometimes complementary) economic instruments. Incentives such as grants, loans and rebates are alternatives to each other. While depletable energy resources are alternatives to non-depletable energy resources, there are also

alternative strategies within depletable and non-depletable renewable resources. There are alternative means to achieve policy objectives even within the same policy instrument. The preference of one strategy for another depends on the strength of sustainability position and/or proper application of SEA to these policies. The study also reveals the effects of all the policy options and therefore informs choice of mitigation options.

Table 3.3: Examples of the link Between Energy Policies and SEA

Broad Policy Objectives	Modified Policy post-SEA Objectives
Introduce legislation to regulate on SEA of energy policies (legal).	*Introduce legislation within two years to* require SEA of energy policies within the electricity sub-sector (legal).
Establish a regulatory commission to regulate the commercial interface between energy utilities and their customers (least cost planning and third party agreement).	Establish Public Regulatory Commission by the end of 2003 to license and regulate 2 new private energy utilities (least cost planning and third party agreement).
Encourage a cut in fossil fuel consumption through taxation (economic).	Introduce appropriate carbon tax on petrol to reduce CO_2 emissions by 5% by 2020 (economic).
Limit NOx emissions through permit trading among industries (economic).	Limit NOx emissions by 10% of 2002 emission levels by 2010 through the establishment of permit trading by the end of 2002 (economic).
Grant incentives to investors in energy efficiency and renewable energy (economic, energy efficiency and renewable energy).	Seek to designate 5% of annual national budget for the next 5 years to promote energy efficiency in industry and solar energy technology (economic, energy efficiency and renewable energy).

In general energy policies may be stated broadly as those indicated in Column 1 of Table 3.3. In such examples, it is difficult to achieve the objectives of sustainability in practice without any direction of change or quantified targets. By subjecting the

broad policies to SEAs, it enables stakeholders to introduce directions of change or quantified targets into the policies. The possible post-SEA modified policies are shown in Column 2 of Table 3.3. In addition to making objectives more specific, measurable, achievable, realistic and time-related. SEA can help change a supply side management policy to a demand side management policy. Thus while the knowledge of energy policies provides the framework for making alternative policy choices, SEA makes those alternative policy options truly sustainable.

3.4 Energy Plan

A plan, according to Wood and Djeddour cited in Thérivel *et al.*1996, is a set of coordinated and timed objectives for implementing a policy. A plan is purposeful forward-looking strategy or design, often with co-ordinated priorities, options and measures that elaborates and implements a policy (Sadler, 1996:140). Energy sector planning is also essential in order to rationalize, coordinate and maximize energy resource development (Turkson, 1990). Thus just as there are broad policy objectives in respect of economic instruments, legal tools, renewable energy, energy efficiency and conservation so also there are conscious and timed strategies or spatial plans to cater for planning within the energy sector.

Although lots of policies have countrywide or even international application, with no direct spatial implications, some policies that seek to address development activities may readily be located in space. Plans that capture such development actions will therefore have spatial significance. Giving a concrete spatial dimension to energy policy proposals may mean the transformation of such proposals into structure, development, master or land use plans. For instance, the extractive activities relating to energy, refineries, installations, power stations, hydro-electricity production, transmission of electricity, overhead or underground lines, main and distribution pipelines, storage facilities for gas and fossil fuel, storage and disposal facilities for wastes, haulage, marketing and distributing networks have substantial spatial implications not only for existing plans but also for future plans. This may necessitate development control, good road networking and planning restrictions to influence free flow of traffic. It may also take account of energy programme or project proposals in the comprehensive development plans of districts, regions and

the country as a whole. Therefore government agencies and regulators need to co-ordinate with all relevant public agencies and stakeholders in preparing a planning framework for the rational and productive development and management energy resources.

On the other hand, policies relating to RD & D in this sector may not be obvious in its spatial requirement. In fact land use planning implication for some policies that seek to stress environmental protection may not always be clear. Some of these policies are carbon taxation, subsidies and energy efficiency. For example, they aim to restrict consumption, limit pollution and improve existing building fabric or industrial plant. Indeed the development of renewable energy resources such as wind energy requires space. But space requirements of all policies are not easily deduced from a policy. Thus although an energy plan has or may ultimately have a spatial implication, it need not always be seen in terms of space. In this sense, it may be a detailed scheme or method for attaining an objective. It is schematically outlining the manner in which policies are achieved within a set time frame taking into account strategies of organizations, governments and policy makers. Energy plan can be a schematic and systematic expression or presentation of energy policies into workable strategies or timed objectives for effective implementation.

Thus for planning to deal with energy efficiency, for instance, it may provide a means of spelling out government's strategy on energy inefficient appliances and vehicles as well as government's phasing out proposals for inefficient plants and technology. The time frame within which a plan is implemented, its co-ordination strategy, logistical supply to support the plan and allowances for likely changes in governments are essential considerations which go into planning proposals arising from an energy policy. Education, information and government's promotional efforts are also subject to planning and so are monitoring and evaluation. Energy planning also involves contingency plans that deal with stresses and shocks in the global energy market, flood, fire and earthquakes. Plans would also have to be drawn to deal with shortages arising from industrial action and fuel protests. Planning under such circumstances entails fuel rationing and prioritisation. Also, the mechanisms in place to monitor such occurrences are important ingredients of energy planning. Thus planning within the energy sector is essential to account for supply and price

fluctuations, shocks and stresses, industrial action, catastrophes, co-ordination of departmental energy options.

3.5 Energy Programme

A programme is a coherent organized agenda or schedule of commitments, proposals, instruments and/or activities that elaborates and implements policy (Sadler, 1996:140). Policies and plans serve no useful purpose unless they are translated into action through specific programmes and projects. Programmes may generally deal with information gaps in energy efficiency or with physical development. Programmes that deal with information may take the form of a series of advisory services scattered across the country on a sustained basis or for just a limited period. Programme may also deal with the provision of information on energy efficiency to masses of people as part of national campaign for building awareness through promotional materials. In the UK, energy efficiency programmes in the industrial sector include the best practice programme (Kraemer and Forlager, 1997); it provides reliable information about energy efficiency technology. It is a promotional tool committing public and business sectors to improve their energy efficiency performance through energy management. Another example is Local Energy Advice Centres that aims to increase the adoption of energy efficiency in households and small businesses. Furthermore, financial support is given to small to medium sized enterprises for energy efficiency consultancy and project management (Kraemer and Forlager, 1997).

Groups of site-specific projects that come under the ambit of energy sector are more common. The policy that promotes investment in renewable energy will generate some development actions such as the development of wind farms, development of solar energy services, geothermal and various biomass options. In order to pursue development goals or fulfil election promises, development actions such as rural electrification programmes, construction of power stations, fuel depots, oil refineries and mini-hydro generation plants may be supported by governments from time to time. There is no limit to the numbers and complexity of energy projects and programmes that can be put in place. Political will matched by the availability of financial resources determines the energy programmes to be implemented. Energy programmes do change in intensity, emphasis and funding with changes in

governments and as a consequence changes in political and policy orientation. A government that favours the open market economics will be opposed to regulation and may discontinue projects and programmes regulated by law. The opposite is true for a more tolerant government. See Chapter 5 for details on specific energy policies. plans and programmes in Ghana.

3.6 Problems of Sustainable Energy Policies, Plans and Programmes

As discussed in Chapter One, there is compelling evidence that climate change is occurring. Effects range from droughts, melting glaciers and ice caps, to dramatic ocean warming, and regional increases in extreme and violent storms. The effects on nature and human health are evidenced in tropical diseases such as malaria and dengue fever, damage to coral reefs, and threats to species such as migratory birds and polar bears. And there is a scientific consensus that anthropogenic emissions from the burning of fossil fuels such as coal, oil, and gasoline are causing the problem. Energy policies, plans and programmes that promote energy efficiency and conservation, encourage living off fossil fuel and emphasise the use of renewables are likely to help reverse the adverse trend of global warming and its consequences (See Halsnæs, 1996; Glan, 1998; Strong, 1992; Houghton, 1994; Grubb, 1996; O'Riordan, 1996; Pepper, 1997; Dryzek, 1997 and Ekins, 1997). Energy policies, plans and programmes also tend to be diffused, fluid, subject to numerous interpretations and sometimes conflicting and confused. Energy PPP may not obviously be explicit; it may be implicitly gleaned from different political statements with its origin from many sectors. A transport ministry may have different policy outlook from a housing, energy, environment or finance ministry (Thérivel *et al.*, 1992).

Again, Energy PPP may be concerned with specific products and overlook projects that generate the products; they may ignore programmes that give rise to projects and ignore the policies that generate energy programmes. Furthermore, although carbon taxes, for example, aim to reduce the use of fossil fuel and an eventual reduction in emissions, they have social impacts on the more vulnerable which can easily be taken for granted in energy policy implementation. Another feature of energy policy-making is lack of balance in the allocation of resources. Policies may just be a mixed basket of ideas, aims and objectives lacking consistency and coherence. Thus Energy

PPP may fail to achieve the goal of sustainability it aims at. A management tool that can effectively render energy policies, plans and programmes responsive to sustainable development is Strategic Environmental Assessment.

3.7 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) evolved from the National Environmental Policy Act, 1969 (NEPA) of the USA. The Act aimed to prevent damages to the environment and endorsed the use of systematic and interdisciplinary approach to ensure that environmental values are given consideration in decision-making. Since then Environmental Impact Assessment (EIA) has been adopted world wide; and over the past 25 years there has been a growing awareness that environmental assessment[3] is a tool for sustainable development. While EIA is applied to project-level assessments, Strategic Environmental Assessment (SEA) is the environmental assessment of policies, plans or programmes (PPP). Abaza (1996:218) conceives of SEA as

> a process, which promotes the integration of social, economic and environmental considerations in development, plans, policies and programmes. SEA not only provides recommendations for mitigating measures, it also identifies and assesses the alternative policies and actions, and helps in the selection of those policies and programmes, which promote the attainment of sustainability objectives.

Thérivel and Partidário (1996) defined Strategic Environmental Assessment (SEA) as

> a formalised, systematic and comprehensive process of evaluating the environmental effects of a policy plan and programme and its alternatives, including the preparation of a written report on the findings of that evaluation, and using the findings in a publicly accountable decision-making.

Based on their definition, Thérivel and Partidário (1996) excluded the following from SEAs

- Project EIA.

[3] The Earth Summit of 1992 for example brought increased global awareness and commitment to environmental assessment (See Agenda 21 Chapter 17).

- Integrated PPP-making that incorporates environmental issues but lacks formal stages of EA process and an appraisal of alternatives against environmental objectives and criteria.
- Environmental audits or 'state of the environment' reports that fail to predict impacts of PPPs.
- SEA studies that fail to influence decision-making.
- Environmental appraisals or strategies as well as cost and benefit analyses that fail to (i) predict effects of PPPs, (ii) consider a range of environmental components and/or (iii) result in written reports.
- Integrated management plans that deal with environmental impacts but fails to inform decision-making on alternatives that could result in sounder outcomes.

It would appear from the above definitions that the minimum requirement of SEA includes the following:

- A systematic and comprehensive approach to policy, plan and programme level assessments
- A formal stages of EA process
- The prediction of environmental impacts of PPPs
- The appraisal of alternatives against environmental objectives and criteria.
- The influence on decision-making.
- Consideration of a range of environmental components
- and/or written reports.

3.8 The Need for and the limitations of SEA

SEA has become important because it is an effective tool for sustainable development and counteracts the limitations of project EIA. In fact SEA has become important because project appraisal techniques and tradition of rational planning fail to adequately address environmental issues. EIA fails to address impacts of policies, plans and programmes at strategic levels. Thus it is unable to deal with strategic problems such as natural hazards. Projects EIA is not anticipatory; rather, it is incremental and reactive. Besides, EIA fails to address cumulative (additive),

induced (subsidiary), and synergistic and global impacts of individual projects. Moreover, it could only address a limited range of alternatives and mitigation measures (Glasson, 1995; Lee and Walsh, 1992; Thérivel *et al.*, 1992; Thérivel and Partidário, 1996; Clark, 1978; Kornov, 1997; Wilson, 1993; Partidário 1996; Roe *et al.*, 1995; Montz and Tobin; 1993; Clark; 1994; Sadler; 1996).

SEA also provides a framework for a systematic and rational reasoning, measurement, analysis and participation of, consultation and negotiation with stakeholders to unearth the best possible alternatives for sustainable development. SEA therefore allows impacts to be prevented, mitigated, ameliorated or avoided by communicating them to policy-makers and making it inform and influence decision-making at policy, plan, programme and project levels. It forces the introduction of systematic practices in the identification of relevant environmental issues and assessment of environmental impacts before and after policy and planning implementation stages. It strengthens impact assessment by establishing the appropriate context for EIA including the pre-identification of issues and impacts that warrant detailed examination. SEA helps to determine the need and feasibility of government initiatives and proposals; avoiding the foreclosure of options and opportunities that arise when assessments occur only at the project stage (Sadler, 1996:141). SEA also anticipates cumulative issues by focusing on the consequence of sectoral and regional-level developments. SEA helps to integrate environmental issues into the development of policies, planning and programme decisions. But once sound environmental integrated approaches have been achieved, SEA has played its part and may no longer be necessary (Partidário, 1996:35-36, Sadler, 1996:141).

A nation may have a policy that encourages sustainable development in every sector of the economy. Nevertheless, the interpretation and implementation of such a policy by different sectors and actors could produce different, conflicting and inconsistent outcomes with the result that sustainable development goals can be jeopardised. Again, the PPP making process carries with it the presumption that policies, plans and programmes can be consistent and compatible with sound environmental principles although not easily achieved in practice. SEA looks at development actions systematically and brings co-ordination of decision-making to the highest strategic level. It ensures that each policy is compatible and consistent with the

overall goal under consideration. SEA differs from PPP in the sense that it is the crucible in which sustainability is really refined in the planning process.

Although SEA addresses project EIA's limitations and has some benefits, it does have a number of limitations. Wilson (1995) summarises these limitations succinctly as follows:

> The problems of achieving integration through SEA are both political and technical. Both within the EC and at national level, integration is difficult in vertically structured sectoral departments protective of their own competences. There are also technical difficulties in terms of base-line data needed, the scoping of any possible impacts of the policy on the environmental assets, and the techniques available for predicting impacts and for comparing alternatives. The policy formulation and implementation process is complex, and defining the scope of policy is difficult where the environmental outcomes may be unintended or unpredictable. Whatever the limitations, SEA will continue to influence decision-making through policy leverage.

3.9 Regulation and guidance

According to Thérivel and Partidário (1996) and Partidário and Clark (2000), even where no regulation exists, SEA is being carried out voluntarily. In some cases, SEA is being undertaken on the basis of guidelines while in other cases legislation informs SEA practice. As awareness increases more nations either legislate or draw up guidelines to guide the practice. And the adoption of regulations would strengthen the procedures, although there are certain areas where the regulations conflict with legal precedents' Clark *et al.* (1978:129). Thérivel and Partidário (1996) cautioned that while legislation and guidelines provide a basis for adopting SEA or using a particular methodology, they might sometimes limit innovation and flexibility in the evolution of SEA methodology and practice if legislation is rigid. A substantive law can provide for the legal basis for SEA while a subsidiary or procedural legislation can provide for a flexible basis of assessment. In Ghana for example, while the Environmental Protection Agency Act, 1994 is the legal basis for SEA, the subsidiary legislation LI 1652 is the procedural basis for assessment. By and large, knowledge, expertise and experience by experts in the field can shape SEA on the ground. Besides, participation in conference, short courses, consultation with other

experts and literature as well as requirements by donor agencies can expand the practice into 'unwritten constitutions' for future guideline and legislation.

3.10 Links to Sustainability

Strategic Environmental Assessment is a means of achieving sustainable development. DETR (1998:25-26) argues that SEA is linked to sustainability in the sense that it begins with precautionary principle for maintaining natural capital and avoiding environmental damage, especially irreversible and unacceptable changes. It adds that the

> 'principle that there should be no net loss of natural capital (i.e. keeping resources, stocks and ecological processes more or less at present levels and valuing them separately from other types of capital) can best be met in SEA by specifying requirements for full impact mitigation and compensation.'

Besides other environmental management tools may not have the in-built mechanism like SEA to incorporate sustainability into decision-making process using sustainability criteria or some indicators. Since the SEA framework allows objectives to trickle down from policies to projects, it reinforces this type of top-down approach to planning and thereby leading to sustainable development. No-regrets policy, objective-led approaches management, integrated environmental management, carrying capacity and precautionary principle are meaningless unless they can be incorporated into decision-making at levels at which they can constrain ecologically harmful, economically wasteful and socially unproductive projects and products. For a discussion on the link between SEA and the 'trickle-down' approach to sustainable development, see Section 2.6.

3.11 Links to PPP decision-making and EIA

The key questions as to what model should be used in SEA decision-making process is a function of whether or not a policy, plan or programme will initiate, locate or lead to projects and activities; and the extent to which the direct and indirect impacts and risks associated with these can be identified. Based on these principles, SEA

systems may exhibit three structural forms. These are standard EIA-based model,[4] equivalent environmental appraisal model and integrated environmental management model[5] undertaken as an integral part of a comprehensive policy and plan setting process (Sadler, 1996:149). Thérivel *et al.* (1996) similarly explain that models linking SEA to PPP are consent related, integrated and formalisation of integrated models.

The 'consent-related' model is closely related to project EIA. Essentially, it adjusts PPP-making where possible to include (a) a formal decision-making stage, and (b) an SEA stage, similar to EIA, which informs decision-making. Various forms of this model are applied in the US, the UK and the Netherlands. The 'integrated' model assumes that PPPs are subject to multiple stages of decision-making (e.g. choice of objectives, alternatives, or mitigation measures) and attempts to integrate SEA into each of these decisions. The model relies on the shift in the conceptual approach to decision-makers. It is promoted in Canada, New Zealand and the European Union. The formalisation of the 'integrated' model supported by a series of regulatory requirements, can evolve into an 'objective-led' model. This model attempts to readjust PPP-making into a more strategic, transparent and objective-led process, where SEA sets a framework for subsequent decision-making. This involves (a) establishing sustainability benchmarks as a main objective which is then trickled down through the various tiers of PPPs, (b) establishing clear top-down links from policies to plans to programmes, and (c) identify clear decision-making stages for each of these PPP tiers.

Applying SEA to PPP requires PPPs to be adjusted to include formal decision. Integrated model involves integration of PPP in all multiple stages of decision-making. Glasson and Gosling (2001) refer to incremental, stapled, concurrent and holistic models. In the incremental model, elements of SEA may be applied to a plan. Stapled model refers to the process whereby SEA of a specific completed stage of PPP is undertaken and stapled to the plan. A concurrent model is based on the

[4] According to Sadler (1996), this is SEA patterned after the EIA process with similar steps and activities but with differences introduced by more fluid policy requirements as in Denmark

[5] In the equivalent environmental appraisal model, policy and plan evaluations are undertaken to identify and take account of environmental effects as in the UK (Sadler, 1996). In the integrated environmental management model, Sadler (1996) claims that SEA is undertaken as an integral part of as a comprehensive policy and plan setting process as in the New Zealand.

integration of the SEA process into the various stages of the plan-making process in an iterative manner as a concurrent assessment. Holistic model is based on the integration of environmental concerns into planning process without the need for a formal SEA. The desired situation is for SEA to be tiered and to trickle down to site-specific projects. Where SEA can be implemented at project level, it should provide the coherent framework for such a project and strive to create consistencies between different projects and PPPs. But the success of SEA as a top-down approach (tiering) to decision making is dependent on the conditions for implementation discussed in Section 8.4

3.12 Methodology

SEA has been evolving as a tool and so have varieties of methodologies been evolving. Its approaches may be based on EIA methodology involving matrices, checklists, overlays, networks, quantitative or index methods and more complex techniques such as photomontage, remote sensing, GIS, compatibility matrices, scenario analysis, modelling, exclusion zoning, life cycle analysis, expert opinion and Cost Benefit Analysis among others (Clark *et al.*, 1980:17; Thérivel *et al.*, 1996). UK Government guidelines for SEA (DoE, 1991), for example, entails summarising the policy issue, listing the objective, identifying the constraints, specifying the options, identifying the cost and benefits, weighing up the cost and benefits, testing the sensitivity of the options, suggesting the preferred option, setting up the monitoring necessary and evaluating the policy at a later stage. Other methodology adopted by local planning authorities in UK, by Hertfordshire (Hertfordshire, County Council, 1994), requires that plans establish sustainability objectives, establish plan objectives, compare local alternatives, describe the environment and establish environmental criteria and /or indicators, scope the plan, test the plan strategy and policies in relation to the environmental criteria and include specific environmental policies.

Sadler (1996:165) suggests a seven steps approach as a framework of good practice. These are for practitioners to (i) *screen to trigger* SEA and identify likely screen of review needed, (ii) *scope to identify* key issues and alternatives, clarify objectives and to develop terms of reference for SEA, (iii) *elaborate and compare* alternatives include no action options to clarify implications and tradeoffs, (iv) *undertake an impact analysis* or policy appraisal to examine effects (issues), evaluate alternatives

and identify mitigation and follow-up measures, (v) *document the findings* of SEA if necessary, with supporting advice and recommendations to decision makers on terms and conditions for implementation, (vi) *check the quality* of SEA report to ensure it is clear and concise, and the information is sufficient and relevant to the decision being taken and (vii) *establish necessary follow-up* measures e.g. for monitoring effects, checking implementation, and tracking any arrangements for subsidiary level assessment.

3.13 Interest Groups and Institutional Framework

Interest groups will involve those to be affected by policies, plans and programmes, initiators as well as persons or groups of persons - private or corporate - concerned about the effects of development actions. These are action-leading agents responsible for development, competent authority, responsible for deciding on the PPP, environmental authority or agency, environmental NGOs and regulatory authorities. A distinctive feature of SEA is that it has the potential for involving substantial number of stakeholders; and because people do not like giving up control, governments tend to be secretive and protective of strategic information. Proponents of SEA like those of

> policy review must convince central government that a system of appraisal will not retard economic growth and development before a system will be introduced... Successful review requires public involvement. Given the attitude of central government to confidentiality, it would appear unlikely that central government would be willing to release a significant amount of information on policies for public consideration (Clark et al. 1981:149-150).

The effectiveness of stakeholder activism depends on the institutional framework and the enabling environment. These include concern about the feasibility and acceptability of SEA and the type of policy and processes that are in place. Implementation, through well-structured and hierarchical frameworks, is more accommodating than a fluid and defused background and structure of policy making. Specifically, barriers, which must be removed, include, insufficient political will, limited societal support base, a narrow definition of issues, compartmentalized organizational structures and bureaucratic prerogatives (Sadler, 1996; O'Riordan and Sewell, 1981; Bregha *et al.*, 1990). The implementation issues worth considering are the 'scope of the process application, opportunities for public involvement,

integration of SEA with project EIA and other instruments and relevance and value for policy-making.' Moreover, the effectiveness of SEA depends on institutional capacity, availability of professionals, consultants, the general public, regional and local authorities. For further discussions on the effectiveness of SEA see UNEP (1996:43) and Marsden (1998:257). Also refer to Chapter 6 for further debates on institutional factors.

3.14 Conclusion

The foregoing discussions highlight the importance not only of SEA but also of energy policies, plans and programmes to foster sustainable development. Although it does not necessarily guarantee that all proponents will be influenced by it, some will be and others will be educated it. Proliferation of SEA test cases the world over attests to its application to decision-making in practice. Inclusion of ingredients of success and consideration for cost effectiveness are likely to make it an influential tool in decision-making (See Sadler. 1990:156).

In broad terms energy policies, plans and programmes and Strategic Environmental Assessment play complementing roles. Nevertheless, there are realms of decision-making within the energy sector for which sustainable development can be compromised in the absence of a strong sustainability assessment tool such as SEA. When it also comes to a policy arena characterised by multiple government departments and multiple goals, energy policy may not be properly placed to deal with environmental issues. SEA may have its own limitations; indeed, it will and cannot replace or supplant energy policy-making, of course not: its aim is to provide an environmental/sustainability input to decision-making, not take over decision-making. Nevertheless, SEA consideration in energy policy-making, planning and programming will tremendously improve energy sector policies. If such improvements in policy lead to the reduction in fossil fuel consumption, the greater use of renewable energy resources supported by energy efficiency and conservation, greenhouse gas emissions will be cut and the environment's contribution to human welfare and the economy can be sustained; wealth creation can be sustained from the economy's point of view and social cohesion and important social institutions can be sustained as well.

PART

2

GEOGRAPHICAL CONTEXT

Reviewing Background and Cases

Chapter

4

The Evolution of SEA in Ghana

Chapter Outline

Introduction

The Evolution of SEA in Ghana

SEA within the EIA System

SEA within the Decentralised Planning System

The Application of SEA Theory to Law

The Analysis of SEA Practice against Law and Theory

Overview of Sub-Regional Practice

Conclusion

4 Chapter Four: The Evolution of SEA in Ghana

4.1 Introduction

Strategic Environmental Assessment (SEA) is evolving in Ghana *first* as part of the environmental impact assessment (EIA) process and *second* as part of the planning process. As part of the EIA process the SEA practice tends to emphasize written SEA reports while less emphasis is placed on written SEA reports through the planning process. Legal reforms in the 1990s have influenced the evolution of SEA within the EIA and the planning systems in Ghana. The principles emerging from the laws, regulations and guidelines are consistent with SEA theory. These principles in turn influence SEA practice in Ghana. In the West African sub-region, EIA procedures are emerging rather slower than in Ghana. To explore the Ghanaian context of SEA, the following sections discuss the evolution of SEA in Ghana and legal and regulatory framework within the EIA and planning systems of Ghana. It then discusses the application of law to theory and the application of theory to practice using 6 examples. Reference is then made to some research work in the area before concluding the chapter.

4.2 The Evolution of SEA in Ghana

Within the EIA system, the Environmental Protection Council Decree, 1974 and the Environmental Protection Council (Amendment) Decree, 1976 established the rationale and the institutional framework for EIA in Ghana. These earlier legal provisions, however, failed to define the scope for major projects[1] and the status of SEA of policies, plans and programmes. To address some of these limitations, the Ghana Investment Code, 1985 and the Minerals and Mining Law, 1986 expanded the scope of major projects to include private investment (undertakings) particularly in the mining sectors. On the basis of the provisions of the Ghana Investment Code, 1985 and the Minerals and Mining Law, 1986, the then Environmental Protection Council (EPC) drafted preliminary EIA guidelines regulating all 'undertakings.' By the early 1990s, it was observed that the implementation of these provisions failed to address additive, induced synergistic and cumulative impacts of mining activities.

[1] Glasson *et al.* (1999:14-17) have suggested that major projects are defined according to the types of activity; they involve considerable investment; they also involve a planning and development life-cycle and are initiated in several ways.

Besides, the procedures for project EIA failed to proactively address the adverse effects of trade liberalisation and the ongoing development actions in other sectors of the economy. In order to address these limitations, methods for the assessment of policies, plans and programmes and integrated approaches to assessment became important. Stephens (1998) rightly noted the importance of SEA in Ghana and indeed in other developing countries.

> Both Ghana and India are at a more critical environmental and developmental juncture than Europe or North America. Perhaps that it why they have grasped the nettle of integrated approaches and in the face of overburdened governments are attempting to develop processes which will help them control unbridled liberalisation... Without such approaches as SEA, however idealistic at present, the governments of Africa, Asia and Latin America are left with the fallacies of economic development and a balance sheet where lose-lose is more true than win-win.

By 1994, the Environmental Protection Agency (EPA) was established under the Environmental Protection Agency Act, 1994 to replace the EPC. Within two years of its creation, the EPA (1996)[2] published a comprehensive EIA guideline within which the EPA set out the basis for Strategic Environmental Assessment. Furthermore, to make the EIA procedures and SEA of plans and programmes mandatory, substantial portions of the 1996 guidelines were codified as the Environmental Impact Assessment Regulations, 1999, LI 1652.

While SEA was evolving within the EIA system, a parallel development was occurring within the planning system, particularly after the Earth's Summit in 1992. One way by which the Earth Summit conceptualised environmental action was that nations would *think globally and act locally*. Ghana sought to translate the slogan through its planning systems. At best, PPP-making under the existing planning law could only incorporate some limited environmental issues. In fact, the existing planning framework was inefficient. This is partly because the colonial ordinance - the Town and Country Planning Ordinance, 1894, Cap 84 – has continued to govern planning in Ghana.[3] Apart from being dated, planning under Cap 84 ignored policy, plan and programme impacts on the environment and failed to address

[2] With the support from ODA, IIED and Mouchel and Partners
[3] Although many different complementing Local Government Acts have been repealed and/or amended over the years, Cap 84 is still in force.

environmental, social and economic dimensions of sustainability. Planning under it lacked formal stages of EA process: its planning processes failed to predict impacts of PPPs and consider alternatives. As a result, it failed to influence coherent environmental action and decision-making. To worsen the general planning context, there was no national vision or guidelines for the overall policy-, plan- and programme-making. In response to these limitations, a series of legal interventions were made between 1993 and 1994 to address these limitations and to ensure that policies, plans and programmes considered the economic, social and environmental dimensions of sustainability in a consistent and a compatible manner. These include the Local Government Act, 1993, Act 462, the National Development Planning Commission Act, 1994, Act 479 and the National Development Planning (Systems) Act, 1994, Act 480.[4] In 1995, the NDPC produced Ghana's Vision 2020 to provide a framework for PPPs. Within this decentralised planning system, SEA is being applied as an integrated strategic planning tool although SEA is not very well developed (Kessler, 1999). Nevertheless, many SEAs under the decentralised planning system do not end in written reports. Stephens (1998) suggested that although SEA was not yet well developed; broad ideas of SEA are applied within national and local environmental plans.

> Within these guidelines the notion of SEAs is relatively underdeveloped, not because it is unimportant, but because the process is still new and largely untested. Other processes in Ghana, such as the development of National and Local Environmental Plans incorporate the broad ideas of an SEA, including health and social impacts and allowing participatory monitoring procedures.

As Dalal-Clayton and Hughes (1998) also note, the fewer number of written SEA statements may be due to other informal SEA-like activities that may not necessarily be documented.

> What is needed is for developing countries to take a close look for themselves at the relevance and potential utility of SEA, perhaps through stakeholder workshops. They could also take stock of the considerable experience which many of them have of SEA-like approaches (but never

[4] It is pertinent to note that planning approved under the Department of Town and Country Planning continues to be influenced by Cap 84 which is still in force. Although planning under Cap 84 incorporates environmental issues in the integrated PPP-making process, it does not involve the formal EA process, particularly an appraisal of alternatives based on environmental criteria. They do not take alternative into consideration.

labelled as SEA), e.g. through developing environmental action plans and an array of strategies for individual sectors, conservation and sustainable development.

Some forms of SEA-like approaches referred to include Environmental Overview,[5] applied to a number of redevelopment schemes in Accra, Ghana between 1991 and 1996. Notable cases include (i) the Cantonments, (ii) the Ridge, (iii) the Airport and (iv) the Kanda Residential Areas. Other schemes include (v) the Marine Drive and (vi) the Airport City. Information obtained from the head office staff of the Town and Country Department, Accra indicated that the schemes were assessed for consistency with sound environmental principles; alternatives were compared and assessed using some sustainability criteria. Besides, the result of the assessment influenced the original policy objectives such as the sequence of development. These assessments, however, did not result in separate SEA reports. In a study of the schemes the Department of Town and Country Planning noted that the Environmental Impact Assessment of groups of projects taken together helped to apply the same baseline data to the projects at the same time (GOG/UNDP, 1991a, 1991b and 1991c; GOG, 1993 and 1994).

Thus while SEA under the EIA system tends to be written, SEA under the decentralised planning system does not necessarily end in written reports. The experience in SEA here tends to be in 'people's minds.' Another reason why SEA may not end in written reports includes the nature of decentralisation and levels of corresponding planning activity. Decentralised planning in Ghana essentially follows a cascade model (See Chapter 6 for detailed discussion of model). For example, at the national level, the National Development Planning Commission (NDPC) prepares national development plans; while regional planning coordinating units prepare regional plans. At the district level, district development plans are prepared by the District Planning Authorities. Whereas sub-district councils prepare sub-

[5] Environmental overview is a particular form of SEA used internally within the United Nations Development Program (UNDP), and applied to a very wide range of capacity building and other development plans and programmes. This could be deployed rapidly and effectively at low a cost and on a regular basis. It utilises a small group approach where its participants examine time proposal and its context; scope the potential social and environmental consequences and opportunities associated with the proposal; and propose how it can be modified to reduce the unwanted consequences and to enhance the opportunities. The involvement of a broad cross-section of interests and disciplinary skills in the small group is fundamental to its operation.

district plans, town and area councils prepare local action plans. From the national level down towards the local community level, ecocentric views are stronger and oral tradition tends to play a significant role in communication (see post-colonialist critique discussed in Chapter Two). Consequently, the attachment to written reports is less important at that level. Even at the top, unless SEA reports become a World Bank loan requirement, a separate written SEA report is not a priority, so long as the development planning process is made consistent with sound sustainability principles. Besides, although the EPA supports the decentralised planning institutions,[6] it is unable to enforce EIA law against them.

4.3 SEA within the EIA system: Regulation and Guidance.

Within the EIA system, the Environmental Assessment Regulations, 1999, L.I. 1652 provides the clearest legal basis for Strategic Environmental Assessment in Ghana. This is because it is the first law that has defined undertaking,[7] to which SEA relates, to include plan and programme, thus paving the way for plan and programme SEA. Regulation 30 (1), LI 1652 defines 'undertaking' as

> any enterprise, activity, scheme of development, construction, ***project,*** structure, building, work, investment, ***plan***, ***programme*** and any modification, extension, abandonment, demolition, rehabilitation or decommissioning of such undertaking, the implementation of which may have significant impact (emphasis added).

Based on this definition of undertaking,

> No person shall commence any of the undertakings specified in Schedule 1 to these Regulations or any undertaking to which a matter in the Schedule relates, unless prior to the commencement, the undertaking has been registered by the Agency and an environmental permit has been issued by the Agency in respect of the undertaking. No person shall commence activities in respect of any undertaking which in the opinion of the Agency has or is likely to have adverse effect on the environment or public health unless, prior the commencement, the undertaking has been registered by the Agency and

[6] To support Local Agenda 21 initiatives and the EPA has trained some people in the grassroots levels in broad environmental issues through the District Environmental Management Committees (DEMC) formed within the District Assemblies (DAs). These DEMCs have helped the DAs to complete their environmental action plans that identified problems, prioritised problems, causes, effects and the needed interventions. The action plans provide sources of information and policy direction at the grass root level policy making and SEA.

[7] The term undertaking has appeared in the EIA laws since 1994 but has never been defined to include plan and programme EIA.

an environmental permit has been issued by the Agency in respect of the undertaking (Regulation 1).

Furthermore, Regulation 2 requires that

> where the Agency considers that any undertaking in existence on the date of the coming into force of these regulations has or is likely to have adverse effect on the environment or public health, the Agency shall issue a written notice to the person responsible to seek registration and obtain an environmental permit in respect of the undertaking within such time as shall be specified in the notice

Moreover

> No environmental permit shall be issued by the Agency for any of the undertakings mentioned in Schedule 2 to these Regulations unless there is submitted by the responsible person or Agency, an environmental impact assessment in accordance with these Regulations in respect of the undertaking.

The regulation covers indirect impacts and transboundary issues as follows:

> the environmental impact statement shall also address possible direct and indirect impacts of undertaking on the environment at the pre-construction. operation, decommissioning and post-decommissioning phases [and the draft terms of reference is to have] an indication whether any area outside Ghana is likely to be affected by the activities of the undertaking [Regulations 14(2) and12(0)].

Being a development within the EIA system, SEA practice follows the EIA procedures. The procedure for obtaining an environmental permit covers both undertakings existing prior to the coming into force of 1999 regulation and proposed undertakings after 1999. There are basically three stages through which a permit is obtained and an undertaking is registered. These include Registration Assessment (RA), Preliminary Environmental Report (PER) and Environmental Impact Assessment (EIA). These stages are based on the categorisation of the undertakings, their likely adverse impacts, and/or the discretion of EPA.

4.3.1 Registration Assessment Report

Figure 4.1 below shows the procedure for Registration Assessment Procedure. The process begins by completing an appropriate form and submitting a Registration

Assessment Report which the EPA by an initial assessment screens. If after the assessment by the EPA the application is approved, then the undertaking will be permitted and registered. If the application is not initially approved, it may require revision and modification before resubmitted. Depending on the perceived impacts the undertaking is likely to make, the EPA may also ask for a Preliminary Environmental Report or an EIA. Alternatively the application may be declined in which case the applicant discontinues an existing undertaking or if the undertaking is yet to commence, it is prohibited.

Box 4.1: Registration Assessment by screening of application

5. (1) The Agency shall on receipt of an application and any other relevant information required, as an initial assessment, screen the application taking into consideration—

a. the location, size and likely output of the undertaking;
b. the technology intended to be used;
c. the concerns of the general public, if any, and, in particular, concerns of immediate residents if any;
d. land use; and
e. any other factors of relevance to the particular undertaking to which the application relates.

(2) An applicant shall for the purpose of enabling the Agency determine the level or environmental assessment of his undertaking, prepare and submit to the Agency a report on the undertaking indicating in the report--

a. the environmental, health and safety impact of the undertaking;
b. a clear commitment to avoid any adverse environmental effects which can he avoided on the implementation of the undertaking;
c. a clear commitment to address unavoidable environmental and health impacts and steps where necessary for their reduction; and
d. alternatives to the establishment of the undertaking.

Screening report

6. After the screening under regulation 5, the Agency shall issue a screening report on the application and shall state in the screening report whether the application~

a. is approved; or
b. is objected to; or
c. requires submission of a preliminary environmental report; or
d. requires the submission of an environmental impact statement.

Source: LI 1652 ENVIRONMENTAL ASSESSMENT REG. 1999

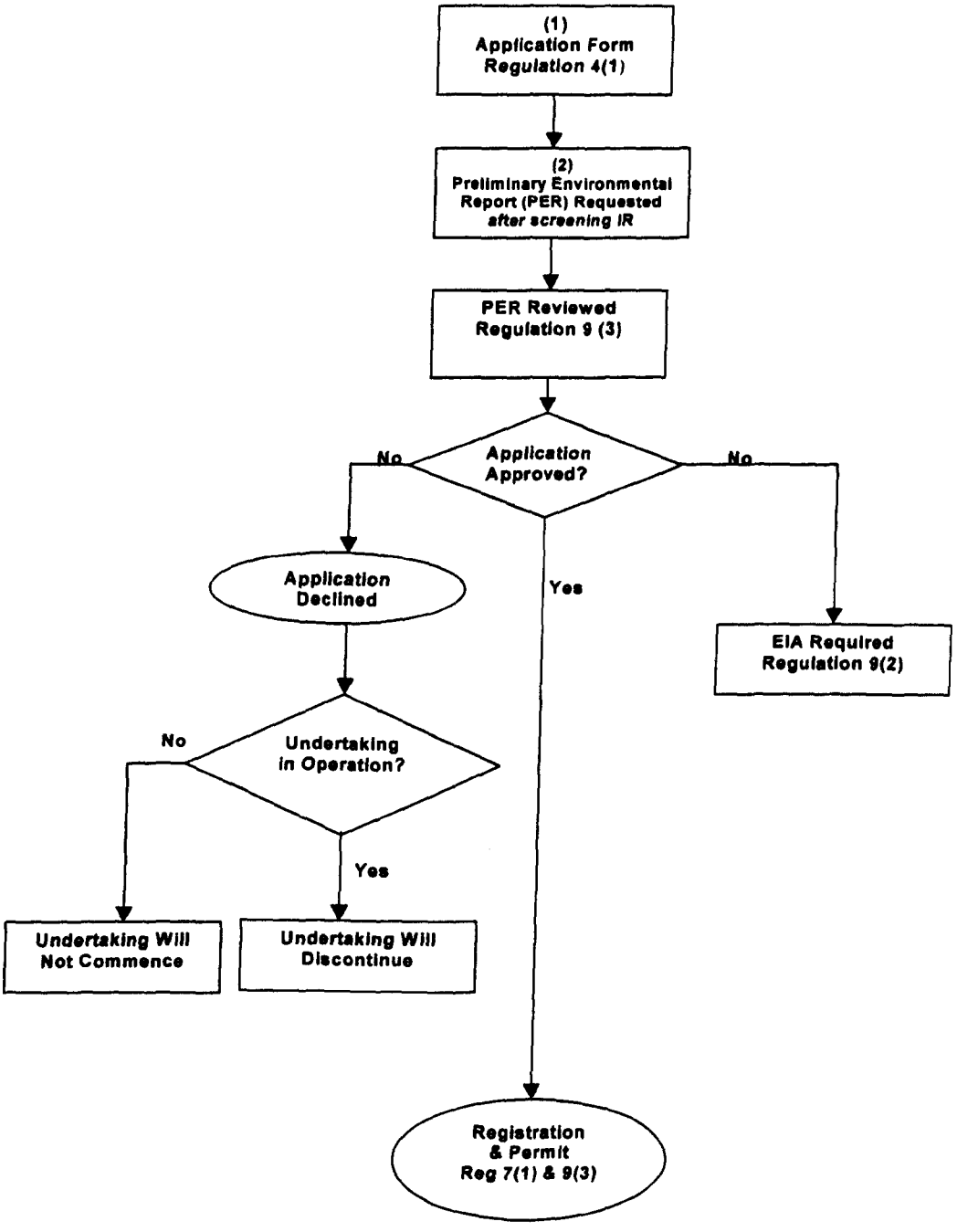


Figure 4.1: Registration Assessment Report

4.3.2 Preliminary Environmental Report

The procedure is similar to the process for Initial Report insofar as steps (1) and (2), as labeled in Figure 4.1 above, are concerned but adds a requirement for submitting a Preliminary Environmental Assessment Report which is reviewed by the EPA. The approval or refusal of PER follows the same process as Initial Report except that EIA may be required following its review.

Box 4.2: Preliminary Environmental Report

9. (1) Where the Agency upon consideration of an application decides that there is the need for a preliminary environmental assessment to be submitted in respect of the application, the Agency shall request the applicant to submit a preliminary environmental report on the proposed undertaking.

(2) A preliminary environmental report submitted under sub-regulation (1) shall contain details other than information submitted with the original application or the environmental permit and shall state specifically the detailed effects of the proposed undertaking on the environment.

(3) Where the Agency after consideration of' a preliminary environmental report approves the report, it shall register the undertaking and issue in respect of the undertaking an environmental permit.

(4) Where the Agency, upon receipt of a preliminary environmental report is satisfied that a significant adverse environmental impact is likely to result from the activities of the undertaking the applicant shall be asked to submit an environmental impact statement on the undertaking in order that the environmental impact of the proposed undertaking can he assessed.

Source: LI. 1652 ENVIRONMENTAL ASSESSMENT REGULATION, 1999

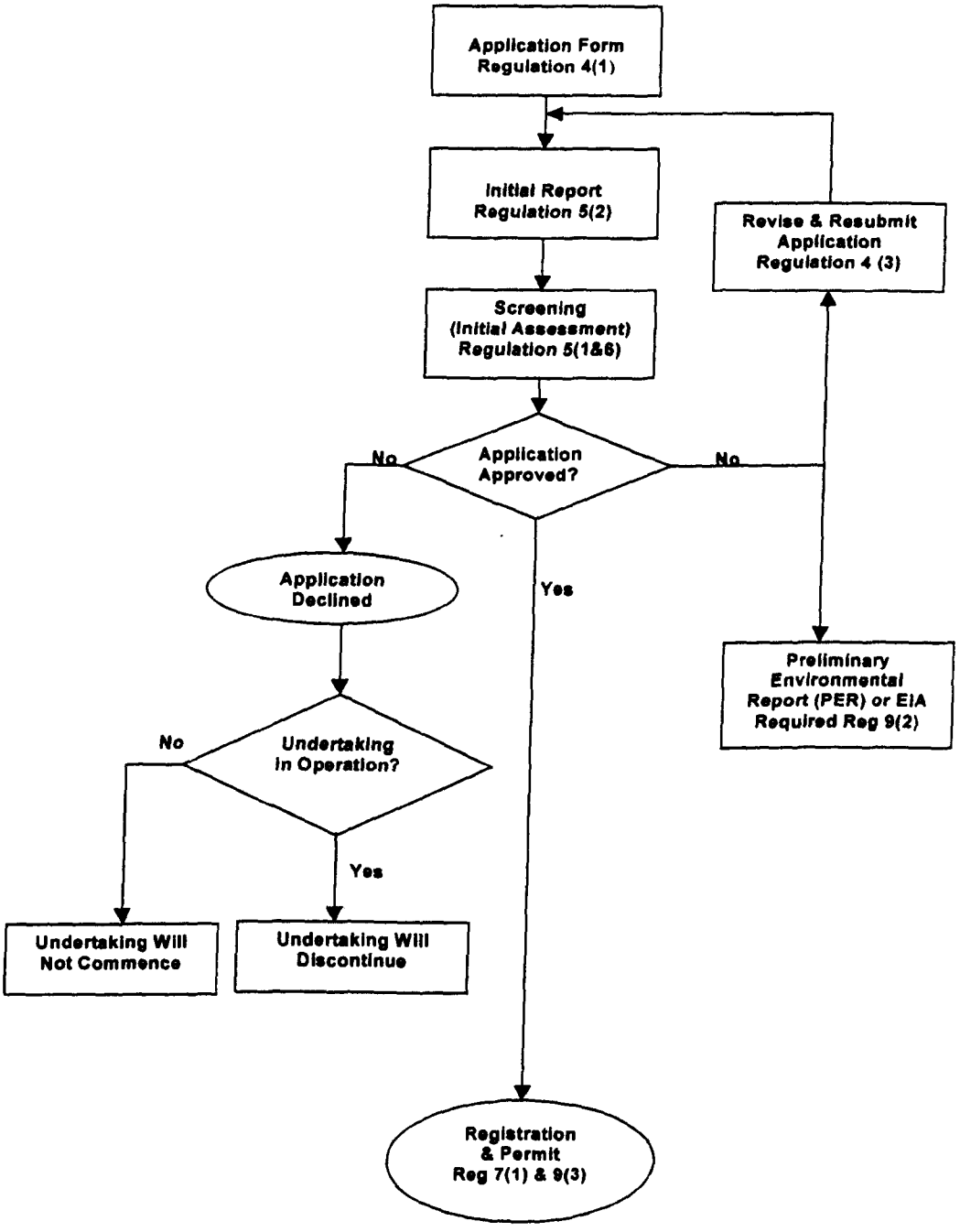


Figure 4.2: Procedure for PER Assessment

4.3.3 Environmental Impact Assessment

EIS either arises in the first instance when an undertaking [including plan and policy] is a Schedule 2 undertaking. It arises indirectly as the result of RA and PER reviews. After an application form is completed as in RA and PER, the EPA as an in initial assessment screens the application. The applicant then submits a Scoping Report (SR). The SR, based on the terms of reference provided for by regulation and listed in Box 4.3, may be approved in the first instance or subjected to a further revision prior to resubmission. If the SR is approved it paves the way for the preparation of Draft EISs by the proponent. Then the applicant advertises the SR to enable him address concerns at an earliest stage.

Box 4.3: Scoping report and Terms of Reference

11.A scoping report shall set out the scope or extent of the environmental impact assessment to be carried out by the applicant, and shall include a draft terms of reference, which shall indicate the essential issues to be addressed in the environmental impact statement.

Draft terms of reference

12. The draft terms of reference shall stipulate that the environmental impact statement on the proposed undertaking will deal with matters including the following—

a. description of the undertaking;
b. an analysis of the need for the undertaking;
c. alternatives to the undertaking including alternative situations where the undertaking is not proceeded with;
d. matters on site selection including a statement of the reasons for the choice of the proposed site and whether any other alternative site was considered;
e. an identification of existing environmental conditions including social, economic and other aspects of major environmental concern;
f. information on potential, positive and negative impacts of the proposed undertaking from the environmental, social, economic and cultural aspect in relation to the different phases of development of the undertaking;
g. the potential impact on the health of people;
h. proposals to mitigate any potential negative socio-economic, cultural and public health impacts on the environment;
i. proposals to be developed to monitor predictable environmental impact and proposed mitigating measures
j. contingency plans existing or to be evolved to address any unpredicted negative environmental effect;
k. consultation with members of the public likely to be affected by the operations of the undertaking;
l. maps, plans, tables, graphs, diagrams and other illustrative material that will assist with comprehension of the contents of the environmental impact statement;
m. a provisional environmental management plan;
n. proposals for payment of compensation for possible damage to land or property arising from the operation of the undertaking; and an indication whether any area outside Ghana is likely to be affected by the activities of the undertaking.

Source: LI. 1652 ENVIRONMENTAL ASSESSMENT REGULATION, 1999

The applicant then prepares and submits at least 12 EISs for a further publication by the EPA in the relevant circulating papers. After the publication, the EPA reviews the EIS based on all the comments, concerns, reservation and objections raised by the public and stakeholders. On the basis of the review, the application could be approved leading to finalisation of the EIS, registration and the issuing of permits. The EPA may also ask for the EIS to be revised and further studies conducted by the applicant prior to resubmission. Where it is necessary that a public hearing is conducted, the hearing will precede the revision and resubmission. Following the outcome of the public hearing and review, the application may be approved or declined.

Box 4.4: Matters to be addressed in Environmental Impact Statement

14.(1) In submitting an environmental impact statement pursuant to regulation the applicant shall indicate in the document a clear assessment of the proposed undertaking on the environment based on the contents of the scoping report.

(2) The environmental impact statement shall also address possible direct and indirect impact of the undertaking of the environment at the pre—construction, construction, operation, decommissioning and post-decommissioning phases including—

a. concentration of pollutants in environmental media including air water and land from mobile or fixed *sources:*;
b. any direct ecological changes resulting from such pollutant concentrations as they relate to communities, habitats, flora arid fauna;
c. alteration in ecological processes such as transfer of energy through food chains, decomposition and bio-accumulation which could affect any community, habitat or specie of flora and fauna;
d. ecological consequences of direct destruction of existing habitats from activities such as dumping of waste and vegetation clearance and fillings;
e. noise and vibration levels;
f. odour;
g. vehicle traffic generation and potential for increase in road accidents;
h. changes in social, cultural and economic patterns relating to—
i. decline in existing or potential use of valued resources arising from matters referred to in paragraphs *(a) to d)* of this sub—regulation;
j. direct and indirect employment generation;
k. Immigration and resultant demographic chances:
l. provision of infrastructure such as roads, schools and health facilities;
m. local economy;
n. cultural changes including possible conflict arising from immigration and tourism; and
o. potential and use in the area of the proposed undertaking.

(3) An environmental impact statement shall also include information on the possible health effect of the undertaking on persons within and around the vicinity of the proposed undertaking.

(4) An environmental impact statement for mining and other extractive industry shall include reclamation plans.

Source: LI 1652 ENVIRONMENTAL ASSESSMENT REG,1999

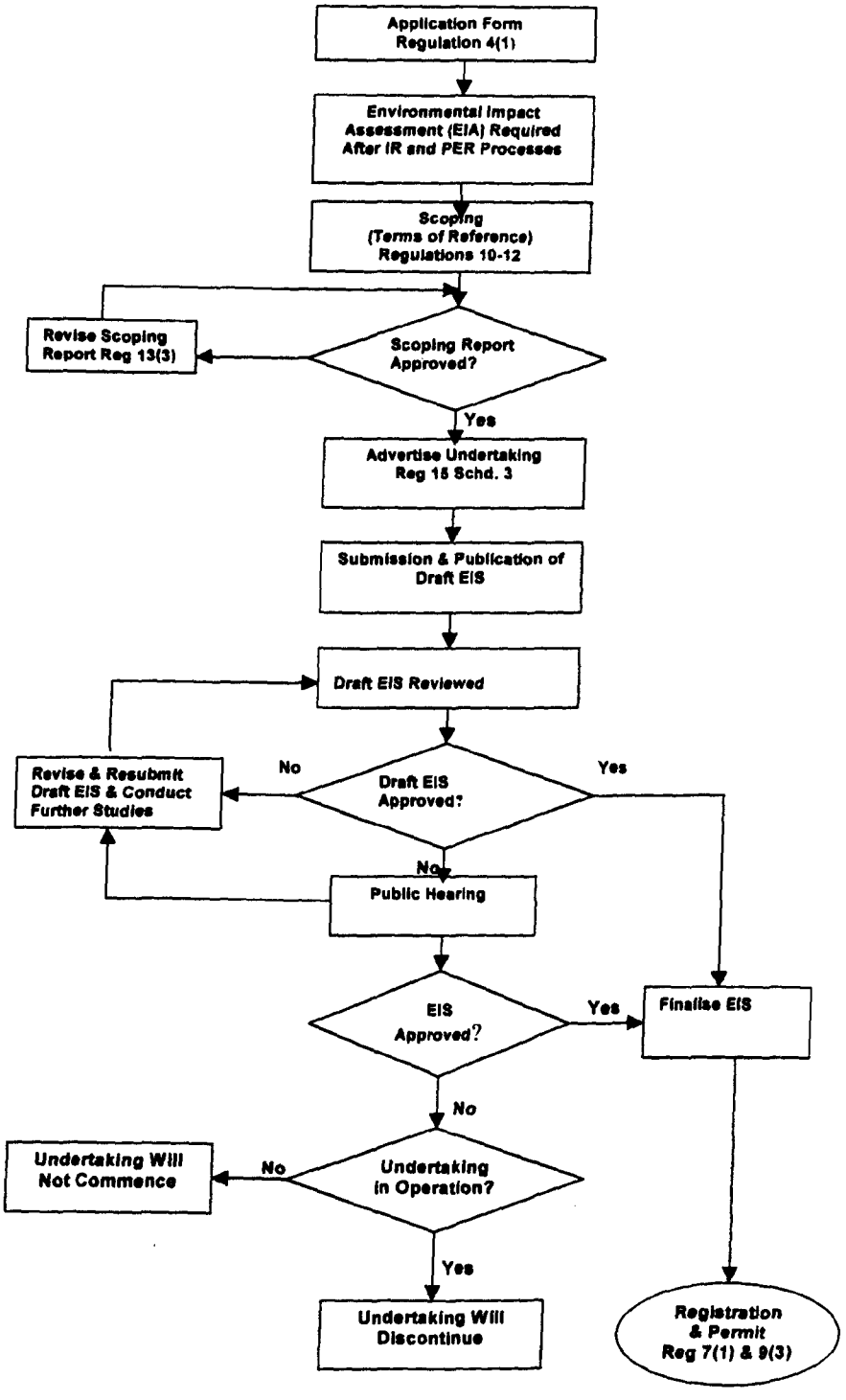
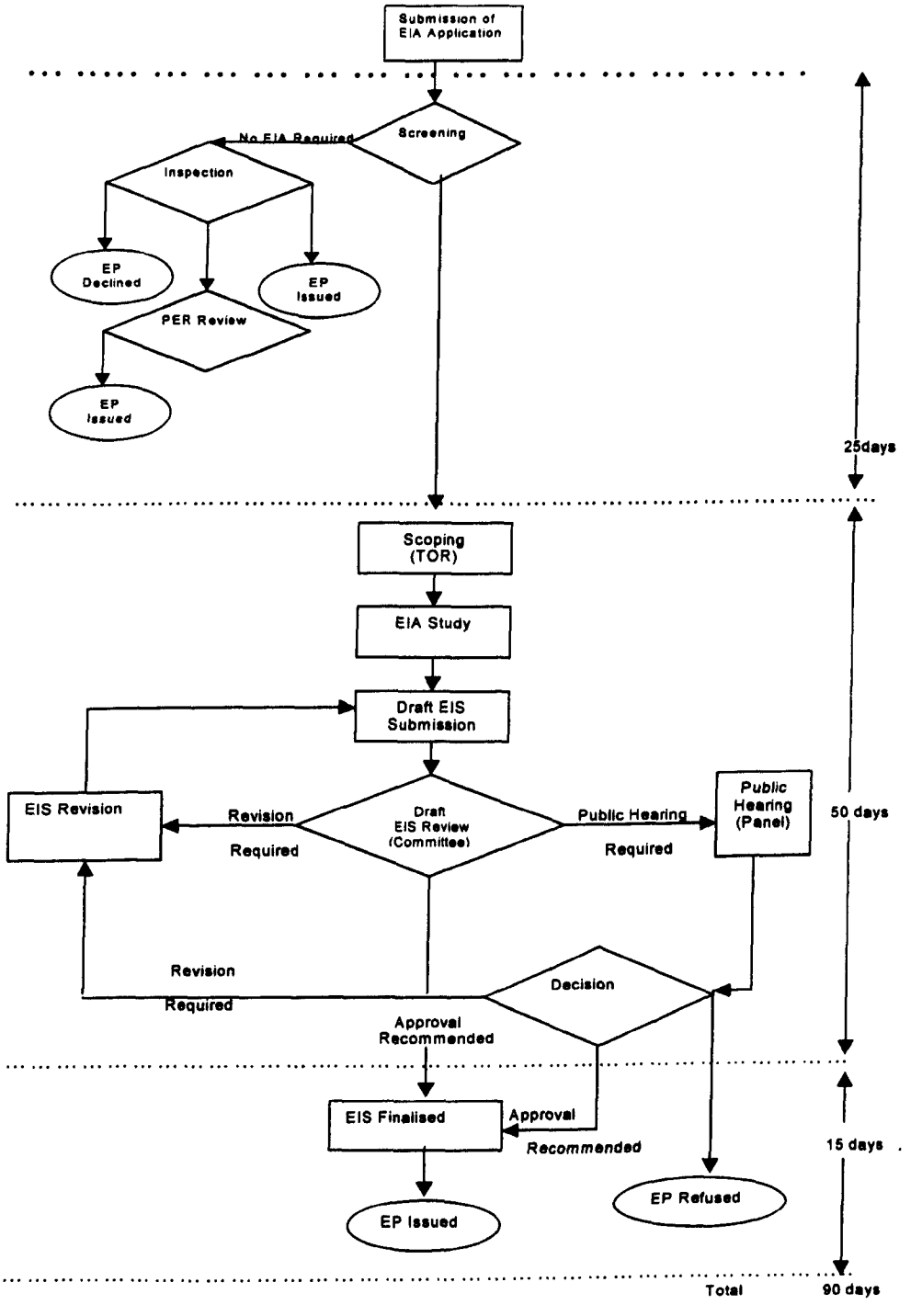


Figure 4.3: Plan, Programme and Project Impact Assessment Procedure

Figure 4.4 below shows the consolidated procedural diagram as applied in Ghana providing links between RA, PER and EIS.



Source: EPA, Ghana

Figure 4.4: EIA Procedure in Ghana in Practice,

Under the provisions of the legislative instrument (LI 1652), development must commence within 18 month from the date of approval to validate the permit. Within 24 months from the commencement of the undertaking, the applicant obtains a Certificate from the EPA. Post application monitoring and management require that the applicant should submit an Environmental Management Plan (EMP) and Annual Reports (AR).

4.4 SEA within the Decentralised Planning System

Figure 4.5 below illustrates the SEA Procedure under the decentralized planning system in Ghana. Within the new decentralized planning system in Ghana, SEA starts with the Ghana Vision 2020, relies on national policies and objectives. They are then assessed for their compatibility with each other and the national development objectives. In view of environmental concerns, decentralised plans are also examined to ensure that they are in conformity with sound environmental principles.

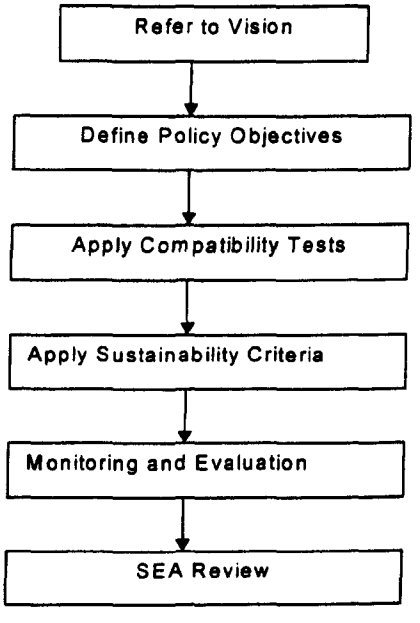


Figure 4.5: SEA Procedure

This assessment is carried out based on some sustainability criteria. Turkson and Amadu (1999) claimed that Ghana's Ministry of Mines and Energy 'has defined a

number of criteria for the promotion of and commercialisation of renewable energy technologies. The criteria include sustainability, cost recovery, environmental protection and basic community needs.' In addition, PPPs are subject to monitoring and evaluation as well as to constant review. The relevant regulation relating to each of the above components are as follows.

In relation to a vision, Ghana's Vision 2020 document provides a starting point. It states that:

> the long-term vision for Ghana is that by the year 2020 Ghana will have achieved a balanced economy and a ***middle-income country status and standard of living...*** This will be realised by creating an open and liberal market economy, founded on competition, initiative and creativity, that employs science and technology in deriving maximum productivity from the use of all our human and natural resources and in optimising the rate of economic and social development, with due regard to the protection of the environment and to equity in the distribution of benefits of development. These aims will be achieved by creating a robust, diversifies and commercially-based agricultural sector with strong linkages to an efficient, technologically-progressive and market oriented industrial sector, both of which sectors pay due regard to the maintenance of a sound and sustainable environment as well as to the generation of employment opportunities, including self employment"(GOG, 1995: 1)

Regarding the source of policy and objectives to guide plans and programmes, the following provision makes the National Development Planning Commission's role explicit.

> The National Development Planning Commission shall **issue approved development policies** as directed by the President for the guidance of the public and private sector; prescribe the format and content of development plans for the districts, ministries and sector agencies; co-ordinate district development plans and programmes...and ensure that these plans and programmes are compatible with **national development objectives** (Act 480, Section 11 (a-i)) (emphasis mine).

Similarly at the district level, the District Assembly shall

> carry out studies on development planning matters in the district including studies on economic, social, spatial and environmental, sectoral and human settlement issues and policies; initiate and co-ordinate the processes of...implementation of district

development plans, programmes and projects; integrate and ensure sector and spatial policies, plans, programmes and projects of the district are compatible with each other and with national **development objectives** issued by the Commission (*emphasis mine*) (Act 480, Section 2(1)(b-e)).

The basis for applying compatibility tests to national and lower tier development plans can be gleaned from the following provision. At the national level,

> The National Development Planning Commission shall ...integrate economic, spatial and sectoral plans of ministries and sector agencies and ensure that these plans are **compatible** with national development objectives; keep under constant review national development plans in the light of prevailing domestic and international economic and political conditions and make recommendations for the revision of existing policies and programmes where necessary (Act 480, Section 11 (a-i)).

Similarly at the district level, the District Assembly shall carry out the

> implementation of district development plans, programmes and projects; integrate and ensure sector and spatial policies, plans, programmes and projects of the district are **compatible** with each other and with national development objectives issued by the Commission (Act 480, Section 2(1)(b-e)).

The use of sustainability criteria at the highest and lowest levels of development planning is also founded on legal provisions. At the highest level, the National Development Planning Commission (NDPC) would

> 'prepare broad national development plans; make proposals for the protection of the natural and physical environment with the view to ensuring that development strategies and programmes are in ***conformity with sound environmental principles***' (Act 479, Section 2(2)(c & h)).

Similarly, at the lowest level planning authorities shall

> synthesize the policy proposals and development planning in a district into a comprehensive framework for the economic, social and spatial development of the district including human settlement and ensure that the policy proposals and projects are

in **conformity with the principles of sound environmental management** (See Section 2(1)(b-e) of Act 480)

In terms of monitoring and evaluation, the National Development Planning Commission and the District Assemblies responsibilities are stated clearly. At the national level, Act 479, Section 2(e) spells out the NDPC role as follows.

> The Commission shall, at the request of the President, Parliament, or on its own initiative... monitor, evaluate and coordinate development policies, programmes and projects.

At the District level, the District Assemblies

> shall monitor and evaluate the development policies, programmes and projects in the district...[and to] monitor the execution of projects under approved development plans and *assess and evaluate their impacts on the people's development, the local, district and national economy*...[Act 462, Section 10(4)(e); Act 480, Section 2(1)(f)].

In relation to review, the NDPC is mandated to keep

> under constant review national development plans in the light of prevailing domestic and international economic social and political conditions and make recommendations for the revision of existing policies and programmes where necessary (Act 479 2(2)(l)).

On the basis of these provisions and practice, the NDPC claims that

> the approach is comprehensive inasmuch as the social, economic, environmental and spatial aspects of development have been examined as a single integrated task. Their relationships have been explored in order to provide mutually supportive solutions to identified problems (GOG, 1995: 3).

4.5 The Application of SEA Theory to Ghanaian Legal Provisions

Putting the lessons from previous discussions together, the following lessons can be learnt. The above-mentioned legal provisions cover EIA/SEA principles of screening, scoping, mitigation and monitoring. Regulation 5(1) of LI 1652, for instance, supports screening based on Registration Assessment (Figure 4.6). Under Regulation 11, impacts are scoped based on the terms of reference (TOR) listed under Regulation 12. In addition to the TOR, regulation 5(2) stresses the importance

of mitigation. Moreover, post development monitoring would be facilitated by annual reports and environmental management plans prepared by the proponent.

When Act 480 refers to 'approved development policies' setting the framework for 'development plans and programmes' at the national level on the one hand, and to 'national development objectives' determining 'district development plans and programmes and projects' on the other hand; the importance of tiering is implied. The requirement for a Registration Assessment, Preliminary Environmental Assessment or Environmental Impact Statement prior to commencement of any undertaking is a statement of proactive assessment.

Furthermore, LI 1652 is explicit on indirect impacts and quite clear on transboundary effects when proponents are to indicate 'whether any area outside of Ghana is likely to be affected by the activities of the undertaking' (See TOR). Other references in the regulation to 'undertaking to which a matter in the schedule relate,' 'activities in respect of any undertaking' and 'undertaking which in the opinion of the Agency is likely to have adverse environmental effects' suggest a possibility of extending assessments to cover such other impacts as cumulative or synergistic impacts. Moreover, 'activities in respect of an undertaking' could also relate to cycles, phases and processes of a policy plan and programme. The ability to use these provisions to cover these impacts depends to a large extent on the ability and creativity of the Agency to use its discretion positively. But discretion must be used cautiously. Hawkins (1993:17-18) cautions about this kind of law making that characterises environmental enforcement and confers discretion on public officers. According to him,

> The essence of regulation is a conception that law is the means by which some notion of public good is to take precedence over narrow economic interests. This is not particularly novel in law. What is of relatively recent origin, however, is the creation of bureaucracies equipped with legal sanctions to regulate economic life. Specifically created to control a particular segment of economic activity, regulatory agencies in general enjoy broad powers to set and enforce standards of conduct. Each agency has its own form of organisation, administrative control and territorial jurisdiction. The authorities' legislative mandate, intended to give organisational activity, a sense of purpose and direction, is framed in general terms and confers wide discretion as to the formulation of policy and its implementation. The boundaries of regulatory deviance

> are drawn by administrative agencies: what passes for approval, in other words, is administrative creation. The broad legal mandate of the agencies about environmental compliance is transformed into policy by senior officials and given practical expression in the setting of enforcement procedures.

This use of discretion applies to the EPA and its officials in the performance of their functions in many respects. This is because the laws give the EPA discretion to take certain actions whenever 'in its opinion' it is necessary.

Besides, by drawing inspiration from a vision, and insisting that plans and programmes are consistent and compatible with other policies, national policy, national development objectives and sound environmental principles, a methodological framework for SEA involving compatibility assessment is very plausible. The evolution and laws also stress the importance of sustainable development in development planning. The above principles enmeshed in the legal provisions for EA of policies, plans, programmes and projects in Ghana are consistent with EIA/SEA theory (For detailed discussions of the principles, see Chapter 3 for SEA Theory and Chapter 8-10 where these theoretical foundation provided a backdrop for the questionnaires).

4.6 The Analysis of SEA Practice in Ghana against Law and Theory

Subject to the above legal and theoretical interpretations, the following sections discuss the evolution of SEA practice in Ghana. This discussion adopts two sets of criteria (general framework and sustainability framework) to analyse 6 reports from Ghana. Under the general framework, the study considered legal-institutional and participatory frameworks. It also addressed contents of the some 6 reports on SEA (description of PPPs, identification of alternatives, scoping and prediction of impacts etc). It looked at methods (e.g. matrices, quantitative, qualitative and modelling etc) and changes resulting from the SEA (e.g. more explicit or improved SEA). The sections also discussed a sustainability framework for analysis including the use of vision, goal, criteria and indicators in assessment; proactive assessment and the importance of tiering (policy designed to affect plan or programme). Furthermore, the study explored some dimensions of sustainability (social, economic and

environmental) and their compatibility. It then looked at how the reports covered the scale of impact (local, national and global) as well as cumulative/indirect impacts.

4.6.1 Examples Examined

The reports analysed include the Environmental Action Plan (EAP) [1991]; the Village Infrastructure Programme (VIP) [1997]; the First Medium-Term (1997-2000) Development Plan (FMTDP)[1998]; the Export Processing Zone (EPZ) [1999]; the Electricity Power Restructuring Programme (EPRP)[1999]; and the Bui Hydroelectric Project (BHEP) [2002-ongoing]. The Village Infrastructure Project (VIP) is a poverty reduction agricultural sector programme initiated by the Ministry of Food and Agriculture (MOFA) to meet the World Bank and other donors' borrowing requirements and in accordance with EIA requirements. The VIP aims to achieve sustainable livelihood[8] and targets women, children and other vulnerable groups as beneficiaries. The programme goals include increased smallholder productivity, increased smallholder farm incomes, improved community welfare, increased rural employment, better community health and nutritional status and strengthened rural institutions.

The EPZ (1999) was a plan to establish a 1156.7 export processing zone in Tema, the industrial and sea port city of Ghana. The project has 2 major components: (a) provision of offsite infrastructure to facilitate the development of the site such as access roads, water, electricity and drainage and (b) provision of various on-site facilities to enable productive activities such as factory building, commercial centres, security and the like. The EAP (1991) was a sectoral SEA dealing with sectoral activities such as agriculture, forestry, industry and urbanisation of different receptors. It was perhaps Ghana's first attempt on an SEA-like activity. It addressed the key issues relating to the protection of the environment and better management of renewable resources.

The FMTDP (1998) is a national development plan. It covered planning, human development, economic growth, rural and urban development, infrastructure and spatially oriented development. It also dealt with macro-economic issues, resource

[8] This is discussed as a component of sustainable development in the third chapter.

mobilisation and efficient resource allocation in line with prioritised national development goals and targets. Other issues dealt with include public-private partnership, resource constraints, monitoring and evaluation plan, review processes and implementation.

The BHEP (2002-) is being prepared with the support from international financial institutions, such as the World Bank (WB) and the International Finance Corporation (IFC). It covers mitigation/management program for the Bui project; environmental monitoring plan; management plan for Bui National Park (BNP); and, plan for the establishment of a BNP Foundation. It deals with cumulative impacts. The EPRP (1999) studies dealt with the environmental effects of the restructuring of the electricity sector of Ghana. It covered general environmental effects of the electricity utility industry. This covered local and regional environmental impacts, impacts on soil and land, environmental effects of hydroelectric power projects and electricity transmission lines. It looked at mitigation of environmental impacts power sector reforms in Ghana.

These examples are chosen to reflect different aspects of SEA. The EAP (1991) was chosen to reflect a policy SEA; the VIP (1997) was chosen because it was an example of programme SEA; the EPZ (1999) was an example of plan SEA; the FMTDP (1998) reflected the interplay between policy, plan and programme SEA. The EPRP (1999) was an example of an SEA study meant to influence decision-making and the BHEP (2002 ongoing) was chosen because it is an energy programme being undertaken after the LI 1652 and incorporates some aspects of the SEA process.

4.6.2 Description of PPPs and Scoping

Based on the criteria adopted in Table 4.1, the following conclusions can be drawn. All the reports made a reference to clear legal, institutional and participatory frameworks. All the reports also described PPPs. In the description, the VIP (1997) provided a list of measures for the implementation of the strategy and the restrictions, which should be placed on future development. The EPZ (1999) made assumptions about the envisaged developments occurring as the result of the PPPs. In the exception of the EAP 1991 and the FMTDP 1998, other reports presented

evidence of scoping. Scoping techniques used include checklists developed based on the EPA guidelines and EIA regulations.

Table 4.1: General Framework

	EAP 1991	VIP 1997	FMTDP 1998	EPZ 1999	EPRP 1999	BHEP 2002-
Clear Legal Requirements	√	√	√	√	√	√
Public Participation Framework	√	√	√	√	√	√
Institutional Framework	√	√	√	√	√	√
Identify Alternative PPPs	√			√	√	√
Describing the PPPs	√	√	√	√	√	√
Scoping		√		√	√	√
Consideration for Limited Policy Options	√		√	√	√	√
Wide range of effects Considered	√	√	√	√	√	
Describing Baseline Environment		√	√	√		√
Predicting Impacts	√	√	√	√	√	√
Evaluating Impacts and Comparing Alternatives				√	√	√
Mitigation	√	√	√	√	√	√
Monitoring	√	√	√	√	√	√
Adapting EIA Methodology to SEA	√	√	√	√	√	√
Developing a Distinctive SEA Methodology						
Scenarios Used				√	√	√
Matrices are Used	√	√	√	√	√	√
Modelling is Used					√	
Geographical Information System In Use						
Quantitative Analysis in Use				√	√	
Qualitative Analysis in Use	√	√	√		√	
Compatibility Matrices In Use						
More Explicit PPP Objectives						
Removing Contradictions in PPP						
Improving PPP because of SEA						
Changing PPP because of SEA						
New Objectives to Capture Sub-components						

4.6.3 Baseline Environment

From Table 4.1, the VIP (1997), the FMTDP (1998), the EPZ (1999) and the BHEP (2002) described detailed baseline environment. The EPZ (1999) for example, described the existing environmental baseline and predicted likely future baseline without the PPPs. The baseline environment for the VIP (1997) was provided by reference to existing geographical, geological, hydrological, demographic, health and statistical data as well as *Ghana Living Standards Survey* (GLSS 1991/92) published in 1993. Other baseline information on surface and underground water resources was quantified by using drainage area (km^2), minimum, maximum and mean runoff rates (m^2/day). Thus the baseline information describes the physical environment over the whole country and covering specifics, like water resources (both surface and groundwater), geology, soil types and climate. Since the project primarily aims to reduce rural poverty, the report elaborates on the socio-economic aspects of rural life by providing extensive baseline information on factors such as population, income levels, education, housing, health and existing infrastructure including markets and roads.

The baseline environment for the EPZ (1999) was provided by reference to existing geographical, geological, hydrological, demographic, health and statistical data as well as study conducted by Ghana Highway Authority (GHA) and other consultants. The baseline data first identified generated traffic growth as a result of normal population growth over time under no action alternative. It then outlined the number of trips diverted from other routes and modes as the result of the project and additional trips induced by the lower travel time and vehicle operating cost due to the improvement of the road and as the result of the export processing zone. Where it was necessary, projected figures were quantified. For example, cumulative equivalent standard axle for each vehicle to use the road facility was calculated [using the formula 365 x AADT x (1+ av. growth) ^{15} x ESA.][9] Two alternative

[9] AADT is average annual daily traffic; av. growth is average growth rate of each vehicle and ESA is equivalent standard axle for a vehicle.

further assumptions guided the assessment of sewer network: one based on the existing citywide network and the other on a separate network for the export processing zone.

Thus the baseline information covered location of project site, status of existing infrastructure, road and transport, engineering design and details road, pavements and drainage, traffic load (cumulative axle load) design. It also covered immediate (1998-2000) water supply and medium to long-term (2000-2015) water supply. In general the baseline study covered adopted approaches, demand estimation, electricity, telecommunication, waste management, toxic substances, land use and land forms, population, soils, geology, topography, climatic data, air quality and noise levels. It also took account of the characteristics of two affected lagoons and their catchments in terms of water quality, aquatic life, flora and fauna.

4.6.4 Impact Identification and Prediction

Although all the reports predicted impacts, only the EPZ (1999), the EPSR (1999) and the BHEP (2002) evaluated impacts and compared alternatives. Impacts predicted were presented descriptively. In predicting impacts, the 4 VIP (1999) projects under the programme were subdivided into sub-projects. The report further broke down detailed predicted impacts under broad subheadings for each of the sub-project. For example, the rural water infrastructure component was divided into (i) ponds, dugout wells and other surface impoundments; (ii) boreholes, hand-dug wells and spring development; (iii) stream diversion, pumping facilities, and runoff management and (iv) catchments management. The broad subheadings under which the impacts were discussed include (a) water quality/risk of contamination, (b) habitat for disease vectors, (c) evaporation and seepage, (d) sedimentation/siltation, (e) eutrophication /aquatic weeds, (f) erosion. Under the sub-component (a) above, impacts identified include contamination from waste disposal, indiscriminate defecation, contact by disease vectors like guinea worm, animal faecal matter and introduction of microbial/biological agents through runoffs. This is done for each sub-component of sub-projects identified under each of the 4 VIP (1999) projects in detail.

The EAP (1991) tabulated identified impacts of sectoral activities on people, animals, vegetation, aquatic life and air. For example, the impact of forestry (i.e. logging, fuel wood and land clearing for farming) on people includes reduced fuel wood. On animals, the impacts are reduced habitat and disappearance of endangered species. Its effects on vegetation are reduced forest and plant cover, increased soil erosion and chances of desertification. The impact of forestry on water includes destruction of watershed, drying up of waters and reducing moisture carrying capacity of soil. On air, increased rate of evaporation versus lower precipitation affecting rainfall patterns are some impact identified.

Table.4.2: Activities and their Impacts on Receiving Media

	RECEIVING MEDIA				
SECTORAL ACTIVITIES	PEOPLE	ANIMAL	VEGETATION	WATER (fish etc)	AIR
AGRICULTURE Crops Grazing					
FORESTRY Logging Fuelwood	Reduced Fuelwood	Reduced Habitat and Disappearance of Endangered Species	Reduced Forest and Plant Cover, Increased Soil Erosion and Chances of Desertification	Destruction of Water-shed, Drying up of Waters and Reducing Moisture Carrying Capacity of Soil	Increased Rate of Evaporation versus Lower Precipitation Affecting Rainfall Patterns
HUNTING Practices Timing Rate & Intensity					
INDUSTRY Mining					
MANUFACTURING Production Consumption Processing					
URBANISATION Household Production and Consumption					

Source: EPA(1991:94-95)

In terms of the EPZ (1999), the reports discussed identified impacts under offsite and onsite infrastructural facilities. Besides, the development of industries within the EPZ (1999) was divided into constructional and operational phases. The onsite sectors deal with ceramic, textile, food processing, wood processing, metal processing, pharmaceutical facilities and beauty products. Offsite sectors deal with access road, electricity and water supply, sewerage and rail corridor. For each of the

sectors, environmental impacts were broken down into broad subheadings under which detailed impacts were discussed. For example, ceramic sector was discussed under air pollutants, liquid wastes, solid wastes and occupation health hazards. Under the textile sector, air emission was considered in addition to issues discussed under ceramic sector and these are shown in Tables 4.3-4.5.

Table 4.3: Impact Prediction for EPZ

	Components of Affected Environment							
	Physical			Biological		Socio-Economic		
Project Activity	Soil	Air	Water	Flora	Fauna	Population	Health	Jobs
1. Constructional								
Access road	-2	-2	-2	-2	-2	-2	-1	+2
Electricity	0	0	0	0	0	+2	-1	+2
Sewage	-2	-2	-2	-2	-2	+2	+1	+2
Water Supply	0	0	0	+1	+1	+2	+2	+2
Rail Corridor	-2	-2	-2	-2	-2	-2	-1	+2
Telecom	0	0	0	0	0	+2	+1	+2
2. Operational								
Access road	0	-1	0	0	-2	-2	-1	+1
Electricity	0	-1	0	0	0	+1	+2	+2
Sewage	-2	-2	-1	-1	+1	+1	+1	+2
Water Supply	0	0	0	+1	+1	+2	+2	+2
Rail Corridor	0	-2	0	0	0	+2	+2	+2
Telecom	0	0	0	0	0	+2	+1	+2
Ranking: 0=Insignificant 1=Less Significant 2=significant += Positive -=Negative								

4.6.5 Impact Evaluation and Comparison of Alternatives

The report also provided a framework for evaluating impacts on the basis of checklists and the rating based on –2 to +2 range as in Tables 4.4 and 4.5 below.

Table.4.4: Impact Prediction

POTENTIAL PROJECT IMPACTS
Air Quality

	Yes	No	Not Known
Is information available on existing air quality?			
Will project produce any air emission directly?			
Will project help to reduce existing air pollution sources?			
Could project lead to practices that worsen air quality?			
Could project lead to a change in engine or fuel use that could cause serious air problems?			
Is it necessary to consult an air quality specialist?			

ESIIMATED IMPACT MAGNITUDE: -2 -I 0 +1 +2

Table 4.5: Impact Prediction Summarised

SUMMARY OF ESTIMATED IMPACT MAGNITUDE					
AFFECTED ENVIRONMENT / FACTOR	-2	-1	0	+1	+2
Farm Lands					
Soil Erosion					
Slope Stability					
Surface Water Quantity					
Surface Water Quality					
Ground Water Quantity					
Ground Water Quality					
Air Quality					
Noise					
Aquatic Ecosystems					
Wetland Ecosystems					
Terrestrial Ecosystems					
Endangered Species					
Migratory Species					
Beneficial Plants					
Beneficial Animals					
Pests (Plants and Animals)					
Disease Vectors					
Resource/Land Use					
Energy Sources					
Distribution Systems					
Employment					
At-Risk Population					
Existing Population					
Migrant Population					
Cultural and Religious					
Tourism and Recreation					

Sample formats are shown in Tables 4.6-4.11 below. All examples except the VIP (1997) considered limited options while all excluding the BHEP (2002) considered a wide range of effects. Apart from the VIP (1997) and the FMTDP (1998), other reports made reference to alternatives. The BHEP (2002), for instance, investigated alternatives to include: thermal power: alternative energy sources (e.g., wind, solar power, other hydropower and industrial cogeneration); and demand side management (implementation of conservation and efficiency measures). This evaluation takes into account the regional context, including the potential for import/export to adjacent countries and the sources of fuel (oil and gas) for thermal power plants, both existing and proposed. These evaluations include the assessment of the magnitude and the significance of the prediction particularly in the EPZ (1999). In some cases impact identification matrices Table 4.3 and qualitative assessments Table 4.6 were used to predict impacts.

Table.4.6 : Qualitative Evaluation of Impacts

Important Environmental Components		Qualitative Levels
Short term (constructional)		
Air quality	Dust and Machinery Emissions	Medium
Hydrology	Water Impoundment, ground water and surface water pollution from oils and lubricants	Low
Soil	Top soil removal, exposure to erosion and silt run off	Medium
Flora	Loss of Tree cover Loss of general biodiversity Habitat destruction of threatened species	Low Low Low
Population	Increased in population due to construction activities and associated environmental effects	High
Health and safety	Water safety, increase in related disease, accidents related to disruption of traffic flow on main roads	Medium
Agriculture	Compensation for loss to grazing land and watering points and farm lands	Low
Waste Disposal	Siting of waste facilities to serve EPZ, disposal of constructional waste; selection of site for treatment of liquid effluent, soil investigation at final disposal site	Low
Water Supply	Disruption and reduction of water flow to Tema Township as a result of connection to main supply line from Main.	Low

4.6.6 Mitigation and Monitoring

All the reports provide sections on mitigation and monitoring. To mitigate effects envisaged of the programme, the VIP (1997) provided guidelines to cover the effects of the programme in a descriptive format. For example, guidelines for selecting sites identified impacts in relation to cultural, ecologically sensitive sites, adequate land area, sanitation and public health, pollution of water bodies and air pollution. It then describes specific action to be taken to avoid them. The guideline also covers institutional framework co-operation, co-ordination and participation frameworks. The report also set the institutional and technical framework for monitoring future impacts. The EPA and the District Environmental Management Committee are monitoring the implementation of the environmental aspects of the programme

To mitigate effects envisaged of the programme, the EPZ (1999) provided guidelines to cover all areas of the life of the programme using the environmental standards available at the EPA and on the basis of detailed mitigation measures. While the Customs, Excise and Preventive Service, the Ghana Civil Aviation Authority, the Ghana Ports and Harbours Authority, the Ghana Investment promotion Centre and the Ghana Free Zone Board are the institutions monitoring the implementation of the

programme generally, the EPA and the Tema Metropolitan Assembly are strictly monitoring the environmental aspects of the programme. The programme is only at its embryonic stages; it remains to be seen what difference the monitoring programme is to make on the programme.

Table 4.7: Investment Projects to Arrest Environmental Degradation

SECTOR	THEME	PROJECT TITLE	PROJECT OBJECTIVES	ACTIVITIES	IMPLEMENTING AGENCY AND PERIOD
AGRICULTURE					
FORESTRY	Forestry and Wildlife	Desertification Control Plan and Forests and Woodland Monitoring System	Mitigating Drought Effects and Promoting Control of Desertification	Establishment of Desertification Control Machinery, Establishment of Data and Information System to Monitor, Educate and Train Population about it and Rehabilitation of Degraded lands	EPC.
HUNTING					
INDUSTRY					
MANUFACTURING					
URBANISATION					

Source: EPA (1991:96-99)

For the EAP (1991), the mitigation technique employed includes the use of a table. Table 4.7 shows investment projects or mitigation measures aimed to arrest their effects. These are divided into theme, title of project, project objectives, activities, implementing agency and time. The table is then completed descriptively. Using the Forestry sector, the theme adopted is Forestry and Wildlife. Under project titles, the use of Desertification Control Plan and Forests and Woodland Monitoring System are envisaged. Their project objective includes mitigating drought effects and promoting control of desertification. Corresponding activities proposed include establishment of desertification control machinery, establishment of data and information system to monitor, educate and train population about it and rehabilitation of degraded lands. The implementing Agency is the EPC. Apart the above SEAs actually carried out on live programmes, the following are academic researches relating to SEA in Ghana. These cases are therefore summaries of the studies.

For the BHEP (2002), the environmental mitigation/management plan for the Bui Hydroelectric Power Project identify the mitigation and enhancement measures that will most effectively address concerns associated with the project, and provide the

detail needed to implement the plan. Any residual impacts that cannot be mitigated will also be identified and a proposed course of action (i.e., compensation or other measure, as appropriate) to deal with those impacts will be identified. Monitoring plans will be developed for three stages of the project, i.e., pre-construction, construction and operation.

4.6.7 Methodological Issues

There is an evidence of tiering and proactive assessment from all the reports. In the VIP (1997), there is an indication of a proactive action towards sustainable development. SEA was used in this context to identify those sub-projects that have significant impacts and therefore require EIA. For instance, those sub-projects that would be located in environmentally sensitive or critical areas were identified in the report. Other less damaging sub-projects, which require preliminary environmental assessment, such as Feeder Road Rehabilitation and Rural Water Infrastructure Development, were also identified. Similarly others that require registration assessment like Post-Harvest Infrastructure Development were listed. Thus the SEA provides a framework for tracking major, minor and intermediate projects. In terms of the principle of tiering, there is evidence that all, except the EPSR (1999) and the BHEP (2002-), are tiered. For example the VIP (1999) and the EPZ (1999) provide a framework for future project PER and EIA as well as where projects should be sited. As far as goal setting from a vision and policy is concerned, the VIP (1997), the FMTDP (1998) and the EPZ (1999) make reference to goals from Ghana Vision 2020. In addition, the VIP (1997) and the FMTDP (1998) define policies drawn from its goal.

All the reports address economic, social and environmental sustainability issues but none of them analysed the link between economic, social and environmental sustainabilities, sustainability criteria or carrying capacity. While the FMTDP (1998) and the EPSR (1999) employed targets and indicators and used quantified targets, other reports (EAP, 1991; VIP, 1997 and BHEP, 2002) did not use targets and indicators, quantified targets and direction of change. Another feature of all the reports is that they use environmental regulation-based criteria for assessment.

Table 4.8: Sustainability Framework

	EAP 1991	VIP 1997	FMTDP 1998	EPZ 1999	EPSR 1999	BHEP 2002-
Proactive	√	√	√	√	√	√
Designed Policies Affect Plan or Programme	√	√	√	√		
Goals deduced from Vision		√	√	√		
Policy deduced from Environmental Goals		√	√			
SEA Linked to Sustainability Criteria or carrying capacity						
Targets or Indicators Used in Assessment			√		√	
Using More Response Indicators						
Introducing Direction of Change in PPPs Objectives			√			
Introducing Quantifying Targets			√		√	
Economic Sustainability	√	√	√	√	√	√
Social Sustainability	√	√	√	√	√	√
Environmental Sustainability	√	√	√	√	√	√
Links between Economic Social and Environment Considered						
Environmental Objective-Based Indicators						
Environmental Regulation-Based Criteria	√	√	√	√	√	√
Monitoring Programme-Based Indicators						
Indirect Effect of Projects					√	√
Cumulative Effects Assessed					√	√
Consideration Given to Local Impacts	√	√	√	√	√	√
Consideration Given to National Impacts	√	√	√	√	√	√
Consideration Given to Global Impacts	√	√			√	√
Policy Affects Energy Use	√	√	√	√	√	√

It is also pertinent to note that apart from the EPSR (1999) and the BHEP (2002) no other report dealt with cumulative and indirect effects; but all the reports fairly dealt

with local, national and global issues of sustainability. Moreover, all the reports discuss energy implications of the PPPs.

4.6.8 Techniques for Assessment

The reports followed EIA-based approaches rather than the development of a distinction SEA methodology. The main techniques adopted in the reports include matrices and qualitative methods. Methods such as scenarios (EPZ, 1999; EPSR, 1999 and BHEP, 2002), modelling (EPSR, 1999) and quantitative methods (EPZ, 1999 and EPSR, 1999) are emerging. In addition, compatibility matrices (EPZ, 1999) have been used. From the Table 4.9 - Table 4.11, compatibility matrices are neither used to assess the compatibility between vision and PPP objectives nor used to assess the compatibility and consistency between and within sectoral PPPs. It is rather used for site selection or zoning purposes (See Table 4.9 and Table 4.10). Again, none of the reports indicated that GIS was used. There is no indication in the reports that SEA is leading to changes in terms of making PPP objectives more explicit, removing contradictions in PPPs and changing or improving PPPs. There is no evidence also from the reports that new objectives have been drawn to capture sub-components.

Table 4.9: Groupings based on best compatibility

Zone A	Zone B	Zone C	Zone D
Sea Food Processing	Textiles	Wood Processing	Electronics
Food and Beverage		Metals	Jewel
Pharmaceuticals		Ceramics	Cosmetics

Table.4.10: Groupings based on less compatibility

Zone A	Zone B	Zone C	Zone D
Textiles	Sea Food Processing	Wood Processing	Electronics
Jewel	Food and Beverage	Metals	Jewel
Ceramics			Cosmetics
Electronics			

Table 4.11: Compatibility Matrix for Industrial sector

Sectors	Sea Food	Wood	Metals	Textiles	Pharmaceuticals	Ceramics	Cosmetics	Food and Beverage	Jewel	Electronics
Sea Food	3	0	0	2	3	0	2	3	0	1
Wood	0	3	3	1	0	3	0	0	1	0
Metals	0	3	3	1	0	3	0	0	3	2
Textiles	2	1	1	3	0	2	0	0	2	2
Pharmaceuticals	3	0	0	0	3	0	3	3	0	0
Ceramics	0	3	3	2	0	3	0	0	2	2
Cosmetics	2	0	0	0	3	0	3	2	3	2
Food and Beverage	3	0	0	0	3	0	2	3	0	0
Jewel	0	1	3	2	0	2	3	0	3	3
Electronics	1	0	2	2	0	2	2	0	3	3

Legend: 0=Not Compatible 1=Least Compatible 2=Less Compatible 3=compatible

4.7 Brief Overview of Sub-regional Practice

Table 4.12 and Table 4.13 below show the status of EIA/SEA in West Africa.

Table 4.12: The Status of Environmental Assessment in West Africa

Country	EIA Legislation	Strategic Planning A	B	C	D	E	F	Strategy	SEA	Laws
Mauritania							√	NEAP		
Senegal	√			√				NEAP		
The Gambia	√						√	NEAP		National Environment Management Act, 1994
Guinea Bissau								NEAP		
Guinea	√			√				NEAP		
Sierra Leone			√					NEAP		
Burkina Faso	√					√		NEAP		
Cote D'Ivoire			√					NEAP		
Mali						√		NEAP		
Niger		√						NEAP		
Nigeria	√					√		NEAP/NCS		Federal Environmental Protection Act, 1988
Ghana	√						√	NEAP	√	Environmental Protection Agency Act, 1994, Environmental Assessment Regulation, 1999
Liberia										
Cape Verde	√									
Togo	√		√					NEAP		
Benin						√		NCS		

A-Entry Phase, B-Initial development Phase, C-Strategy Awaiting Adoption, D-Formal Adoption, E-Implementation Phase, F-Strategy Stalled. NEAP-National Environmental Action Plan, NCS-National Conservation Strategy

Source: Dorm-Adzobu (1995) and Paoletto (2001).

Within the sub-region of West Africa, Ghana appears to lead in EIA/SEA. EPA staff from Ghana also train others in the sub-region. Kessler's (1999) said that

> SEA have by now (early 1999) been introduced and applied in several countries and under different conditions...The main variation in terms of final output is that between an environmentally oriented strategic plan or an integrated plan in which issues from social and economic analyses have been more specifically integrated...In May 1999, a workshop was held in Cotonou to summarise and evaluate experiences with SEA, with participants from some countries having applied SEA (Benin, Honduras and Ghana) and others without experience.

Table 4.12 shows the status of implementation of EIA in the sub-region while Table 4.13 shows the status of training going on in the sub-region. From Table 4.12 it is only Ghana that has followed the NEAP initiative to formalise SEA. Ghana has also provided training for many institutions within the sub-region of EIA matters

Table 4.13: SEA in West Africa

Country/Objectives	*Level*	*Environmental or Integrated*	*Completed SEA process phases/ output and follow-up*
Ghana –Integration of environmental issues into SNV[10] policy and local policy	Regional level and district level	Environmentally oriented.	Regional analysis has been completed, some issues have been integrated into SNV policy at district level an action plan has been elaborated.
Cameroon, Burkina Faso, Ghana – Training for variety of donors/ NGOs/ development institutions	Planned for regional level	Integrated	Training finalised, implementation awaiting suitable conditions

Source: Kessler (1999)

4.8 Conclusion

Two types of SEA are evolving in Ghana. One form is written while another is not. The question that arises is whether in the absence of a written SEA report, a practice can truly be SEA. In Thérivel and Partidário's (1992 and 1996) definition cited in Chapter 3, SEA involves (a) a systematic and comprehensive approach to policy, plan and programme level assessments, (b) a formal stages of EA process, (c) the prediction of environmental impacts of PPPs, (d) the appraisal of alternatives against environmental objectives and criteria, (e) the influence on decision-making, (e)

[10] Sustainable national level policies promoted by the Netherlands Development Organisation. In this text SNV policy may refer to regional strategic development policy or plan.

consideration of a range of environmental components and/*or* (f) written reports (emphasis mine). By employing the words *and/or*, they do not impose such a condition strictly speaking. Again, in Sadler's (1996) seven-step framework for good practice SEA discussed in Chapter 3, Section 3.11, he suggested documenting the findings of SEA *if necessary* (emphasis mine). Thus while it is a good practice to document SEA, it may not be necessary in some circumstances, although a valid SEA may have been carried out. Indeed, Partidário (1996:52) argues that it is a good procedural practice to 'concentrate on the process rather than the product. More than a final report, SEA must aim at assessing environmental soundness in the policy-making, planning and programme-making process.' The researcher believes that a written SEA report is essential. This will avoid lowering of standards, hiding under the pretext of 'SEA in people's minds' and avoiding responsibility. The writer, nevertheless, acknowledges that written reports *per se* do not necessarily mean that the goal of SEA is achievable. They could be made just to fulfil a legal requirement as O'Riordan (1995:131) observed: 'even today too many environmental impact assessments (EIAs) are cook-book studies, done in-house by shadowy teams to fulfil legal obligations.' Thus, SEA reports, written merely with the view to satisfying legal requirements, may not be good enough to influence decision-making. Even where SEA reports are not made, it is equally plausible that sustainability principles can be integrated into the planning process while SEA remains essentially in 'people's minds.' A balance between the SEA reports and SEA is therefore essential. This conclusion about Ghana can be extended to the potential practice in other countries in the sub-region. This is because culturally, the people of West Africa have similar beliefs. Moreover, like Ghana, the pattern of economic development in the sub-region has also been largely influenced by donor assistance. Besides, Ghana has been influential training programmes in the sub-region. It is therefore realistic to expect that the development of SEA in the whole sub-region in some years to come is likely to follow the model in Ghana.

Chapter

5

Ghanaian Energy Context

Chapter Outline

- Introduction
- Regional Energy and EIA Framework
- Policy Framework
- Planning Framework
- Programme Framework
- Evidence of Sustainable Energy PPP
- Implication of Energy PPP for Environmental Assessment
- Conclusion

5. Chapter Five: Energy and Environment Sectors in Ghana

5.1. Introduction

The challenges identified in the energy sector by Government of Ghana (1997) in *Ghana Vision, 2020 Medium Term Report* relate broadly to energy security, environmental consequences of energy production and use, inefficiency in the production and use of energy resources, lack of a coherent legal and economic framework to attract private investment and weak institutional capacity to transform both tradition and renewable energy resources. The issues of insecurity and environmental consequences manifest themselves in vulnerability to short-term disruptions and lack of access by all Ghanaians to energy resources and this is partly as a result of over-dependence on hydro-electricity and crude oil importation, inadequate products and distribution channels and dilapidated energy infrastructure. Moreover, there is a perennial shortage of LPG cylinders with consequential high local market prices. Environmentally, over-dependence on renewable resources such as biomass creates an imbalance between forest resources regeneration and depletion rates, threatens sustained supply of charcoal and firewood, promotes deforestation, desertification, and contributes to the emission of CO_2 and other anthropogenic gases from burning wood (GOG, 1997).

According to GOG (1997), low productivity, high inefficiency and poor investment in the energy sector in general is a reflection of lack of awareness and expertise in industry and among local appliance suppliers and energy services companies, inadequate financial and fiscal incentives to support energy efficiency and lack of codes, standards and guides on energy efficiency. Challenges in attracting investment in the energy sector include statutory restrictions to entry[1], inadequate regulations, rules of practice and standards of performance in the power sector. Others are unpredictable criteria for setting tariff levels and lack of cost recovery structures by power utility service. According to GOG (1997), there is also a lack of clarity in policy to assist prospective investors in mitigating the risks of investment. In relation to institutional capacity, there is lack of adequate expertise not only in the petroleum and electricity sub-sectors but also in the renewable sector to transform enormous

[1] These restrictions include barring non-Ghanaians from participation in the retail market for petroleum products.

Any maps, pages, tables, figures graphs,or photographs, missing from this digital copy, have been excluded at the request of the university.

renewable resources such as wind, biomass and solar energy resources to useful and efficient energy resources. To address these shortcomings, Ghana (as well as collaborating with other countries in the sub-region) has been evolving policies, engaging in planning and initiating programmes in both the energy and environmental sectors. Against this background, the chapter discusses how sub-regional policy and national policy, plan and programmes seek to address the issues and their implication for environmental assessment.

5.2. Regional Energy and EIA Framework

Figure 5.1: West Africa Map

The energy policy of the Economic Community of West Africa (ECOWAS[2]) aims to promote energy efficiency, find alternative sources of energy for the sub-region, develop renewable energy resources in the region, promote joint ventures in energy resource development in the region, acquire and disseminate information of energy and to create funds to sustain research and development in the energy sector. In this

[2] See Box 4.1 below for overview of ECOWAS

respect, a work programme for energy resource development, regional analysis of energy issues, plans for improving energy efficiency in the region and the development of alternative sources of energy were planned in 1981 under the auspices of the ECOWAS. The creation of an Energy Resources Development Fund was approved in 1982. Other plans include a regional information centre and database to disseminate information on renewable energy resources and the proposed construction of an ECOWAS refinery to supply refined petroleum products for the region. Furthermore, West Africa Power Pool and West African Gas Pipeline projects are being discussed among member states (See Section 4.4 below for details).

Box 5.1: ECOWAS

The Lagos Treaty established ECOWAS in May 1975 to promote trade, co-operation and self-reliance in West Africa. A revised ECOWAS treaty, designed to accelerate economic integration and to increase political co-operation was signed in July 1993. The revised treaty designates the achievement of a common market and a single currency as economic objectives, while in the political sphere it envisages the establishment of a West African parliament, an economic and social council and an ECOWAS court of justice to replace the existing Tribunal and enforce Community decisions. The treaty also formally assigned the Community with the responsibility of preventing and settling regional conflicts. It has the following members: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo. The organizational structure of ECOWAS revolves around the Conference of Heads of State and Government. Council of Ministers, Tribunal, Executive Secretariat, Specialized Commissions and the Fund for Cooperation, Compensation and Development. The Conference is the supreme authority of the organization. It meets once a year. Its chairman is drawn from the member states in turn. The Council, which consists of two representatives from each country, draws its chairman the same as the Conference. It meets twice a year, and is responsible for the running of the community. The Authority of Heads of State and Government determine the composition and competence of the tribunal. It interprets the provisions of the treaty and settles disputes between member states that are referred to it. The Secretariat is headed by an Executive Secretary who is elected for a four-year term, which may be renewed once only. There are five commissions namely, Trade, Customs, Immigration, Monetary and Payments; Industry, Agriculture and Natural Resources; Transport, Communications and Energy; Social and Cultural Affairs and Administration and Finance.

5.3. Policy Framework

Considering the above-mentioned challenges and the drive towards economic growth and having regard to the environmental consequences of development actions, Ghana's 1992 Constitution and Vision 2020[3] (See Section 4.4 in Chapter 4 for details on the vision) provide broad environmental framework for Ghana's energy policies,

[3] Ghana's Vision 2020 spells out its future direction linking development with its social, economic and environment impacts.

plans and programmes. From the Directives Principles of State Policy enshrined in Ghana's 1992 Constitutions,

> The state shall take appropriate measures needed to protect and safeguard the national environment for posterity and shall seek cooperation with other states and bodies for purposes of protecting the wider international environmental for mankind...The state shall endeavour to preserve and protect places of historical and artefacts...The exercise and enjoyment of right and freedoms is inseparable from the performance of duties and obligations and accordingly, it shall be the duty of every citizen to protect and safeguard the environment [Articles 39 (4), 36(9) and 41 (k)].

Within this framework, energy policy objectives, in relation to security, privatisation and capacity aim to reduce dependence on importation of crude oil and forest resources, consolidate the regulatory framework for safe use of LPG and supply affordable cylinders together with other end-use devices to enhance LPG use. They also aim to institute structural reforms, rationalize government's involvement in the sector, improve private sector participation, stabilize the pricing mechanism, promote private sector participation, introduce new legal and regulatory framework and to develop indigenous Ghanaian institutional and professional capability. Energy sector goals also include promoting energy efficiency and conservation, evolving appropriate technology in the general sector, promoting and evaluating renewable energy technologies among others (GOG, 1997). Economic instruments such as carbon tax and transferable permits have been contemplated (EPC, 1991:7); they are not yet being used.

5.4. Planning Framework

Based on the broad policy goals, energy planning framework in Ghana involves planning to facilitate deregulation, privatisation, least cost planning, third party agreement, and the diversification of supply. It involves the use of appropriate methods and techniques for forecasting supply and demand options. It also takes into account day to day demands, contingency plans, transitional plans and the need for a coherent institutional framework to administer energy sector planning. Based on a coherent framework existing since the 1980s (Brobby, 1987), Turkson (1990:703)

referred to the concept and methodology of Integrated Energy Planning (IEP)[4] and Energy Sector Master Plan. Some examples of mini-energy plans within the overall energy sector master plan in Ghana include the Financial Recovery Plans (FRP), the Emergency Power Supply Expansion Plan (EPSEP), and the Transitional Plan for Wholesale Power Supply (TPWPS) evolved by government during the 1990 energy crises in Ghana.

Currently, Ghana is pursuing the privatisation and the deregulation of its State-Owned Enterprises (SOEs) As part of that privatisation policy, there is an on-going integrated planning framework under which suppliers, organised in a market place, interact with distributors through an interconnected network, for the supply of energy on the basis of some terms and conditions (Figure 5.4 below). This enables distributors to operate conveniently in some zones of operation to be designated under the plan and the operation of the scheme is to be regulated and managed under new institutions created under the scheme. The role of energy planning here is therefore to integrate and manage key issues and players comprising suppliers, distributors, consumers, networks, the energy market under appropriate terms and conditions and in proposed zones of operation.

In this context, suppliers include the Volta River Authority (VRA), the statutory authority generation utility and bulk supplier of electricity being transformed into a strategic business unit (SBU), independent power production companies and localized power generation facilities responsible for co-generation and investment in wind power and/or mini-hydro to augment power supply to the distribution licensees at the sub-transmission level (33kV or below). Another future source of power supply will be a proposed West Africa Power Pool. Together these wholesale power suppliers constitute a "Power Pool" for Ghana. They are a complementary source of wholesale power supply to distribution utilities and/or large independent "bulk" power consumers. Distributors on the other hand include the Electricity Company of Ghana (ECG), the existing statutory distribution utility also organised into a strategic

[4] According to him, energy planning aims to rationalise, coordinate and maximise energy resource development and use and to maintain a balance between energy supply and demand options. It also seeks to explore energy and economy interaction more systematically, disaggregate analysis of both supply and demand, identify greater opportunities for inter-fuel substitution through the application of analytical and modelling tools and the reliance on economic principles such as shadow pricing.

business unit and new electricity distribution and retail services providers in the distribution areas or zones to be designated. Within each zone, the licensee will have the monopoly to distribute and retail electricity, and therefore will also be obliged to provide service to all prospective customers through distribution areas.

Consumers include urban and rural dwellers that use energy for domestic, commercial, industry and agricultural uses. There are also bulk consumers such as large industrial consumers operating within industrial estates. These are supplied directly by wholesale suppliers from the WSPSM. Besides, there are also large industrial and mining consumers outside industrial estates that are supplied with power at sub-transmission levels within a licensee's distribution area. These bulk consumers may exercise the option to become independent "bulk customers" which qualifies them to purchase power directly from the wholesale market.

The Market is a higher tier Wholesale Power Supply Market where wholesale power suppliers have "open access" through high voltage transmission network to supply electricity to distribution utilities and/or to large independent "bulk"

Figure 5.2: Thermal Generator

consumers under appropriate terms of licence, pricing guidelines and direction. The Terms and Conditions are on the basis of long-term and short-term contracts. Long-term contracts entitle distributors to purchase capacity from

Figure 5.3: Gas Generator

VRA and other wholesale power supply licensees on a long-term basis. Short-term contract entitles distributors to purchase from a "spot" market based on an hour-by-

hour demand for energy on short-term or through dispatch of available thermal (Figure 5.2) or gas (Figure 5.3) power generation facilities (GOG, 1999).

The relevant regulators/managers are the Public Utilities Regulatory Commission established under Act 538, the Energy Commission established under Act 541. The Ministry of Energy formulates policy for power sector development and issues subsidiary legislation. The Public Utilities Regulatory Commission (PURC) receives, vets, and approves proposals on tariffs and also develops and applies regulations to protect the interests of the customers and suppliers. The Electricity Transmission Utility (ETU) has oversight over the operation of the players in the energy market, the National Interconnected System and the efficient working of the Wholesale Power Supply Market (Figure 5.4).

Network refers to the National Interconnected System (NIS) provided for under Act 541. The NIS consists of the high voltage electricity transmission network in the country, the VRA's hydroelectricity generation facilities, other thermal power generation facilities, the low voltage electricity distribution networks through which large industrial and mining enterprises are connected directly to the electricity transmission network. Under Act 541, the concept of creating distribution areas and zones[5] aims to help government decentralize, and increase private participation in the provision of electricity distribution and retail services nationwide.

Within these areas are Commercialised Electricity Zones (CEZ) and Self Help Electrification Projects (SHEP) Electrification Zones. CEZ relate to all urban centres and areas covered under the District Capital Electrification Projects for which distribution licensees would have the obligation to provide service connections on demand to consumers. SHEP comprises all rural and other areas that qualify for electrification under the Self Help Electrification Projects for which distribution licensees will provide services under "operations and maintenance" contracts (GOG, 1999). Based on the concept of least cost planning and third party agreement discussed in Chapter Two, TPWPS will increase private sector developed thermal power generation capacity to complement existing hydropower capacity in Ghana.

[5] Specifically, the government of Ghana will create 5 areas and zones.

The horizon for the Transitional Plan will be the period until natural gas is delivered into Ghana via the proposed West Africa Gas Pipeline Project.

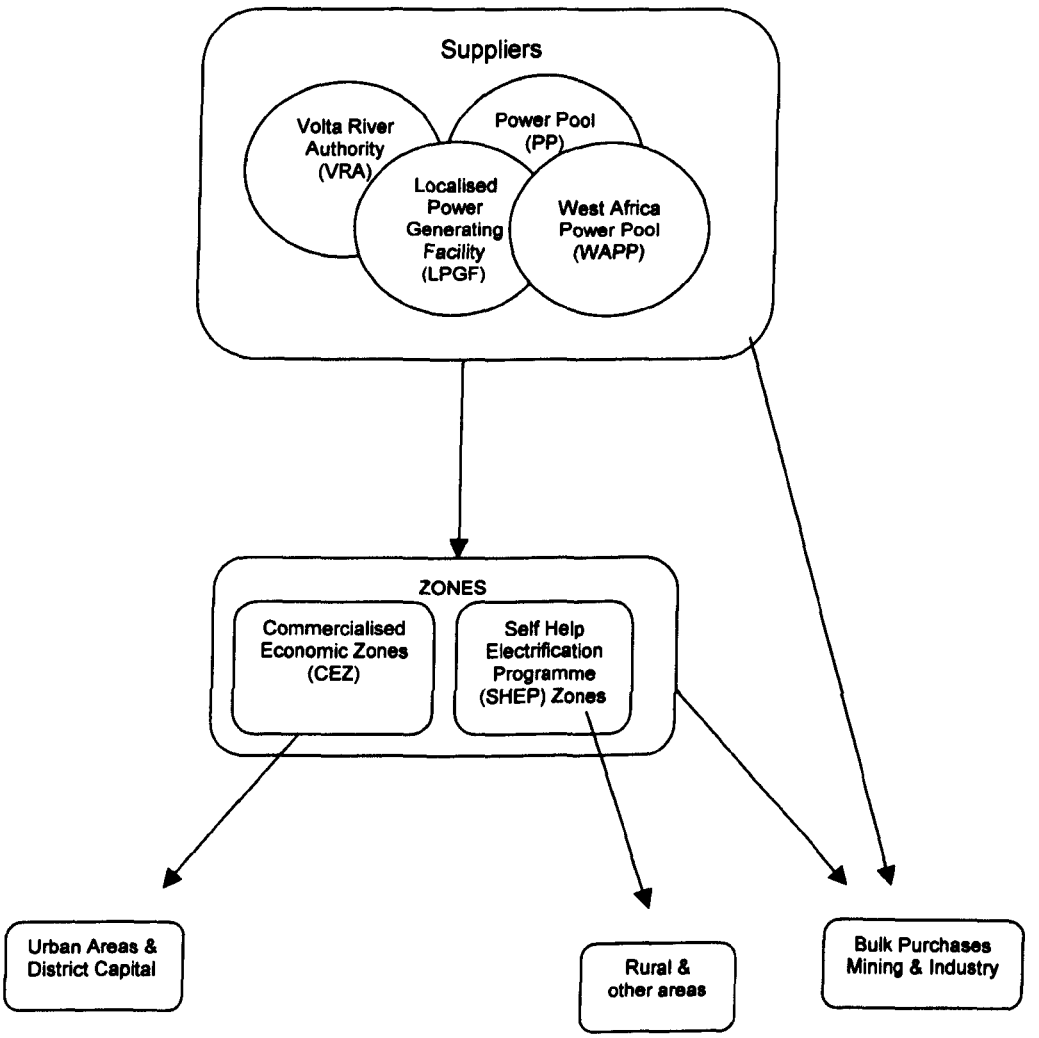


Figure 5.4: Structure of the Privatised Energy Market

Government's diversification of supply has been applied to the EPSEP. The EPSEP is Government's contingency plan aimed to curtail hydropower supply, import power from external sources, build up thermal power generation facilities, operate single-shaft combined-cycle co-generation facility, barge mounted gas turbine power generation facility

Figure 5.5: Mounted Badge

(Figure 5.5) and mobile power generation units through on the basis of joint ventures with private investors whereby companies build own and operate generating facilities within the vicinities of industries and mining clusters.

5.5. Programme Framework

According GOG (1997), programme objectives are to rehabilitate and expand existing power generation infrastructure, extend the sub-transmission and distribution system and extend the national grid to the rest of the country. Others objectives are to diversify the electricity supply base, expand hydro power generation supply to other river basins, implement demand side management programmes and expand the petroleum refinery and marketing infrastructure. The rest are to demonstrate integrated solar power for villages, promote use of LPG in all sectors, institute diagnostic and design tasks and maintenance services for industrial and commercial enterprise and re-organize the existing state-owned power utilities into Strategic Business Units (SBUs). Some specific programmes include the Electricity Programme and National Electrification Scheme,[6] the Petroleum Programme,[7] the National LPG Programme, the Renewable Development Programme[8] and the Energy Efficiency and Conservation Programme.

5.6. Evidence of Sustainable Energy PPP in Practice.

A survey of sustainable energy programmes going on in Ghana indicates that programmes vary and cut across many sectors and programmes. In the private sector led by the Energy Foundation, the following programmes can be cited. These include Electricity Demand Management Project aimed to promote private sector participation in delivering energy management services, perform diagnostic and design tasks, maintenance services and promote energy efficiency techniques and technologies like power factor improvement, load management, monitoring and targeting schemes and developing codes and standards. Other programmes include public education and policy advocacy strategy, strategy for energy efficiency in the

[6] These are programmes by which electricity is being extended to every corner of Ghana to promote rural and urban industrial development and to improve the livelihoods of the urban and rural dwellers.
[7] This is a programme that seeks to secure energy supply through imports, oil exploration, distribution and transportation.
[8] At the moment it involves promotion of solar energy and the efficient use of Ghana's biomass resources

industrial and commercial sectors, industrial co-generation and fuel substitution strategy, renewable and energy development strategy as well as capacity building and human resources development strategy.

There is evidence published by the Energy Foundation (2000), that so far the supply and installation of power capacitors for power factor improvement (from a capacity of 0.5-0.7 to 0.9-.95) in over 100 industrial and commercial firms has been completed resulting in the release of about 15 MVA of reactive power into the grid. Computer based monitoring and targeting systems have been successfully installed in 10 companies while 5 energy service companies have received extensive training to provide this service to industry. Detailed electrical load management studies have been completed for 30 large industrial firms with maximum demand of 500kVA or more. Results from the 30 firms indicate that over 75 MV could reduce the system peak if the surveyed firms reduced their demand during peak period. An industrial energy assessment centre has been established in the School of Engineering in the University of Science and Technology with the assistance of US-DOE.

Moreover, three large buildings, the Ministry of Mines and Energy (MIMO) building, the Kotoka International Airport and the Golden Tulip Hotel have been identified for energy management. Management measures in the MIMO building has resulted in a reduction of electricity consumption by 26, 907 kWh and maximum demand savings of 351kVA in 1999. A baseline study has been completed on the implementation to the European Union type of minimum efficiency standards for cold appliances with the potential savings of (US$50million) by 2010 and reduction of CO_2 emissions by 230,000 tonnes over the same period (Energy Foundation, 2000). In an interview with the director of the Energy Foundation, he said that the emphasis of the foundation was on cost savings, employment and profits and not so much environmental although by default their activities can deliver sustainability in terms of energy savings and CO_2 emissions. It is also pertinent to state that the Ministry of Mines and Energy has transferred its role in the promotion and execution of Energy Efficiency Programmes to the Energy Foundation under a cooperative agreement. It therefore implements much of the policies and programmes that the Ministry and the Energy Commission would have carried out. Thus any lack of data from other energy agencies is supplemented by data from the Energy Foundation.

5.7. Implications of Energy PPP for Environmental Assessment

First by seeking to create 'an open and liberal market economy, founded on competition, initiative and creativity, that employs science and technology in deriving maximum productivity from the use of all our human and natural resources' and by aiming to protect and safeguard the 'national environment for posterity' and 'the wider international environment for mankind,' Ghana's Vision 2020 and the Constitution set a framework for a development path based purely on a technocentric philosophy. (See full discussion in Chapter Two under environmental philosophy)[9]. This philosophical standpoint is in sharp contrast with earlier colonial laws, which incorporate ecocentric (intrinsic) value for nature (See the Forest Ordinance of 1851 where the 'well-being' of forests per se was a primary concern). From the premise of market economy, it is not surprising that the structural changes occurring in the energy sector has followed open market principles.

Second, by recognising the need not only for 'linkages to an efficient' technology-based development, but also for addressing the economic, social and environmental dimensions in development with due 'regard to the maintenance of a sound and sustainable environment,' sustainable development and efficiency issues seem to have been made a priority. Nevertheless, massive privatisation of the economy particularly in the capital-intensive energy sector is likely to provide a serious dilemma between Foreign Direct Investment that is probably less benign to the environment and local investment, which may be environmentally friendly but less substantial to drive the country along the trajectory proposed in Ghana Vision 2020. In this regard, there is also the possibility of inconsistency between privatisation, exploitation of all human and natural resources, and environmental concerns.

Third it can be observed from the energy sector policy, planning and programme framework in Ghana that they are stated in broad terms without reference to time framework, quantifying targets and direction of change. Besides, the planning issues arising from the sector policies such as the Integrated Energy Plan, the Energy Master Plan, the Transitional Plan for Wholesale Power Supply, the Financial Recovery Plans and the Contingency Plans have effects including cumulative,

[9] This has also been discussed under African traditional beliefs in Chapter Two that portrays Africa's relationship with nature to be inspired by anthropocentric desires.

induced, indirect, time-crowded and synergistic impacts. Equally likely to give rise to similar impacts are the spatial plans within which groups of projects such as thermal generation facilities, cogeneration facilities and barge mounted facilities are situated. Moreover, issues in respect of the West Africa Power Pool and the Gas Pipeline Project will have transboundary implications. Similarly, programmes such as rehabilitating of generation infrastructure, extension of distribution network, diversification programmes for oil exploration, expanding hydro generation to other basins, national electrification schemes and renewable programmes are not without considerable impacts.

5.8. Conclusion

From the above discussions, Ghana has identified and documented its energy policies, plans and programmes set within the context of West Africa. Ghana has also shown a commitment to the use of all types of policy instruments to deal with the environment. For example, legal instruments have been employed in the deregulation of the energy market; economic instruments, such as incentives, have been used to attract private investors. Although carbon tax and tradable permits are not yet being used, they are contemplated. Ghana is currently promoting energy efficiency and conservation. Besides, eco-planning and third party agreements are being developed in collaboration with the private sector. In Ghana, the development of renewable energy resources is on the energy agenda. However, energy policies, plans and programmes per se are not sufficient to address sustainability issues. An assessment framework that focuses on capturing the environmental implications of policies, plans and programmes is essential. This is why Ghana's legal framework that provides for SEA is encouraging (Chapter 4). But the scope of SEA practice should be expanded to every sector of Ghana. Moreover, in the light of other joint ventures being undertaken in the sub-region[10] and the general implications of transboundary impacts from the development and use of energy resources, the feasibility of a common SEA strategy should be considered and implemented through the ECOWAS. It is then that energy policies, plans and programmes for the whole sub-region can be truly sustainable.

[10] such as the West African Gas Pipeline Project.

Chapter

6

Ghanaian Institutional Context

Chapter Outline

- Institutional Framework
- The Cascade Model
- The Sectoral Model
- The Thematic Model
- Coordination
- Participation
- Mix Administrative Strategies
- Adaptive Capacity
- Effectiveness, Efficiency and Equity
- Constraints
- Opportunities
- Conclusion

6 Chapter Six: Institutional Context

6.1 Introduction

Chapter One asserts that the effectiveness of environmental assessment is predicated on a sound institutional framework. This is because decisions and implementation of SEA take place within institutions or organisations. A weak institution may adversely affect the implementation strategies for SEA; while a strong institution will positively enhance the implementation strategies for SEA. To device an effective institution to implement SEA, it is therefore important to understand the nature of implementing institutions, their strengths and limitations. To explore the interplay between the energy and environment institutions in Ghana, the study discusses the institutions in Ghana within the framework of models, coordination, participation, mix strategies, adaptive capacity, efficiency, effectiveness and equity after which conclusions are drawn.

6.2 Institutional framework

According to Mitchell *et al.* (1996), the term institutional and institutional arrangements refer to structures, processes and policy approaches for making public decisions and for influencing the behaviour of individuals, groups and firms. They identify key institutional variables to include legislation and regulations, policies and guidelines, administrative structures, economic and financial arrangements, political structures and processes, historical and traditional customs and values, and key participants and stakeholders. Wood (1995), Fischer (1999), Sadler (1996), Sadler and Verheem (1996) and Partidário (1996) suggested similar listing elsewhere. To understand the dynamics of institutions, Freeman *et al.* (1996) provide useful structural analytical prototypes to include cascade, sectoral and thematic models while Mitchell *et al.* (1996) suggest procedural and substantive evaluative criteria. Procedural criteria include coordination, participation, mix administrative strategies and adaptive capacity, while substantive yardstick include equity, efficiency and effectiveness.

6.2.1 The Cascade Model

According to Freeman *et al.* (1996), the cascade model is a structure in which an authority or institution has a clear political hierarchy, which demands an action-oriented approach. It is the model most closely linked to the role of policy making

and implementation. Action is expected to 'cascade' down, the steps of the hierarchical structure investing ownership at different levels, but with the authority or institution inevitably placed at the head. In this model, the institutions are expected to have initiating roles and to deliver and prioritise action above process. The cascade model facilitates focus and control, ensuring that there is a responsible body to keep the process moving. A potential disadvantage, according to Freeman *et al.* (1996), is that although the authority may wish to invest ownership, the stakeholders may find it difficult to accept responsibility. Another potential problem which is implicit in the cascade model is that while it may be relatively easy for things to travel downwards, it is that much more difficult for capillary action to occur. There is a danger that this model sees the energy of the initial impact dissipate by the time it reaches the bottom leaving people at the bottom feeling marginalized. Nonetheless, it may well be the most popular model, given past experience of institutions such as a local authority and the particular role ascribed to them.

Figure 6.1: Cascade Model adapted from Freeman *et al.* (1996)

A good example of a cascade model is Ghana's NDPC. The National Development Planning (Systems) Act, 1994, Act 479 Section 15, the Local Governments Act 1993, Act 462 Sections 3, 15 and Part XIII and the National Development Planning Commission Act, 1994, Act 480 Sections 1(2), 5 and 10 provide the basis for the development planning and SEA institutions. The NDPC fits all the models in its operation. As a cascade model, its structure is tiered at about 5 levels. At the regional level is the Regional Co-ordinating Council, which is charged with the

responsibility of co-ordinating all district development, plans into a coherent framework through its technical arm called Regional Planning Co-ordinating Unit. At the next tier below the ladder is the District Planning Authority administered by District, Municipal or Metropolitan Assemblies. At this level, district development plans are drawn and co-ordinated by District Planning Co-ordinating Unit. Still at the lower tier lies the responsibility for preparing Sub-District Plans by the Sub-Metropolitan District Council, Urban or Zonal Council based on the guidelines in the District Development Plans. The Local Community is at the lowest level of development planning. Here, Town and Area Council or Unit Committees may prepare Local Action Plans.

6.2.2 The Sectoral Model

The sectoral model, in the view of Freeman *et al.* (1996), is a more integrated and complex structure, an intermediate stage in devolved policy ownership, but again showing an institution in a lead role; the emphasis is, however, on an institution as facilitator rather than as the lead body. Members of the cross sectoral group are put together regularly by means of meetings at forums.

Figure 6.2: Sectoral Model Adapted from Freeman *et al.* (1996)

The forum at which all the Cross Sectoral Planning Groups (CSPGs) meet is the hub, defined as a partnership of equals driven by the energy of the sectoral working

groups which integrate different sectors, and which are in the main community-based. The stress is on community accessibility, partnership, ownership and action. Separately, a CSPG is organised as a sectoral model. For example, Infrastructure CSPG deals with energy issues and draws on the Ministry of Environment Science and Technology, the Ministry of Roads and Highway, the Ministry of Mines and Energy, the Volta River Authority, the Ghana National Petroleum Corporation, the Electricity Company of Ghana, the Ghana Chamber of Mines, the Energy Foundation, the Energy Commission, the Environmental Protection Agency and 42 other Agencies. It offers the opportunity to participate in a relatively non-hierarchical and transparent structure, which is accessible to all. Cross-sectoral planning groups work on the basis of interdisciplinarity. Interdisciplinarity is encouraged through the use of resources, expertise and experience of others. This is because, interdisciplinarity recognises that power is shared when information exchange is open, when those likely to be affected by change actually negotiate their values and reactions from the outset, and that data are a function of knowledge, experience and power (O'Riordan, 1995:3). The sustainability indices can be refined via an interdisciplinary team approach (Myrlian and Canter, 1996:183-194). The opportunity to participate is not automatic, however. Where representatives have multiple meetings to attend and place more value of their departmental activities than those of others, participation is sacrificed. It may take a remarkable convergence of interests and opportunities to make it wholly successful. It is likely to appeal to particular sectors, such as the environmental lobby and some community groups, but could fail to engage others whose involvement may be crucial, such as the business sector. It could also be vulnerable to dominance by particular interest groups and the energy spent on consensus forming inhibits action.

6.2.3 The thematic model

The thematic model, as its name suggests, has as its focus an overarching theme, which integrates the activities of a diverse range of community groups, individuals, forums and organizations (Freeman *et al.*, 1996). The NDPC has grouped issues of development planning into 8 themes and each of the themes is organised under a cross-sectoral planning group. The 8 Cross-Sectoral Planning Groups (CSPGs) cover macro-economic programme (MEP), human development (HD), production, technology and competitiveness (PTC), rural and urban development (RUD),

infrastructure development (ID), (vi) enabling environment (EE) (vii) plan financing (PF) and regional economic cooperation and integration (RECI)[1]. Together these 8 CSPGs constitute a thematic model.

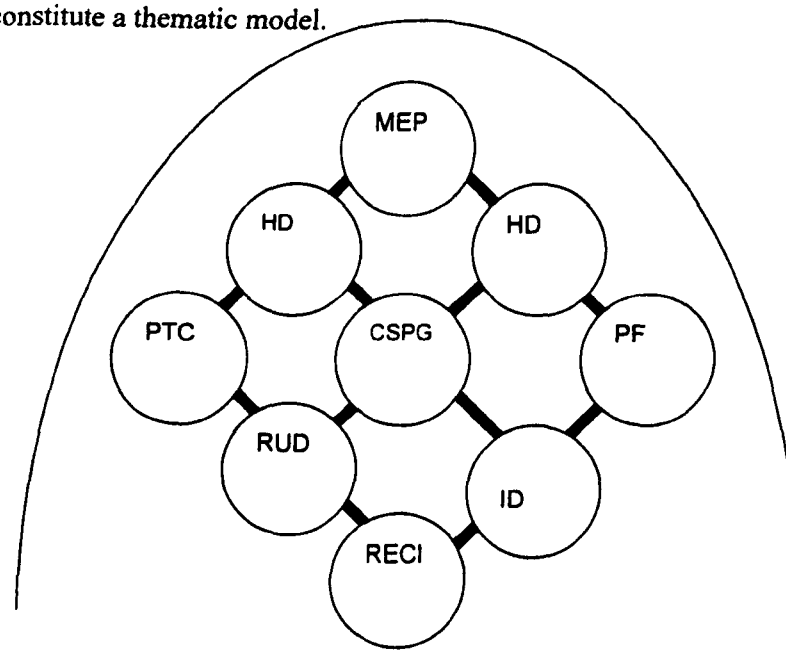


Figure 6.3: Thematic Model Adapted from Freeman *et al.* (1996)

The institution may co-ordinate activities but is not necessarily pivotal. The model is the most explicit attempt at realigning stakeholders according to their expertise, functions and interests. It has the advantage of being able to build on established groups and practices and can easily identify likely participants. It is particularly suitable for areas, which have a degree of spatial fragmentation possibly comprising distinct sub-centres or communities. Though similar in practice to the sectoral model, it differs first and foremost by focusing on the participants, and only then the means of bringing then together within working groups and environmental working fora. This model comes close to realising an integrated bottom-up approach.

6.2.4 Co-ordination

All three models (i.e. cascade, thematic and sectoral) include a central co-ordination body within, or attached to an authority. However, the location and composition of

[1] For sub-regional issues, the Regional Economic Cooperation and Integration CSPG is another sectoral organisation, It is made up of The World Bank Group, International Monetary Fund, UNDP, UNICEF, UNESCO, UN/FAO, WHO, USAID UK/DFID, EC, CIDA (Canada), JICA (Japan), Private Enterprise Foundation, Association of Ghana Industries, Association of Small Scale Industries, Ministry of Trade, Ministry of Finance, Ministry of Local Government and Rural Development, Institute of Economy Affairs and 32 other Ministries, Departments, NGOs and private individuals

the coordination body vis-à-vis an authority or institution differs quite markedly. It may not only be located within an authority but may clearly identify with a specific authority or institution department and this facilitates rapid working, access to clear and somewhat hierarchical decision-making structures, provides an easily identifiable point of contact and a potentially powerful locus within the authority. Areas of more integrated structural approaches, as the sectoral and thematic models, also have a co-ordinating body, which, whilst also located within an authority or institution, usually possessed a greater degree of autonomy and independence. In the sectoral and thematic models control is more diffused. In the cascade model, the co-ordinating body has a strong position in the authority or institution hierarchy and can potentially exert a significant degree of control over the whole of the process. In consequence, whilst in all three models the authority or institution can be in a very powerful position, if the goal is devolution of power of management to the grass root level, it will be much easier for a thematic, or to a lesser degree a sectoral, model. If the goal is for full integration of guiding principles into institutions lower in the ladder, the cascade model will be most suitable. Nevertheless, nothing prevents experimentation with and creation of independent structures as part of management strategy to take over the role of co-ordination.

To improve coordination in the long run, Mitchell *et al* (1996) argue that processes and mechanisms are needed to link the decision making of organisations with responsibilities and to develop mandatory referral systems involving the organisations involved in a process. Coordination is easy with the institutions that are based on a cascade model and therefore are inter-linked and connected in a web of vertical and horizontal networks. For example, the NDPC has a wide coverage across 110 districts and 10 regions of Ghana through the district authorities, Regional Co-ordinating Councils and the calibre of representatives on their boards politically. Environmental education is potentially broad based and shared by various representatives who are part of the decision making process. Theoretically, this has provided the basis for enhancing the NDPC's power to obtain data from many sources to enhance the performance of its functions, all things being equal. But as Meyer and Rowan (1977) argue, coordination is not easy for organisations, which intend to be legitimate and stabilize. Organisations both deal with their environments at their boundaries and imitate environmental elements in structures. Organisations

incorporate elements that are legitimated externally, rather than in terms of efficiency, they employ external or ceremonial assessment criteria to define the values of structural elements and dependence on externally fixed institutions reduces turbulence and maintains stability and promotes success and survival of the organisation. Such legitimating activities create time delays and therefore implementation lag.

6.2.5 Participation

Citing Arnstein (1969), Mitchell *et al.* (1996) suggested that participation was a progressive concept, identifiable as 'rungs in a ladder', with non-participation at the bottom, through *manipulation*, *therapy*, *informing*, *consultation*, *placation*, partnership, delegated power and, ultimately, full citizen control. They mentioned Wilcox's (1994) amendment to the list to include five key stages of participation; information; consultation; deciding together; acting together; and supporting independent community initiatives. O'Riordan and Sewell (1981:4) suggested a listing to include closed decision, consultation and influential participation. These are not mutually exclusive and reflect the fact that actors are able to participate simultaneously at different levels, or may wish to participate differently over time. Applied to the management of the environment and EIA, Clark (1994) says 'essentially, public participation is concerned with informing, consulting and involving the public in planning, environmental management, Environmental Impact Assessment and other decision-making activities.'

The extent to which people move up the ladder of participation is partly a function of education, mutual benefits, reciprocal representation, merger/incorporation and perceived common needs. It also depends on authority, power, meeting needs, service provision, existing group dynamics, consensus building, law and dialogue (Aldrish, 1972, 1976; Kochan, 1975; Yutchman and Seashore, 1967; Bish, 1978, Tuite, 1972 and White, 1974 cited in Parsons, 1995:483-484). Clark (1994) also provides the following list as useful means of improving public participation: improvement of opportunities throughout the project cycle, reduction in resource disparities, mediation, increased use of independent consultants, the establishment of

a statutory review, the rights of third party appeal and improved guidance and training.[2]

All forms of public education and information are useful in cementing participation and creating the enabling environment. Education may require awareness raising programmes, written guides and children education programmes. Citing Levett (1994), Freeman *et al.* (1996) said the logic was irrefutable, in that, 'to have an effective voice in decision making, people have to know what the issues and constraints are, and...the impact their *own* lifestyles have.' This is because effective power sharing is dependent upon shared knowledge. The Lands Commission and the Department of Town and Country Planning derive mutual benefits from cooperation in terms of planning schemes on the one hand and access to title record on the other hand. Reciprocal representation of officials on one another's boards or committees also built reciprocity among representative bodies, facilitated learning and sharing of knowledge and participation. For example, on the Lands Commission, the EPA and the Department of Town and Country Planning are represented on the governing bodies of the Lands Commission,[3] while the Lands Commission in turn serves on planning committees. When institutions with broad network are merged or incorporated into less networked institution, the amalgamated institution has access to wider network of participants as was the case when the defunct Lands and Forestry Departments were incorporated into the Land Commission and the Forestry Commission. Unfortunately, the Department of Town and Country Department and the NDPC are still separate entities. In addition to these chief executives' position as members of Boards and Commissions, they exercise authority by requesting their subordinates to participate in other environmental forums. Authority is exhibited when members of a government council of an environmental institution is a head of a

[2] Clark (1994) refers to the UNEP's five principles that encourage participation (or movement up the ladder) to include *identification* of the interested and affected stakeholders; *outreach* that is armed with accurate, pertinent, understandable and timely information; *dialogue* through meetings, workshops, hearings or personal contacts; *assimilation* that takes account of public concerns and *feedback* that influences public actions (See the earlier reference in Section 1.2).

[3] This is not just a meeting among technocrats for the purposes of information sharing. These technocrats form the governing council of these bodies and it is their approved policies that determine the direction of the organisations whose board and Commission they serve on. .

sector institution with clear hierarchies.[4] Where subordinates are to participation in environmental issues, he can enforce it.

The EPA also coordinated the Ghana Environmental Resource Management Project, a computer aided Geographical Information System which benefited the Survey department, the Lands Commission, the Soil Research Institute, the Water Research Institute and the Remote Sensing Application Unit of the University of Ghana participation in environmental issues with these establishments improved as the establishments see the EPA as meeting some needs. Cooperation in participation is further facilitated when an environmental agency provides some form of a vital service to the public. Land title, development permit, environmental permit are all forms of service some organisation provide. Existing group dynamics involving neighbourhood forums, and focus groups, cross-sectoral working groups, corporate environmental structures and programmes and business liaison initiatives are useful in participation. Because of the complexity of joint action and implementation, consensus building through dialogue and negotiation also improves participation. Because the legal framework for EIA in Ghana[5] provides for participation, it enables some considerations to be given to it if enforcement framework exists. To sustain participation Thissen (2000:120) suggests that

> Depending on the dominant culture of the process, it may take the form of an open participatory learning-oriented activity, or of a negotiation battle in which actors behave strategically its their attempt to achieve as much of their interests as possible...Important content criteria are the variety of stakeholder perspectives and aspects taken into account, the use of state-of-the-art scientific knowledge, the consistency of arguments, the accessibility and understanding of outputs to a broad, non-academic audience, and similar analytic criteria stressing the broadness and openness of the discourse. Important process criteria proposed include the involvement of relevant stakeholders in all phases of a policy analytic activity, inclusion of a pluriform set of participants with different ideas and backgrounds, the use of methods

[4] These may be ministers and chief executives of large organisations. They are therefore able to delegate their staff to participate in other environmental for a if they are unable to attend.

[5] Legal provisions for publicising and/or gazetting scoping reports and Draft EISs as well as for conducting public hearings *prior to* the approval of undertakings or development actions provide a good opportunity for all stakeholders or affected parties to be *identified*, *reached out* to and heard through *dialogue*. They also provide the opportunity for public views to be *assimilated* and *fed back* into changes before implementation stages [See Environmental Impact Assessment Regulation, 1999, Regulation 15, Shedule3; Regulation 16 (3), Schedule 4 and Regulation 17(1)].

> that stimulate open communication and allow participants to learn step by step and the fit of the method of working with the roles and structure of the organization or policy network.

To be effective, Clark (1994) argues that

> participation must be part of a process which provides an opportunity for, or more correctly, encourages, the public to express their views. It also should give confidence to the public that due consideration has been given to public values, concerns and preferences when decisions are made...To be of any use public participation requires the availability of adequate and relevant information.

If participation continues to be effective in the future, it will be reflected in outcomes that portray a shared vision and shared ownership of all aspects of the vision and there must be some means of constantly gauging the effectiveness of participation. Indicators or questions to measure the effectiveness of participation will have to seek if more and different people are turning up to events; if less time is spent on basic explanation; if resources have been added to the pool of environmental action; if there is greater support for the authorities actions as a whole and if there is yet a feeling of 'shared ownership' of sustainability issues Freeman *et al.* (1996).

6.2.6 Mix of administrative strategies

There is not only one means of organising institutions. Neither is there a single rationale or organising concept for institutions. Depending on the extent of institutional control, independence and participation desired by politicians, policy makers and managers, a mixture of administrative strategies, based on institutional models, would be employed in the public service to cure and prevent institutional decay. Thus politicians can choose from one or more or even a mix of strategies, institutional types or institutional structures from a repertoire of resources for effective management. A mix of strategies is observed in real life even where institutions appear to be performing similar functions. Some of the institutional forms include economic, sociological and political institutionalism. Economic institutionalism is articulated through Transaction Cost Economy (TCE) and Principal-Agent (or Agency) Theory (AT). While in TCE, the firm adopts a hierarchy of activities and divisions as expert units so as to lower transaction costs, in AT, institutions incorporate monitorable standards of performance. The framework of sociological institutionalism explains why some establishments will come along

with other establishments. Political institutionalism offers an explanation as to why other strong institutions are able to persuade others to respond to their policies and come along not just in terms of implementation but also in participation and cooperation (For a more detailed discussion, see Chapter 5 under the variables).

Together sociological, political and institutional institutionalisms are discussed at Section 2.1.3 under inter-organisational relationships. According to Hill and Ham (1993:126-127), the concern with organisations and their environments raises questions about the extent to which inter-organisation relationships influence individual action (sociological institutionalism). Hence there has been considerable interest in inter-organisational bargaining and negotiation, but as discourses are analysed, it is inevitable that discourses shift back to macro-level in which it is the place of those relationships in a wider social structure that becomes important (political institutionalism). The application of economics to institutions developed into the notion that inter-organisational relationships are best determined by markets (economic institutionalism).

The emphasis on human behaviour within organisations relates to intra-organisational relationship, (psychological institutionalism). Under intra-organisational relations the concern has been with the conflict between basic human needs and the requirements of work tasks in formal organisations from basic psychological needs to self-actualisation (Maslow, 1954) as well as the orientation towards leadership. The fact that employees must be organised, directed and motivated by economic rewards, which emphasizes self-actualisation and sees their goal achievement through the organisation's goal. Intra-organisation theorists think that it is wrong to search for leadership traits, which will hold for all situations due to differences in tasks, differences between groups individuals expectation (Hill and Ham, 1993).

Thus the independence of institutions may be desired in theory but may be curtailed in practice. In determining what form institutions should take, the sensitivity and the functions they perform are some key considerations. Based on these considerations, some institutions may be more hierarchical than others; others may have board members chosen from the top brass than others. Choices may emphasise the public

sector while may stress the private sector or even a mixture of the two. Again, some may be under tighter control than others. There is a limit to the options open to managers.

For example, the Land Commission, the Environmental Protection Agency, the Electricity Company of Ghana may be under strict ministerial control, while the PURC may not be under such strict controls. Some bodies may be composed entirely of public servants others have a mix of public and outsiders. For example, the Minister for Finance and the governor of the Bank of Ghana serving on the NDPC facilitates the commitment of funds for decisions. Officers at the EPA, being relatively lower in rank than Ministers[6] represented on the NDPC, may have more time at their disposal than those in the NDPC. The EPA may however not have the comparable political powers to back its decisions compared to those of the NDPC unless it goes through its sector ministry or explores the goodwill between it and other institutions. Again, the mixture of strategies by which energy institutions have private sector representations potentially expand the scope of participation in the energy and environmental sectors. Within the context of cross-sectoral planning groups, it opens the opportunity for other non-energy sectors whose actions affect energy and the environment to participate on environmental fora.

6.2.7 Adaptive capacity

Adaptive capacity[7] refers to the ability to work flexibly choosing from a range of curative and/or preventive options in terms of methods and techniques. It also explores new and emerging issues that may not be explicitly covered by law or policy but implicitly derives from law and policy. It also depends on discretion. The

[6] Apart from their roles as members of parliament, they have cabinet functions. They visit their constituencies and are engaged in other public and social functions. They also oversee a civil service with many departments. These positions, together with their representation on boards and commissions, take their time. A public officer in charge of an office schedule has a lesser commitment.

[7] The term 'adaptive management' is also use similar to 'adaptive capacity.' The term is called adaptive management; a term coined by CS Holling and his co-workers at the International Institute of Applied Systems Analysis in the late 1970s.Their work is built on a simple, elegant idea. If human understanding of nature is imperfect, then human interaction with nature should be experimental. That is policies should be designed and implemented as experiments probing the behaviour of the natural system. Experiments often surprise and scientists learn from surprises. So, if resource management is considered from the outset of an experiment, surprises are opportunities to learn rather than failures to predict. Adaptive management holds the hope that, by learning from experience, one can reach and maintain a managed equilibrium efficiently and with the resilience to preserve in the face of surprise (Lee, 1998).

a.

legal provisions for energy and environmental institutions make provision for 'such other functions that will be assigned by the Minister/President.' Thus if an energy or environmental issue arises, there is room for dealing with them if mangers are creative. Under the SEA system discussed above, the discretion granted the EPA in the law also provides the bases for flexibility. Flexibility is important when the debates, arguments, framing context, problem definition and agenda setting as well as the philosophical perspectives held in society changes over time (Parsons, 1995; O'Riordan, 1991; McAllister, 1994; Marsden, 1998 and Pleune, 1997). It this case, it may mean proper application of proactive and reactive assessments. There is a growing institutional capacity in the adoption of methods and techniques in EIA. These include the adaptation of EIA-based methodology for SEA or distinction methodology for SEA. Some general methods and techniques include scenarios, matrices/compatibility matrices, and models. Others include Geographical Information Systems, quantitative or qualitative analysis and compatibility matrices, fuel cycle[8] and these must be applied flexibly and creatively (Turner, 1993; Thérivel *et al.*, 1992; Thérivel. and Partidário, 1996; Glasson *et al.*, 1999; Wood, 1996, EC, 2000; Russo, 1999; Brown and Thérivel (1999) and Blunden and Reddish, 1996). It is argued in this paper that the used of one or more of these methods in assessment is a proof that SEA may be in use. These methods therefore form the basis of items on the instrument of this study in Chapters 7 and 8

6.2.8 Effectiveness, Efficiency and Equity

In relation to institutions, effectiveness is the capability of institutions to produce results and to meet the objectives for which they are set up. Efficiency is the capacity of institutions to function effectively without wasting efforts and resources. Equity is fairness. These principles can be achieved through the creation of mechanisms for institutional accountability; the creation of new institutions in place of existing ones; the provision of advisory services; the improvement of public sector management; the reduction of wastes and duplications; the regulation of new arrangements; and the promotion of fairness. The questions that arise are whether institutions exist to meet these principles and to perform these functions; and whether they are really achieving these goals. In Ghana, energy PPPs aim to increase efficiency in the

[8] See Appendix 14.9.

utilisation of energy resources and to ensure promote equity between the rich and the poor as well as between the urban dwellers and rural areas (GOG. 1997). Institutional reforms in the energy sector take the form of privatisation and the creation of new institutions. Privatisation also seeks to establish efficient management accountability, restore and maintain their commercial viability, re-capitalize the "strategic business units" and secure private participation through joint ventures, public-private partnerships, modernize infrastructure and upgrade standards of utility services. On the question of advisory services, regulation and promotion, the following provisions are made. The Energy Commission (EC) advises on strategies to achieve efficient, economical, and safe supply of electricity. Moreover, the EC also regulates the activities of power sector operators. Specifically, the EC grants licences to operators, and also develops and enforces specific rules and standards in the energy market. The Energy Foundation has been established in 1997 as a non-profit private sector institution devoted to the promotion of energy efficiency and renewable energy, as a key strategy to satisfy Ghana's growing energy needs in a sustainable manner. It has promoted a number of successful energy efficiency programmes and secured third party[9] (EF, 2000). The State Enterprises Commission (SEC) is to restore the credit worthiness of the existing power utilities, and to increase management accountability to the respective corporate boards of directors through Annual Performance Contracts.[10] The PURC's role of price fixing and regulatory requirement and the division of areas into distribution zones is to ensure equity between the urban rich and the rural poor. But there are also areas of inefficiency including duplication and fragmentation. Whereas assigning the same job to others promotes complementarity particularly where sufficient resources are available to the institutions, these provisions suggest a duplication of functions and lack of efficiency in coordination and control.

Planning functions are under the Town and Country Ordinance 1884 (Cap 84). Although the provisions of Cap 84 are virtually repeated in the current Local

[9] The Foundation has helped the Ministry of Energy to cut energy consumption in its building substantially through energy auditing, education campaign, power factor improvement, reduction in a number of lamps in offices by 50% and replacement with energy efficient fluorescent lamps, replacement of louver blade decorative windows with solid wood flush panels to reduce leakage, relocation of window type air conditioners from the floor level to a higher levels to allow for efficient cool air circulation, installation of occupancy sensors that switch off lights and air conditioners when offices are not occupied and replacement of louver blades with sliding aluminium frame windows.

[10] This measure is an application of Agency Theory.

Government Act in which the NDPC is the focal point of planning. Cap 84 is still not repealed thereby creating a parallel and conflicting institutional framework for planning. Meanwhile, the EPA is also enjoined by Section 2(n) of Act 490 'to promote effective planning in the management of the environment.' Besides, the Department of Town and Country is locally under the Ministry of Local Government and nationally under the Ministry of Environment Science and Technology (MEST) with divided responsibility and allegiance. Co-ordination of planning functions is not effective and SEA responsibility is evasive indeed. The confusion further arises in plan approval because while development-planning proposals are subject to the approval of the NDPC, approval of spatial planning schemes are subject to approval by the MEST and by virtue of Cap 84. In essence there are at least three institutions (i.e. Town and Country Planning Department, the EPA, the NDPC/District Assemblies) dealing with planning issues with no one institution exercising control over the other.

Fragmentation manifests it self in the proliferation of increasing number of natural resource management organisations. Organisations and Agencies such as the Forestry Commission, the Forestry Department, the Energy Commission, the Atomic Energy Commission, the Water Resources Commission, the Minerals Commission, the Lands Commission, the NDPC, District Assemblies, the Department of Town and Country Planning and the Ghana Investment Centre reflect different dimensions of the Ghana's natural endowment. The creation of multiple of organisations may foster complementarity in roles. The separation of these roles may also promote specialisation, efficiency and excellence. But fragmentation may also obviate the need to integrate environmental assessment into their decision making process as they tend to concentrate on only an aspect of natural resource management. It also creates more organisations that the EPA and the NDPC have to relate to in the performance of their functions thereby robbing management of resources of efficiency. Existence of multiple agencies may mean delays, bureaucracy and rent seeking. The fragmentation could nullify any beneficial effects of decentralization because developers would have had to deal with several agencies. It may also weaken the strength of personnel and affect logistical supply to all departments. Government's scarce resources and external loans go into setting up new bureaucracies, equipping them to acquire new technical skills and paying salaries

while existing organizations are less funded to perform their tasks (World Bank, 1994: 58). The advantage of synergism is therefore lost. In addition to principles and frameworks that underpin the effectiveness of SEA, there is an emerging unanimity that tiering, proactive assessment, sustainability considerations, carrying capacity, vision, goal setting, targets and indicators and compatibility assessments are essential ingredients of top-down approach to SEA (Dryzek, 1982; Dryzek, 1983; Simon, 1983; Wood, 1995; Bartlett, 1998; Glasson, 1995; Fisher, 1999) and these principles will from the basis for evaluation in Chapters 7-10. Efficiency in the context of SEA is concerned with improving the assessment framework to capture cumulative, additive, synergistic, ancillary, induced, indirect, secondary, time-crowded or space-crowded, non-project, threshold/saturation, regional and global impacts (Thérivel *et al.*, 1996; Glasson, 1995, Glasson et al., 1999 and Wood, 1995). Equity deals with how fairly cost burden in institutions involved in managing the environment are shared.

6.3 Constraints

In addition to inefficiencies discussed in Section 6.2.8, there are other general constraints. In discussing the constraints, Trudgill's (1990) framework of barriers discussed in the first chapter provides a useful guide. He mentions agreement, knowledge, technological, economic, social and political barriers impeding better environmental management. Agreement barriers manifest themselves where boards and commissions are created alongside ministries to perform identical functions. They are also evinced by the disagreement of some institutions to transfer authority to local authorities. The implementation of a comprehensive and decentralized development planning calls for a high degree of co-operation among all government agencies concerned with socio-economic development; and between government as well as private sector institutions at all levels. It also requires effective transfers of all authority and resources from central to local government for the planning and implementation of decentralised programmes. However, there is still reluctance and disagreement in some government agencies to co-ordinate its activities and to transfer resources to District Assemblies (GOG, 1995: 44)

Knowledge barriers are evidenced by weak institutional capacity for SEA in all sectors compounded by duplicated planning functions and this does not promote

efficiency in the distribution of planning experts across planning departments. Capacity is another constraint and Boateng (1996:7) highlights the problem vividly.

> 48 Districts have no Town and Country Planning establishments. 88 Districts have weak or no town and country planning capacity at all, because they have no... planning officers. Fourteen of the 62 district planning establishments are manned by draughtsmen, while 24 are managed by experienced planning assistants. In all cases, the favoured districts have the barest minimum of professional or sub-professional staff. And in most cases, the required essential collaborating district technical agencies do not exist.

Technological barriers relate to appropriateness and existence of technology to deal environmental problems. But within the context of institutions, the barriers involve the ability to choose those forms of technology and equipment that are not exploitative, self-sustaining, capital intensive and creating financial dependency. Most bilateral and multilateral loans are tied to some forms of technology and equipment even if it is not appropriate or can be purchased from elsewhere. For example, support for institutions often comes with many motor vehicles for the departments, which may not be self-sustaining in the long run but deprive institutions of funds for other areas of their operation. Even where the technology is appropriate it may be implemented in ways that are not useful in the long run. For instance, the World Bank assisted the Ghana Environmental Resource Management Programme that involves geographical information system component fixes the scale of land information to accommodate land of 5 mile square and above when the day to day transaction in land in conducted on lands measured in feet square or acres. Although some GIS skills are transferred it not result in better natural resource management without new computerisation. Again, the proliferation of thermal pants in the wake of energy crises instead of gas-fired plants is a limited factor.

Political barriers constitute constraints in the sense of multiple boards/commissions often duplicating the same functions. Multiple representation of some civil servant of different boards/commissions leaves little time for the work in the establishments. Where boards are substantially composed of public servants, the independence of boards is threatened and their decision suppressed if their decisions are in conflict with the government's position. It is also not officially on the NDPC and the Energy Commission and neither are these bodies on the EPA's governing council. These can

be a limiting factor in the future if the EPA is to push for the fusion of SEA into energy policies and development planning. Where members of a board are from other non-public sectors such as the professional bodies and other community groups. government's control is curtailed and the independence of the public sector is ensured. But even when appointees are outside the public service. their independence is guaranteed only when the appointments are on political party lines. Where they are on party lines, appointees may still owe allegiance to government directive and be sympathetic to its cause. Even in the NDPC, government influence could be great. The existence of Ministries with supporting civil servants alongside quasi-autonomous Agencies sometimes creates conflicts. While ministerial control gives some protection and a voice for the Agencies in the cabinet it confuses policymaking. As well as being an agency, the EPA belongs to a Ministry and therefore faces constraints from ministerial control.

Economic barriers relate to inability of institutions to be self-sufficient and to bear environmental costs. Ghana is just treading the path of industrial development with an inherited large civil service that totally depends on the national treasury for its survival. Local authority and central government initiatives are contingent upon the availability of funds, much of which is diverted to debt servicing and as a result of some wastage through inefficiency. Thus when costs have to be borne by institutions on environmental protection and compliance, lack of funds is the normal excuse. Thus SEA faces a danger of not being implemented if it means more costs for institutions, (say in the hiring of experts). Economic constraints also manifest themselves in the inability of the rural poor to meet the cost of modern fuel and therefore depending on wood products to the detriment of the environment.

Trudgill (1990) refers to social barriers to involve resistance to new ideas because of perceptions, beliefs and values; inadequate identification of community hierarchies and leadership; dilemmas over morality of induced social chance; a diffuseness of decision-making process and problems of land tenure. Out of this list, the most evident in Ghana are perceptions, beliefs and values. This relate to how the interconnectedness of Ghanaians, through its extended family network, has often developed into the failure of institutions to bring legal action against individuals and institutions that violate environmental laws particularly in the biomass sector. When

it comes to policy level action where the issues such as confidentiality are pleaded, implementation can prove to be difficult.

6.4 Opportunities

Environmental Institutions and laws in place together with past experience in EIA provide the framework and fertile soil for SEA to flourish and grow in Ghana. The provisions for environment assessment not only in the legal documents but also in Ghana's vision have given credence to a political commitment to environmental assessment in the country. The decision to use political platforms to issue directives such as was done in 1989 reinforces the point. The setting up of a Ministry of Environment, Science and Technology and a parliamentary sub-committee on the Environment provides a further impetus for SEA in Ghana. It is yet to be seen if or when the Ministry will create a mechanism to subject government policy, cabinet decisions and parliamentary bills to SEA. Notwithstanding the fact that possible conflicts could arise between a Ministry and its Agency, the constraints may be unintended and government's motive is clear: it is concerned about the environment and will do all in its power to safeguard the environment. In recent years, the EPA has provided training for its staff, public and private sectors on environmental assessment. Its training has been extended beyond the borders of the country. This will no doubt build the necessary capacity for environmental management in the years ahead.

Within the past few years, two departments of the University of Science and Technology, one of the old Universities in Ghana, have started post-graduate studies in Environmental Studies and have incorporated environmental assessment in the course curricula. This development will certainly provide the added impetus for environmental assessment. The legal requirement that the 110 District Assemblies and the NDPC should carry out environmental assessment and "studies on economic, social, environmental, spatial and human settlement issues" against the background of limited professional staff provides the opportunity for private practice to take root.

Secondly, as being a party to the United Nations Framework Convention on Climate Change, Ghana is committed to playing a role in global stabilisation of green house gases (GHG). The Climate Unit situated within the EPA has been collaborating with

relevant bodies in accessing monitoring and advising of scenarios of energy sources and utilization that will not harm the biosphere.

Thirdly as part of government's public-private partnership promotion drive, the Energy Foundation has been established in 1997 as a non-profit private sector institution devoted to the promotion of energy efficiency and renewable energy, as a key strategy to satisfy Ghana's growing energy needs in a sustainable manner. It has promoted a number of successful energy efficiency programmes and secured third party

6.5 Conclusion

In conclusion, energy policy, plan and programme frameworks set within the context of West Africa are not sufficient to address environmental issues. An assessment framework that focuses on capturing the environmental implications of policies, plans and programmes is essential. Fortunately, Ghana's legal framework provides for SEA; but legal provisions alone are not helpful without an effective institutional framework. The analysis of the institutions in both energy and environmental sectors in Ghana shows tremendous strengths and weaknesses. It is necessary to reinforce the strong points of institutions. It is equally important to address institutional weaknesses if sustainability goals are to be achieved.

PART

3

ANALYTIC CONTEXT

Methodology and Analyses

Chapter

7

Research Design

Chapter Outline

Introduction

Quantitative and Qualitative Methods

Literature Review and Placement of Theory

Instrumentation

Design, items and scales of instrument

Validity and reliability of instrument

Method of Administration of Instrument

Method of Data analysis

Conclusion

7 Chapter Seven: Research Design

7.1 Introduction

From the outset, this research has been driven by theories of ecological rationality, institutions, sustainable development and energy policies, plans and programmes and strategic environmental assessment (Chapters 1-3). The constructs and variables derived from these theories have been adapted in the formulation of key hypotheses that have been presented in the logic of the research (Figure 1.1) and discussed in Sections 1.5 and 1.6. In general, a study that begins deductively by advancing a theory, deriving hypothesis, collecting and analysing data to test the theory is based on a distinct philosophical assumptions compared with studies that are more inductively approached. The distinguishing characteristics of philosophical assumptions underpinning the research, the choice and justification of method and general approach to the entire study are discussed in this chapter. Specifically, the chapter first draws distinctions between quantitative and qualitative methods of research. Next, it discusses the placement of theory in literature review. It then discusses issues related to instrumentation, design, validity and reliability of the instrument. The method of administration and method of data analysis are then considered before conclusions are drawn.

7.2 Quantitative and Qualitative Methods

Quantitative study, consistent with quantitative paradigm, is an enquiry into social and human problems, based on testing of theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalisations of the theory holds true (Creswell, 1994:2). Accordingly, the purpose of this survey research is to generalise from a sample to a population that SEA is the key to the delivery of sustainable energy policy, plan and programme subject to a good institutional framework. As illustrated in Figure 7.1, the sites for the study are Accra, Kumasi and Takoradi, the three largest cities in Ghana. According to Antwi (2000), these cities typify the characteristics of other cities in West Africa and indeed sub-Saharan Africa. Thus the conclusions that can be drawn can be generalised to cover sub-Saharan Africa.

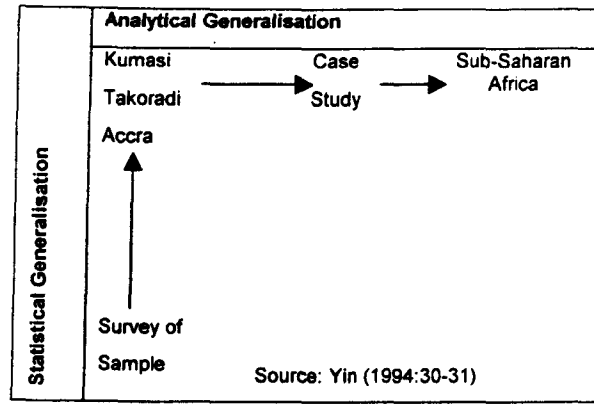


Figure 7.1: Generalisation of a Case

The quantitative method, often used alongside traditional, positivist, experimental, scientific or the empiricist paradigm[1] derives from the empiricist tradition after Bacon, Comte, Mill, Durkheim, Newton, Locke and Popper (Creswell, 1994:4; Isaac and Michael, 1995:1). It has as one of its major goals the collection of information based upon the objective and systematic observation of phenomena with frequent effort to achieve possible cause and effect relationships. The system of philosophy underlying the scientific method is referred to as logical positivism of which one major principle is the verifiability of relationships among natural phenomena expressed by means of hypotheses. Popper postulated that the 'scientific method did not comprise the logical process of proof, based on the accumulation of facts and evidence so much as the setting out of conditions in which theories could be falsified' (Parsons, 1995:48). The Falsification School, after Popper, therefore argues that 'the aim of scientific enquiry is falsification; thus [it is argued that] a theory can never be proven but only disproved.'

Typically, interrelated hypotheses, tentative statements and possible relationships between two or more variables, derived from a theory, are tested and evaluated for their tenability. If the hypotheses are shown to be tenable through the process of falsification, researchers judge the theory to be supported. On the other hand, if the hypothesis cannot be verified or falsified, the investigator may be led to revise or modify the theory or check the reliability and validity of measures or scales of variables entering into the hypotheses. Thus 'failure to reject a null hypothesis does

[1] Although these terms have much in common, each has distinguishing features that characterise it

not...logically imply accepting it' (Isaac and Michael, 1995; Dillon and Goldstein, 1984:450).

Table 7:1: Philosophical Assumptions behind Research Generally

Assumptions	Questions	Quantitative	Qualitative
Ontological	What is the nature of reality?	• Reality is objective and singular, apart from the researcher.	• Reality is subjective and multiple as seen by participants in a study.
Epistemological	What is the relationship of the researcher to that researched?	• Researcher is independent from that being researched	• Researcher interacts with that being researched
Axiology	What is the role of values?	• Value-free and unbiased.	• Value-laden and biased
Rhetorical	What is the language of research?	• Formal • Based on set definitions • Impersonal voice • Use of accepted quantitative words	• Informal • Evolving decisions • Personal voice • Accepted qualitative words
Methodological	What is the process of research?	• Deductive process based on theory, hypotheses, variables and constructs existing prior to the study • Cause and effect • Static design-categories isolated before study • Context-free • Generalisations leading to prediction, explanation, and understanding • Accurate and reliable through validity and reliability.	• Inductive process • Mutual simultaneous shaping of factors • Emerging design-categories identified during research process • Context-bound • Patterns, theories developed for understanding • Accurate and reliable through verification.

Source: Creswell(1994:5)

In contradistinction to the quantitative approach, the qualitative paradigm, often discussed along with constructivist, postmodernist, naturalistic, the interpretative or postpositivist paradigm,[2] began as a countermovement to the positivist tradition after Weber and Kant (Lincoln and Guba, 1985; Smith, 1983). As Borg and Gall (1989) and Isaac and Michael (1995) argue, a postpositivist philosophy of science has

[2] Although these terms also have much in common, each has distinguishing features that characterise it

emerged alongside positivism with an increasing emphasis on value-laden and theory driven principles that direct the acquisition of knowledge about phenomena that are not directly observable through the senses. The distinctions between the two traditions are explained in Table 7.1

Primarily, the choice between quantitative and qualitative methods of enquiry can be made on the basis of ontological, epistemological, axiological, rhetorical and methodological philosophical assumptions. Regarding ontology, quantitative paradigm considers reality to be objective and singular apart from the researcher, whereas qualitative study takes reality to be subjective and multiple as seen by participants. Under epistemological assumption, positivist researchers are seen as independent from the phenomena being researched unlike naturalist colleagues who are assumed to interact with the subject being researched. As regards axiological underpinning, research is held to be value-free and unbiased in quantitative enquiry but is value-laden and biased in postmodernist study. Rhetorically, formality, the use of set definitions and impersonal voice will underlie the language of scientific paradigm whereas the opposite holds true for constructivist model. As touching methodological assumptions, empiricist research process follows deduction (based on theory, hypotheses, variables and constructs existing prior to the study and remaining fixed throughout the study), cause and effect, static design, context-free and generalisations leading to prediction, explanation and more understanding of the phenomenon being studied, unlike postpositivist method of enquiry. Furthermore it is presumed that accurate and reliable results can be achieved through validity and reliability in quantitative paradigm as opposed to qualitative paradigm.

Secondly, both quantitative and qualitative processes of analysis depend on whether pure research, evaluation or development (or design) is the enquirer's focus. Research is defined by Isaac and Michael (1995) as a systematic approach to (i) identifying relationship of variables representing concepts (constructs) and/or (ii) determining differences between or among groups in their standing on one or more variables of interest. Research constitutes an endeavour to generate new knowledge or to resolve contradictions or inconsistencies in given bodies of knowledge through the testing of hypotheses deduced from theory so as to enable verification,

modification, or rejection of the major propositions. axioms, or assumptions on which the theory is based.

Evaluation primarily involves a determination of the effectiveness or worth of a program intervention or action through the establishment of criteria of effectiveness so that judgements can be made in a relatively objective manner. According to Isaac and Michael (1997:8), evaluation has come the way of technology rather than science. Its accent is not on theory building but on product delivery or mission accomplishment. Citing Stufflebeam (1971), Isaac and Michael said 'the purpose of evaluation is to improve not to prove.' Its essence is to provide feedback leading to a successful outcome defined in practical concrete terms. Such a process has functioned since the beginning of time although its formal version coincided with the advent of the computer to give rise in the 1950's to the man-machine systems movement and currently to the systems approach. Its general steps are setting goals; designing of means to achieve these objectives; and construction of a feedback mechanism to determine progress toward, and attainment of, the objectives. Its basic paradigm, in computer language is:

Input ⟶ Process ⟶ Output

Development[3] or design is directed toward achieving a reasonably well-defined product of functional utility such as computer software or standardised test. In engineering and the applied sciences, invention is a process that uses development and design.

The purpose of this study is not to evaluate the effectiveness of SEA in Ghana. It is neither aimed to design a method or a model for SEA. The study is purely for research purposes. Neither evaluation nor development/design approaches are therefore applicable. Consequently, all assumptions are based on quantitative and qualitative paradigms. In this research, the presumption is that there is an objective conception of SEA (as a tool for sustainability) and this is apart from the researcher [ontology]. Irrespective of where the study is being undertaken, there are some basic

[3] Note that research is an effort to generate new knowledge or to resolve existing conflicts or inconsistencies in existing body of knowledge.

assumptions (such as tiering, proactive assessment, scoping, screening etc.) that should govern SEA. Thus the researcher can be independent from the phenomenon (SEA) that is being researched [epistemology]. That being the case, the outcomes of SEA-based research can be value-free [axiology]. Moreover, because SEA theory exists prior to the study, it is possible to design a process based on, theory, hypotheses, variables and constructs. The purpose of a study determines the method to choose for the investigation. Indeed, the purpose of this research study is essentially to test some hypotheses (Sections 1.3 and 7.4) [methodology]. On the basis of these assumptions and based on the purpose of the study, the quantitative paradigm is a more suitable approach than the qualitative approach.

7.3 The Choice of an Approach

Having chosen a research paradigm/design in Section 7.2 above, it is important to choose the method applicable to that paradigm. This is done by considering methods applicable to qualitative and quantitative design and their relative merits within the constraints imposed by the Ghanaian context. Creswell (1994) listed methods frequently used under the qualitative design to include case studies, grounded theory, ethnographies, biographical studies and phenomenological studies. Case studies are studies in which the researcher explores a single entity or phenomenon ('the case') bounded by time and activity (a programme, event, process, institution, or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time. In a grounded theory, the researcher tries to drive a theory by using multiple-stages of data collection and the refinement and interrelationship of categories of information. The researcher in ethnographies[4] uses an intact cultural group in natural settings during a prolonged period of time by collecting primary and observational data. The research process is flexible and typically evolves contextually in response to lived realities encountered in the field setting. A biographical study is the study of an individual and his/her experiences as told to the researcher or found in documents and archival materials. In phenomenological studies, human experiences are examined through the detailed description of the people studied. The process involves studying small numbers of

[4] *Participant and Non-participant Observation* and *Naturalistic Observation* as qualitative approach fall under this type of study.

subjects through an extensive and prolonged engagement to develop patterns and relationships of meaning (See Creswell, 1994:11-12).

Methods adopted under quantitative approach are experimental design, single-subject research, causal-comparative research, correlational research, survey research and content analysis research (or meta-analysis research). These methods are the best approaches to hypothesis testing (See Kerlinger and Lee, 2000; Wallen and Fraenkel, 2001). In an experimental design, the researcher tests cause-and-effect relationships and randomly assigns subjects to groups. Here the researcher manipulates one or more independent variables and determines whether these manipulations in an experiment cause an outcome. A single-subject research is the approach in which one subject (rather than a group) is exposed to series of treatment over a period of time where the earlier treatment may be taken as the baseline against which the subsequent treatment is compared under controlled experimental conditions. When a researcher conducts a causal comparative study, two or more groups that differ in certain ways are compared on the basis of one or more variables. There is no manipulation or intervention on the part of the researcher other than what is required to administer the instruments necessary to collect the data. In a correlational research, researchers investigate possible relationships among variables without trying to influence those variables. Although correlational research cannot determine the causes of relationships, they suggest them. A survey design provides a quantitative or numeric description of some fraction of the population (sample) through a data collection process of asking questions of people. Content analysis is an analysis of the written or visual contents of a document to determine the occurrence of various words, statements, concepts, pictures, images and ideas (See Kerlinger and Lee, 2000; Wallen and Fraenkel, 2001).

As discussed above, the best approach to hypothesis testing is the quantitative approach using experimental design, single-subject research, causal-comparative research, correlational research, survey research, content analysis research or meta-analysis research. This is based on the assumption that there is a body of literature from which constructs and variables can be derived (See Kerlinger and Lee, 2000; Wallen and Fraenkel, 2001). Fortunately, the existence of a body of literature on the subject (such as SEA, sustainable development, energy policies, plans and

programmes) facilitates constructs and variables to be derived and questionnaires to be constructed to gauge the opinion of respondents. Thus based on the purpose of the research and existence of literature and the relative weakness of qualitative methods in hypothesis testing, the quantitative approach is adopted. Because the qualitative paradigm is not the best approach to hypothesis testing, methods such as case studies,[5] grounded theory, ethnographies, biographical and phenomenological studies have not been adopted.

Another broad reason why this study does not adopt the case study approach is because of the limitations inherent in case studies. Good research must demonstrate objectivity (Isaac and Michael, 1995). It should also have a broad focus and be representative of the population being investigated. This can be achieved through random sampling (Locke, Spirduso, and Silverman, 2000). Research should also allow valid generalisations to be made from samples to populations (Babbie, 2001:298). The choice of variables relevant to samples, that will reflect population characteristics, must be based on their typical attributes. Unfortunately, case studies based on qualitative paradigm are fundamentally flawed.

> Because of their narrow focus on a few units, case studies are limited in their representativeness. They do not allow valid generalisations to the population from which their units came until the appropriate follow-up research is accomplished, focusing on specific hypotheses and using proper sampling methods. Case studies are particularly vulnerable to subjective biases. The case itself may be selected because of its dramatic, rather than typical, attributes; or because it neatly fits the researchers preconceptions. To the extent selective judgements rule certain data in or out, or assign a high or low value to their significance, or place them in one context rather than another, subjective interpretation is influencing the outcome (Isaac and Michael, 1995).

Locke, Spirduso, and Silverman (2000:100) also argue that

> Absolute fidelity in execution of a particular design does not offer the same benefit it yields in quantitative studies. Instead, it is common in qualitative research for plans to

[5] Isaac and Michael (1997: 52) argue that because case studies are intensive, they bring to light the important variables, processes, and interactions that deserve more extensive attention. They pioneer new grounds and often are the source of fruitful hypotheses for further study. But where variables, processes and interactions are known, case studies are not important in this regard.

be regarded as tentative and contingent on the realities presented by data collection and analysis.

Babbie (2001:300) suggests that unlike quantitative research, qualitative studies have to deal with at least eight ethical concerns. Compared with case studies, survey study (based on quantitative analysis and hypothesis testing), does not have the same limitations. Survey study is therefore a better method of research for this study than case studies.

Furthermore, the Ghanaian context poses serious challenges to case study methods. Case studies work on the basis that there are several cases of SEA from which a variety of variables in respect of good practice SEA can be tapped at policy, plan and programme levels. SEA is formalised only in 1999 and diverse numbers of written cases are not available. Besides, case studies, as an approach, require a 'sustained period of time' for completion. Within the context of SEA, there should be a number of good quality cases covering the entire policy cycle, implementation phases and the period of long-term monitoring and evaluation. Such studies should not be limited to written reports alone; they should also cover the entire application process: from completing application forms, screening, scoping, report preparation, consultation/participation, publication of draft EISs and public hearing to post approval monitoring and management. All of these stages invariably require a 'sustained period of time' to accomplish. In the developing world where data management is poor compared with the West, and the funding for energy programme can be problematic, more than two years is needed to complete the fieldwork on SEA. This research does not have the resources and time to accomplish such a long-term research. Any case studies undertaken only become useful for the purposes of triangulation and not as a quantitative study.

Since much of the SEA-like activities, applied to PPP by practitioners, through the decentralised planning system of Ghana, are unwritten; a method that can tap these opinions is most useful. EIA-based EISs, if used, will ignore the distinctiveness of SEA and therefore not suitable for an SEA study. Besides, research must proceed on the assumption that quality studies have already been conducted to determine the

quality of EISs in Ghana. This is not the case; any EIS-based content analysis will be flawed from the outset (i.e. without the complement of a quality studies) and adversely affect the validity and reliability of the study. Such a study will only look at SEA from EIA perspectives and fail to tap the perceptions and experiences of practitioners who, although are involved in some forms of SEA, have not produced reports in every case.

With these considerations in mind, the best practical method this survey study adopts is quantitative design. The adoption of quantitative design is further strengthened by the fact that there exists a substantial body of literature on the subject being investigated; the design of this study is based on hypotheses testing; there are more constraints as to the use of qualitative case studies and the fact that the research does not seek to explore new variables or an emerging design. Although under certain circumstances, it might be possible to use both qualitative and quantitative approaches, the limitations of qualitative method advanced above and the fact that the variables such as SEA, sustainable development and energy policy are not grey areas for exploratory studies, the study stuck to quantitative analysis.

7.4 Hypothesis testing

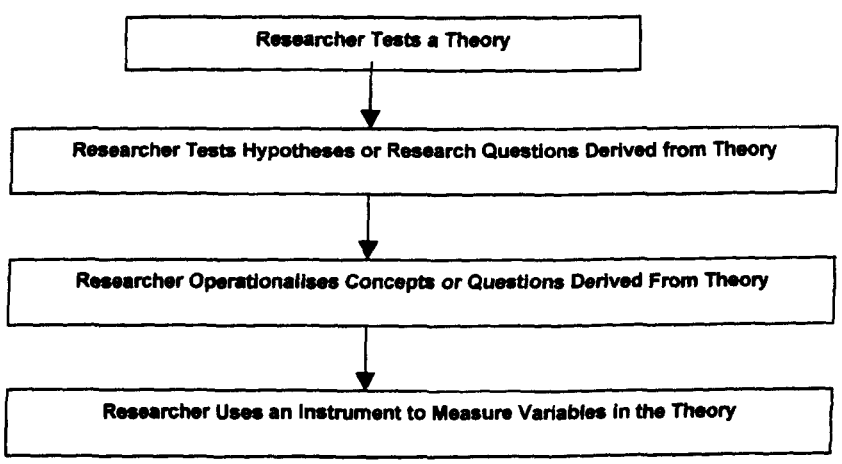


Figure 7.2: The Deductive Model of research in a quantitative study

A quantitative study based on hypothesis testing begins by advancing a theory. The theory becomes a framework for the entire study, an organising model for the research questions or hypotheses and for data collection procedure. Data is then collected to test hypotheses, which then help to confirm, or refuted the theory. A deductive model of thinking used quantitatively is shown in Figure 7.2 above. It is observed that the researcher tests a theory using hypotheses or questions derived from theory. These hypotheses and questions, in turn, contain variables that are measured by means of items on an instrument (questionnaire). Questionnaires or instruments are designed by operationalising concepts and questions derived from theory. In this study, the constructs are defined based on a theoretical universe of SEA and sustainable development discussed in the review of the literature in Chapter 2-3. To generate items for these measures, questions were created to tap the dimensions of the constructs in literature (a deductive approach[6] to item development).

The constructs included enough items that adequately sample the domain, but at the same time aim to be as parsimonious as possible, in order to obtain content and construct validity [See Section 8.3 Chapter Eight] (Cronbach and Meehl, 1955). Since the number of items in a scale can affect responses in different ways, the 'measure must adequately capture the specific domain of interest yet contain no extraneous content' (Anastasi, 1976; Schmitt and Stults, 1985; Kenny, 1979; Nunnally, 1976; Hinkin and Schriesheim, 1989; Trochim, 1989; Hinkin, 1995).

On the basis of the general literature about SEA, ecological rationality, sustainable development and energy policy, plan and programme, hypotheses are derived to pilot the study and then subsequently revised for the main study. The main (revised) hypotheses adopted in this study are shown in Table 7.2 below. The first column corresponds to the hypotheses as numbered in Chapters 8-10 of this thesis. Column 2 shows the wording of the hypotheses in the study.

[6] In the absence of sufficient literature or theory existing concerning a construct, then an inductive approach to item development must be undertaken Basically the researcher is left to determine the domain or dimensions of the construct. The researcher can gather qualitative data, such as interviews, and categorize the content of the interviews in order to generate the dimensions of the construct. One method that of data gathering that is quite useful in developing a conceptual domain of a construct is concept mapping (Trochim, 1989; Hinkin, 1995).

Table 7.2: Revised Hypotheses

References	Hypotheses
Consolidated Hypothesis	The more (X_1) SEA is carried out generally, (X_2) SEA is applied to energy sector with (X_3) a strong SEA framework, then (Z) the more sustainable energy policies, plans and programmes will be provided (Y_1) the existing system of assessment and (Y_2) institutional context are improved.
Hypothesis 1	The more (X_1) SEA is carried out generally, (X_2) SEA is applied to energy sector with (X_3) a strong SEA framework; (Z) the more sustainable energy policies, plans and programmes will be.
Hypothesis 2	The more suitable the institutional framework (X_3sub) or SEA Framework (X_3), the better the implementation of policies, plans and programmes (Y1). The more effective or suitable the institutional framework (X_3sub) or SEA Framework (X_3), and the more improved institutional context (Y_2), the more sustainable energy policies, plans and programmes will be.
Hypothesis 3	The greater the impact of context (X_3sub) and philosophical/institutional changes (Y_2sub), the more effective are institutions to deliver sustainable energy policies, plans and programmes
Hypothesis 4	There is the possibility that (X_1) the more SEA is carried out generally, (X_2) SEA is applied to energy sector with (X_3) a strong SEA framework (Y_1) the more there will be improvement in the existing system or (Y_2) the more there will be improvement in the institutional.
Hypothesis 5	It hypothesizes that common needs, resources, strategic advantages and mutual benefits within the West Africa sub-region have causal effects on sub-regional cooperation and common sustainable energy policies, plans programmes.
Hypothesis 6	SEA facilitates and increases participation on environmental matters, facilitates consultation between authorities.

Other supplementary hypotheses can be derived from the above hypotheses. For example, 4 supplementary hypotheses based the first main hypothesis, 5 supplementary hypotheses based on the fourth main hypothesis and 2 supplementary hypotheses based on the second main hypothesis are shown in Table 7.3 below. In the table below, the first column corresponds to the main hypotheses as numbered in Chapters 8-10 of this thesis. Column 2 shows the supplementary hypotheses derived from the corresponding hypotheses.

Table 7.3: Supplementary Hypotheses

References	Supplementary Hypotheses
Hypothesis 1	The more (X_1) SEA is carried out generally, (Z) the more sustainable energy policies, plans and programmes will be.
√	The more (X_2) SEA is applied to energy sector (Z) the more sustainable energy policies, plans and programmes will be.
√	The more established is (X_3) a strong SEA framework; (Z) the more sustainable energy policies, plans and programmes will be.
√	The more SEA is generally carried out the more improvements can be made to the institutional context
Hypothesis 4	The more SEA is carried out generally the more the desire to improve the existing system
√	The more Energy-sector SEA is carried out the more improvements can be made to the institutional context.
√	The more an Energy-sector SEA is carried out the more the desire to improve the existing systems
√	The more an SEA framework is established the more improvements can be made to the institutional context
√	The more an SEA framework is established the more the desire to improve the existing system
Hypothesis 2	The more the institutional context is improved the more likely can sustainable energy policy, plan or programme be achieved
√	The more the existing system is improved the more likely will be sustainable energy policy, plan or programme

7.5 Instrumentation.

Quantitative data collection takes the form of experimental design in the laboratory, fieldwork or simulation of life situations. It also takes the form of survey research based on fully structured standardised questionnaires prepared by the researcher or another researcher. Items comprise the domain of a set of pre-prepared questions with a domain of answers from which respondents choose an answer and the respondents must be competent to answer the questions reliably. According to Babbie (2001: 241), in asking respondents to provide information, you should continually ask yourself whether they could do so reliably. Thus questions should be such that respondents have a fairly good knowledge of their nature and content and can remember their answers with some degree of accuracy. An advantage of this

approach lies in survey research's strong emphasis on representative samples, overall design, plan of research and expert interviewing using carefully and competently constructed schedules (Kerlinger and Lee, 2000; Babbie. 2001). A carefully selected probability sample in combination with a standardised questionnaire offers the possibility of making refined descriptive assertions about any large population. Surveys such as self-administered ones make large samples feasible. Quantitative research is also flexible in the number of questions to be asked and the possibility of developing operational definitions from actual observations. Besides, standardised questionnaires have an important strength in regard to measurements generally (Babbie, 2001). It also has economy of design, rapid turn about in data collection and the ability to obtain a great deal of information from a large population. It is economical compared with qualitative research and produces accurate research information on values, attitudes and beliefs (Fowler, 1993; Creswell, 1994). A disadvantage however relates to the undue emphasis placed on the researcher's ability to predict *a priori*, the appropriate items to include on the response domain. In this sense the researcher imposes constraints on responses. This disadvantage can, however be minimised with experience and knowledge of the field under investigation as well as extensive literature review. Given the conditions, it was considered that the gains from employing this approach far outweighed the losses (Antwi, 2000).

7.6 Design of Questionnaire

On the basis of the above discussions, the main survey questionnaire, at appendices, has six variables each for policy, plan and programme level analysis. These were SEA in General (X_1), Energy Sector SEA (X_2) and SEA Framework (X_3) as independent (predictor) variables, Improved Systems (Y_1), and Improving Institutional Context (Y_2) as mediator (intervening) variables and Sustainable Energy Policy the dependent variable (Z). The independent and mediator variables were measured by 22 sub-variables while the dependent variable was measured by 24 variables. To choose these 22 and 24 sub-variables, a number of sub-variables were first chosen to adequately sample the domain of the variables, and aim to be as parsimony as possible, in order to obtain content and construct validity. These 22 and 24 sub-variables were chosen from a larger number of sub-variables on the basis of factor analysis and discussion with supervisors and practitioners in the field in

Ghana. Those variables with statistically insignificant factor loading of less than 0.30 were excluded.[7] There was another 10-item questionnaire used for the survey of West Africa. The sub-variables measuring each of these 6 variables are indicated in Tables 7.4 – Table 7.9 below. Specifically, all the 22 items on the variable marked 'A' in the questionnaire at Appendix 14.1 and shown in Table 7.4 below measure the variable (X_1) SEA in General. Similarly, items in Table 7.5 measure the variable (X_2) Energy Sector SEA; items in Table 7.6 measure the variable (X_3) SEA Framework; items in Table 7.7 measure the variable (Y_1) improving the existing system; items in Table 7.8 measure the variable (Y_2) Improving the Institutional Context and items in Table 7.9 measure the variable (Z) Sustainable Energy Policy. The items in Table 7.10 deal with the West Africa Survey. The following sub-sections explain the sub-variables used in each of the variables used in this study. With minor modifications these variables were adopted for plan and programme levels data collection (See Appendices14.2 and 14.3).

7.6.1 SEA in General

Table 7.4 below lists the sub-variables employed in gauging the variable – SEA in General (X_1). This variable on the main survey instrument seeks to measure the extent to which SEA is undertaken generally in Ghana. This variable *SEA in General* took into consideration several factors discussed in the SEA literature including competence of respondents [Item A1[8]] (Babbie, 2001), tiering and trickle-down effect of SEA [Item A2]. Others include consideration for limited options and a wide range of effects at policy level [Item A3-4], evidence of undertaken SEA [Item A5, 18-19], vision, aim, goal, objectives, topics, criteria, targets and indicators [Item A 6-8, 12-13] and for compatibility and consistency [Item A 9-11]. The rest involved the use of environmental objectives, regulations and/or monitoring programmes as the basis for measurement and comparison [Item A 15-17]. Another sub-variable adopted SEA as a proactive assessment tool [Item A 20-22] (Glasson, 1995; Glasson *et al.* 1999; Thérivel, 1992; Thérivel *et al*, 1996, Wilson, 1993; Wood, 1992 and Sadler, 1996).

[7] In factor analysis, a factor loading of between 0.30 and 1.00 is considered a significant.
[8] Item A1 refers to item A1 on the questionnaire. Subsequent labelling will carry similar meaning throughout the study.

Table 7:4: The Variable Denoted by X_1 – SEA in General

A	SEA in General
1	My establishment directly or indirectly initiates or implements environmental policies
2	Policies are designed to affect plans or programmes
3	My establishment is able to consider a limited number of policy options
4	My establishment is able to consider a wide range of effects
5	My establishment assesses the environmental impact of its policies
6	My establishment has deduced some of its goals from Ghana Vision 2020
7	My establishment does not have environmental goals or objectives
8	My establishment's policies flow from its goals and objectives
9	My establishment considers the compatibility or consistency of its policies to one another.
10	My establishment does not considers how compatible and consistent its policies are to the Ghana Vision 2020
11	My establishment considers the compatibility or consistency of its policies to its establishment goals or objectives
12	My establishment has developed a set of sustainability criteria against which objectives are tested
13	My establishment has a set of targets or indicators against which objectives are tested
14	My establishment considers the link between social, economic and environmental effects of its actions
15	Indicators are developed based on environmental objectives
16	Criteria are developed based on environmental regulations
17	Indicators used in policy assessment are based on monitoring programmes
18	To date written environmental assessment reports exceed 2
19	To date written environmental assessment reports are below 2
20	Environmental Assessment of Policies is made at the initial stages of policy formulation.
21	Environmental Assessment of Policies are made during policy implementation phase
22	Environmental Assessment of Policies are made at the end of policy implementation phase

7.6.2 Energy Sector SEA

Table 7.5 below shows the sub-variables employed in gauging the variable – Energy Sector SEA (X_2). The variables *Energy Sector SEA* took into consideration factors including the competence and general knowledge of respondents [Item B1-2], economic, social and environmental factors underlying sustainable development [Item B3-5], impact of non-energy sectors such as housing, industry, mining and transportation on energy use and the environmental impact of energy use on local, national and global scales and therefore the need to consider local, nation and global criteria for SEA [Item B6-11]. As part of SEA process, not only is impacts predicted, they are also evaluated together with alternatives. The use of some techniques for prediction and evaluation is an indication that SEA is being undertaken. Consequently, consideration was given to techniques including scenarios,

matrices/compatibility matrices, and models. Others include Geographical Information Systems, quantitative or qualitative analysis and compatibility matrices [Item B13-19], (Turner, 1993; Thérivel *et al.*, 1992; Thérivel, and Partidário, 1996; Glasson *et al.*, 1999; Wood, 1996, EC, 2000). It was also suggested in the energy literature that assessment of either energy projects or its policies should take account of analysed fuel cycle, analysed phases of fuel cycle and analysed processes associate with each phase [Item B20-22], (Russo, 1999 and Blunden and Reddish, 1996).

Table 7.5: The Variable Denoted X_2 – Energy Sector SEA

B	Energy Sector SEA
1	My establishment directly or indirectly evolves or initiates energy policies
2	The policies of my establishment may affect energy use.
3	My establishment assesses the environmental effects of its policies
4	My establishment assesses the social effects of its policies
5	My establishment does not assesses the economic effects of its policies
6	Energy policy making takes account of housing development
7	Energy policy decisions does not take account of the industrial sector
8	Energy policy making takes account of the transportation sector
9	Criteria for environmental assessment consider local impacts
10	National impacts are considered in the assessment of environmental impacts of energy policy.
11	Criteria for assessment consider global impacts
12	Key issues affecting decision-making are the focus of policy assessment
13	Policy assessment methods include scenarios
14	Policy assessment methods include matrices
15	Policy assessment methods include models
16	Policy assessment methods include Geographical Information Systems
17	Environment Assessment of Policies make use of quantitative analysis
18	Environment Assessment of Policies makes use of quantitative analysis
19	Policy assessment methods include compatibility matrices
20	Analysed Fuel Cycle
21	Analysed Phases of Fuel cycle
22	Analysed Processes Associated with each phase

7.6.3 SEA Framework

Table 7.6 below lists the sub-variables measuring the variable – SEA Framework (X_3). Wood (1995), Fischer (1999), Sadler (1996), Sadler and Verheem (1996) and Partidário (1996) proposed principles that facilitate SEA to include clear legal provision, clear requirement [Item C1-4], accountability, early application, tiering, proactive use of policy, time frame, methodology and experience [Item C5 and C20], institutional framework, institutional capacity, expert services and inter-agency

cooperation [Item C9-11, 21] participation and democratic culture [Item C5-8]. Parsons (1995) and Pleune (1997) add other constructs to include the role of politics and past track record, budgetary allocation [Item C12-14, 22], framing context, problem definition and agenda setting [Item C15-17]. Because of the trans-boundary nature of energy impacts, a framework for inter-regional cooperation on economic, environmental and energy issues are essential for SEA [Item C18-19].

Table 7:6: The Variable Denoted by X_3 - SEA Framework

C	SEA Framework
1	There are clear legal requirements for environmental assessment of policy
2	There exist clear written policy frame for reference
3	My establishment has clear responsibility for the environmental assessment of policy.
4	There is a clear requirement for accountability
5	There is a clear time frame for accountability
6	There exist a culture of democracy or participation
7	A clear framework for public participation is provided
8	A clearly defined institutional framework exists
9	A framework for institutional capacity building exists
10	A framework for inter-agency co-operation exists
11	Institutions are insulated from political interference
12	There is a strong political will to implement environment policy
13	There exists a good track record of compliance
14	There is a framework for framing or redefining environmental problems
15	Many stakeholders are involved in setting the environmental agenda
16	There is a framework of Inter Regional Environmental Cooperation
17	There is a framework of Inter Regional Cooperation on Energy Policy
18	There is a framework of Inter Regional Economic Cooperation
19	Staff experience in environmental assessment exists
20	Clear mandate for the use of consultants or experts in assessment or review exists
21	There is adequate budgetary allocation for environmental assessment.
22	There is a good practice or clear methodology for reference

7.6.4 Improving the existing system

A good system of SEA will address cumulative, induced, synergistic and indirect effects among others (Glasson, 1995; Glasson *et al.* 1999; Thérivel *et al*, 1996, Wilson, 1993; Wood, 1992). It will also hopefully align project EIA methodology to SEA and adapt or modify EIA methodology for SEA and relate EIA to policy objectives (Thérivel *et al*, 1996; Sadler, 1996) [Item D1-6 and 11-12]. The literature mentions the strength of sustainable development in forging a link between economic, social and environment goals of development [Items D7-10] (Toman *et al.*

1997; Redcliff, 1997:438; Jacobs, 1997; Dobson, 1996; Ekins, 1997; Gladwin and Kennelly, 1997; Goodland, 1997). Other areas of change and improvement mentioned in the SEA literature are in PPP making, framing of policies to include direction of change, quantification, fine-tuning, removal of contradiction and using sustainability indicators [Item D 13-19 and 22] (Sheate, 1992; Mitchell *et al.*, 1999; Thérivel, and Partidário, 1996). SEA will serve its purpose if it leads to changes in policies as a result [Item D 20-21]. Table 7.7 below shows the sub-variables under this variable.

Table 7.7: The Variable Denoted Y_1 – Improving the Existing System

D	Variable – Improving the Existing System
1	Addressing the environmental effects of major projects such as dams or power stations
2	Addressing the environmental effects of 2 or more major projects such as dams or oil refinery put together
3	Addressing the environmental effects of minor projects
4	Addressing the combined environmental effects of several minor projects put together
5	Addressing the indirect environmental effects of activities or projects induced by a major project
6	Not addressing the environmental effects of many scattered insignificant projects whose effects put together can be very significant
7	Adapting EIA Methodology to SEA
8	Developing distinctive SEA methodology
9	Introducing more response indicators in the assessment of policy impact assessment
10	Introducing direction of change in PPP objectives
11	Maintaining quantified targets for assessment
12	Linking SEA to PPP
13	Linking and coordinating EIAs, PPPs and SEAs
14	Linking SEA to sustainable development
15	Introducing carrying capacity assessment in PPPs
16	Making PPP's objectives more specific or explicit
17	Removing contradictions in PPPs
18	Improving or fine tuning PPPs as a result of policy impact assessment
19	Changing or modifying PPPs as result of policy impact assessment
20	Writing new objectives to capture subcomponents of policies
21	Emphasising or improving mitigation measures
22	Improving monitoring measures

7.6.5 Improving the institutional context

This instrument was constructed on the assumption that in a multicultural society full of multiple ideas and philosophies, SEA needs to identify the institutional forms in operation, examine their constraints and opportunities for effective assessment of environmental effects. Options include using existing institutions, modifying and/or

empowering existing ones, creating new ones or merging others depending on institutional orientation: sociological, economic and political (Hill and Ham, 1993, Parsons, 1995, Morton, 1998; Marsden, 1998; Webb and Sigal, 1996). Also, see Section 6.2.6 for a discussion on these forms of institutionalism[9] [Item E1-17]. It also covers a framework for facilitating enforcement through resource dependency, strategic advantage, common need and mutual benefits [Item E18-22] (Parsons, 1995). Table 7.8 below shows the sub-variables employed in gauging this variable.

Table 7:8: The Variable Denoted Y_2 – Improving Institutional Context

E	Variable – Improving Institutional Context
1	*There is no improvement in the implementation structures of my establishment.*
2	EPA should be empowered to enforce Environmental Assessment of Policies in private institutions.
3	EPA should be empowered to enforce Environmental Assessment of Policies in public institutions.
4	Another institution such as NDPC should oversee the EA of policies in public institutions
5	I believe that the impact of environmental agencies is generally being felt.
6	There is no improvement in communication and coordination among agencies.
7	There is no improvement in the enforcement of regulations in the environment and energy sectors
8	There is no improvement in logistical and resources supply for the effective execution of the work of my establishment.
9	*There is little progress in encouraging participation among stakeholders in energy and environmental issues*
10	*Partnerships are generally encouraged*
11	There is improved cooperation with other establishments.
12	Environmental assessment of policies may not be in conflict with my departmental policies
13	My establishment can adapt to any environmental concerns or assessment requirements
14	My establishment can displace or suspend some of its goals for the sake of the environment
15	Environmental assessment of policies should be taken on by my establishment
16	EA of policies can be integrated into other principles upon which my department operates
17	My organisation may imitate the success story of another organisation in terms of environmental compliance
18	Environmental assessment of policies can be promoted or disseminated by my department
19	*My establishment's mission statement should include environmental assessment of its policies*
20	*To guide departmental compliance to environmental issues performance indicators are needed*
21	*What is important is to have an expert unit in our establishment to oversee EA of Policies*
22	There is a law in place to make the employment of consultants easy

[9] We have already seen in Section 2.2.2, Chapter Two that any discussion of inter-organisational relationships will cover sociological, political and institutional institutionalisms. In discussing inter-organisational relations, the place of those relationships in a wider social structure (political institutionalism), and of course, within the narrower structure (sociological institutionalism) that becomes important The application of economics to institutions developed into the notion that inter-organisational relationships are best determined by markets (economic institutionalism). Intra-organisational relations emphasises human behaviour within organisations. It is concerned with the conflict between basic human needs and the requirements of work tasks in formal organisations from basic psychological needs to self-actualisation (Maslow, 1954) as well as the orientation towards leadership

7.6.6 Sustainable Energy Policy

From the discussions on sustainable development in Section 2.5, Chapter Two, it was stressed that any meaningful discussion of sustainable development should address socio-economic as well as biophysical aspects of sustainability (Toman *et al.* 1997; Redcliff, 1997:438; Jacobs, 1997; Dobson, 1996; Ekins, 1997; Gladwin and Kennelly, 1997; Goodland, 1997); in other words, it should address economic, social and environmental dimensions of sustainability. Thus three classes of variables sought to measure social [Item F1-8], economic [Item F9-16], and environmental [Item F17-24] sustainability (Sheate, 1992; Mitchell *et al.*, 1999; Thérivel. and Partidário, 1996; Wood, 1995; Fischer, 1999; Sadler, 1996). Table 7.9 below lists the sub-variables employed in gauging the variable.

Table 7.9: The Variable Denoted Y_2 - Sustainable Energy PPPs

F		Sustainable Energy Policies, Plans and Programmes
1	**Social**	Fostering social cohesion and integration
2		Enhancing social sense of community and connectedness
3		Housing with modern lighting
4		Enhancing cultural values of society
5		Reducing social inequalities
6		Improving health services
7		Increasing access to social services
8		Limiting unemployment
9	**Economic**	Creating Jobs
10		Raising revenue.
11		Sustaining economic growth
12		Private investment in the energy sector
13		Ensuring economic sufficiency
14		Increasing the supply of services or products
15		Recovering cost for energy supply
16		Reducing inflation
17	**Environmental**	Maintaining the supply of natural/biomass resources
18		The use of energy efficient appliances
19		Energy security is being ensured through efficient management policies
20		The ratio of the use of LPG to other fossil fuels in domestic use
21		Reducing energy consumption per capita
22		The ratio of the use of solar products to traditional energy products
23		The ratio of public transport use to private transport use
24		Reducing the percentage of used motor vehicles or appliances imported

7.6.7 West African Survey

The questionnaire sought to sample the opinion of respondents about the dominant environmental conception [Item 9-10] (Pepper, 1996; O'Riordan, 1989; Goodin, 1992; Beckerman, 1994; Nordhaus, 1992; Dryzek, 1997), the identified common needs [Item1-3] (Parsons, 1995;Bish, 1978; Tuite, 1972; White, 1974), some form of strategic advantage of a country like Ghana over others [Item 4-5] and mutual benefits in terms of common programmes which will provide the framework for common environmental and energy policy [Item7-8] (Bansal and Howard, 1997; Bansal, 1994 and 1997). A high score on man-centredness as motivation for energy policy is an indication for ethnocentrism and conversely, a low score for man-centredness is an indication for ecocentrism. Again a high score on benefit of nature as a motivation for energy policy is an indication for ecocentrism and the reverse reflects technocentrism. The mean score from the combined scores give general ideas to environmentalism. The scores in between the two polar scores indicate moderate leaning towards ecocentrism or technocentrism as the case may be. Table 7.10 below shows the summary of the findings.

Table 7:10: Variable – West Africa

	West African Survey
1	Energy security is a common problem for West Africa
2	Insufficient rainfall is a common concern for West Africa
3	A common energy policy for West Africa is important
4	Ghana's stable democracy is advantageous to West Africa
5	Ghana's natural resources is advantageous to West Africa
6	Ghana's past leadership role makes Ghana a natural leader in West Africa
7	The Proposed West African Gas Pipeline will be mutually beneficial to the Sub-region.
8	The Proposed West African Power Pool will be mutually beneficial to the Sub-region.
9	Any energy policy for the sub-region to focus mainly on its benefits to humankind.
10	Any energy policy for the sub-region to focus on its overall benefit for nature

7.7 Items and Scales of Measure

For this research, the scales of measure include quantities as well as nominal values formulated as Likert-like items based on a scale from 'strongly disagree' to 'strongly agree' or 'definitely not' to 'definitely yes' preceded by a choice of categories respondents fell in. Other questions asked are based on priorities requiring respondents to rank a series of statements on a scale of one (1) to five (5) such as the variable – *Sustainable Energy Policy*, which is ranked from 'very low' to 'very

high.' Babbie (2001:140) argues that 'as a general rule, precise measurement is superior to imprecise measurement. Even so, exact precision is not always necessary or desirable. If knowing [the imprecise data] satisfies your research requirements, then the additional effort invested in obtaining precision is wasted.' In any research, the method of data analysis adopted determines how data is collected. As mentioned above, the method of analysis for this research is based on five ranges of scores: definitely not (1), probably not (2), not sure (3), probably yes (4) and definitely yes (5). Eliciting actual scores will therefore serve no useful purpose in the light of the method of analysis chosen. Consequently, questions that required some quantities and figures on the questionnaire, such as the number of environmental impact statements produced over a period, are converted into likert format based on the method of data analysis chosen. In this study, reverse-scored items[10] were included to eliminate or attenuate response pattern bias or response set to avoid the situation where the respondent simply goes down the page without really reading the questions thoroughly and circles all "2"s for example for a response to all the questions. According to Cook, Hepworth, Wall, and Warr, (1981) adequate internal consistency reliability can be obtained with a number of response choices as few as three and the more items are added the progressively less impact they have on the scale of reliability (Carmines and Zeller, 1979). Lissitz and Green (1975) suggest that the reliability of Likert-type scales increases with the increase in the number of response choices up to five, but then levels off; consequently, in this study, the number of response choices for all the questionnaires used are up to five.

7.8 Validity and reliability of questionnaire

Reliability of the factors was established through the coefficient alpha – a statistical unit of measure for reliability. In the reliability[11] assessment only internal consistency reliability was established using reliability alpha built into the SPSS. Based on the recommendation of Kerlinger and Lee (2000), Babbie (2001), Isaac and Michael (2001) and Wallen and Fraenkel (2001), a reliability (alpha) of .70 is considered to

[10] With reverse-scored items, the thought is that the respondent will have to think about the response because the answer is "reversed." However, in recent years, reverse-scored items have come under attack because these items where found to reduce the validity of questionnaire responses (Schriesheim & Hill , 1981) and in fact may introduce systematic error to the scale (Jack, Wall, Martin, & Davids, 1993)

[11] As mentioned previously, the internal consistency reliability measures whether or not the items "hang together" - that is, whether the items all measure the same phenomenon.

be at an acceptable level of questionnaires for this type of research. In factor analysis, a factor loading of .30 is considered an adequate level of reliability (Child, 1970) although minimum item loadings of 0.40 are the most commonly mentioned criteria (Hinkin, 1995). Construct validity as well as the structure of these variables were established through factor analysis and were found to be an adequate level. Detailed assessment of validities of the variables based on a formula by Kerlinger and Lee (2001) is shown at Appendix 14.14. After field-testing, the number of items and the refinement of the construct was undertaken using factor analysis[12] (Ford, MacCullum and Tait, 1986). Items, which do not load sufficiently on a factor, were discarded or revised. Construct validity, face validity and content validity as well as internal consistency were also established.

7.9 Population Size and Characteristics

To determine the population and the sample sizes for this study, reference is made to people with some expertise and experience in SEA or SEA-like activities in the civil service, the National Development Planning Commission, the decentralised planning system of Ghana, energy institutions, the Department of Town and Country Planning, environmental NGOs and private practitioners in environmental assessment. The data adopted in the population estimates are based on record of expertise in NDPC involved in 8 cross-sectoral planning groups (GOG, 1998; NDPC, 2000); the number and size of groups of representatives and experts involved in the decentralised planning and the register of environmental NGOs kept by EPA (EPA, 2000). A further adjustment was made in proportion to the number of regions the study covered. Information obtained from NDPC indicates that there are about 336 individuals working in 8 different cross-sectoral planning groups (NDPC, 2000). Further information obtained in respect of the distribution of the decentralised planning system indicates the following:

> A local government law passed in 1991 created thirteen submetropolitan district councils and fifty-eight town or area councils under three metropolitan assemblies; 108 zonal councils under four municipal assemblies; and thirty-four urban, 250 town, and 626 area councils under 103 district assemblies. In addition, 16,000 unit committees

[12] The purpose of the factor analysis in the construction of the scale is to 'examine the stability of the factor structure and provide information that will facilitate the refinement of a new measure' (Hinkin, 1995: 977). The researcher is trying to establish the factor structure or dimensionality of the construct.

were established under metropolitan, municipal, and district assemblies throughout the country. (District assemblies, of which there are 110, are designated metropolitan and municipal assemblies in metropolitan centers and major cities.) No Urban Council, Zonal Council, or Town Council or Unit Committee has the power to levy any taxes without the approval of the relevant assembly (Library of Congress, 2000).

Since the study is about environmental assessment at strategic level, it is important that respondents, who are competent in the general area of environmental assessment or involved in policymaking, planning or programme implementing, should be targeted (Babbie, 2001). Table below 7.11 shows the computational details for the survey's population estimate.

Table 7.11: Computation of Survey Population Size

Plans	Institutions	Number of Planning Groups
National Development Plan	NDPC	8
Regional Plans	Regional Planning Coordinating. Unit	10
District Plans	District Assemblies	110
Sub-Regional Plans	Submetropolitan Councils	13
	Urban Councils	34
	Zonal Councils	108
Local Action Plans	Town Councils	250
	Area Councils	626
	Town/Area Councils	58
	Unit Committees	16000
	TOTAL	**17209**
Computations	7 X No. of Groups	**120463**
	10% of Experts	**12046**
	30% for 3 regions	**3614**
	Population est. say	**3000**

In determining the competence in SEA, account is taken of experts whom the government nominates to these bodies. All legal instruments on planning, environment and energy sectors require that the government should nominate at least 10%[13] of members of the bodies on the basis of their expertise. Besides, most of these members also serve on District Environmental Management Committees

[13] In fact the actual figure is 4 out of every group or committee or board. If the lowest composition of boards is 7 and the maximum is about 40 as in a cross-sectoral planning group, then this works out between 10% (4/40) and 56% (4/7). The fact that earlier studies on Ghana indicated that SEA-like activities were being carried out although not ending in written reports and the fact that opinion of practitioners favoured lowers figures, 10% was adopted.

sensitised and trained by the EPA. That some experts undertake SEA or SEA-like activities has been confirmed by some earlier studies (See Chapter 4). Based on the minimum of 7 in each group,[14] the proportion of them involved in SEA (10%) and allowing for adjustments to reflect the fact that only three regions are the subjects of this survey, the population size of 3,000 was considered to be very reasonable for this survey research. An alternative calculation was made to reflect the regional distribution of population rather than district distribution. This is the proportion of population corresponding to the three regions chosen for the survey. Based on 2000 population census of Ghana, the figure is 5, 000 (GRI, 2000). This is shown in Table 7.12. Again, a lower figure of 3,000 rather than 5,000 was considered more reliable.

Table 7.12: Computation of population based on national census

Items	Computations
Population of 3 Regions	7940128
Population of Ghana	18412253
Proportion (%)	43
Estimated Expertise	12046
43% of Experts	5179
Survey Population size	5000

7.10 Sample Size

The first stage of sampling was selection of quotas for various sectors. Key officers were contacted where appropriate to help estimate and compile the name of officials for the survey. The names are then selected randomly. In other cases such as the selection of respondents from the NDPC, District Assemblies and NGOs, compiled lists of possible respondents in the EPA and the NDPC partly formed the basis of the selection. 100 questionnaires each were distributed in policy, planning and programme sectors of the country. To determine the sample size relative to the population (3,000), the study considered ideal sample sizes reported in quantitative design literature. Ideally, the larger the sample of individuals administered the items (even during the pilot stage), the better the validity and reliability and the more likely the results will be statistically significant of the study. A sample size of 150

[14] The lowest number of members on each Committee, Commission and board range between 7 and 40 (For details, see the Energy Commission Act, Public Utilities Regulatory Commission, the EPA Act, the Local Government Act and the National Development Planning Commission Act.)

respondents is suggested for exploratory factor[15] analysis in respect of reasonably strong internal consistency reliability (Guadagnoli and Velicer, 1988). A minimum sample size of 200 is suggested for an accurate confirmatory factor solution (Hoelter, 1983). By reference to statistical calculations in Kerlinger and Lee (2001:297) as well as Krejcie and Morgan's (1970) conversion tables cited in Isaac and Michael (1995:201), a reasonable sample size was chosen. Based on these literature and conversion tables (Krejcie and Morgan, 1970), the sample size relative to the population of 3,000, lies between 35 and 341. On the basis of these assessments, a sample size of 300 was considered adequate and reliable for this study. A further sample size of 100 was chosen for the West Africa survey.

7.11 Method of Administration of Questionnaires

This research is a cross-sectional survey and the fieldwork was carried out over a period of one year and the questionnaires were distributed by hand from office to office. The researcher used several follow-up visits on weekly basis to respondents' offices, to conferences and public seminars where respondents were likely to be. This was to send reminders either by word of mouth or by his mere presence. Through continuous visits, interpersonal relations were built and deepened. This facilitated access to documents held in offices. It also got officers expressing interest in the outcome of the research. This approach was adopted because postal survey or telephone survey does not work, as these systems are inefficient. Things get better done through personal contacts in Ghanaian culture than by other means. Moreover, the weight of work in the civil service can adversely affect the ability of officers to respond to a questionnaire without the reminder of a personal presence.

The fieldwork, which began in November 2000, took one year of which 3 months was for field test and 9 months was for the major survey. The instrument was field tested in Accra and Kumasi. It was not feasible in terms of time and resources to field-test the instrument using up to 200 respondents as the literature suggests. The field test relied on 50 respondents comprising MSc students on the environmental management programme in the University of Science and Technology, planners and practitioners in environmental assessment. This group was chosen because most

[15] An exploratory factor analysis is when there is no a priori conceptualization of the construct.

students were mature students involved in EIA before undertaking further studies. Furthermore, to avoid *reactive and interactive effects of testing* as well as *multiple treatment interference* of using the same groups for pilot and main questionnaires, these groups were chosen (See Chapter 11 for explanation of these expressions). Field-testing allows the applicability and reliability of the instrument to be tested; the preliminary hypothesis to be fine-tuned; the overall research to be improved; and new ideas, approaches and unforeseen clues to be incorporated. It also allows planned statistical and analytical procedures to be tested and improved so as to permit more efficient data analysis and to save money and time (Isaac and Michael, 1995:38).

At the policy level, the following institutions were targeted: the Environmental Protection Agency, the Ministries of Works and Housing, Trade and Industry, Environment, Science and Technology, Mines and Energy and Roads and Transport. In addition, some environmental NGOs and private practitioners were targeted. At planning levels, the focus was on the District Assemblies, the Town Country Planning Department/Lands Commission, the NDPC and private consultants/NGOs. At programme level, District Assemblies, the GNPC, the Volta River Authority, the Ministries of Works and Housing and Transport, the Electricity Company Limited, NGOs and consultants have been targeted. A fourth West Africa-wide survey questionnaire was distributed to 100 people in Accra, Kumasi, Takoradi and Lome, during a trade fair and during the West African Conference on Oil and Gas. Details of the distribution of questionnaires have been tabulated in Table 7.13, Section 7.12 below. Interviews were also held with key personnel in the GNPC, the NDPC, the EPA, the Energy Foundation and private practitioners.

7.12 Response Rate

According to Isaac and Michael (1995:101), a sample size of 30 is considered large enough to test a null hypothesis, yet small enough to overlook weak treatment effects. Besides, not only is a sample distribution statistically large when the sample size is 30 and above, the distribution is said to be normal (Waters, 1997:483). The response rate for this study at policy level for N=39. At plan level, N= 44 and at programme level, N=46. For the West Africa Survey, N=41. Since a response rate of 30 and more is considered reliable and valid, the results of N>30 at each level of

analysis in this study are equally valid and reliable. Table 7.13 below shows the detailed distribution of the response rate according to departments and sectors. For the purposes of confidentiality, the individual names are not mentioned. From Table 7.13, 100 policy-related questionnaires were distributed as follows. The private sector comprising consultants and NGOs had 20; the non-energy sector had 30; the energy had 20 and the environmental sector took 30. Out of this, the private sector returned 35% (5 out of 20); the energy sector returned 35% (7 out of 20), the non-energy sector returned 23.5% (7 out of 30) and the environmental sector returned 67% (20 out 30). The overall response rate was 39%. To use the instrument to gauge the opinion of various respondents, 100 plan-level questionnaires were distributed targeting the private sector and NGOs and district assemblies in Accra and Kumasi, Planning Institutions such as the Town and Country Planning Department and the Lands Commission and the National Development Planning Commission. The distribution went thus: private sector (20), District Assemblies (50) Planning Institutions (20) and the NDPC (10). Out of that, the private sector returned 20 % of the questionnaires (4 out of 20); District Assemblies returned 20 out of 50 (40%), the Planning Institutions worked on 16 out of 20 (80%) and the NDPC dealt with 4 out of 10 (40%) of the questionnaires

Table 7.13: Response Characteristics

	Policy		Plan		Programme		West Africa	
	Expected	Actual	Expected	Actual	Expected	Actual	Expected	Actual
Private/ NGOs	20	5	20	4	20	13		
Non-Energy	30	7			20	3		
Energy	20	7						
Environment	30	20						
District Assembly			50	20	30	11		
Planning Institutions			20	16				
NDPC			10	4				
Petroleum					10	6		
Electricity					20	13		
Ghanaians							20	8
Non-Ghanaian							80	33
Total=N	100	39	100	44	100	46	100	41

In all, 100 programme-level questionnaires were distributed targeting the private sector comprising private practitioners and NGOs and District Assemblies as well as the Electricity, Transport, Petroleum and Housing Sectors in Accra and Kumasi. The distribution went thus: private sector (20), District Assemblies (30), Petroleum (10), Electricity (20), non-energy sector (20). Out of that, the private sector returned 65 % of the questionnaires (13 out of 20); District Assemblies brought back 11 out of 30 (37%), the Petroleum Sector completed 6 out of 10 (60%), the Electricity Sector returned 13 out of 20 (65%) and non-energy sectors worked on 3 out of 20 (15%). Overall, the response rate was 46% (46 out of 100). For the West Africa survey, 20 of the questionnaires were distributed to Ghanaians and 80 of them went to non-Ghanaians. The response rates were 40% (8 out of 20) for Ghanaians and 41% (33 out of 80) for non-Ghanaians.

7.13 Method of Data Analysis

Data was initially compiled using Microsoft excel. These data were subsequently transferred onto SPSS application for ease of statistical analysis. Where applicable, multiple linear regression, partial regression and path analyses were used to analyse the data. Multiple regression is partly used because the dependent variable sustainable energy policy, plan and programme (Z) is affected simultaneously by many independent variables. In this case they are (X_1) SEA in general, (X_2) SEA in energy sector, (X_3) SEA framework, (Y_1) improving the existing system and (Y_2) improving the institutional context. Multiple regression analysis provides the means for analysing such relationships. Again, the result is compared with partial regression analysis based on the same logical model except that Y_1 and Y_2 are treated as intervening/mediating variables as shown in the model in Chapter One. In such a case, the intervening variables are held constant or controlled. In both situations the analyses are more amenable to the use of statistical software packages such as SPSS. Path analysis is a form of multiple regression analysis that uses path diagrams similar to the causal model for this study shown in the first chapter. Through its use one can calculate the direct and indirect influences of independent variables on a dependent variable. These influences are reflected in path co-efficients, which are actually regression coefficients (beta, ß or b). Moreover one can test different path models for their congruence with observed data (Kerlinger and Lee, 2000).

In the causal model, sustainable energy policies, plans and programmes were regressed on all variables that preceded it in a causal sequence. Intervening variables - *Improving Existing System* and *Improving the Institutional Context* were then regressed on SEA in general, SEA in energy sector, and SEA framework. The coefficient of determination (r^2) is used as a measure of the relationship between variables. The coefficient of determination measures the proportion of the total variation explained by the relationship as depicted by the regression line. A value close to one (1) shows a strong relation while a value close to zero (0) shows a poor relationship. In this study, any value above 0.5 suggests a reasonably strong linear relationship. A further test at 5% significant level was computed using SPSS statistical software to test the hypothesis that the strong linear relationship between some variables is not by chance. Thus a strong linear relationship between variables is acceptable when $\rho < \alpha$; where ρ is the computed probability and α is 0.05, the level of significance.

7.14 Conclusion

In this chapter, the main theoretical and procedural approaches to the research have been discussed. This chapter is however a general discussion of methodology. Specific details of methodology for each level of research (i.e. policy, plan and programme) are further discussed in the analysis chapters (8-10). Again, although the general literature review is discussed in Chapters 1-3, some aspects of the general literature have been expanded in Chapter 6 and in the analysis chapters when it is believed to enhance the interpretation of the results of the study. The study acknowledges that quantitative methodology is not the only means by which a research study such as this research can be carried out. It is quite possible to conduct a study into SEA using a qualitative method discussed in this chapter, if the purpose is not to test hypotheses. It is equally possible to use both quantitative and qualitative methods at the same time. It might even be possible to conduct an action research. Nevertheless, based on the general aims of the research, the vast literature in the area of the study, constraints as well as advantages discussed fully in Chapter 12, a quantitative method has been chosen.

Chapter

8

Analysis of Policy Level Data

Chapter Outline

Introduction

Overview of the key Issues

Characteristics of the Questionnaire

Statistical Models

Results of the Study

Hypotheses Testing

Conclusion

8 Chapter Eight: Analysis of Policy Data

8.1 Introduction

Following the discussion of the theoretical foundations of the study in the preceding chapters, the present chapter discusses the main findings of the survey on which the conclusions of the thesis are based. To address the main issues of this study, this policy-based chapter begins by giving the overview of the problems to be addressed and the related hypotheses. The analytical framework/methodology for the analyses is then overviewed building on the broad discussions of the methodology in Chapter 7. The survey results are then presented followed by discussion of the findings and conclusions.

8.2 Overview of the key Issues

Six main concerns were raised in the introductory chapter. The first related to the link between SEA and Sustainable energy policy. The case of this thesis is that SEA makes a significant contribution to sustainable Energy Policy, Plans and Programmes; that SEA sharpens other environmental assessment and management tools; and that it contributes substantially to sustainable development. The *second* challenge concerns the institutional question for SEA. It posits that SEA allows the integration of environmental considerations into institutional decision-making and orientation. The more SEA is institutionalised into an integrated and hierarchical structure, the more sustainable energy policy can be delivered. *Thirdly,* it was suggested that a multi-cultural society was rife with diverse philosophical perspectives, which in turn hampered stakeholder agreement on a common strategy for the management of the environment. It argued for a harmonising framework for the development of sustainable energy policy. The *fourth* problem recognised the difficulty in transforming sustainability ideas into practice particularly within the context of joint action and implementation required for SEA. If a framework therefore exists to facilitate implementation, more sustainable development is likely to be achieved. The *fifth* view proposed that the sub-regional level environmental and energy policies impinged on national environmental and energy policies, which in turn influenced sustainable energy policy. The more nations recognised their common needs and mutual benefits from cooperation, the more they can work together towards a common policy. In this context the strategic advantage and

resourcefulness of a particular nation became a rallying point for that common policy such as a common environmental and energy policy. The *sixth* concern saw the improvement in cross-sectoral participation and co-operation as essential for Sustainable Energy Policy. These issues were then expressed in terms of hypotheses derived from theory and causal models.

8.3 Statistical Models

Having described the characteristics of the variables, the following section discusses the statistical framework as the basis of testing the various hypotheses and measuring reliability and validity of the study. This statistical framework included descriptive statistics (i.e. frequencies, minimum/maximum, sums and standard deviations), factor, multiple linear, partial regression and path analyses as well as crosstabulation. For the descriptive statistics, tables of frequencies (%) and of minimum, maximum, sum, mean and standard deviation scores of each of the 39 respondents' detailed opinion as to the extent to which each variable rates either on Definitely-Not (1) to Definitely-Yes (5) scale or on Strongly Disagree (1) to Strongly Agree (5) scale were discussed. A good practice [1]SEA in Ghana corresponds to scores over and above a 3-point *(Not Sure)* mark for positively worded questions. For negatively worded questions, scores lower than a 3-point *(Not Sure)* mark also indicates a strong SEA in Ghana. In this sense, mean scores are more useful than the total scores for comparative purposes. Nevertheless, mean scores alone have limitations in interpretation. For example, a mean score of say 2.5 obscures the fact that some sub-variables might have scores exceeding 3. Descriptive parameters such as minimum, maximum, sum and standard deviations fill that gap in interpretation.

Factor analysis is used to determine consistency and coherence of the structure of the variables, the variables to be included in the instrument and the conformity of the models with theory. The strength of variables under consideration depended on their factor loadings. In this study both principal factor and rotation methods of factor analyses were used. Restriction of 0.30^2 was placed on the magnitude of the factor loadings to be reported by the SPSS model. Multiple linear regression analysis was

[1] Best practice SEA will correspond to the score 4 or 5.

[2] For a sample size less than 100, the smallest loading would be at least 0.30 to be statistically significant (Dillon and Goldstein, 1984:69).

substantially used to test the general and specific hypotheses. The model for multiple linear regression analysis is in the form

$$Y=\beta_0+\beta_1x_1+\beta_2x_2...+\beta_nx_n+\epsilon$$

where Xs are the predictor variables and Y is the dependent variable βs are the regression weights, β_0 is a constant and ϵ is a residual. Multiple linear regression analysis was used in this study because by its very nature it deals with inferential statistics following the model if p, then q and also facilitates the handling of many independent variables on a dependent variable at the same time.

In this study, parameters (statistics) needed to explain causal links and to test hypotheses were read from SPSS printouts. The standard procedure adopted was to keep the hypotheses-null (H_0) and alternative (H_1) - in focus; specify the level of significance to be used in the computer (SPSS) model. In this study, 1% and 5% levels, corresponding to the probability $p<0.01$ or $p<0.05$, were specified in the model. The normal procedure is to calculate an F-ratio manually or with the help of a computer model. The result is then compared with F-ratio read from a table based on the degrees of freedom computed and the chosen levels of significance. If the computed critical F-ratio was less than the F-value read from the tables at the appropriate degrees of freedom and levels of significance, the null hypothesis is rejected. And the alternative hypothesis becomes accepted.

With the SPSS package, the probabilities for each relationship are computed. This allows for comparison with the levels of significance. The necessity to use F-ratios to test hypotheses is therefore not necessary. In a multiple-regression model printout from the SPSS, the relative contribution of each variable to the regression model was also read from t-statistics table. Other parameters read from the computations were the R and R^2. In order to test for the supplementary (separate linear) hypotheses, correlation coefficients matrices printed from bi-variate analysis were used. Furthermore, a partial regression analysis model was used so as to control for the effects of the mediator variables Y_1 and Y_2. Since the hypotheses are in directional modes (i.e. in the format: *the more x_1... the more y_1 ...)* only one-tail test were read.

Path analysis is another multivariate technique mentioned in Chapter Four. The purpose of path analysis is to test theories about hypothesized causal links between variables. The effective use of path analysis is predicated on a number of assumptions as follows. Path-analytic models assume that the relationships among variables are linear and additive. Secondly, all error terms (i.e. residuals) are assumed to be uncorrelated with each other. Thirdly, only recursive models are considered; that is, there are only one-way causal flows in the system. Fourthly, path-analytic models assume that the endogenous variables have at least interval scale properties. Fifthly, observed variables are assumed to be measured without error and sixthly, that the model being considered is assumed to be correctly specified. The path diagram used in this study results from translating key hypothesis into a working diagram. Path coefficients were then derived algebraically. The estimates for the path coefficients were obtained by regressing the dependent variable or mediating variables on the variables that influence them using standardized regression weights β read from SPSS multiple linear regression model as coefficients. The results were then compared with moment product coefficients, followed by the interpretation of parameters and the testing of hypotheses.

Reliability is a measure of dependability, stability, consistency, reproducibility of and lack of distortions in the research. In statistical terms, it is the proportion of the true variance to the total obtained variance of the data yielded by a measuring instrument. Alternatively it is the proportion of error variance to the total variance yielded by measuring instrument subtracted from 1.00, the index 1.00 indicating perfect reliability. Reliability coefficients can be computed using a number of techniques including analysis of variance, product moment correlation between the odd and even sums and correcting the result with the Spearman-Brown Formula, correlation between scores obtained on two separate occasions referred to as test-retest reliability, correlation between the results of two similar instruments administered at the same time to the same respondents known as equivalent or parallel form of reliability and internal consistency reliability measured by Split-Half Reliability Formula, Kuder-Richardson Formulas, Spearman-Brown Prophecy formula, Rulon Formula and Guttman Formula (See Kerlinger and Lee, 2000 for

fuller discussions). Alternatively, SPSS can be used to compute internal consistency coefficients directly. This study relied on the SPSS model for all computations. Removing ambiguities from the instrument, increasing items of equal kind and quality, giving clear instruction as well as using reverse scores on the instrument increase reliability of a measure. The level of reliability accepted conventionally ranges between 0.7 and 0.9. But Kerlinger and Lee (2000:662) argued that there was no evidence to support this arbitrary rule and indicated that in some cases a reliability value of 0.5 or 0.6 was quite acceptable.

Validity is the degree to which an instrument truly measures the phenomenon under investigation. There are content, criterion-related and construct validities. *Content validity* is the representativeness or sampling adequacy of the content and is measured by personal judgement with or without others. *Face validity* similar to content validity is not judged on the basis of any criteria as such. It is on the basis of appeal to the researcher considering the facial value of the instrument. *Criterion-related validity* comprises predictive and concurrent validities. *Predictive validity* involves the use of future performance of the criterion whereas *concurrent validity* measures the criterion at about the same time. Thus criterion related validity is characterized by prediction to an outside criterion and by checking the measuring instrument, either now or in the future against some outcome or measure. Limited time, resources and the absence of established validity for SEA does not permit the use of predictive and concurrent validities in this study.

Construct validity sets itself apart from other types of validities by its preoccupation with theory, theoretical constructs and scientific empirical inquiry involving the testing of hypothesized relations (Kerlinger and Lee, 2000:671). Methods for measuring construct validity include analysis of variance, multitrait-multimethod matrix method and factor analysis. In this paper factor analysis[3] was used. The results indicated that the internal consistency reliability coefficient alpha for the variables on the major policy questionnaire range between 0.45 and 0.71, while

[3]The ratio between common factor variances or communalities (h^2) and the total variance derived from a multiple regression model is the measure of validity used in this research.

construct validity for the variables fall between 0.26 and 0.37[4]. For the West African Survey instrument, the reliability alpha was as low as 0.32 with relatively lower validity. These levels of reliability and validity are considered to be sufficient to validate the results of the study. For the explanation of how these values are computed, see Appendix 14.14.

8.4 Results of the Study

An effective SEA system aims to provide a framework for the highest and sustained economic, social and environmental benefits from resource management and development actions. Through a process of tiering, proactive decision-making, sustainability and carrying capacity considerations, SEA seeks to achieve its goal of sustainable development. Other processes include goal setting and compatibility assessment that ensures that the existence of overall consistency and coherence between policy, plan and programme. The processes are circumscribed by a framework of legal, institutional, political, philosophical and democratic constraints and opportunities. With a comprehensive view of analyses and assessments, different effects, impacts and alternatives at different scales are analysed using a number and mixes of tools and methods. Moreover, SEA does not only address limitations in the project EAs, but also provides the basis for integration, participation and coordination. Thus the effectiveness of an SEA system in Ghana should not only cover the above elements but also demonstrate that they are being implemented. These elements were built into the instrument and formed the basis for subsequent analysis and discussions.

8.4.1 Frequency and Descriptive Statistics

The following sections discuss the characteristics of the six variables discussed above using the frequency distribution (%) of the responses and descriptive statistics such as mean, minimum and maximum to clarify the results. A further measure of agreement (MOA) between negative and positive responses has been assessed to convey at a glance which scores are significant on the entire measure.

[4] Details of reliability and validity coefficients for the variables are as follows: General SEA (Rel 0.46, Val.0.31), Energy Sector SEA (Rel 0.5583, Val 0.26), SEA Framework (Rel 0.7105, Val 0.35), Improved Systems (Rel 0.7087, Val 0.26), Institutions Addressed (Rel 0.6192, Val 0.37) and Sustainable Energy Policy (Rel 0.6242, Val 0.33)

Table 8.1: SEA in General

	Negative Responses %	Not Sure %	Positive Responses %	MOA[5]	Mean	Minimum	Maximum
Establishment Initiates Policy	.0	30.8	69.2	-100.00	4.38	3.00	5.00
Designed Policies Affect Plan or Programme	30.8	56.4	12.8	-41.28	2.95	2.00	5.00
Consideration for Limited Policy Options	41.0	51.3	7.7	-68.38	2.74	2.00	5.00
Wide range of effects Considered	25.6	59.0	15.4	-24.88	3.05	2.00	5.00
Policy Impact Assessed	30.8	48.7	20.5	-20.08	3.10	2.00	5.00
Goals deduced from Vision	35.9	41.0	23.1	-21.69	3.10	2.00	5.00
No Environmental Goals or Objectives Exist	35.9	43.6	20.5	-27.30	3.05	2.00	5.00
Policy deduced from Goals or Objectives	46.2	43.6	10.3	-63.54	2.74	2.00	5.00
Compatibility or Consistency Considered	41.0	38.5	20.5	-33.33	3.00	2.00	5.00
Compatibility and Consistency of Policy to Vision not Considered	5.1	66.7	28.2	69.37	3.51	2.00	5.00
Compatibility with Goals or Objectives Considered	59.0	28.2	12.8	-33.33	2.67	2.00	5.00
Sustainability Criteria Developed	69.2	30.8	.0	-100.00	2.31	2.00	3.00
Targets or Indicators Used in Assessment	56.4	33.3	10.3	-69.00	2.64	2.00	5.00
Links between Economic Social and Environment Considered	46.2	38.5	15.4	-50.00	2.85	2.00	5.00
Environmental Objective-Based Indicators	33.3	66.7	.0	.100.00	2.67	2.00	3.00
Environmental Regulation-Based Criteria	2.6	43.6	53.8	90.78	4.05	2.00	5.00
Monitoring Programme-Based Indicators	23.1	71.8	5.1	-63.83	2.87	2.00	5.00
Written Reports Under Two	43.6	51.3	5.1	-79.06	2.67	2.00	5.00
Written Reports Exceeding Two	23.1	71.8	5.1	-63.83	2.87	2.00	5.00
Effects Assessed at The Beginning	35.9	61.5	2.6	-86.49	2.69	2.00	5.00
Effects Assessed at the Middle	25.6	74.4	.0	-100.00	2.74	2.00	3.00
Effects Assessed at the End	15.4	74.4	10.3	-19.84	3.05	2.00	5.00

One of the issues addressed by the variable-*SEA in General* in Table 8.1 above is tiering. That tiering is important to SEA is clearly explained in the EIA literature. Glasson (1995:716) said SEA could 'be seen as providing a potentially effective vehicle for promoting sustainable development, cascading relevant actions from tier to tier with the form of action at one tier inevitably conditioned by prior actions at higher tier.' Figures 8.1 and 8.2 below for illustrate the point on tiering.

[5] MOA is measure of agreement between positive and negative responses.

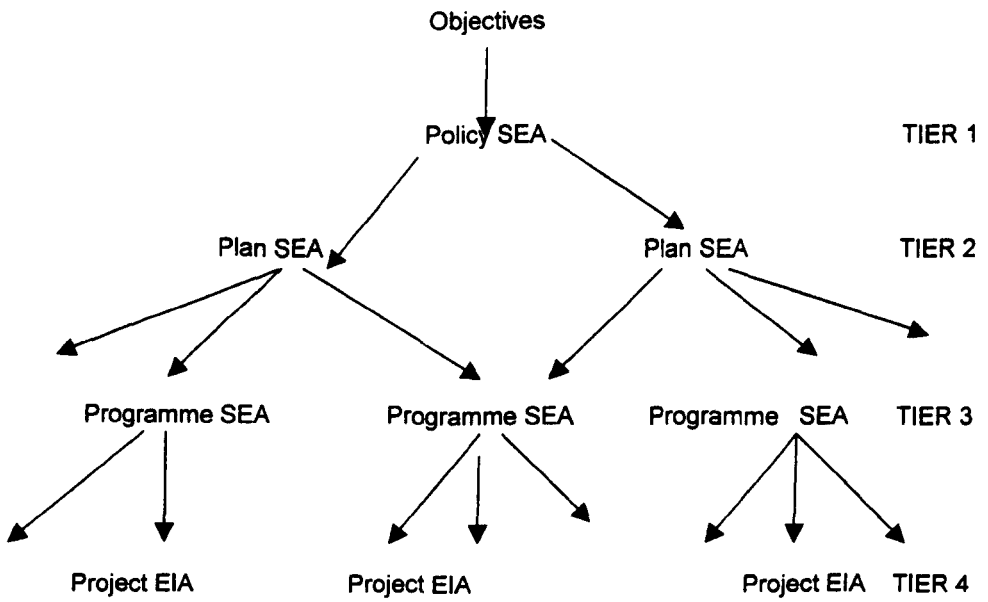


Figure 8.1:Tiers of SEA and EIA. ***Source*: Glasson (1995), Glasson *et al.* (1994 and 1999).**

Level of Government	Land Use Plans (SEA)	Policies (SEA)	Plans (SEA)	Programmes (SEA)	Projects (SEA)
National/ Federal	National Land Use Plan	National Transport Policy	Long-term National Roads Plan	5-year road building programme	Construction of Motorway Section
Regional/ State	Regional Land-Use Plan	National Economic Policy	*Regional* Strategic Plan		
Sub-regional	Sub-regional Land use Plan			Sub-regional Investment programme	
Local	*Local* Land-Use Plan				Local Infrastructure Project

Figure 8.2. A tiered planning and assessment system.

Source: Glasson (1995) citing Lee and Walsh (1992), Lee and Wood (1978).

According to Wood (1995:262),

> generally, there exists a tiered forward planning process which starts with the formulation of a policy at the upper level, is followed by a plan at the second stage and a programme at the end...A tiered system can apply at the national level and also may apply at regional and local levels. It can apply to sectoral actions and to physical planning actions.

Specifically in response to the question whether policies[6] were designed to affect plans and programmes, a little more than a tenth (12.8 %) of the respondents gave positive responses. More than a fifth (30.8 %) of the respondents said no such practice exists while more than half (56.4%) of the respondents were in doubt. Closely related to the principle of tiering is the use of SEA as a proactive instrument. Glasson (1995) said SEA could facilitate consideration of development actions at an earlier stage allowing more proactive approach in contrast to the normally reactive approach associated with EIA. Fisher (1999:147) noted that 'being proactive, SEA needs to be applied as early as possible in the planning process. The scores for proactive questions indicated contrasting responses. A high proportion of the respondents indicated that it was neither taking place in the beginning (38.9 %), the middle (25.6 %) nor in the end (15.1%). The implication was that between 15.1% and 38.9% of those respondents' establishments were not involved in SEA at all. Indeed Ghana's Environmental Assessment Regulation, 1999, Regulation 2 provides for the assessment of undertakings[7], which existed before the coming into force of the regulation thus giving some legal backing to reactive assessments policies, plans and programmes.

That SEA is a tool for sustainability has extensive support. Glasson (1995) said SEA was 'an effective vehicle for promoting sustainable development' while Wood (1995) averred that SEA could 'increase the weight given to the environment in decision-making.' Scores from Table 8.1 above indicate a poor rating on sustainability criteria (0%), targets or indicators (10.3%) and links between economic, social and environmental goals (15.4%). This indicated that assessments might not be based on sustainability criteria as such. This is further buttressed by the fact that PPP's objectives were not based on environmental-based objectives (0%) or significantly on monitoring programmes (5.1%) but rather on environmental regulations (53.8%).

On the key contribution of goal orientation and compatibility assessment, Thérivel *et al.* (1996:113) observed that SEA would enable the fuller integration of energy

[6] Where N=39.
[7] Undertaking is defined to include plan and programme.

objectives and environmental objectives and hence assist in the development of coherent energy strategy. The evidence from this study revealed on goal orientation, as follows: More than a third (35.9%) of respondents believed that their establishments had environmental goals or objectives. A fifth (20.5 %) of respondents believed that those goals were derived from Ghana's Vision 2020. Furthermore, a fifth (20.5%) of respondents indicated that compatibility within policies were being considered; a little more than a quarter (28.2%) of respondents thought compatibility of environmental goals to national vision was being assessed in carrying out SEA of policies that influence lower tier plans and programmes. To have an enduring impact on the environment, SEA must lead to implementation and the sub-variables, that sought to gauge whether SEA was carried out at all, showed the following results. About a fifth (20.5 %) of respondents answered in affirmation. But out of this figure, only 5.1 % of respondents said that their establishments had so far written more than two SEA reports of a sort. More two thirds (43.5 %) of the respondents did not even believe that reports were up to two.

From the Table 8.1 above, it is observed that although for almost all the variables, maximum scores exceed 3 (Not Sure), it was only for the variables – *establishment initiates policies, wide range of effects, policy impact assessed, goals deduced from vision, compatibility or consistency considered, effects assessed at the end* that the mean score exceeded the 3-point mark. Out of these only a few really have significant impacts on the result as indicated by positive measures of agreement (MOA). This implied that although some elements of SEA were probably in place, it was only on a very limited scale in Ghana and the mean scores for those cases were less than could compensate for the numerous instances for which SEA was not carried out. Thus although some elements of SEA are evident in Ghana, on the whole the result is very weak on the criteria of tiering, sustainability, proactive application and determination of compatibility among others. The study therefore highlights some of the areas that need attention if SEA can truly play its role as a tool for sustainability. This is particularly important when most of the respondents' establishments were involved in policy making.

Table 8.2 below shows responses to the variable *Energy Sector SEA*. The main issues addressed by the variable include sustainable development, the scales of

environmental impact, non-energy sectors and some SEA techniques in use. The rationale for creating a separate SEA variable for the energy sector stems from general contentment in that sector to the effect that other environmental management tools used in that sector is sufficient to deliver sustainability. Brown and Thérivel (1999:443) citing Holstein (1996) mentioned life cycle analysis and energy scenarios[8] as tools already in use in the energy sector to fulfil some functions of SEA. Thus a different SEA variable for the energy sector sought to play a complementary role. In this respect some of the sub-variables used in the variable - *SEA in General* - were applied to Energy Sector SEA with some modifications. It would therefore not be surprising that multicollinearity occurred between these two variables in a later stage analysis (See Section 8.5.8).

As with other development activities, sustainability in the energy sector is essential particularly when more than half of the anthropogenic greenhouse gas emissions are due to energy production and use. In this study, the non-energy, economic, environmental, social local, national and global scale sub-variables measure sustainable development. From the data in Table 8.2 below the following observations were made. Although considerations were probably given to non-energy sectors such as housing (10.3%), industry (12.8%) and transport (12.8%) as well as for local (10.3%), national (15.4%) and global impacts (15.4%), there were weak scores for social (0%) and environmental impacts (5.1%) of energy policies. The greatest indicated consideration was for economic impacts (17.9%). Predictably, it also shows how emphasis tends to be given to economic factors rather than environmental and social impacts of development actions. Again the analysis above may be an indication that sustainable development issues had not yet taken a significant hold on institutions evinced by a very low proportion of respondents (5.1%) who indicated that environmental impacts of policies were assessed at all. The survey result also revealed a variety of methods in use together with the level of their application in the energy sector assessments. These included scenarios (41%), Modelling (15.4 %), Geographical Information Systems (15.4%) and Quantitative Analysis (2.6%). The respondents could however not affirm any scores for the use of

[8] The Climate Change Unit of Environmental Protection Agency uses Scenarios in the Economics of Mitigation of Greenhouse gases emission in the Energy sector of Ghana.

matrices. qualitative analysis and compatibility matrices in the energy sector with the slightest certainty or probability.

Table 8.2: Energy Sector SEA

	Probably Not %	Not Sure %	Definitely Yes %	MOA	Mean	Minimum	Maximum
Policy Initiating Establishment	33.3	38.5	28.2	-8.29	3.05	2.00	5.00
Policy Affects Energy Use	35.9	33.3	30.8	-7.65	3.03	1.00	5.00
Environmental Impact Assessed	48.7	46.2	5.1	-81.04	2.51	1.00	4.00
Social Impact Assessed	41.0	59.0	.0	-100.00	2.67	2.00	4.00
Economic Impacts Assessed	35.9	46.2	17.9	-33.46	2.54	1.00	4.00
Consideration Given to Housing Sector	38.5	51.3	10.3	-57.79	2.69	1.00	4.00
Consideration Given to Industrial Sector	56.4	30.8	12.8	-63.01	2.41	1.00	4.00
Consideration Given to Transport Sector	59.0	28.2	12.8	-64.35	2.38	1.00	4.00
Consideration Given to Local Impacts	64.1	25.6	10.3	-72.31	2.28	1.00	4.00
Consideration Given to National Impacts	33.3	51.3	15.4	-36.76	2.87	2.00	4.00
Consideration Given to Global Impacts	43.6	38.5	17.9	-41.79	2.72	1.00	5.00
Only Key Issues are Considered	43.6	41.0	15.4	-47.80	3.00	1.00	5.00
Scenarios Used	25.6	33.3	41.0	23.12	3.28	1.00	5.00
Matrices are Used	56.4	43.6	.0	-100.00	2.67	1.00	5.00
Modelling is Used	51.3	33.3	15.4	-53.82	2.31	1.00	5.00
Geographical Information System In Use	46.2	38.5	15.4	-50.00	2.64	1.00	5.00
Quantitative Analysis in Use	69.2	28.2	2.6	-92.76	2.15	1.00	5.00
Qualitative Analysis in Use	61.5	38.5	.0	-100.00	2.44	1.00	5.00
Compatibility Matrices In Use	61.5	38.5	.0	-100.00	2.38	1.00	5.00
SEA Assessed at Initial Stages	61.5	38.5	.0	-100.00	2.62	1.00	5.00
SEA Assessed in the Course/Middle of Policy Making	64.1	30.8	5.1	-85.26	2.23	1.00	4.00
SEA carried out at the End of Policy Process	51.3	28.2	20.5	-42.90	2.41	1.00	4.00

The implication of this result was amply summarised by Thérivel *et al.* (1996:95) thus: 'Despite the government having an overt statement of policy, there are grounds for doubting that its constituent objectives are compatible and therefore they may be

inconsistently pursued'. They also 'concluded that despite the evident difficulties in setting boundaries to energy systems in terms of environmental effects, SEA would enable the fuller integration of energy objectives and environmental objects and hence assist in the development of a coherent energy strategy' (Thérivel *et al.*, 1996:113).

Russo (1999:351) suggested a fuel cycle approach to project EIA while Blunden and Reddish (1996) proposed it for energy policies. A study of 59 energy EISs held in Oxford Polytechnic Collection of EISs and organised according to the stages of the fuel cycle found that sustainable development was not easily achievable even if separate projects cover all the stages in the fuel cycle. It concluded that SEA was one way to ensure that vertical integration within the entire fuel cycle was achieved (Thérivel *et al.*, 1996:11). Thus perhaps the first stage in applying a fuel cycle analysis is at policy level. In this paper, the responses to fuel cycle related questions indicated that some establishments began giving some consideration to the fuel cycle in analyses although all the three stages were yet to be considered. For example, out of the analysed positive responses, consideration for fuel cycle took slightly above a fifth (20.5%) of the positive responses; phases of fuel cycle took substantially below a tenth (5.1%) of the share while processes associate with each phase took no share (See Appendix 14.9 for a fuller discussion on the fuel cycle).

Other results from the survey seeking general information about the involvement of respondents' establishments in policymaking and the respondents' knowledge about the effect of policies on energy use registered contrasting results. With respect to policymaking, more than a quarter (28.20 %) of the respondents was involved in policymaking in the energy sector. While a third (33.3 %) indicated that they were not directly or indirectly involved in energy sector policy making, more than a third (38.5 %) of the respondents was not sure. The all-pervading nature of energy impacts means that policies from every sector would directly or indirectly affect energy use. It was therefore expected that almost all respondents would indicate positive effects of their policy on energy use. In fact nearly a third (30.8 %) of respondents did indicate that the policies of their establishments affected energy use. However nearly 7 out of 10 (69.2%) of them were either not sure or thought their policies did not affect energy use. This was probably an indication of lack of good understanding of

the implications of energy use across government departments. From the Table 8.2 above, it is also observed that out of the 22 variables, only one really has significant impacts on the result as indicated by positive measure of agreement (MOA) although 4 of them have mean scores above 3. This implies a weak SEA in Ghana.

Table 8.3 below summarises the responses to the framework for SEA covering legal and institutional matters. Lack of legal, institutional, political, participatory, philosophical and practical provisions constitutes barriers to effective SEA. Wood (1995:272) was right when he said to 'overcome these barriers you need some action-forcing mechanism or a formal framework to ensure that SEA process works'. Barriers to SEA include lack of clear objectives, insufficient political will, the narrow definition of issues, the existing organisation structure, absence of accountability, bureaucratic politics, lack of information and absence of incentives (See Fischer, 1999; Sadler, 1996; Sadler and Verheem, 1996; and Partidário, 1996 and also Thérivel. *et al.*, 1996:18-19 for a similar listing). The results in Table 8.3 show the extent to which these barriers have been overcome. The level of perception for SEA framework was reflected in terms of a clear requirement (7.7%), assignment of responsibility (12.8%), accountability (7.7%) and time frame (20.8%) supported by written policy (12.8%). No respondent was, however, certain that there was a clear institutional structure for SEA at least at policy level. Issues such as laws, written policies, experts and democratic structures must inhabit institutions. This is an area in which reforms should take place if SEA is to be taken seriously. Again although there was some scope for institutional capacity, clear methodology, staff experience, the use of experts and consultants, their impacts were very minimal. In fact only between 2.6% and 12.8% of respondents probably thought there was such a framework for capacity building, clear methodology, staff experience and the use of experts and consultants compared with between 38.5 % and 53.9 % of respondents who gave negative responses. These attributes together with budgetary provisions and a track record of compliance provide a basis for translating sustainable development into practice. Nevertheless under a tenth of the respondents indicated that budgetary provisions (0%) were made and that there was a track record of compliance (7.7%). Concerning the role of politics, the responses showed a very low level of political will (7.7 %) and non-interference (10.3%). Moreover, the existence of democratic culture, cross-sectoral, inter-agency cooperation, inter-regional

cooperation and provision for private sector involvement in decision-making was a good signal for participation.

Table 8.3: SEA Framework

	Negative Responses %	Not Sure %	Positive Responses %	MOA	Mean	Minimum	Maximum
Clear Legal Requirements	53.85	38.46	7.69	-75.00	2.385	1	4
Written Policy Exists	48.72	38.46	12.82	-58.33	2.462	1	4
Establishment is Expressly Assigned Responsibility	53.85	35.90	10.26	-68.00	2.410	1	5
Accountability Requirement Exists	48.72	43.59	7.69	-72.73	2.462	1	4
Time frame for Accountability Exists	30.77	46.15	23.08	-14.29	2.897	1	5
The Culture of Democracy Exists	48.72	38.46	12.82	-58.33	2.513	1	5
Existence of Public Participation Framework	46.15	38.46	15.38	-50.00	2.590	1	4
Existence of Institutional Framework	48.72	51.28	0.00	-100.00	2.359	1	3
Capacity Building Framework Exists	53.85	41.03	5.13	-82.61	2.410	1	4
A Framework of Inter-Agency Cooperation Exists	41.03	48.72	10.26	-60.00	2.692	1	5
Non-interference in Institutional Affairs	43.59	46.15	10.26	-61.90	2.487	1	4
Political Will for Implementation	46.15	46.15	7.69	-71.43	2.462	1	4
Existence of Track Record of Compliance	51.28	41.03	7.69	-73.91	2.359	1	4
Framing Context for the Environment	35.90	53.85	10.26	-55.56	2.692	1	4
Environmental Agenda Being Set Stakeholders	38.46	46.15	15.38	-42.86	2.641	1	4
Inter Regional Environmental Policy	43.59	48.72	7.69	-70.00	2.564	1	5
Inter Regional Cooperation *on Energy Policy*	33.33	56.41	10.26	-52.94	2.718	1	4
Inter Regional Economic Cooperation	41.03	51.28	7.69	-68.42	2.590	1	5
Existence of Staff Experience	38.46	51.28	10.26	-57.89	2.538	1	4
Possibility of Using Experts and Consultants	38.46	48.72	12.82	-50.00	2.667	1	4
Provision for Budgetary Allocation	35.90	64.10	0.00	-100.00	2.564	1	3
Existence of Clear Methodology	38.46	58.97	2.56	-87.50	2.615	1	4

Within this context, the result of the survey indicated that there was some perception of the existence of democratic culture (12.9 %), public participation (15.4%), inter-agency cooperation (10.3%), inter-regional economic cooperation (7.7%), inter-regional cooperation on energy policy (10.3%) and inter-regional environmental cooperation (7.7%) although a substantial percentage of respondents did not think that such a context for democracy (48.7%), participation (46.2%), inter-agency co-operation (41.0%), inter-regional economic cooperation (41.0%), inter-regional cooperation on energy policy (33.3 %) and inter-regional environmental cooperation (43.6 %) really existed.

To deal with diverse philosophical perspectives, public policy literature mentions the value of framing context and agenda setting. In general, globalisation, media, politicians, elites, professionals, experts, think tanks, pressure groups, lobby groups, power of marketing, associations, academicians, parties and NGO[9]s play a pivotal role in environmental issues. This is done through setting environmental agenda, defining the critical environmental problem requiring attention, raising alarm, providing framing context for key issues, unifying ideas and compelling action in a desired direction. Thus the stronger the framing context is, the greater the chance to unify diverse philosophical perspectives and the greater the likelihood for a common strategy. This is important because the more uniformly philosophies are held, the more likely it is to reach an agreement on a common policy such as sustainable energy policy (Parsons, 1995). O'Riordan (1991), McAllister (1994) and Pleune (1997) provided empirical evidence about the use of these tools in environmental issues. In this study, respondents indicated that some level of framing context (10.3 %) and agenda setting (15.4%) existed in Ghana although a substantial percentage of respondents did not opine that framing context (35.9%) and agenda setting (38.5%) existed. It is further observed that although 20 out of 22 variables have maximum scores exceeding the 3-point mark, none of the mean scores for 22 variables exceed the 3-point mark. This is an indication that the combined effect of the positive scores for the variables is not significant to give an overall positive mean.

[9] At the time of the survey, there were at least 172 Environmental NGOs registered with Environmental Protection Agency of Ghana.

Table 8.4: Improving the Existing System

	Negative Responses %	Neutral Responses %	Positive Responses %	MOA	Mean	Minimum	Maximum
EIA of Major Projects	2.6	5.1	92.3	94.6	4.28	2.00	5.00
Assessment of Two or More Major Projects	43.6	56.4	0.0	-100.0	2.56	2.00	3.00
Effects of Minor Projects	30.8	69.2	0.0	-100.0	2.69	2.00	3.00
Combined Effect of Minor Projects	48.7	51.3	0.0	-100.0	2.51	2.00	3.00
Indirect Effect of Projects	43.6	56.4	0.0	-100.0	2.56	2.00	3.00
Combined Effect of many otherwise Insignificant Projects	46.2	53.8	0.0	-100.0	2.54	2.00	3.00
Adapting EIA Methodology to SEA	43.6	43.6	12.8	-54.5	2.56	1.00	4.00
Developing a Distinctive SEA Methodology	51.3	43.6	5.1	-81.8	2.51	1.00	4.00
Using More Response Indicators	41.0	53.8	5.1	-77.8	2.64	2.00	4.00
Introducing Direction of Change in PPPs Objectives	43.6	53.8	2.6	-88.9	2.56	1.00	4.00
Introducing Quantifying Targets	53.8	41.0	5.1	-82.6	2.31	1.00	4.00
Linking SEA to PPP	48.7	38.5	12.8	-58.3	2.59	1.00	4.00
Linking EIAs, PPPs and SEA	46.2	41.0	12.8	-56.5	2.64	1.00	5.00
Linking SEA to Sustainable Development	46.2	38.5	15.4	-50.0	2.56	1.00	4.00
Adopting Carrying Capacity into PPP	56.4	33.3	10.3	-69.2	2.46	1.00	4.00
More Explicit PPP Objectives	33.3	66.7	0.0	-100.0	2.67	2.00	3.00
Removing Contradictions in PPP	35.9	64.1	0.0	-100.0	2.64	2.00	3.00
Improving PPP because of SEA	20.5	79.5	0.0	-100.0	2.79	2.00	3.00
Changing PPP because of SEA	41.0	56.4	2.6	-88.2	2.54	1.00	4.00
New Objectives to Capture Sub-components	51.3	43.6	5.1	-81.8	2.26	1.00	4.00
Emphasising Mitigation Measures	51.3	46.2	2.6	-90.5	2.41	1.00	4.00
Improving Monitoring	46.2	51.3	2.6	-89.5	2.38	1.00	4.00

Table 8.4 shows the improvements expected in the existing assessment framework as a result of SEA. The key issues the variable dealt with in the survey included addressing limitations of EIA, methodological issues, links between SEA, EIA and PPP, sustainable development, policy changes, mitigation and monitoring. The variable under consideration is basically a measure of implementation. This is because it seeks to address cumulative, additive, synergistic impacts, ancillary impacts, induced, indirect, secondary, time-crowded or space-crowded, non-project, threshold/saturation, regional and global impacts which project EIA could not adequately deal with (Thérivel *et al.*, 1996; Glasson, 1995, Glasson et al., 1999 and

Wood, 1995). More than half (between 51.3% and 69.2%) of the respondents were just not sure while under half (between 30.8 % and 46.2%) of them thought these impacts were probably not being assessed.

The perception of respondents to EIAs of major projects was, however, very high. Methodological changes envisaged in an SEA system to deliver sustainable development were not rated highly. Under a tenth (2.6% - 5.1%) of the respondents thought distinctive methodology for SEA, response indicators, quantifying targets as well as direction of change were introduced into PPP's objectives. The highest score in the category went to the sub-variable - *adapting EIA methodology for SEA*. Regarding links between SEA, PPP and EIA, the following were the level of perception: linking SEA to PPP (12.8%), linking EIAs, PPPs and SEA (10.3%), linking SEA and sustainable development (15.4%), changing PPP because of SEA (10.3%) and introducing carrying capacity into PPP (5.1%). With these low levels of perception, it was no surprise that the corresponding changes needed in PPP, such as making PPP more explicit, removing contradictions in PPP, improving PPP because of SEA, changing PPP because of SEA and writing new objectives to capture subcomponents scored between 0% and 2.6%. For mitigation measures and monitoring only 2.6% of the respondents agreed they were adhered to. EIA of major projects was an area of highest certainty (92.3%).

Table 8.5 shows the improvements expected in the institutional context for SEA at policy level to influence lower tier development actions at plan, programme and project levels. Being a top-down approach to environmental management, effective SEA requires institutions that are hierarchically structured or amenable to vertical integration. As an assessment that thrives on the role of stakeholders, the ability of institutions to facilitate coordination and participation are also essential. A structure that is hierarchically structured or is amenable to vertical integration of the principles of SEA within PPP making is likely to pay high dividends. Such a structure must also ensure coordination and participation if SEA would be implemented. Consequently the variable was constructed taking account of hierarchy, control, integration, implementation, coordination and participation. Institutional theories, which underlie these parameters, include sociological or structural functionalist, economic and political institutionalism. The functionalists argue that organisations

interact with their environments so as to adapt, survive and thrive (See Sections 2.2.2 and 6.2.6). The decisions that take place are therefore dependent on the environment in which organisations are situated, rather than purely on formal considerations. It shows how policy could lose its way in an institution, and how in order to ensure its survival, members of an organisation could make decisions, which were contrary to the defined means and ends for which it was actually established. This is because organisations are embedded in an institutional matrix and is therefore subject to pressure upon it from its environment to which a general adjustment must be made. An organisation may therefore be seen as an adaptive social structure. From this premise, decision making in organisations is envisaged as involving values, interests, impact of the environment, goal displacement, compromises and adaptation particularly where no conflict is perceived with the organisation's goals and those of the environment. The importance of this form of institutionalism is that it helps to distinguish between organisations that can be easily influenced by policy directions from those needing greater effort to get on board. In this study 59% of the respondents saw no conflicts of SEA with their organisation's policies. In fact 48.9% of the respondents were willing to adapt their establishments' policy to SEA and more than 28 % were willing to displace and suspend some of their policies.

As discussed in Sections 2.2.2 and 6.2.6, economic institutionalism is articulated through Transaction Cost Economy (TCE) and Principal-Agent (or Agency) Theory. TCE institutionalism argues that firms grow by incorporating firms within its structure so as to reduce all uncertainties and difficulties in doing business in the market place. In this model, the firm adopts a hierarchy of activities and divisions within itself so as to lower transaction costs by substituting an internal market for an external market, which is less efficient. This allows for more certainty, more control and more capacity to monitor the opportunism of individuals and subordinates. Complexity and higher costs of the factors such as uncertainty, bargaining, bounded rationality and opportunism mean the firm must grow in order to lower the cost and these impair efficiency. Applied to SEA, the theory seeks to highlight the need for assessment units manned by experts throughout government departments rather than restructuring or using consultants or experts as and when they are needed. In this regard the last two questions on the scale regarding the need to establish expert units

in establishments and getting a law in place recorded substantial agreement. More than half (56% and 51 %) of the respondents agreed that a law was in place.

Table 8.5: Improving Institutional Context

	Negative Responses %	Neutral Responses %	Positive Responses	MOA	Mean	Minimum	Maximum
Implementation Structures are not improved	0.0	7.7	92.3	100.0	4.26	3.00	5.00
EPA's Power Over Private Developers	0.0	2.6	97.4	100.0	4.44	3.00	5.00
EPA'S Power Over Public Agencies	5.1	51.3	43.6	78.9	3.38	2.00	4.00
Another Institution such as NDPC	20.5	61.5	17.9	-6.7	2.97	2.00	4.00
Impact of Environmental Agencies Felt	7.7	71.8	20.5	45.5	3.15	2.00	5.00
Communication and Coordination are not improved	2.6	56.4	41.0	88.2	3.41	2.00	5.00
Enforcement by Environmental Agencies are not improved	5.1	30.8	64.1	85.2	3.67	2.00	5.00
Resources or Logistical Supply Unimproved	0.0	35.9	64.1	100.0	3.79	3.00	5.00
Little Progress on Participation	43.6	53.8	2.6	-88.9	2.59	2.00	4.00
Partnerships Encouraged	0.0	38.5	61.5	100.0	3.67	3.00	5.00
Improved Cooperation with Other Establishments	2.6	25.6	71.8	93.1	3.77	2.00	5.00
No Conflict of SEA with Organisation Policies	0.0	41.0	59.0	100.0	3.59	3.00	4.00
Adaptability of Policies to SEA	2.6	48.7	48.7	90.0	3.46	2.00	4.00
Can Displace or Suspend Some of its Policies	25.6	41.0	33.3	13.0	3.13	2.00	5.00
Can Imitate Success Stories of Others	0.0	10.3	89.7	100.0	4.26	3.00	5.00
Can Take SEA on Board	7.7	61.5	30.8	60.0	3.28	2.00	5.00
Can Integrate SEA into its Policies	20.5	46.2	33.3	23.8	3.15	2.00	5.00
Can Disseminate information on SEA	0.0	46.2	53.8	100.0	3.56	3.00	5.00
Can Incorporate the Environment into its Mission Statement	41.0	53.8	5.1	-77.8	2.67	2.00	5.00
Performance Indicators to Guide Compliance	30.8	61.5	7.7	-60.0	2.77	2.00	4.00
Establish Expert Unit in Establishment	0.0	25.6	74.4	100.0	3.92	3.00	5.00
Law in Place or being Made to Employ Environmental Consultants	0.0	5.1	94.9	100.0	4.38	3.00	5.00

In fact most of the laws empower establishments to engage the services of experts and consultants although the terms of their engagement are not specified.

Agency theory suggests that there is a problem within and between firms in ensuring that providers do what they are supposed to do. Employees and outside firms will be self interested in profits and opportunism rather than the goals of the firm, which employ or enter into contract with them. There is no difference between inter-organisational and intra-organisational agents. Thus decision-making for an agent or employee inside and outside an organisation is based on calculations to cheat, and to exploit opportunities. Similarly, decision-making for a principal or employer is to do with calculation about implementation and enforcement. The principle will be to choose those institutional arrangements which best provide for contractual (monitorable) relationships that keep tabs on actors in the policy process and the decision they make. Thus public services mediate through short-term contracts, performance indicators and mission statements among others.

With this in mind, the questions dealing with the willingness of establishments to incorporate environmental issues into mission statements and use performance indicators revealed the following outcome. While under a tenth (5.2%) of the respondents were in agreement, more than a third of them (41%) were in disagreement over having mission statements. To performance indicators, nearly a tenth (7.7 %) of the respondents agreed while more than a fourth (30.8%) disagreed. It was on the question about imitating the success story of others that the highest agreement was recorded in this category. More than three quarters of the respondents (89.3%) gave positive responses.

The perspective of political institutionalism goes beyond organisations to include the interaction of state and society as well as the international economy. It takes account of the way the configuration of interests and ideas within an institutional context shapes and determines the conduct of policy making. It focuses on how institutions constrain decision-making in government outside the formal constitutional arrangements that also shape and often determine decisions that are made. In this case the ideas or perceptions of the relevant actors are not exogenous variables but a component of their rational action as it is situationally determined. Ideas acquire

force when they find organizational means of expression. Some ideas do have power of their own but the social power of any set of ideas are magnified when those set of ideas is taken up by a powerful organisation integrated with their ideological appeals and widely disseminated. In this research, the questions on political institutionalism had very positive responses. Asked whether the establishment could take SEA on board, there was more than 25% agreement with only 7.7% disagreement. More than 30% of the respondents agreed that SEA principles could be integrated into their establishments' policies with 20.5% disagreement in comparison. The responses to the questions on dissemination of information on SEA were strikingly high compared with other responses. About half (53.9%) of the respondents gave positive responses.

The framework of sociological institutionalism explains why some establishments will come along with other establishments. Political institutionalism offers an explanation as to why other strong institutions are able to persuade others to respond to their policies and come along not just in terms of implementation but also in participation and cooperation. In SEA literature, Wood (1995) said SEA could facilitate and increase consultation and participation on environmental matters. In this survey, less than half (43.6%) of the respondents disagreed that there was a little progress in participation; under 3 in 100 (2.6%) of the respondents agreed there was little progress when it came to participation. The issues of encouraging partnership (more than 56% agreement) and improved cooperation (more than 64% agreement) scored very impressively.

As already mentioned, SEA is predicated on a hierarchical or top down approach to implementation. For effective enforcement, the ideal situation is for organisations should be in a position such that (i) circumstances external to agency should not impose constraints, (ii) adequate time and resources available, (iii) required combination of resources available at each stage of the implementation process, (iv) policy based on valid theory of cause and effect, (v) relationship between cause and effect is direct and that there are few, if any intervening links, (vi) a single implementing agency which need not depend on other agencies for success or if other agencies must be involved, the relationship is minimal in number and important, (vii) agreement and understanding of objectives which persist through the implementation process, sequencing the tasks to be performed by each participant, (viii) perfect communication and coordination of the process, (ix) those in authority

demanding perfect obedience (Parsons, 1995). While all of these conditions are difficult to achieve in practice, some they serve as a guide. The three questions asked in this study showed that environmental agencies were making poor progress in this regard. More than a third (38%) of the respondents felt that communication and coordination were unimproved. Fewer than 3 in 100 (2.6%) of them agreed there was some improvement. Again more than half (56%) of them thought there was no improvement in enforcement by the Environmental Agencies. Surprisingly, as to whether the impacts of the agencies were felt, nearly a fifth (17.9%) agreed that their impacts were felt compared with the slightly over a fifth (20.5%) of them disagreeing. The higher agreement recorded here compared with the previous two could probably be as the result of legitimating myths discussed in Chapter One. Thus levels of agreement recorded on the scale were a measure of an establishment's ability to implement policies.

The result of the survey, from both public and private sector respondents, also indicated that there was no disagreement over the need to increase the power of the EPA over the private sector. In fact nearly all the respondents (97.4%) gave positive responses to the suggestion but when it came to the need to increase the power of the EPA over the public sector (who really are policy initiators), only under half of the respondents agreed (43.6%). Besides, over half (51.5%) of the respondents were in doubt. While nearly a fifth (17.9%) of the respondents agreed that another institution such as the NDPC could exercise that power over public institutions, about a fifth (20.5%) of them were in disagreement. The greatest agreement (59%) was over the unimproved nature of implementation structure. The study highlights the areas of strengths and weakness as well as constraints and opportunities within the institutions in Ghana. The willingness of organizations to adapt policies to suit SEA, displace or suspend their own policies if need be, imitate successes of others, make environment part of mission statement and to promote SEA is an indication that SEA could be integrated into policy-making process of institutions. The stronger the framework for integration, control and institutionalization of SEA in the existing establishments: the stronger the ability of policy makers to diffuse SEA throughout policymaking process.

Table 8.6 shows the rank scores for sustainable energy policy. The other 5 variables are seeking to predict the extent to which sustainable development has occurred as the result of their impacts. It is therefore the strength of sustainable development that is being gauged rather than the extent to which respondents agree to questionnaire items. This is why rank score are used here. The sub-variables are organised along the lines of social, economic and environmental sustainability.

Table 8.6: Sustainable Energy Policy

	Very Low	Low	Moderate	High	Very High
	%	%	%	%	%
Social Cohesion and Integration	38.5	56.4	2.6	2.6	.0
Sense of Community and Connectedness	20.5	33.3	46.2	.0	.0
Housing with Modern Lighting	48.7	38.5	12.8	.0	.0
Cultural Values	28.2	43.6	28.2	.0	.0
Reduction in Social Inequality	41.0	28.2	30.8	.0	.0
Improvement in Health Services	30.8	48.7	17.9	2.6	.0
Accessibility to Social Services	38.5	25.6	35.9	.0	.0
Limiting Unemployment	23.1	28.2	46.2	2.6	.0
Job Creation	33.3	25.6	41.0	.0	.0
Raising Revenue	28.2	38.5	33.3	.0	.0
Sustaining Economic Growth	35.9	23.1	38.5	2.6	.0
Private Investment	7.7	41.0	51.3	.0	.0
Ensuring Economic Efficiency	20.5	46.2	30.8	2.6	.0
Increasing Supply of Services	33.3	46.2	20.5	.0	.0
Cost Recovery	20.5	51.3	25.6	2.6	.0
Reducing Inflation	25.6	41.0	30.8	.0	2.6
Maintain Natural Resource Supply	25.6	41.0	20.5	12.8	.0
The Use of Energy Efficient Appliances	33.3	35.9	25.6	2.6	2.6
Ensuring Energy Security	7.7	61.5	30.8	.0	.0
Ratio of LPG Use to Fossil Fuel	17.9	53.8	28.2	.0	.0
Reducing Per Capita Energy Consumption	5.1	56.4	35.9	2.6	.0
Ratio of Solar Energy to Traditional Fuels	35.9	33.3	20.5	7.7	2.6
Ratio of Public Transport use to Private Transport	23.1	51.3	23.1	2.6	.0
Percentage of Second-hand Vehicles or Appliances	17.9	56.4	23.1	2.6	.0

It will be observed that the ranking received from most of the respondents is up to a 3-point mark. Under the 3-point mark, social sustainability indicators recorded between 2.6% and 46.6% of respondents' scores; between a fifth (20.5%) and half (51.3%)) of the respondents indicated that economic sustainability issues were taken on board while between a fifth (20.5%) and a third (35.9%) of the respondents indicated that environmental sustainability were considered. A few variables for which 4-point rank scores were recorded included social cohesion and integration,

improving health services and limiting unemployment. Economic sustainability received the same level of ranking in respect of economic growth, economic efficiency and the supply of services. In terms of environmental sustainability, the level of ranking was similar, except for maintenance of natural resources and the ratio of solar energy to traditional fuels, for which the respective responses rose to more than a tenth (12.8%) and less than a tenth (7.7%) of the responses. While the above variables served as predictor variables in most of the analyses, it was necessary to modify some of them so as to test other hypotheses that were supplementary to the main hypotheses. SEA Framework, for example, deals with legal, institutional, political and philosophical aspects of the framework. To test a hypothesis, for instance, to establish a causal link between institutions as a predictor variable and another dependent variable, a subset of that variable was used. Similarly, the variable - *Improving Institutional Context* deals with issues such as hierarchy, integration, coordination and participation.

Table 8.7: West African Survey

	Strongly Disagree /Disagree	Not Sure	Agree / Strongly Agree
	%		
Energy Security	50.0	42.5	7.5
Insufficient Rainfall	47.5	40.0	12.5
Common Energy Policy	30.0	45.0	25.0
Ghana's Stable Democracy	45.0	40.0	15.0
Ghana's Resources	45.0	50.0	5.0
Ghana's Leadership Role	52.5	42.5	5.0
Mutual Benefits from West African Gas Project	40.0	47.5	12.5
Mutual Benefits from West African Power Pool	42.5	45.0	12.5
Energy Policy not Man Centred	45.0	47.5	7.5
Energy Policy for the Benefit of Nature	50.0	42.5	7.5

Table 8.7 above shows the results of the West Africa survey based on 20% Ghanaians and 80% other West Africans. Theoretically, common needs, strategic advantage and mutual benefits provide the basis for cooperation (Aldrish, 1972, 1976; Kochan, 1975; Yutchman and Seashore, 1967; Bish, 1978, Tuite, 1972 and

White, 1974 cited in Parsons, 1995:483-484). Common needs factored into the questionnaire include rainfall and energy. Ghana's natural resources and stable democracy among other factors have often been cited in the sub-region (See Section 1.2). These parameters were therefore used to frame the strategic advantage questions on the instrument. On mutual beneficial issues, two programme areas which regional policy is currently dealing with include West African Gas Pipe Line and West African Power Pool projects. The results of the survey reveals that while up to half (50%) of respondents did not see energy security as a common problem facing West Africa Sub-Region, nearly a tenth (7.5 %) of respondents identified with the problem leaving under half (42.5 %) of respondents in doubt. In respect of insufficient rainfall, nearly half (47.5%) of respondents disagreed that it was a common problem; slightly more than a tenth (12.5 %) of the respondents agreed that insufficient rainfall was problematic while 40 % of the respondents were on neither side. On the suggestion of forging a common energy policy, 25% of the respondents gave positive responses. There were disagreements (up to 30 %) and doubts (45 %) over the issue. There were varied responses to Ghana's stable democracy: These are disagreement (45 %), doubts (40 %) and agreement (15 %). Regarding Ghana's resources the level of agreement (5%) was very low compared with the levels of doubt (47.5%) and disagreement (47.5%). Ghana's leadership role was not entirely disagreed with or doubted; 5 % of the respondents agreed with the view.

There were substantial levels of doubt (45%-47.5 %) and disagreement (40-42.5%) over the role of the West African Gas Pipeline and Power Pool proposals to mutually benefit the region. However, 10-12.5% of the respondents did agree to the mutual benefits to be derived form from the proposed West African Gas Pipeline project. Regarding the motivation of respondents for energy policy, 15 % of the respondents strongly disagreed to the assertion that energy policy was not man-centred; 30 % of them disagreed with the assertion, nearly half of them (47.5%) were in doubt and only under a tenth (7.5%) of them agreed. A similar question asking if energy policy was for the benefit of nature had 20 % strong disagreement, 30 % disagreement, 42.5 % doubt and 7.5 % agreement. Averaging the results of the last two items[10], West

[10] The responses to than 'man-centred' question being a negatively worded question means that disagreements to '...not man-centred' imply man-centredness or anthropocentrism. Conversely, agreement implies ecocentrism. Disagreement to the nature related question also implies a leaning

Africa can be shown to demonstrate some elements of extreme anthropocentrism/technocentrism (30%), moderate technocentrism (60%), moderate ecocentrism (10%) and extreme ecocentrism (0%). On the basis of the variables discussed above, it cannot be said that SEA is firmly established in Ghana. Nevertheless, the fact that it has already started in a developing country and the necessary legal framework was put in place provides the scope for its growth.

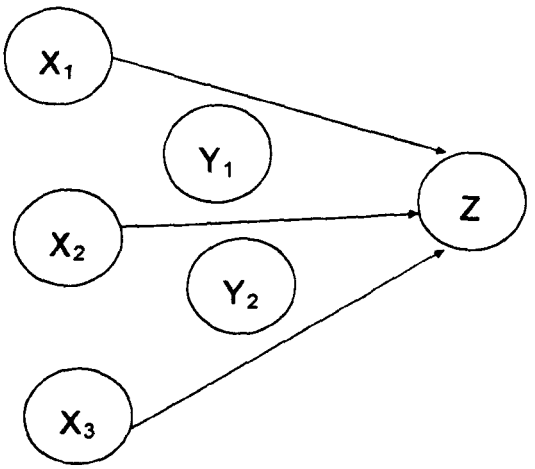
8.5 Testing of Hypotheses.

The fact that the responses to the questionnaires unearthed the strengths and the characteristics in Ghana does not yet prove that any causal links exist between the variables. The following section therefore narrows on to the various hypotheses. In this study it is hypothesised that SEA is a tool for sustainable development. In this regard, SEA promotes Sustainable Energy Policy. The more SEAs are carried out in the energy sector, the more sustainable energy policies are likely to be. Conversely, the less SEAs are carried out in the energy sector, the less sustainable energy policies will tend to be. Within the framework of the causal model designed for this thesis, the study specifically seeks to find out (a) whether in the absence of Energy Sector SEA, SEA in General[11] will deliver sustainability; (b) whether in the absence of SEA in general, Energy Sector SEA can deliver sustainability; (c) whether an SEA framework without SEAs in other sectors is sufficient to deliver sustainability and (d) and whether a policy-making scenario under which SEA is generally integrated into the entire policy-making process with no exception for the energy sector and interlaced with a legal and institutional framework offered the best opportunity for sustainable development. The relationship is schematically expressed in Model 8.1. The regression results of Model 8.1 are shown in Tables 8.8 and 8.9 below. The probability statistic-p shown in the Table 6.9 below under the label 'sig' is used in the analysis.

towards anthropocentrism. The mean scores for the two items reflect the leanings on the ecocentric-technocentric continuum.

[11] This refers to SEA undertaken in other non-energy sectors. This is because development actions in other sectors affect energy use.

8.5.1 Hypothesis No 1: SEA and Sustainable Energy Policy



Model 8.1: The link between SEA and Sustainable Energy Policy.

The model hypothesizes that the more there are *SEA in General (X_1), Energy Sector SEA (X_2)* and a well established *SEA Framework (X_3)* simultaneously or separately, then the opportunity to achieve *Sustainable Energy Policy (Z)* where Y_1 is *Improving Existing System* and Y_2 *is Improving Institutional Context.*

Table 8.8: ANOVA[b] Model 8.1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.963	3	.321	8.058	.000[a]
	Residual	1.394	35	3.983E-02		
	Total	2.357	38			

a Predictors: (Constant), SEA Framework, Energy Sector SEA, General SEA

b Dependent Variable: Sustainable Energy Policy

To test the hypotheses under consideration [that if X_1, X_2 and X_3, then Z where X_1, X_2, X_3 and Y_1 have the meanings already assigned to them in this study], the following null and alternative hypotheses have been considered.

Null Hypothesis	$\mathbf{H_0}$	$p>0.05$ or $p>0.01$
Alternative Hypothesis	$\mathbf{H_1}$	$p<0.05$ or $p<0.01$

Comparing the computations in Table 8.8 with the null hypothesis, the result indicates that p (.000) < 0.05 and 0.01. Since the expected values for p for Model 8.1 are outside the acceptance range, the null hypothesis is rejected for Sustainable Energy Policy regressed on SEA in General, Energy Sector SEA and SEA Framework. It means that the evidence supports the alternative hypothesis ($p<0.01$)

and the data are consistent with the proposed causal inference that SEA is a tool for sustainable development on the basis of the combined model. From Table 8.9 it is noted that about 41% (R^2=0.409) of the variation is explained by the linear relationship; 59 % of the variation is unexplained. The contributions of the predictor variables are quite good. The 59% of unexplained relationship might either be due to the fact that not all possible variables have been included in the model or that multicollinearity between some independent variables might have occurred. The following correlation matrix of pairs of the variables in this model explains the other relationships in the model.

Table 8.9:Model 8.1 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639[a]	.409	.358	.1996

a Predictors: (Constant), SEA Framework, Energy Sector SEA, General SEA

From Table 8.10 of correlations, the relation between each of the predictor Variables SEA in General, Energy Sector SEA and SEA Framework and Sustainable Energy Policy is statistically significant at $p< 0.05$. In addition other relationships with Sustainable Energy Policy apart from that of SEA Framework are statistically significant at $p<0.01$. Nevertheless, for SEA in General, only 22.1% (R^2=0.470^2) of the variation is explained by the linear relationship; 77.9 % of the variation is unexplained; for Energy Sector SEA, only 25.6 % (R^2=0.506^2) of the variation is explained by the linear relationship; 74.4 % of the variation is unexplained; for Energy Sector SEA; similarly, for SEA Framework, only 7.8 % (R^2=0.279^2) of the variation is explained by the linear relationship; 92.2 % of the variation is unexplained. Each of the variables which measure aspects of SEA showed a significant relationship with sustainable energy policy consistent with theory that SEA is a tool for sustainable development.

Table 8.10:Correlation Matrix between the Means of the Variables

		General SEA	Energy Sector SEA	SEA Framework	Improved Systems	Improving Institutional Context	Sustainable Energy Policy
General SEA	Pearson Correlation	1.000	.553**	-.175	.486**	-.062	.470**
	Sig. (1-tailed)	.	.000	.143	.001	.353	.001
	N	39	39	39	39	39	39
Energy Sector SEA	Pearson Correlation	.553**	1.000	.058	.381**	.217	.506**
	Sig. (1-tailed)	.000	.	.363	.008	.093	.001
	N	39	39	39	39	39	39
SEA Framework	Pearson Correlation	-.175	.058	1.000	-.041	.718**	.279*
	Sig. (1-tailed)	.143	.363	.	.403	.000	.043
	N	39	39	39	39	39	39
Improved Systems	Pearson Correlation	.486**	.381**	-.041	1.000	.009	.567**
	Sig. (1-tailed)	.001	.008	.403	.	.478	.000
	N	39	39	39	39	39	39
Improving Institutional Context	Pearson Correlation	-.062	.217	.718**	.009	1.000	.431**
	Sig. (1-tailed)	.353	.093	.000	.478	.	.003
	N	39	39	39	39	39	39
Sustainable Energy Policy	Pearson Correlation	.470**	.506**	.279*	.567**	.431**	1.000
	Sig. (1-tailed)	.001	.001	.043	.000	.003	.
	N	39	39	39	39	39	39

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Comparing the relative contributions of the variables to the linear relationship, the result indicated that the greatest predictor of the dependent variable occurred with the combination of the three variables. On the whole however, it can be concluded that data used in this analysis are consistent with proposed causal inference that SEA in General; Energy Sector SEA and SEA Framework concurrently and separately have a significant correlation with Sustainable Energy Policy. Further analysis of the data by means of path analysis and partial regression shown at appendices also corroborates the finding that SEA promotes sustainable development. This in turn finds support in SEA literature that SEA promoted sustainable development (See Glasson *et al.*, 1999:422; Thérivel *et al.*, 1992; Roe, Dalal-Clayton and Hughes, 1995:19-20; Abaza, 1996:218; Partidário, 1996:35-36 and Sadler, 1996:141).

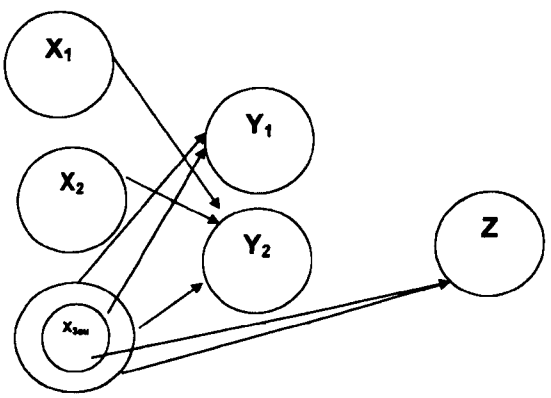
8.5.2 Hypothesis No 2: Institutions and Implementation

Regarding the institutional question, it is hypothesized that the ability of institutions to implement policies is predicated on the effectiveness or suitability of the institutions, which they inhabit. SEA is an action-forcing tool. In this regard, there is a causal link between the type and suitability of the institutional framework and the level of implementation of SEA.[12] The more effective or suitable institutions for SEA

[12] It was mentioned that the variable [Improving the existing system] was a measure of implementation. Thus the hypotheses being tested could also be framed as: the more suitable institutions are, the more likely cumulative impacts for example will be addressed within the SEA framework.

are, the more the goals of SEA are likely to be implemented and the more sustainable energy policies are likely to be. Conversely, the less effective institutions of SEA are, the less the goals of SEA are likely to be implemented in the energy sector and the less sustainable energy policies will tend to be.

With this framework in mind, the study seeks to find out (a) whether the existing institutional framework (as a subset of SEA framework) can facilitate implementation; (b) whether the existing institutional framework (as a subset of SEA framework) can deliver sustainability (c) whether it is the SEA framework (including institutional framework) that can facilitate implementation and (d) whether the existing institutional framework requires improvements necessitated by SEA in order to implement policies effectively. The relationships are shown in Model 8.2 below.



Model 8.2: Regressing Y_1 over X_3 and X_{3sub}; Y_2 over X_1 and X_2 ; and Z over X_3 and X_{3sub}.

This is the hypothesis that the more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), the better the implementation of policy (Y_1). The more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), and the more improved institutional context (Y_2) the more sustainable energy policies are likely to be.

Table 8.11 shows a correlation matrix of pairs of the variables in this model explaining the relationships in the model. From the analysis, there is no significant relation between the existing institutional framework and the dependent variables implementation (using improving existing system as a surrogate) and sustainable energy policy. As already seen in Model 8.2 above, the relationship between SEA framework and sustainable energy policy is statistically significant although at $p<0.05$. This implies that the existing institutional and SEA framework, per se, facilitate implementation.

Table 8.11:Correlation Matrix for Model 8.2

		Institutional framework	SEA Framework	Improved Systems	Sustainable Energy Policy
Institutional Framework	Pearson Correlation	1.000	.709**	-.168	.066
	Sig. (1-tailed)	.	.000	.154	.345
	N	39	39	39	39
SEA Framework	Pearson Correlation	.709**	1.000	-.041	.279*
	Sig. (1-tailed)	.000	.	.403	.043
	N	39	39	39	39
Improved Systems	Pearson Correlation	-.168	-.041	1.000	.567**
	Sig. (1-tailed)	.154	.403	.	.000
	N	39	39	39	39
Sustainable Energy Policy	Pearson Correlation	.066	.279*	.567**	1.000
	Sig. (1-tailed)	.345	.043	.000	.
	N	39	39	39	39

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 8.12 and 8.13 below show the regression results of the relationships.

Using Institutional Framework as a subset of SEA framework gives the following result in Table 8.12.

Table 8.12: Regressing Z over X_{3sub} and Y_2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.483	2	.241	4.640	.016[a]
	Residual	1.874	36	5.205E-02		
	Total	2.357	38			

a Predictors: (Constant), Improving Institutional Context, Institutional Framework

b Dependent Variable: Sustainable Energy Policy

Table 8.13: Regressing Z over X_3 and Y_2

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.443	2	.222	4.172	.023[a]
	Residual	1.913	36	5.315E-02		
	Total	2.357	38			

a Predictors: (Constant), SEA Framework, Improving Institutional Context

b Dependent Variable: Sustainable Energy Policy

The results of the regression analysis indicated the relationship between the existing institutional framework (as a subset of SEA framework) supplemented by the improvements in the institutional context (necessitated by SEA) and sustainable energy policy is statistically significant at p (0.016)<0.05. Similarly, for the

relationship between SEA framework (including existing institutional framework) and sustainable energy policy is statistically significant at p (0.023)<0.05. The results indicated that the existing institutional framework required improvements in institutional context facilitated by SEA in order to deliver sustainable energy policy. From the model summary only between 19% and 21% of the variation is explained by the linear relationship.

Table 8.14: Model 8.2 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.434a	.188	.143	.2305

a Predictors: (Constant), SEA Framework, Improving Institutional Context

For institutional framework as a sub-variable, the model summary is shown in Table 8.15 below.

Table 8.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.453b	.205	.161	.2281

a Predictors: (Constant), Institutional Framework, Improving Institutional Context

To show that there was a causal link between SEA and improvements in the institutional context, a further regression model was considered.

Table 8.16: ANOVA[b] SEA and SEA Framework (Institutional Context)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.924	3	.308	14.186	.000[a]
	Residual	.760	35	2.170E-02		
	Total	1.683	38			

a Predictors: (Constant), SEA Framework, Energy Sector SEA, General SEA

b Dependent Variable: Improving Institutional Context

Table 8.17: ANOVA[b] SEA and Institutional Context

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.466	3	.155	4.467	.009a
	Residual	1.217	35	3.477E-02		
	Total	1.683	38			

a Predictors: (Constant), Inst. Framework, Energy Sector SEA, General SEA

b Dependent Variable: Improving Institutional Context

With the correlation being statistically significant at $p<0.01$ for both SEA Framework and for Institutional Framework as a subset of SEA Framework, the study shows that not only is SEA a tool of sustainable development. It is also a tool for improving institutional context. The findings in this section support the assessment literature that SEA feeds forward into institutions and impacts on them. Partidário (1996:43) rightly stated that SEA required

> appropriate organizational structures, across and within departments, agencies responsible for developing policies, [to] be established to allow the pre-stages and follow up to be addressed, such that analysis, integration and review of proposals are ensured [including] steering committees, interdepartmental committees, and stakeholder involvement.

Adopting the expression of Dryzek (1982), Dryzek (1983) and Simon (1983), SEA practitioners base 'decisions upon careful considerations of the future through a sort of strategic feedforward mechanism' or 'a tiered forward planning process' (Wood, 1995:226). Discussing the influence of environmental assessment through NEPA, Bartlett (1998:90) similarly wrote:

> NEPA is best understood as an attempt to force greater rationality in government decision making through an experiment in institutional and policy design...a natural experiment in the institutionalization of rationality on government organizations and, indeed, in a whole society. The enactment and implementation of NEPA constitute an effort to structure situations to achieve certain results.

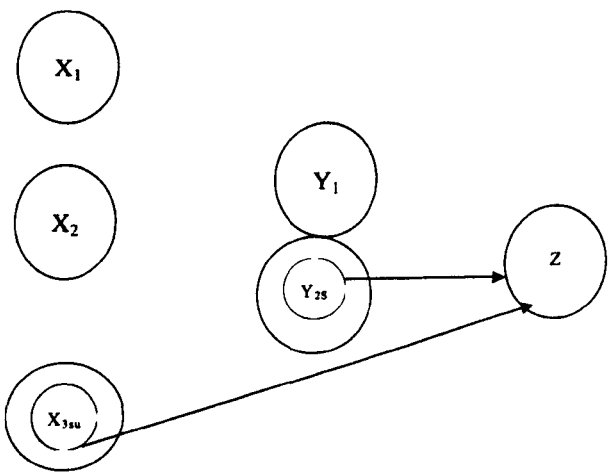
Thus the result of analysis views SEA as action forcing and a proactive exercise in Environmental Impact Assessment that influences institutions. Unless SEA mentality influences institutional focus, structures per se will not be able to facilitate the implementation of policies that in turn deliver sustainable development.

8.5.3 Hypothesis No 3: Context and Sustainable Development

This hypothesis relates to philosophical convergence. It posits that the ability of institutions to work towards a common strategy and policy such as sustainable energy policy is a function of context[13] (as a subset of SEA framework) and the

[13] Defined in this study to include framing context, problem definition and agenda setting

corresponding convergence in the philosophical/institutional views[14]. In this regard, there is a causal link between context, philosophical/institutional changes (as a subset of improving institutional context) and sustainable energy policy. Thus the greater the impact of context and philosophical changes the more effective are institutions to work towards sustainable energy policy. By implication, the less the impact of context and philosophical changes are, the less effective are institutions to deliver sustainable energy policy.



Model 8.3: Regressing Z on X_{3su} and Y_{2s}.

This is a hypothesis that the greater the impact of context (X_{3su}) and philosophical changes (Y_{2s}), the more effective are institutions to deliver sustainable energy policy.

The regression Model 8.3 above and correlation matrix below summarise the key parameters.

Table 8.18: ANOVA[b] Philosophical Changes

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.428	2	.214	3.992	.027a
	Residual	1.929	36	5.358E-02		
	Total	2.357	38			

a Predictors: (Constant), Philosophical Changes, Agenda Setting and Framing Context

b Dependent Variable: Sustainable Energy Policy

[14] The extent to which there is a general agreement over common and workable elements of functional, political and economic institutionalism is the concern of this hypothesis.

Table 8.19:Correlation Matrix for Context and Sustainable Development.

		Sustainable Energy Policy	Agenda Setting and Framing Context	Philosophical Changes
Sustainable Energy Policy	Pearson Correlation	1.000	.199	.411**
	Sig. (1-tailed)	.	.112	.005
	N	39	39	39
Agenda Setting and Framing Context	Pearson Correlation	.199	1.000	.215
	Sig. (1-tailed)	.112	.	.095
	N	39	39	39
Philosophical Changes	Pearson Correlation	.411**	.215	1.000
	Sig. (1-tailed)	.005	.095	.
	N	39	39	39

**. Correlation is significant at the 0.01 level (1-tailed).

The result from Table 8.18 indicated that the relationship between context, philosophical changes and sustainable energy policy was statistically significant at p (0.027)<0.05 a condition for rejection of the null hypothesis that p>0.05. From the Table 8.19 of correlations, it can be deduced that. context alone does not significantly influence sustainable energy policy apart from philosophical changes (a subset of improving institutional context). The work of Pleune (1997:733) provides a clear example of a framing context. In his paper *The Importance of Contexts in Strategies of Environmental Organisations with Regard to Climate Change*, he examined five environmental organisations in the Netherlands with respect to climate change. He noted that several of the organisations changed their strategies over time owing to the dominant framing of the problem in society (See also McAllister, 1994). Marsden (1998) believed that context was important as a measure for SEA's effectiveness.

8.5.4 Hypothesis No 4: Implementation and Sustainable Development

In discussing hypothesis 2 above, the emphasis was on the general effectiveness or suitability of the institutions as an instrument for implementation. This hypothesis, closely related to the second, focused on joint action and implementation and considered the forms of institutions, which could ensure effective SEA. It hypothesizes that more hierarchically (top-down) structured institutions are [such as that of NDPC] and the more amenable the general institutional contexts are to integration, the better the opportunity for SEA and sustainable development. It further hypothesized the more unhindered and empowered an implementing agency

[such as EPA] is to exercise control over both private and the public sectors, the more SEA can be integrated in PPP making process. It also hypothesizes that the more institutions cooperate and work on the basis of equal partnerships, the more joint action and implementation are likely to succeed. In testing these hypotheses, factor analysis was used based on a principal component factor analysis with using varimax rotation. This was because the sub-variables were just regrouped around common themes within the same variable. For example, all the variables on TCE are grouped together and so were those dealing with agency theory, integration/hierarchy, conditions for top-down approach and partnerships.

Table 8.20: Rotation Matrix - Joint Action and Implementation

	Component			
	1	2	3	4
Implementation Structures are not improved				.891
EPA's Power Over Private Developers		.790		
EPA'S Power Over Public Agencies			.836	
Another Institution such as NDPC	.387	-.464		-.598
Conditions for Top-Down Approach Created	.358		.725	
Encouraged Partnerships		.747		
Agencies Amenable to Integration and Hierarchy	.685		.320	
Performance Indicators/Mission Statements(Agency Theory)	.826			
Incorporating Expert Units(Transaction Cost Economy)	.872			

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

The result of this study indicates that the variables - *another institution such as NDPC* (0.387), *conditions for top-down approach* (0.358), *agencies amenable to hierarchy and integration* (0.688), *the use of performance indicators/mission statements* (0.826) and *incorporating expert units* (0.872) have significant loadings (>0.30) on the first factor. The second group of variables - *EPA's powers over private developers* (0.790) *another institution such as NDPC* (-0.464) and encouraged partnerships (0.747) - also load significantly on the second factor. The third group of variables, which significantly loads on the third factor, is EPA's power over public agencies (0.836), conditions for top-down approach created (0.725) and amenability to integration and hierarchy (0.320). For the fourth factor extracted, two variables loading on to it are unimproved implementation structure and another institution such as NDPC (-0.958). From the variables loading on the first factor, it can be surmised that a hierarchically structured institution such as NDPC offers the

best opportunity for integration of SEA into agencies if conditions for top-down approach to implementation are provided and amenability of institutions to hierarchy and integration as well as to economic basis of institutionalism are explored. The figures from the third factor indicate that the EPA can exert considerable influence on the public sector in respect of SEA if the enabling environment for top-down approach to implementation is provided and the EPA begins with institutions amenable to hierarchy and integration. The results from the second factor indicate that public-public partnerships provided a plausible and tangible framework for both the EPA and the NDPC to jointly work together to implement SEA. From the nature of the fourth factor loading, it is possible that an empowered the NDPC can provide the framework for changing unimproved implementation structures into implementable ones.

An effective cooperation of institutions, complementing the efforts of one another is likely to contribute to full integration of SEA into the entire policy making process when SEA may not even be necessary. Partidário (1996) perhaps illustrated the contribution of the existing system on sustainable development in the Figure 8.3 below.

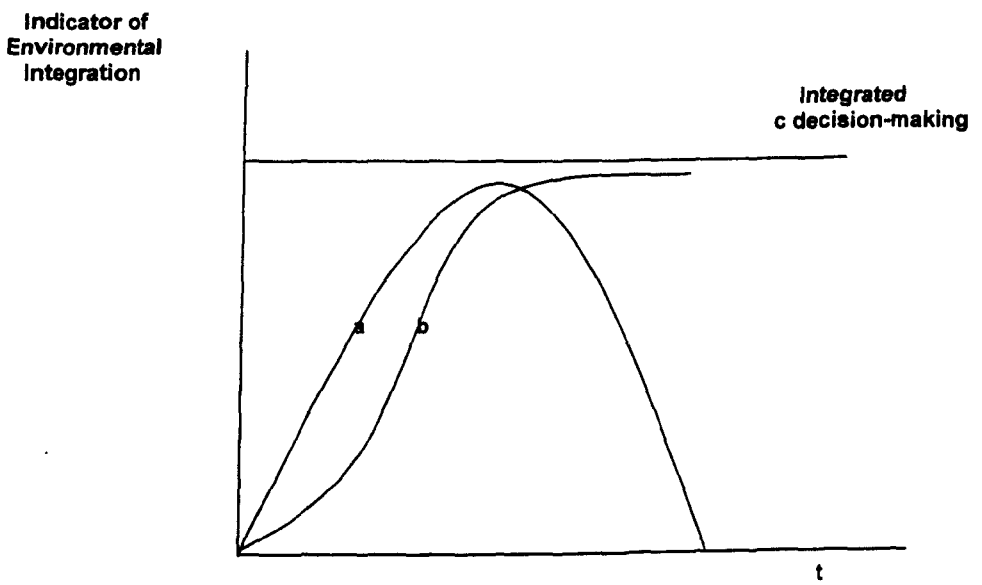


Figure 8.3: Contribution of SEA to achieve full-integrated decision-making.
a-SEA, b-process of integration of environmental issues in decision-making (policies, plans, and programmes), c-integrated decision-making, t-time.

Source: Partidário (1996)

Figure 8.3 illustrates how full integration of environmental/sustainability principles into plans and programmes is the ultimate means by which sustainable development can be achieved. In a fully integrated system where every level and tier of decision-making is influenced by sustainability considerations, SEA may have played its role. Thus the hypothesis that the existing system involving improved PPP and EIA influences sustainable development as the result of SEA is supported by the data.

8.5.5 Hypothesis No 5: Sub-Regional Context

This hypothesis relates to the international context. It hypothesizes that the more nations acknowledge their common needs and find the resourcefulness of another nation as beneficial, the more they are likely to cooperate on a common policy such as sustainable energy policy. Again, the more nations recognize the mutual benefits they are likely to derive from cooperation, the more they are likely to cooperate on a common policy such as sustainable energy policy. Furthermore, the more nations recognize the mutual benefits they are likely to derive from cooperation and the more they acknowledge the strategic advantage of a nation, the more likely they are to accept the leadership of that nation in directing a sustainable policy.

Table 8.21: Rotated Component Matrix[a]: West African Context

	Component			
	1	2	3	4
Energy Security		.797		
Insufficient Rainfall		.706		
Common Energy Policy	.561	-.401		
Ghana's Stable Democracy			.709	-.388
Ghana's Resources	.306		.650	
Ghana's Leadership Role			.654	.303
Mutual Benefits from West African Gas Project	-.378	-.341		.607
Mutual Benefits from West African Power Pool	.823			
Energy Policy not Man Centred				.718
Energy Policy for the Benefit of Nature	.659			

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 9 iterations.

The testing of these hypotheses also relied on factor analysis shown in Table 8.21. The result of the factor analysis indicates that Common Energy Policy (0.561), Ghana's Resources (0.306), Mutual Benefits from West Africa Gas Pipeline Project (-0.378), Mutual Benefits from West Africa Power Pool Project (0.828) and Energy

Policy for the Benefit of Nature (0.659) have significant loadings (>0.30) on the first factor. This implies that Ghana's strategic advantage through its resources as well as the mutually beneficial projects such as West Africa Power Pool and Gas Pipeline Projects provide some basis for a common energy policy that is nature oriented. The second group of variables, Energy Security (0.797), Insufficient Rainfall (0.706), Common Energy Policy (-0.401) and Mutual Benefits from West Africa Gas Project (-0.341), share common properties with the second factor. These second group of variables are, however, bipolar[15]. The result from the second factor also highlights the fact that common needs such as energy security and insufficient rainfall as well as mutual benefits from the gas pipeline project provide a rallying ground for a common energy policy. Furthermore, the common energy policy and mutual gas pipeline being bipolar to insufficient rainfall and energy security is an indication of contrast. The result underlies the fact that constraints such as energy insecurity can be turned into and opportunity for common beneficial policy. It also underlies the fact that the existing problems can be turned into hope if there is the willingness to work towards a common strategy. Moreover, it contrasts the existing situations with future beneficial ones.

Ghana's Stable Democracy (0.709), Ghana's Resources (0.650) and Ghana's Leadership Role (0.654) also load on the third factor. The implication is that Ghana's stable democracy and resources can become the springboard for its leadership role in the sub-region. The fourth group of variables which significantly load on the fourth factor are Ghana's stable Democracy (-0.388), Ghana's Leadership Role (0.303), Mutual Benefits from West Africa Gas Project (0.607) and Energy Policy not Man-Centred (0.718). Similar to deductions based on the first factor, Ghana's strategic advantage (in terms of its resources and leadership) and the mutual benefits from gas pipeline provide a basis for energy policy that is not man-centred.

These findings are not without theoretical support. Theoretically, effective cooperation among organisations is founded on power, resource dependency and organisation exchange. Organisations can induce less-powerful and more dependent organisations to interact with them. In the same way those organisations, which are dependent, have to engage in strategies to secure their interest and maintain their

[15] The positive and negative nature of the scores is referred to as bipolar.

relative autonomy. Thus relationships are based on dominance and dependence. In organisation exchange model, mutual benefits to be derived draw them together. The greater the perceived benefits mutual or subjugated the greater the desire for cooperation on common problems supplemented by national policies (Aldrish, 1972, 1976; Kochan, 1975; Yutchman and Seashore, 1967; Bish, 1978, Tuite, 1972 and White, 1974 cited in Parsons, 1995:483-484). This is the way the relationship of other states in West Africa in relation to Ghana can be interpreted.

8.5.6 Hypothesis 6: Co-operation, Participation & Sustainable Development.

From the conclusions drawn from hypothesis 5, common need, mutual benefits and strategic advantages provide some basis for cooperation not only on the international scene but also on the local scene. The purpose of this section is to test the hypothesis that SEA facilitates and increases participation on environmental matters, facilitates consultation between authorities.

Table 8.22: Rotated Component Matrix – Coordination and Participation

	Component	
	1	2
SEA Framework	.900	
Improving Institutional Context	.832	
International Framework for cooperation	.803	
Improved Context for Cooperation, Participation and Partnership	.478	-.360
Local and National Framework for Cooperation	.451	
Sub Regional Context		.795
Sustainable Energy Policy	.363	.709

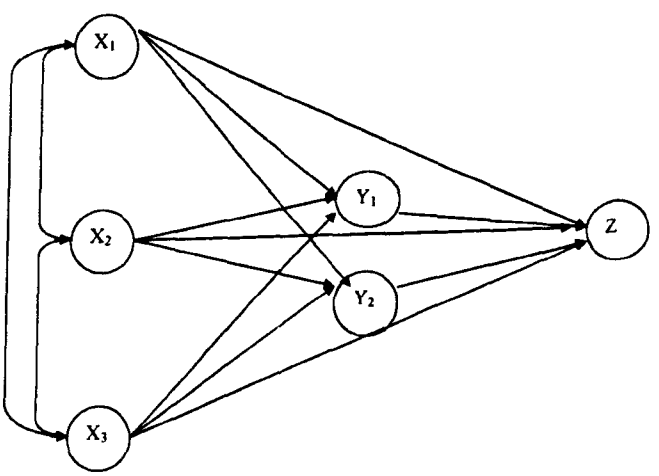
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

The result detailed in Table 8.22 shows that apart from the variable sub regional context, all the variables have significant loading [between 0.363 and 0.900] on the first factor extracted. This result indicates that SEA framework and improved institutional context provide the springboard for local and international cooperation and partnership in the development of sustainable energy policy. The second factor extracted has improved context for cooperation, participation and partnerships on the one part, sub regional context on the second part and sustainable energy policy on the third part loading significantly on it [between -0.360 and 0.797]. This implies that sustainable energy policy is possible within the sub-region within a framework of partnerships. The result also confirms the hypotheses under consideration. Wood (1995) sums the position when he said: 'SEA can...facilitate and increase

participation on environmental matters...and facilitate consultation between authorities.'

8.5.7 Consolidating the Models

Combining the major hypotheses gives an integrated Model 8.4 and Tables 8.23-8.24 below. The result shows a strong correlation between the independent and mediator variables acting together on one hand and the dependent variable on the other hand ($p< 0.01$ and $r^2 =58.3\%$). The results from path analysis and partial regression, at appendices, confirm earlier findings that SEA strongly contributes to sustainable development. The results also show a significant correlation between all the predictor variables (SEA in General, Energy Sector SEA and SEA Framework) and the dependent variable Sustainable Energy Policy on the one hand. It also indicates a strong correlation between the mediator variables (improving the existing system and improving the institutional context) and the dependent variable. While there is a strong relationship between two predictor variables (SEA in General and Energy sector SEA) and the mediator variable (improving the existing system), the pair of predictor variables does not have such a significant correlation with the second predictor variable (improving the institutional context). It is rather the third predictor variable (SEA Framework) that relates strongly with the mediator variable (improving institutional context) although it fails to register a significant correlation with the first predictor variable (improving the existing system). The study also shows a strong multicollinearity between the first, two predictor variables (SEA in General and Energy Sector SEA).



Model 8.4: Consolidated Model: See Chapter 1, Figure 1.5

Table 8.23: Consolidated Model 8.4

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.373	5	.275	9.212	.000[a]
	Residual	.984	33	2.981E-02		
	Total	2.357	38			

a. Predictors: (Constant), Improving Institutional Context, Improved Systems, Energy Sector SEA, General SEA, SEA Framework

b. Dependent Variable: Sustainable Energy Policy

Table 8.24: Consolidated Model 8.4 Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.763[a]	.583	.519	.1727

a. Predictors: (Constant), Improving Institutional Context, Improved Systems, Energy Sector SEA, General SEA, SEA Framework

8.5.8 Multicollinearity and Autocorrelation

The ideal prediction situation is when the correlation between the independent variables and the dependent variables are low. The more the independent variables are intercorrelated, the more difficult the interpretation. This is because one has greater difficulty telling the relative influence on the dependent variable. When the independent variables are correlated some of the common variance of dependent variable on the independent variables is shared by another independent variable. In short the independent variables are redundant to some extent in predicting the dependent variable. Thus a multiple regression analysis works properly if there is no significant linear relationship between the independent variables. But there are often such relationships in the real world and we accept the result if these relationships are not too strong.

However, multicollinearity or correlated independent variables is not always undesirable. In some cases when a multiple regression is used to establish the validity of measure or scale, correlated independent variables can be most useful. Independent variables that have zero or near zero correlation with the dependent variable, can actually improve the amount of variance shared by the dependent and

independent variables. This type of independent variables is called suppressor variables. In this study, there is multicollinearity between SEA in General and Energy Sector SEA. At any rate the two independent variables play complementary roles and their inter-correlation in this study does not detract from the goal of this study. Apart from multicollinearity there is a problem of autocorrelation when the error terms are not independent but in practice error terms are not so random (Kerlinger and Lee, 2000:777-779; Waters, 1997:257).

8.6 Conclusion

The results of this study supported the general theory that SEA provided the framework for sustainable development. The variations in the causal relationships were not totally explained by the linear relationships. This implied that other management tools could contribute to sustainable development.[16] Nevertheless, the study overwhelmingly found that SEA rendered energy policy more responsive to sustainable development. SEA increased the awareness of policy makers for institutional changes needed to accommodate sustainable development. SEA helped to take integrated view of institutional and philosophical constraints and opportunities affecting policy-making and furnished practitioners with a tool for addressing contradictions, inconsistencies and incompatibility in policies at different levels. By providing a framework for project EIA and PPPs, SEA transformed sustainability ideas into practice. The scope of issues addressed by SEA, such as trans-boundary pollution, the creation of awareness among nations to examine their common needs, mutual benefits and exploit strategic advantages of other nations, reinforced the importance of cooperation, participation and partnerships not just among nations but also among agencies within national borders.

The results show that SEA is just beginning in Ghana. Nevertheless, planners, practitioners, diplomatic missions and the World Bank consider SEA useful. Consequently, what started based on the grey parts of the law was now codified into

[16] A quantitative study is an *a priori* investigation. On that basis, the study presumes that SEA is the only tool for sustainable development. The extent to which this presumption holds true is measured by the co-efficient of determination – $R.^2$ In this analysis, R^2 ranged between 19% and 58%. Statistically, this means, the contribution of SEA to sustainability according to this study is only up to 58%, allowing for some errors. There must be other unknown variables; and this must be the subject matter of future investigation. To list other variables, which have not been empirically tested, will be a mere speculation.

a legal provision. Some commissioned reports were written and at least two postgraduate level research studies were concluded on SEA based on Ghana by 1996. The evidence of a framework for cooperation, participation and partnership provided a springboard for a common sustainability goal. The existence of a framework for integration, hierarchy, control and implementation offered a scope for improvement in compliance and implementation. Considering that SEA regulation was barely two years old, there is scope for improvement in the years to come.

Chapter

9

Analysis of Plan Level Data

Chapter Outline

Introduction

Characteristics of the Questionnaire

Results of the Study

Hypotheses Testing

Conclusion

9 Chapter Nine: Analysis of Plan level Data

9.1 Introduction

This chapter is very similar to the last chapter in terms of issues and methodology. It examines the same policy-level hypotheses at plan level; that SEA promotes sustainable energy plan and that there is a link between institutions and SEA. It argues that harmonisation of philosophical frameworks are essential for sustainable energy policy and that a framework to facilitate implementation is essential for sustainable development. It stresses the importance of cooperation across national borders in facilitating SEA as well as arguing that participation within the state.

9.2 Characteristics of the instrument and response rate

In the third chapter, policy has been viewed essentially as a stance, which, once articulated, contributes to the context within which a succession of future decisions will be made (Jenkins, 1978). Seen from public perspectives, it is a process of public decision-making leading to (or appearing to lead to) actions outside the political system (1998:204). Sadler (1996:140) says it is a particular course of action or proposed overall direction that a government is or will be pursuing and which guides ongoing decisions. Applied to the energy sector, energy policy may be manifested in a series of interrelated goals and objectives set by governments to address local, regional or international environmental concerns (such as mitigating the effects of climate change through the reduction of green house gases) and to shift towards sustainability. Plan, in contradistinction to policy, has been defined as a set of coordinated and timed objectives for implementing a policy (Wood and Djeddour cited in Thérivel *et al.*1996). It is a purposeful forward-looking strategy or design, often with co-ordinated priorities, options and measures that elaborates and implements a policy (Sadler, 1996:140). It was argued that planning was necessary to operationalise energy sector policies. Energy sector planning is also essential in order to rationalize, coordinate and maximize energy resource development (Turkson, 1990). Thus just as there are broad policy objectives in respect of economic instruments, legal tools, renewable energy, energy efficiency and conservation so also there should be conscious and timed strategies or spatial plans to cater for

planning within the energy sector. The scope and range of planning encompass a vast area related to economic, sectoral and spatial matters at supra-national, national, regional. sub-regional and local levels. Gosling (1998) identified facet,[1] sector,[2] strategic[3] and project[4] plans. To maintain some distinctions between policy and plan SEA, broad brushed items featured on policy related questionnaires while a modified version, reflecting planning functions, was used at plan level. Again whereas policy related questionnaires were focused on policy sector respondents, plan level questionnaires were directed at respondents in planning establishments.[5] With the exception of a few sub-variables, the sub-variables are reworded to reflect plan level SEA. For example, sub-variables 1, 2 3 and 5 of the variable SEA in General have been reworded as *my establishment has planning functions, plans are designed to affect programmes, spatial implication of PPPs considered* and *my establishment assesses Impact of plans*. In respect of the second variable Energy Sector SEA for instance, sub-variables 1, 2 and 20 similarly reflect planning considerations thus: *Does not reduce energy PPPs into land use plans, Plan Affects Energy Use* and *Plans consider fuel cycle.*

To use the instrument to gauge the opinion of various respondents, 100 plan-level questionnaires were distributed targeting the private sector and NGOs and district assemblies in Accra and Kumasi, Planning Institutions such as Town and Country Planning Department and The Lands Commission and the national Development Planning Commission. The distribution went thus: private sector (20), District Assemblies (50) Planning Institutions (20) and NDPC (10). Out of that, the private sector returned 20 % of the questionnaires (4 out of 20); District Assemblies 20 out of 50 (40%), the Planning Institutions worked on 16 out of 20 (80%) NDPC dealt with 4 out of 10 (40%) of the questionnaires. Overall, the response rate was 44% (44 out of 100). The internal reliability alpha for the variables on the plan questionnaire is between 0.70 and 0.92 while construct validity for the variables fall between 0.11 and 0.38. These levels of reliability and validity are considered to be sufficient to validate

[1] *'facet' plans* are distinguished by their comprehensiveness. The facet plan is aimed at coordination between sectors. Facet plans therefore deal with what various sectors have in common and so crosscut departmental boundaries. Facet plans are therefore broad based in nature.
[2] *'sector'* plans are focused on specific sectors and/or topics.
[3] strategic' plans are used as aids to decision making
[4] *project' plans* are plans on which decisions are based
[5] These respondents are different from policy level respondents.

the results of the study.[6] For the explanation of how these values are computed, see Appendix 14.14.

9.3 Results of the Study

Table 9.1: SEA in General

	Negative Response	Not Sure	Positive Response	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%	%			
Spatial Implications of policies captured in land use plans	31.8	11.4	56.8	28.2	3.52	2.00	5.00
Plans Affect Programmes	56.8	6.8	36.4	-21.9	2.82	1.00	5.00
Consideration of limited plan options	56.8	4.5	38.6	-19.1	2.86	1.00	5.00
Wide range of effects Considered	56.8	6.8	36.4	-21.9	2.80	1.00	5.00
Plan Impact Assessed	52.3	9.1	38.6	-15.1	2.80	1.00	5.00
Goals deduced from Vision	61.4	6.8	31.8	-31.8	2.61	1.00	5.00
Environmental Goals or Objectives Exist	45.5	2.3	52.3	7.0	3.23	1.00	5.00
Plan not consistent with Goals or Objectives	68.2	2.3	29.5	-39.6	2.59	1.00	5.00
Within Plan Compatibility or Consistency Considered	50.0	4.5	45.5	-4.7	3.14	2.00	5.00
Compatibility and Consistency of Plan to Vision not Considered	61.4	4.5	34.1	-28.6	2.77	1.00	5.00
Compatibility with Goals or Objectives Considered	54.5	11.4	34.1	-23.0	2.77	1.00	5.00
Sustainability Criteria Developed	79.5	2.3	18.2	-62.7	2.36	1.00	5.00
Targets or Indicators Used in Assessment	59.1	6.8	34.1	-26.8	2.70	1.00	5.00
Links between Economic Social and Environment Considered	65.9	4.5	29.5	-38.2	2.48	1.00	5.00
Environmental Objective-Based Indicators	50.0	2.3	47.7	-2.4	2.95	1.00	5.00
Environmental Regulation-Based Criteria	34.1	.0	65.9	31.8	3.57	1.00	5.00
Monitoring Programme-Based Indicators	56.8	.0	43.2	-13.6	2.84	1.00	5.00
Written Reports Up to Two	31.8	.0	68.2	36.4	3.61	1.00	5.00
Written Reports Exceeding Two	90.9	.0	9.1	-81.8	2.16	1.00	5.00
Effects Assessed at The Beginning	65.9	6.8	27.3	-41.4	2.59	1.00	5.00
Effects Assessed at the Middle	79.5	.0	20.5	-59.0	2.32	1.00	5.00
Effects Assessed at the End	38.6	4.5	56.8	19.1	3.41	1.00	5.00

[6] Details of reliability and validity coefficients for the variables are as follows: General SEA (Rel 0.87 Val.0.31), Energy Sector SEA (Rel 0.70, Val 0.28), SEA Framework (Rel 0.82, Val 0.33), Improving Existing Systems (Rel 0.82, Val 0.32), Improving Institutions (Rel 0.92, Val 0.11) and Sustainable Energy Policy (Rel 0.80, Val 0.38)

In addition to the principle of tiering, discussed in Chapter 8, Section 8.4.1 and which is applicable to plan SEA, the need to translate energy planning into space cannot be overemphasised. Wood (1995:271-272) intimated that 'because of the effects of new activities in other sectors, [such as energy sector] or because of cumulative effects of many activities not subject to project EIA, [impacts] can be considered in the SEA of land use and other spatial plans and that it could be argued that environmental assessment of land use plans is the most easily implementable of all types of SEA'. Sheate (1992:173) also underscored this importance when he wrote: 'crucial to SEA being effective is the inclusion of the findings at the most appropriate place in the planning and decision-making procedure.' Accordingly the question seeking to know whether spatial implication of policies was captured in land use plans received substantial positive response (56.8%). As to whether plans are designed to affect programmes, while more than half of the respondents (56.8%) did not think plans were sufficiently tiered, more than a third (36.4%) of them indicated that plans were tiered.

On the issue of SEA being proactive not only at policy level but also at plan level, Pinfield (1992) had this to say: 'The notion that the assessment of environmental effects should take place at the earliest stage in decision-making about land use and development is entirely logical one'. In this respect, over one-quarter (27.3%) of the respondents indicated that plan level SEA was undertaken at the beginning against almost two-third (65.9%) of them who gave negative responses. While more than three-quarters (79.5%) of the respondents did not think it was assessed during the planning process, a little under a quarter (20.5%) of them think otherwise. There is greater evidence that much of the assessments are at the end of the process indicated by a substantial positive response (56.8%) on the sub-variable. In connection with sustainability within the context of SEA of land use and energy use, Sheate (1992:172) expressed his conviction succinctly this way: 'Land-use planning offers opportunities for securing long-term environmental sustainability by addressing fundamental questions...The energy implications of different development scenarios, through their transport implications, should be central to such planning studies'. Pinfield (1992) similarly claimed that '[m] any planning authorities now recognise that the environmental assessment in development plans will have to take place if

they are to be made more sustainable'. Score from Table 9.1 above indicate a varied rating on sustainability. While more than three-quarters (79.5%) of the respondents thought no sustainability criteria have been developed in their planning establishments, about a fifth (18.2%) of them indicated that some sustainability criteria was being developed. More than half (59.1%) of them thought targets and indicators were not yet in use but more than a third (43.1%) said targets or indicators were in use. Over links between economic, social and environmental goals, almost two-third (65.9%) of the respondents gave negative responses while more than one-quarter of the respondents thought that links between the variables were established. This is further buttressed by the fact that PPP's objectives were based on environmental-based objectives (47.7 %) significantly on monitoring programmes (43.2%) rather on environmental regulations (65.9%).

On goal orientation, citing Doyle and Sadler (1996), Marsden (1998:256) said 'a well founded EA system-one that meets widely agreed objectives, principles and criteria-is a cornerstone for good practice and effective performance. From the goal of environmental protection, an objective is to ensure that environmental factors are considered in decision-making; an action (principle) is to educate decision-makers; and an evaluation criterion is whether the EA results in changes to the proposal.' Regarding the issue of consistency/compatibility of plans Mitchell *et al.* (1999:757) lamented that several causes of disillusionment in resource management reflected the fact that '(1) local and regional planning often are not consistent with environmental planning; or (2) an integrated approach to resource and environmental issues is usually part of local and regional or other planning processes'. The evidence from this study revealed as follows: More respondents indicated that their establishments had environmental goals or objectives (52.8%) than those who indicated that clear goals and objectives do not exist (45.5%). Out of this about a third (31.8 %) of respondents believed that those goals were derived from Ghana's Vision 2020. Furthermore, Almost half (45.5%) of respondents indicated that compatibility within plans was being considered in contrast with the other half (50%) of them who gave negative responses. Similar positive responses were indicated for compatibility with broader goals and objectives as well as between plans and vision (34.1%) compared with negative responses (54.5%-61.4%).

On the action side, more than a third (38.6%)of the respondents indicated that plan SEA was being carried out in comparison with over half (52.3%) of the respondents who said plan SEAs were not carried out. But out of this figure, nearly one-tenth (9.1%) of the respondents said that their establishments had so far written more than two SEA reports of a sort. Over two-third (68.2%) of the respondents did not even believe that reports were up to two. From the Table 9.1 above, it is observed that although for almost all the variables, maximum scores exceed 3 (Not Sure), it was only for five variables shown in Table 9.1 above that the mean score exceeded the 3-point mark and these cases correspond to cases for which the measures of agreement were either positive or insignificant.

Table 9.2 below shows the responses to the variable *Energy Sector SEA*. The main issues addressed by the variable include sustainable development, the scales of environmental impact, non-energy sectors and some SEA techniques in use. A separate SEA variable for the energy sector is as important for plan level SEA as it is for policy-level SEA. The energy sector is not without planning. Turkson (1990:703) refers to the concept and methodology of Integrated Energy Planning (IEP). According to him, energy planning aims to rationalise, coordinate and maximise energy resource development and use and to maintain a balance between energy supply and demand options. It also seeks to explore energy and economy interaction more systematically, disaggregate analysis of both supply and demand, identify greater opportunities for inter-fuel substitution through the application of analytical and modelling tools and the reliance on economic principles such as shadow pricing. Indeed there are other instruments in the public domain including 'physical and spatial planning, environmental planning, environmental management, environmental policy and programme development and environmental; quality control' (Lawrence, 1997:31). Clark *et al.* (1979:51-87) discussed the role of environmental Impact Analysis which plays a similar role.

> It [*i.e. Environmental Impact Analysis*] has evolved from the growing concern that social, economic and environmental impacts of major projects cannot be addressed adequately using conventional planning procedures... It is illogical to consider plan, policies and development in isolation from other proposals likely to affect the same

socio-economic and environmental factors...It could be used to in the preparation of plans and policies as a means of ensuring that compatibilities of different plans and policies affecting a particular area and as a method of assessing the likely impacts of projects, plans and policies.

Notwithstanding these tools referred to above, SEA has a very significant role to play in the energy sector and contributing to sustainable development generally.

Table 9.2: Energy Sector SEA

	Negative Response	Not Sure	Positive Response	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%	%			
Establishment has planning functions	36.4	6.8	56.8	21.9	3.39	2.00	5.00
Plan does not capture the spatial implications of energy PPP	43.2	9.1	47.7	5.0	3.20	1.00	5.00
Environmental Impact Assessed	47.7	9.1	43.2	-5.0	2.93	1.00	4.00
Social Impact Assessed	65.9	9.1	25.0	-45.0	2.57	1.00	5.00
Economic Impacts Assessed	20.5	9.1	70.5	54.9	3.70	1.00	5.00
Consideration Given to Housing Sector	36.4	2.3	61.4	25.6	3.36	1.00	5.00
Consideration Given to Industrial Sector	22.7	6.8	70.5	51.3	3.66	1.00	5.00
Consideration Given to Transport Sector	25.0	2.3	72.7	48.8	3.66	1.00	5.00
Consideration Given to Local Impacts	29.5	4.5	65.9	-64.1	3.55	1.00	5.00
Consideration Given to National level Impacts	72.7	11.4	15.9	-68.5	2.41	1.00	5.00
Consideration Given to Global Impacts	72.7	13.6	13.6	-66.7	2.18	1.00	4.00
Only Key Issues are Considered	79.5	4.5	15.9	30.0	2.30	1.00	5.00
Scenarios Used	31.8	9.1	59.1	-19.9	3.39	1.00	5.00
Matrices are Used	54.5	9.1	36.4	-31.8	2.75	1.00	5.00
Modelling is Used	61.4	6.8	31.8	-13.6	2.64	1.00	5.00
Geographical Information System In Use	56.8	.0	43.2	-4.7	2.89	1.00	5.00
Quantitative Analysis in Use	50.0	4.5	45.5	-25.6	2.95	1.00	5.00
Qualitative Analysis in Use	61.4	2.3	36.4	42.8	2.77	1.00	5.00
Compatibility Matrices In Use	27.3	4.5	68.2	-65.9	3.55	2.00	5.00
Plans consider fuel cycle	77.3	6.8	15.9	-67.5	2.30	1.00	5.00
Plans consider phases of fuel cycle	81.8	2.3	15.9	38.4	2.14	1.00	4.00
Plans take account of processes associated with phases of fuel cycle.	27.3	11.4	61.4	21.9	3.52	1.00	5.00

From the data in Table 9.2 the following observations were made. Compared with the respondents who indicated that they were not engaged in planning functions (36.4%-43.2%), more than half (56.6%) of the respondents indicated that they were involved in planning. Besides, nearly half (47.7%) of them agreed that their plans affect energy use. Concerning the issue of sustainability, more positive emphasis is placed on economic sustainability (70.5%) than environmental (43.2%) and social (25%%) considerations. Again, substantial positive responses are observed in respect of non-energy sectors such as housing (61.4%), industry (70.5%) and transport (72.7%). Regarding the scale question, more local issues (65.5%) commanded greatest consideration than issues on the national (15.9%) and global (13.6%) scale. The survey result also revealed a use of variety of methods within the planning sector. Between a third (31.8%) and two-third (68.2%) of the respondents indicated positively that they use of scenarios, modelling geographical information systems, quantitative analysis matrices, qualitative analysis and compatibility matrices although these respondents are fewer than the respondents who indicated that these methods were not used in their establishments (31.8%-77.3%). For example, out of the analysed positive responses, consideration for fuel cycle took under a fifth (15.9%) of the positive responses; analysed phases of fuel cycle took over one-third (38.4%) of the share while analysed processes associate with each phase took over half (61.4 %) of the share. The result also indicate that more elements of SEA are positively emerging from planning and this is evidenced by the fact that some average scores exceed 3 while 10 sub-variables show positive figures on the measure of agreement scale.

Table 9.3 below shows the responses to the variable *SEA Framework*. The main issues addressed by the variable include legal, political and institutional framework for SEA. In the discussing the variable SEA Framework comprising legal, institutional, political, participatory, philosophical and practical provisions, the recent work by Glasson and Gosling (2001:93). Other studies on the subject based on Canada, UK, Europe, Australia and West Africa, but applicable to this study, include the works of Mitchell (1983), Mitchell (1990a, 1990b, 1990c, 1994a, 1994b and 1994c), Mitchell and Gardner (1983), Mitchell and Sewell (1984), Mitchell and Mulamoottle (1996), Mitchell and Dearden (1998), Mitchell *et al.* (1993a, 1993b, 1995, 1999a, 1999b), Salau (1990), Mikulski (1990), Pitkethley (1990), Shrubsole

(1990), Ericksen (1990), Muckleston (1990) and Shirai (1990). Other institutional barriers are discussed as below.

Table 9.3: SEA Framework

	Negative Response	Not Sure	Positive Response	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%	%			
Clear Legal Requirements	34.1	13.6	52.3	21.1	3.30	2.00	5.00
Written Plan objectives Exist	45.5	11.4	43.2	-2.6	3.02	1.00	5.00
Establishment is Expressly Assigned Responsibility	40.9	6.8	52.3	12.2	3.18	1.00	5.00
Accountability Requirement Exists	52.3	11.4	36.4	-17.9	2.91	1.00	5.00
Time frame for Accountability Exists	56.8	13.6	29.5	-31.6	2.77	2.00	5.00
The Culture of Democracy Exists	15.9	18.2	65.9	61.1	3.59	1.00	5.00
Existence of Public Participation Framework	34.1	15.9	50.0	18.9	3.27	1.00	5.00
Existence of Institutional Framework	36.4	13.6	50.0	15.7	3.23	1.00	5.00
Capacity Building Framework Exists	22.7	15.9	61.4	46.0	3.57	2.00	5.00
A Framework of Inter-Agency Cooperation Exists	27.3	13.6	59.1	36.8	3.36	1.00	5.00
Non-interference in Institutional Affairs	63.6	6.8	29.5	-36.6	2.70	2.00	5.00
Political Will for Implementation	52.3	4.5	43.2	-9.5	3.05	1.00	5.00
Existence of Track Record of Compliance	50.0	11.4	38.6	-12.9	2.89	2.00	4.00
Framing Context for the Environment	29.5	15.9	54.5	29.8	3.34	1.00	5.00
Environmental Agenda Being Set Stakeholders	29.5	15.9	54.5	29.8	3.39	1.00	5.00
Inter Regional Environmental Planning framework	43.2	15.9	40.9	-2.7	3.00	1.00	5.00
Inter Regional Cooperation on Energy Planning Framework	50.0	6.8	43.2	-7.3	2.98	1.00	5.00
Inter Regional Economic Cooperation	56.8	4.5	38.6	-19.1	2.75	1.00	5.00
Existence of Staff Experience	27.3	4.5	68.2	42.8	3.45	1.00	5.00
Possibility of Using Experts and Consultants	36.4	4.5	59.1	23.8	3.20	1.00	5.00
Provision for Budgetary Allocation	54.5	6.8	38.6	-17.1	2.84	1.00	5.00
Existence of Clear Methodology	52.3	4.5	43.2	-9.5	2.89	1.00	5.00

For example, Mitchell *et al.* (1996:48-49) listed institutional barriers to include 'overlapping agency responsibilities, fragmented administrative structures, weak legislation, inadequate financial provision, limited public participation and entrenched organisation cultures' and proposed key variables for analysis to include legislation and regulations; policies and guidelines, administrative structures, economic and financial arrangements, political structures and processes, historical

and traditional customs and values and key participants and stakeholders.' For instance, framing context and agenda setting may influence culture and attitude. It may also relate to democratic culture; again, accountability requirement may be dealt with under administrative structures. Mitchell (1983) stressed that planning needed to facilitate public participation and accountability as well as adequate institutional arrangements to facilitate coordination...during both planning and implementation. Mitchell *et al.* (1996) harped on inter-agency coordination in planning and implementation. The above-cited articles cover other issues not covered by the framework. From the point of view of the law guiding environmental assessment, between a third and over half of the respondents indicated positively that there were clear legal requirement (52.3%), assignment of responsibility (52.3%), accountability (36.4%) and time frame (29.5%) supported by written plan objectives (43.2%). From institutional viewpoint although similar range of scores (34.1%-56.8%) disagreed with the suggestion that such a legal framework does exist. On the score of institutional considerations, half (50%) of the respondents indicated that there was an institutional framework for plan level SEA in the energy sector and over that figure (61.4%) agreed that a framework for capacity building was in place. capacity building, clear methodology (43.2%), staff experience (68.2%) and the use of experts and consultants (59.1%). With some level of budgetary provisions for environmental issues (38.6%) and backed by a track record of compliance (38.6%) plan level SEA is likely to promote sustainable development.

From the political standpoint, the result of the perception of democratic culture (65.9 %), public participation (50%), inter-agency cooperation (59.1%), inter-regional economic cooperation (38.6%), inter-regional cooperation on energy planning (43.2%) and inter-regional environmental planning framework (40.9%) are high compared with the respondents who registered negative responses for democracy (15.9%)), participation (34.1%), inter-agency co-operation (27.3%), inter-regional economic cooperation (56.8%), inter-regional cooperation on energy plan (50%) and inter-regional environmental cooperation (43.2 %). In terms of changing philosophical perceptions, respondents indicated that some level of framing context (54.5 %) and agenda setting (54.5%). From Table 9.3 above, it is observed that although 14 out of 22 variables have maximum scores exceeding the 3-point mark

corresponding to positive measures of agreement between positive and negative responses.

Table 9.4: Improving the Existing System

	Negative Response	Not Sure	Positive Response	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%				
EIA of Major Projects	38.6	15.9	45.5	6.2	3.23	1.00	5.00
Assessment of Two or More Major Projects	54.5	15.9	29.5	-29.8	2.70	1.00	5.00
Effects of Minor Projects	68.2	18.2	13.6	-66.7	2.34	1.00	5.00
Combined Effect of Minor Projects	79.5	4.5	15.9	-66.7	2.07	1.00	5.00
Indirect Effect of Projects	56.8	18.2	25.0	-38.9	2.64	1.00	5.00
Combined Effect of many otherwise Insignificant Projects	52.3	6.8	40.9	-12.2	2.82	1.00	5.00
Adapting EIA Methodology to SEA	38.6	4.5	56.8	19.1	3.34	1.00	5.00
Developing a Distinctive SEA Methodology	50.0	11.4	38.6	-12.9	2.98	1.00	5.00
Using More Response Indicators	70.5	2.3	27.3	-44.2	2.52	1.00	5.00
Introducing Direction of Change in PPPs Objectives	50.0	13.6	36.4	-15.7	2.95	1.00	5.00
Introducing Quantifying Targets	36.4	18.2	45.5	11.1	3.30	1.00	5.00
Linking SEA to PPP	54.5	6.8	38.6	-17.1	2.89	2.00	5.00
Linking EIAs, PPPs and SEA	63.6	6.8	29.5	-36.6	2.64	1.00	5.00
Linking SEA to Sustainable Development	36.4	9.1	54.5	19.9	3.25	1.00	5.00
Introducing Carrying Capacity into PPP	79.5	4.5	15.9	-66.7	2.00	1.00	4.00
More Explicit PPP Objectives	70.5	4.5	25.0	-47.6	2.36	1.00	5.00
Removing Contradictions in PPP	54.5	9.1	36.4	-19.9	2.61	1.00	5.00
Improving PPP because of SEA	68.2	2.3	29.5	-39.6	2.39	1.00	5.00
Changing PPP because of SEA	70.5	2.3	27.3	-44.2	2.32	1.00	5.00
New Objectives to Capture Sub-components	65.9	2.3	31.8	-34.9	2.52	1.00	5.00
Emphasizing Mitigation Measures	38.6	2.3	59.1	21.0	3.25	1.00	5.00
Improving Monitoring	45.5	2.3	52.3	7.0	3.00	1.00	5.00

As discussed under policy-level SEA, the variable *Improving Existing System* seeks to gauge implementation by finding out the extent to which SEA improved issues such as cumulative impacts and indeed the usefulness of plans. Citing Rodgers (1996) concerning SEA of land use plans in the USA, Wood (1988:99) concurred that in SEA of plans, 'the quality and usefulness of the plan should improve'. Furthermore, the value of quantifying targets and indicators has been stressed elsewhere. Sheate (1992:171) said '[o]bjectives may be quantified targets or

qualitative statement of intent. Even qualitative statements could be focused by setting quantitative targets'. Mitchell *et al.* (1999:752) similarly had this to say: 'One of the best ways to deal with the concern about ambiguity and vagueness is to develop indicator measures to establish from the outset which outputs and outcomes are desired.' The responses to the sub-variables relating to *effects of minor projects*, *the combined effects of minor projects* and *carrying capacity considerations* registered low positive responses (13.6%-15.9%). Between 25% and 59.1% of the respondents, however, indicated that positive changes were occurring in environmental assessment at planning level. While the perception for the level of project level assessment of major projects was quite high (45.5%), consideration for cumulative, additive, induced, indirect and synergistic impacts were relatively lower (13.6%- 40.9%). These positive responses were lower compared with those who felt that these considerations were not in place (52.3%-79.5%).

Although more than a quarter (27.3%-56.8%) of the respondents thought distinctive methodology for SEA was developing alongside the use of response indicators, quantifying targets as well as direction of change in PPP's objectives, majority of the respondents (45.5%) said SEA at plan level tended to follow EIA methodology. The level of agreement regarding links between SEA, PPP and EIA, were quite high apart from carrying capacity issue (29.5%-54.5%). With these levels of perception, positive changes needed in PPP such as making PPP more explicit, removing contradictions in PPP, improving PPP because of SEA, changing PPP because of SEA and writing new objectives to capture subcomponents range between 25% and 36.4% while negative responses outstrip positive responses in respect of all variables (54.5%-70.5%). For mitigation measures and monitoring more than half (52.3%-59.1%) of the respondents agreed they were adhered to.

Table 9.5 shows the responses to the variable *Improving Institutional Context.* As top-down approach to environmental management (in which hierarchical institutions or amenability to vertical integration) is essential for effective for policy-level SEA so is it necessary for plan-level SEA. To take stakeholders on board the ability of institutions to facilitate coordination and participation are essential. Consequently as with policy-level SEA, this variable was constructed taking account of hierarchy, control, integration, implementation, coordination and participation.

Table 9.5: Improving Institutional Context

	Negative Response	Not Sure	Positive Response	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%				
Unimproved Implementation Structures	38.6	4.5	56.8	19.1	3.36	1.00	5.00
EPA's Power Over Private Developers	36.4	2.3	61.4	25.6	3.34	1.00	5.00
EPA'S Power Over Public Agencies	50.0	.0	50.0	0.0	3.18	1.00	5.00
Another Institution such as NDPC	40.9	2.3	56.8	16.3	3.25	1.00	5.00
Impact of Environmental Agencies Felt	45.5	4.5	50.0	4.7	3.00	1.00	5.00
Unimproved Communication and Coordination	50.0	2.3	47.7	-2.4	3.07	1.00	5.00
Unimproved Enforcement by Environmental Agencies	40.9	4.5	54.5	14.3	3.25	1.00	5.00
Resources or Logistical Supply Unimproved	88.6	2.3	9.1	-81.4	2.00	1.00	5.00
Little Progress in Participation	68.2	2.3	29.5	-39.6	2.45	1.00	5.00
Partnerships Encouraged	47.7	4.5	47.7	0.0	2.91	1.00	5.00
Improved Cooperation with Other Establishments	36.4	.0	63.6	27.2	3.41	1.00	5.00
No Conflict of SEA with Organization Plans	36.4	.0	63.6	27.2	3.43	1.00	5.00
Adaptability of Plans to SEA	40.9	.0	59.1	18.2	3.20	1.00	5.00
Can Displace or Suspend Some of its Plans	34.1	4.5	61.4	28.6	3.41	1.00	5.00
Can Imitate Success Stories of Others	34.1	2.3	63.6	30.2	3.34	1.00	5.00
Can Take SEA on Board	47.7	2.3	50.0	2.4	3.20	1.00	5.00
Can Integrate SEA into its Plans	50.0	2.3	47.7	-2.4	2.84	1.00	5.00
Can Disseminate information on SEA	38.6	4.5	56.8	19.1	3.41	1.00	5.00
Can Incorporate the Environment into its Mission Statement	34.1	4.5	61.4	28.6	3.43	1.00	5.00
Performance Indicators to Guide Compliance	50.0	2.3	47.7	-2.4	3.05	1.00	5.00
Establish Expert Unit in Establishment	31.8	2.3	65.9	34.9	3.52	1.00	5.00
Law in Place or being Made to Employ Environmental Consultants	45.5	9.1	45.5	0.0	3.09	1.00	5.00

Kessler (1999) said 'strong integration is essential in order to demonstrate how institutional and political factors should be adjusted in order to meet criteria of sustainable development'. The study by Freeman *et al.* (1996) in which they discussed cascade, sectoral and thematic models of participation within the context Local Agenda 21 within the UK also stressed the importance of integration, hierarchy, control and coordination. Mitchell and Sewell (1984), on their part, spoke of being attuned to economic and political institutions. With 18 out of 22 of the

variables showing average scores above 3-point mark and the maximum scores of 5 for each sub-variable, the study indicates that there is a substantial perceived improvement in institutional framework. In support of this observation, the following specific observations can be made. With respect to environmental structures, over half (56.8%) of the respondents indicated that there was improvement in implementation structures. As a consequent, 50% of them indicated that the impact of the agencies was being felt. When it came to the need for EPA to exercise power over both private and public sectors al least half (50-61.4%) of the respondents supported the suggestion although EPA's power over the private sector found more support. In respect of another institution such as NDPC could exercise that power over public institutions there more agreements than disagreements (56.8% vs.40.9%).

Touching on some conditions for a hierarchical structure, such as availability of resources, quite a high percentage of respondents (47.7%-54.5%) gave positive responses in respect of improved communication and coordination as well as improved enforcement while barely a tenth (9.1%) of the respondents could indicate that resources supply for enforcement was improved. Positive scores were quite impressive for participation, partnership and cooperation (47.7%-68.2%). Concerning sociological underpinnings of institutions in the areas of compatibility of SEA with their organisation's plans, adapting establishments' plan to SEA and the willingness to displace and suspend plans, more than half (59.1%-63.6%) of them answered in affirmation compared with the proportion of the respondents who gave negative responses (34.1%-40.9%). Similarly questions dealing with political basis of institutions such as taking SEA on board, integrating SEA into their establishments' plans and disseminating of information on SEA were high (47.7%-56.8%).

Responses to questions dealing with the economic institutionalism were more positive than negative in respect of the willingness of establishments to incorporate environmental issues into mission statements (61.4% vs. 34.1%) and establishment of expert units use (65.9% vs. 31.8%). There is no substantial difference between both negative and positive responses in respect of performance indicators (50% negative response and 47.7% positive response). Moreover, the same positive and negative scores were registered for item - the existence of legislation for the employment of environmental consultants - (45.5%).

Table 9.6: Sustainable Energy Plan

	Very Low /Low	Moderate	High/ Very High	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%	%			
Social Cohesion and Integration	52.3	18.2	29.5	-27.9	2.73	1.00	5.00
Sense of Community and Connectedness	52.3	13.6	34.1	-21.1	2.77	1.00	5.00
Housing with Modern Lighting	56.8	13.6	29.5	-31.6	2.61	1.00	5.00
Cultural Values	47.7	9.1	43.2	-5.0	2.91	1.00	5.00
Reduction in Social Inequality	43.2	4.5	52.3	9.5	3.00	1.00	5.00
Improvement in Health Services	68.2	15.9	15.9	-62.2	2.30	1.00	5.00
Accessibility to Social Services	47.7	11.4	40.9	-7.7	2.86	1.00	5.00
Limiting Unemployment	43.2	15.9	40.9	-2.7	2.95	1.00	5.00
Job Creation	31.8	15.9	52.3	24.4	3.30	1.00	5.00
Raising Revenue	38.6	6.8	54.5	17.1	3.14	1.00	5.00
Sustaining Economic Growth	27.3	11.4	61.4	38.4	3.52	1.00	5.00
Private Investment	31.8	4.5	63.6	33.3	3.36	1.00	5.00
Ensuring Economic Efficiency	27.3	18.2	54.5	33.3	3.23	1.00	5.00
Increasing Supply of Services	29.5	15.9	54.5	29.8	3.41	1.00	5.00
Cost Recovery	22.7	15.9	61.4	46.0	3.48	1.00	5.00
Reducing Inflation	25.0	13.6	61.4	42.1	3.52	1.00	5.00
Maintain Natural Resource Supply	45.5	13.6	40.9	-5.3	2.98	1.00	5.00
The Use of Energy Efficient Appliances	43.2	9.1	47.7	5.0	2.95	1.00	5.00
Ensuring Energy Security	29.5	20.5	50.0	25.8	3.25	1.00	5.00
Ratio of LPG Use to Fossil Fuel	31.8	18.2	50.0	22.2	3.07	1.00	5.00
Reducing Per Capita Energy Consumption	36.4	15.9	47.7	13.4	3.18	1.00	5.00
Ratio of Solar Energy to Traditional Fuels	54.5	20.5	25.0	-37.1	2.48	1.00	5.00
Ratio of Public Transport use to Private Transport	56.8	18.2	25.0	-38.9	2.48	1.00	5.00
Percentage of Second-hand Vehicles or Appliances	56.8	18.2	25.0	-38.9	2.50	1.00	5.00

Table 9.6 shows the results for sustainable energy plan based on economic, social and environmental sustainability. Mitchell *et al.* (1999:762) citing Richardson (1994) highlighted the importance of sustainable development in planning thus: 'Sustainable development is not achievable in any real sense without attention to the substance and process of planning which fundamentally seek to integrate social, economic and environmental criteria in planning and approving development'. Thus social,

economic and environmental factors continue to frame this plan-level variable. It will be observed that the ranking for 12 sub-variables exceed the 3-point mark corresponding to positive measures of agreement. In respect of social sustainability indicators (sub-variables1-8), it was only for the sub-variable *reduction of social inequality* that a positive response was recorded (52.3%). Negative responses range between 43.2% and 68.2%. For economic sustainability (sub-variables 9-16), more than half (52.3%-63.6%) of the respondents indicated positive scores. In fact, measures of agreement are positive and mean scores exceed 3. For environmental sustainability, some of the sub-variables such as the use of energy efficiency appliances, energy security, ratio of LPG use to fossil fuel and reduction of per capita energy consumption scored positive points (47.7%-50%). Others such as the ratio of solar energy to traditional fuels, ratio of public transport to private transport, and percentage of second hand vehicles scored lower positive score (25%-40). This indicates that there is more emphasis on economic sustainability that social and environmental sustainability issues in planning.

9.4 Testing of Hypotheses.

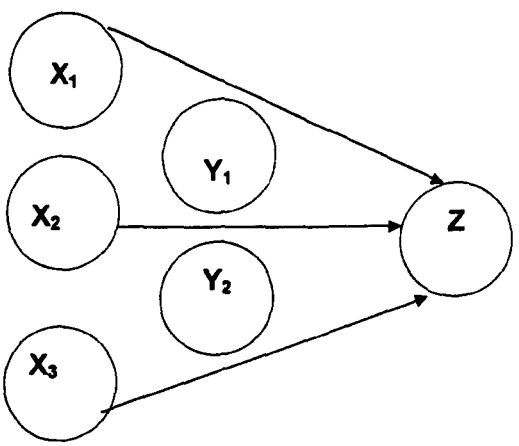
The fact that the responses to the questionnaires unearthed the strengths and the characteristics in Ghana does not yet prove that any causal links exists between the variables. The following section focuses on the various hypotheses. Like policy level analysis, some modifications were made to the predictor variables so as to test other hypotheses that were supplementary to the main hypotheses. SEA Framework, for example, deals with legal, institutional, political and philosophical aspects of the framework. To test a hypothesis, for instance, that establishes a causal link between institutions as a predictor variable and another dependent variable, a subset of that variable was used. Similarly, the variable-Improving Institutional Context deals with issues such as hierarchy, integration, coordination and participation.

9.4.1 Hypothesis No 1: The link between SEA and Sustainable Energy Plan

In this study it is hypothesised that SEA is a tool for sustainable development. In this regard, SEA promotes Sustainable Energy Plan. The more SEAs are carried out in the energy sector, the more sustainable energy plans are likely to be. Conversely, the less

SEAs are carried out in the energy sector, the less sustainable energy plans will tend to be.

Within the framework of the causal model designed for this thesis, the study specifically seeks to find out (a) whether in the absence of Energy Sector SEA, SEA in General will deliver sustainability; (b) whether in the absence of SEA in General, Energy Sector SEA can deliver sustainability; (c) whether an SEA framework without SEAs in other sectors is sufficient to deliver sustainability and (d) and whether a plan-making scenario under which SEA is generally integrated into the entire plan-making process with no exception for the energy sector and interlaced with a legal and institutional framework offered the best opportunity for sustainable development. The relationship is schematically expressed in Model 9.1



Model 9.1: The link between SEA and Sustainable Energy Plan.

The model hypothesises that the more there are SEA in General (X1), Energy Sector SEA (X2) and a well-established SEA Framework (X3) simultaneously or separately, then the greater opportunity to achieve Sustainable Energy Plan (Z). Y_1 is improving the existing system and Y_2 is improving the institutional context.

To test the hypotheses under consideration [that if X_1, X_2 and X_3, then Z where X_1, X_2, X_3 and z have the meanings already assigned to them in this study,] both a correlation matrix and regression models are used and the results are shown in Table 9.7-Table 9.9 below. F-ratio statistic, probability statistic-p and coefficient of determination R^2 are used in testing the hypotheses and gauging the magnitude of the relationships.

Table 9.7: Correlations for Model 9.1

		General SEA	Energy Sector SEA	SEA Framework	Sustainable Energy Plan
General SEA	Pearson Correlation	1.000	.383**	.107	.448**
	Sig. (1-tailed)	.	.005	.244	.001
	N	44	44	44	44
Energy Sector SEA	Pearson Correlation	.383**	1.000	.343*	.394**
	Sig. (1-tailed)	.005	.	.011	.004
	N	44	44	44	44
SEA Framework	Pearson Correlation	.107	.343*	1.000	.574**
	Sig. (1-tailed)	.244	.011	.	.000
	N	44	44	44	44
Sustainable Energy Policy	Pearson Correlation	.448**	.394**	.574**	1.000
	Sig. (1-tailed)	.001	.004	.000	.
	N	44	44	44	44

** Correlation is significant at the 0.01 level (1-tailed).

* Correlation is significant at the 0.05 level (1-tailed).

From Table 9.7 of correlations above, the relation between each of the predictor Variables SEA in General, Energy Sector SEA and SEA Framework and Sustainable Energy Plan is statistically significant ($p< 0.01$). Furthermore, for SEA in General, only 20% ($R^2=0.448^2$) of the variation is explained by the linear relationship; 80 % of the variation is unexplained; for Energy Sector SEA, only 15.5 % ($R^2=0.394^2$) of the variation is explained by the linear relationship; 84.5 % of the variation is unexplained; for Energy Sector SEA; similarly, for SEA Framework, only 33 % ($R^2=0.574^2$) of the variation is explained by the linear relationship; 67 % of the variation is unexplained. Each of the variables which measure aspects of SEA showed a significant relationship with sustainable Energy Plan consistent with theory that SEA is a tool for sustainable development. The combination of the variables in the regression model gives the following result tabulated in Table 9.8 and Table 9.9

Table 9.8: ANOVA[b] for Model 9.1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.244	3	2.081	12.581	.000[a]
	Residual	6.618	40	.165		
	Total	12.863	43			

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

b Dependent Variable: Sustainable Energy Plan

Table 9.9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.697[a]	.485	.447	.4068

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

The result shows that there is a statistically significant relationship between SEA measured by the three variables (SEA Framework, General SEA and Energy Sector SEA) and sustainable development (measured by sustainable energy plan) ($F=12.581$, $p<0.01$). It is also noted that about 49% of the variation is explained by the linear relationship leaving 51 % of the variation unexplained. The contributions of the predictor variables are quite good. Again there is multicollinearity between SEA in General and Energy Sector SEA as well as between Energy Sector SEA and SEA framework. This is probably due to some common unavoidable sub-variables to the variables.

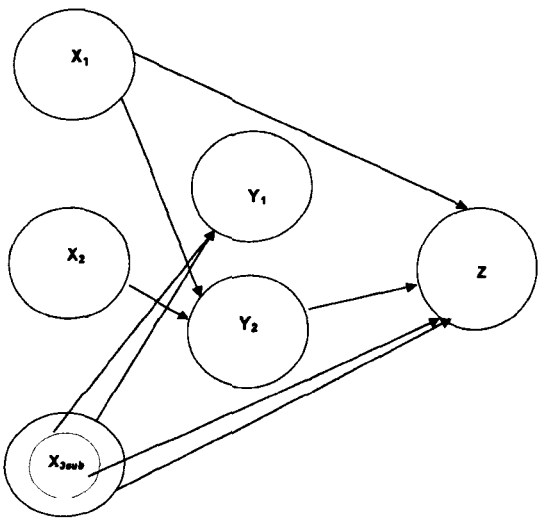
The result indicated that the dependent variable was better predicted when the three variables were combined in the regression model than when they acted separately. On the whole however, it can be concluded that data used in this analysis are consistent with proposed causal inference that SEA in General; Energy Sector SEA and SEA Framework concurrently and separately have a significant correlation with Sustainable Energy Plan. This in turn finds support in SEA literature that SEA at plan-level promoted sustainable development. (See Glasson, 1995; Glasson and Gosling, 2001; Thérivel *et al.*, 1992; Pinfield, 1992 and DETR, 1998)

9.4.2 Hypothesis No 2: The link between Institutions and Implementation

Regarding the institutional question, it is hypothesized that the ability of institutions to implement policies is predicated on the effectiveness or suitability of the institutions, which they inhabit. SEA is an action-forcing tool. In this regard, there is a relationship between the type and suitability of the institutional framework and the level of implementation of SEA[7]. The more effective or suitable institutions for SEA

[7] It was mentioned that the variable [Improving the existing system] was a measure of implementation. Thus the hypotheses being tested could also be framed as: the more suitable institutions are the more likely cumulative impacts for example will be addressed within the SEA framework.

are, the more the goals of SEA are likely to be implemented and the more sustainable energy policies are likely to be. Conversely, the less effective institutions of SEA are, the less the goals of SEA are likely to be implemented in the energy sector and the less sustainable energy policies will tend to be.



Model 9.2: Regressing Y_1 over X_3 and X_{3sub} and Z over Y_1 over X_3 and X_{3sub},

This is the hypothesis that the more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), the better the implementation of plan (Y_1). The more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), and the more improved institutional context (Y_2) the more sustainable energy plans are likely to be.

With this framework in mind, the study seeks to find out (a) whether the existing institutional framework (as a subset of SEA framework) can facilitate implementation; (b) whether the existing institutional framework (as a subset of SEA framework) can deliver sustainability (c) whether it is the SEA framework (including institutional framework) that can facilitate implementation and (d) whether the existing institutional framework requires improvements necessitated by SEA in order to implement policies effectively. The relationships are shown in Model 9.2.

To test the hypothesis that institutions [represented by *Institutional Framework* (X_{3sub}) and *SEA Framework* (X_3)] contribute to implementation [represented by

Improving Existing System (Y_1)], a correlation matrix of pairs of these variables are shown in Table 9.10 below.

Table 9.10: Correlations for Model 9.2

		Institutional Framework	SEA Framework	Improved Systems
Institutional Framework	Pearson Correlation	1.000	.717**	.379**
	Sig. (1-tailed)	.	.000	.005
	N	46	46	46
SEA Framework	Pearson Correlation	.717**	1.000	.156
	Sig. (1-tailed)	.000	.	.151
	N	46	46	46
Improved Systems	Pearson Correlation	.379**	.156	1.000
	Sig. (1-tailed)	.005	.151	.
	N	46	46	46

** Correlation is significant at the 0.01 level (1-tailed).

From the model above, there are statistically significant relationships ($p<0.01$) between the institutional framework and improved system as a surrogate for implementation as well as between SEA Framework and Improved System. Besides between 19.6% (R^2=0.4432) and 23.5% (R^2=0.4852) are explained by the relation; over 75% of the relationships are unexplained by the relationships. Testing the second part of the hypothesis that institution [represented by (*i*) Institutional Framework (X_{3sub}) or (ii) SEA Framework (X_3)] and their improved context [represented by Improving Institutional Context (Y_1)] contribute to sustainable energy plan (Z), the following multiple regressions models shown in Tables 9.11-9.14 have been employed.

(i)Using the variable, *Institutional Framework*, the models are shown as follows.

Table 9.11: ANOVA[b] for Model 9.2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.970	2	1.485	6.155	.005[a]
	Residual	9.893	41	.241		
	Total	12.863	43			

a Predictors: (Constant), Improving Institutional Context, Institutional Framework

b Dependent Variable: Sustainable Energy Policy

Table 9.12: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.481	.231	.193	.4912

a Predictors: (Constant), Improving Institutional Context, Institutional Framework

(ii) Employing the variable *SEA Framework*, computed models are as shown below.

Table 9.13: ANOVA[b] for Model 9.2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.461	2	2.230	10.884	.000[a]
	Residual	8.402	41	.205		
	Total	12.863	43			

a Predictors: (Constant), Improving Institutional Context, SEA Framework
b Dependent Variable: Sustainable Energy Policy

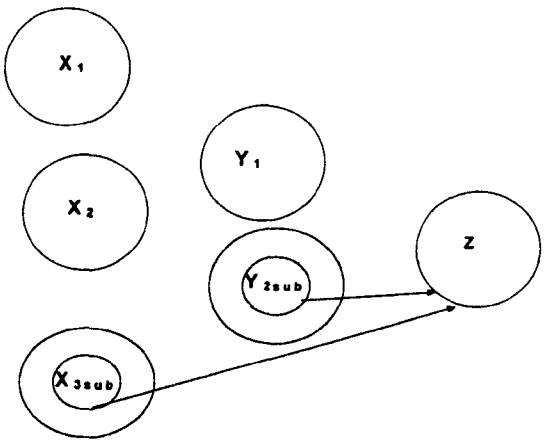
Table 9.14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.589[a]	.347	.315	.4527

a Predictors: (Constant), Improving Institutional Context, SEA Framework

The results from Tables 9.11 and Table 9.13 above reveal that there is a significant relationship not only between the predictor variables (*Institutional Framework and Improving Institutional Context*) and *Sustainable Energy Plan* ($F=6.155$, $p<0.01$) but also between the predictor variables (*SEA Framework and Improving Institutional Context*) and the dependent variable ($F=10.884$, $p<0.01$). The relationship is however slightly stronger when *SEA Framework* is employed ($p=0.000$) than with *Institutional Framework* (0.005). Furthermore, between 23.1% and 34.7 % of the variation is explained by the linear relationships and more than 60% of the variation is unexplained. Overall, the hypotheses support the theory that institutions matter in plan implementation and thereby contribution to sustainability (Tables 9.11 and 9.13). That there is a link between institutions and implementation in the literature is not in doubt. Glasson and Gosling (2001:90) indicated that institutional unwillingness could limit implementation. Mitchell (1983) wrote that transition from planning to implementation requires adequate institutional arrangements. Writing about Nigeria, Mitchell (1994) bemoaned how 'institutional gridlock' negatively affects implementation.

9.4.3 Hypothesis No 3: The link between Context and Sustainable Development



Model 9.3: Regressing Z on X_{3sub} and Y_{2sub}.

This is the hypothesis that the greater the impact of context (X_{3sub}) and philosophical changes, the more effective are institutions in delivering sustainable energy plan.

This hypothesis, like the one for policy analysis, also relates to diverse philosophical perspectives. It posits that the ability of institutions to work towards a common strategy and plan such as *Sustainable Energy Plan* is a function of context (defined to include framing context, agenda setting and problem definition) and the corresponding changes in the institutional context. In this regard, there is a relationship between context (as a subset of SEA Framework), philosophical/institutional changes (as a subset of *Improving Institutional Context*) and Sustainable Energy Plan. Thus the greater the impact of context and philosophical changes are the more effective are institutions to deliver Sustainable Energy Plan. By implication, the less the impact of context and philosophical changes are, the less effective are institutions to deliver Sustainable Energy Plan. 8To determine the contribution of each variable in the relationship, the following correlation matrix is analysed.

Table 9.15: Correlations for Model 9.3

		Agenda Setting and Framing Context	Philosophical Changes	Sustainable Energy Policy
Agenda Setting and Framing Context	Pearson Correlation	1.000	.271*	.540**
	Sig. (1-tailed)	.	.038	.000
	N	44	44	44
Philosophical Changes	Pearson Correlation	.271*	1.000	.413**
	Sig. (1-tailed)	.038	.	.003
	N	44	44	44
Sustainable Energy Policy	Pearson Correlation	.540**	.413**	1.000
	Sig. (1-tailed)	.000	.003	.
	N	44	44	44

* Correlation is significant at the 0.05 level (1-tailed).** Correlation is significant at the 0.01 level (1-tailed).

From the table of correlations, it can be deduced that there is a statistically significant relationship between both context and sustainable energy plan ($p<0.01$) on the one hand and between philosophical changes and *Sustainable Energy Plan* on the other hand ($p<0.01$), the magnitude of the variations explained by the relationships range between 17.1% and 29.2%. The regression model below summarised the key parameters in a combined relationship. The result from Table 9.16 indicates that the relationship between context, philosophical changes and Sustainable Energy Plan violates chance expectations ($F=11.979$, $p<0.01$) and that 36.9% of the variation can be accounted for by the relationship.

Table 9.16: ANOVA[b] for Model 9.3

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.744	2	2.372	11.979	.000[a]
	Residual	8.119	41	.198		
	Total	12.863	43			

a Predictors: (Constant), Philosophical Changes, Agenda Setting and Framing Context

b Dependent Variable: Sustainable Energy Plan

Table 9.17: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.607[a]	.369	.338	.4450

a Predictors: (Constant), Philosophical Changes, Agenda Setting and Framing Context

The work of Mitchell (1999:754) provides a clear example of a context. Elsewhere Shrubsole(1990) mentioned human context and physical context. Mitchell argued that 'an important barrier to effective implementationn of an integrated and coordinated approach to resource managemnt is the frequent failure to recognise the importance of context, or those aspects which are specific in place and time'. He did not underate the role of problem definition, agenda setting and framing context. This is because, 'people need to be persuaded that there is a serious problem regarding scarsity and degradation'.

9.4.4 Hypothesis No 4: Implementation and sustainable development

In discussing hypothesis 2 above, the emphasis was on the general effectiveness or suitability of the institutions as an instrument for implementation. This hypothesis, closely related to the second, focused on joint action and implementation and considered the forms of institutions, which could ensure effective SEA. It hypothesizes that more hierarchically (top-down) structured institutions are [such as that of NDPC] and the more amenable the general institutional contexts are to integration, the better the opportunity for SEA and sustainable development. It further hypothesized the more unhindered and empowered an implementing agency [such as EPA] is to exercise control over both private and the public sectors, the more SEA can be integrated in PPP making process. It also hypothesizes that the more institutions cooperate and work on the basis of equal partnerships, the more joint action and implementation are likely to succeed.

In testing these hypotheses, factor analysis was used based on a principal component factor analysis with using varimax rotation. This was because the sub-variables were just regrouped around common themes within the same variable. For example, all the

variables on TCE are grouped together and so were those dealing with agency theory, integration/hierarchy, conditions for top-down approach and partnerships.

Table 9.18: Component Matrix

	Component		
	1	2	3
Unimproved Implementation Structures	.471	-.539	.493
EPA's Power Over Private Developers	.729	-.400	
EPA'S Power Over Public Agencies	.612	-.527	
Another Institution such as NDPC	.740	-.315	
Conditions for Top-Down Approach Created	.829		
Encouraged Partnerships	.579	.360	
Agencies Amenable to Integration and Hierarchy	.723		
Performance Indicators/Mission Statements (Agency Theory)	.700	.523	
Incorporating Expert Units(Transaction Cost Economy)	.349	.653	.600
Sustainable Energy Plan	.475	.344	-.324

Extraction Method: Principal Component Analysis.

a 3 components extracted.

Using Regression Model,

Table 9.19: ANOVA[b] Model 9.3

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.812	2	.906	3.361	.044a
	Residual	11.051	41	.270		
	Total	12.863	43			

a Predictors: (Constant), Agencies Amenable to Integration and Hierarchy, Conditions for Top-Down Approach Created b Dependent Variable: Sustainable Energy Plan

Table 9.20: Model Summary for Model 9.3

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.375a	.141	.099	.5192

a Predictors: (Constant), Agencies Amenable to Integration and Hierarchy, Conditions for Top-Down Approach Created

The result of this study indicates that the variables-another institution such as NDPC (0.387), conditions for top-down approach (0.358), agencies amenable to hierarchy and integration (0.688), the use of performance indicators/mission statements (0.826) and incorporating expert units (0.872) have significant loadings (>0.30) on the first factor. The second group of variables - EPA's powers over private developers (0.790) another institution such as NDPC (-0.464) and encouraged partnerships (0.747) - also load significantly on the second factor. The third group of variables, which significantly loads on the third factor, is EPA's power over public agencies (0.836), conditions for top-down approach created (0.725) and amenability to integration and hierarchy (0.320). For the fourth factor extracted, two variables--unimproved implementation structure and another institution such as NDPC-- load on to it (-0.958).

From the variables loading on the first factor, it can be surmised that a hierarchically structured institution such as NDPC offers the best opportunity for integration of SEA into agencies if conditions for top-down approach to implementation are provided and amenability of institutions to hierarchy and integration as well as to economic basis of institutionalism are explored. The figures from the third factor indicate that EPA can exert considerable influence on the public sector in respect of SEA if the enabling environment for top-down approach to implementation is provided and EPA begins with institutions amenable to hierarchy and integration. The results from the second factor indicate that public-public partnerships provided a plausible and tangible framework for both EPA and NDPC to jointly work together to implement SEA. From the nature of the fourth factor loading, it is possible that an empowered NDPC can provide the framework for changing unimproved implementation structures into implementable ones.

The study is supported by literature that improved institutions are likely to contribute to full integration of SEA into the entire plan making process. Based on Swedish case studies, Asplund and Hilding-Rydevik (1996:140) noted that subject to 'finding ways to change attitudes, overcome barriers and prejudices, and change the composition of professionals involved in plan-making', 'integration of SEA in the comprehensive planning process can contribute to a general improvement and transformation of both the process and the results. Where the land-use planning process is well developed,

reformation through the integration of SEA is more likely to lead to better solutions than through the creation of a separate SEA procedure'

9.4.5 Hypothesis No 5: SEA, Cooperation, Participation and Sustainable Development

The purpose of this section is to (i) test the hypothesis that cooperation, participation and partnerships are essential for sustainable energy plan and (ii) that. SEA facilitates and increases participation on environmental matters, facilitates consultation between authorities. The result of the study revealed in Table 9.21 shows that there is a significant relationship not only between the predictor variables (*Improved Context for Cooperation, Participation and Partnerships, Local and National Framework for Cooperation and International Framework for Cooperation*) and *Sustainable Energy Plan* ($F=4.114$, $p<0.05$) but also between the predictor variables (*SEA Framework, General SEA, Energy Sector SEA*) and the dependent variable ($F=2.285$, $p<0.01$). Furthermore, between 23.6% and 35.5 % of the variation is explained by the linear relationships and more than 60% of the variation is unexplained.

Table 9.21: ANOVA[b] Cooperation/Participation and Sustainable Energy Plan

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.033	3	1.011	4.114	.012[a]
	Residual	9.830	40	.246		
	Total	12.863	43			

a Predictors: (Constant), Improved Context for Cooperation, Participation and Partnerships, Local and National Framework for Cooperation, International Framework for Cooperation
b Dependent Variable: Sustainable Energy Plan

Table 9.22: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.486[a]	.236	.178	.4957

a Predictors: (Constant), Improved Context for Cooperation, Participation and Partnerships, Local and National Framework for Cooperation, International Framework for Cooperation

Table 9.23: ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.855	3	2.285	7.354	.000a
Residual	12.429	40	.311		
Total	19.283	43			

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

b Dependent Variable: Local and National Framework for Cooperation

Table 9.24: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.596a	.355	.307	.5574

a Predictors:

From the factor solution below the hypothesis is confirmed from the first factor loading that SEA (in this case SEA Framework) provides the platform for in local, national and international cooperation as well as for sustainable energy plan. The fact that the variable *Improved Context for Cooperation, Participation and Partnerships* fails to load on the first factor does not mean that SEA does not promote participation and partnership. The variable *Improved Context for Cooperation, Participation and Partnerships* is subsumed in the variable *improving institutional context.* That this is interpretation is plausible is further confirmed by the fact that in the second factor, the loadings suggest that both *Improved Context for Cooperation, Participation and Partnerships* and *improving institutional context* are essential for sustainable energy plan.

Table 9.25: Rotated Component Matrix

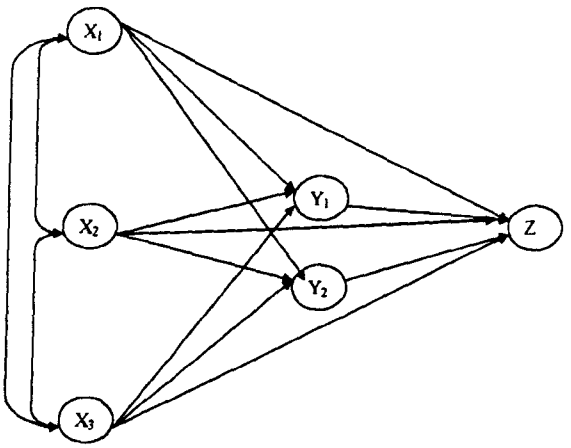
	Component	
	1	2
SEA Framework	.888	
Improving Institutional Context	.342	.834
International Framework for Cooperation	.696	
Improved Context for Cooperation, Participation and Partnerships		.936
Local and National Framework for Cooperation	.731	
Sustainable Energy Plan	.638	.352

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 3 iterations. Constant, SEA Framework, General SEA, Energy Sector SEA

Thus the hypothesis that cooperation, participation and partnerships are essential for sustainable energy plan and that SEA facilitates and increases participation on environmental matters and facilitates consultation between authorities found support in literature such as Freeman *et al.* (1996). They argue that 'sustainability demands a fusion of interests and commonality of purpose'.

9.4.6 Consolidating the Models



Model 9.4: Consolidated model.

Consolidating the relationships between the predictor variables and the mediator variables on the one hand, between the predictor variables and the dependent variables on the second hand, between the mediator variables and the dependent variables and the predictor and mediator variables and the dependent variable.

The combination of the major hypotheses gives an integrated model labelled as Model 9.4. The result in Tables 9.26 and 9.27 show a significant relationship between all the independent variables and mediator variable on one hand and the independent variable on the other hand. The result (Table 9.28) also shows a significant correlation between all the predictor variables (SEA in General, Energy Sector SEA and SEA Framework) and the dependent variable Sustainable Energy Plan on the one hand. It also indicates a strong correlation between the mediator variables (improving the existing system and improving the institutional context) and the dependent variable. There is a strong relationship between two predictor variables (SEA in General and SEA Framework) and the mediator variable (improving the existing system). In addition, predictor SEA Framework relates strongly with the mediator variable (improving institutional context). The study also shows a strong multicollinearity between the first, two predictor variables (SEA in General and Energy Sector SEA) and the second, third predictor variables (Energy Sector SEA and SEA Framework).

Table 9.26: Consolidated Model 9.4

ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.622	5	.324	22.035	.000[a]
	Residual	.559	38	1.472E-02		
	Total	2.181	43			

a. Predictors: (Constant), Improving Institutional Context, SEA Framework, Improved Systems, Energy Sector SEA, General SEA

b. Dependent Variable: Sustainable Energy Plan

Table 9.27: Consolidated Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.862[a]	.744	.710	.1213

a. Predictors: (Constant), Improving Institutional Context, SEA Framework, Improved Systems, Energy Sector SEA, General SEA

Table 9.28: Correlations-Consolidated Models

Correlations

		General SEA	Energy Sector SEA	SEA Framework	Improved Systems	Improving Institutional Context	Sustainable Energy Plan
General SEA	Pearson Correlation	1.000	.182	.072	.554**	.256*	.802**
	Sig. (1-tailed)	.	.118	.321	.000	.047	.000
	N	44	44	44	44	44	44
Energy Sector SEA	Pearson Correlation	.182	1.000	-.048	.480**	.219	.277*
	Sig. (1-tailed)	.118	.	.378	.000	.077	.035
	N	44	44	44	44	44	44
SEA Framework	Pearson Correlation	.072	-.048	1.000	.131	.166	.327*
	Sig. (1-tailed)	.321	.378	.	.199	.141	.015
	N	44	44	44	44	44	44
Improved Systems	Pearson Correlation	.554**	.480**	.131	1.000	.187	.573**
	Sig. (1-tailed)	.000	.000	.199	.	.112	.000
	N	44	44	44	44	44	44
Improving Institutional Context	Pearson Correlation	.256*	.219	.166	.187	1.000	.293*
	Sig. (1-tailed)	.047	.077	.141	.112	.	.027
	N	44	44	44	44	44	44
Sustainable Energy Plan	Pearson Correlation	.802**	.277*	.327*	.573**	.293*	1.000
	Sig. (1-tailed)	.000	.035	.015	.000	.027	.
	N	44	44	44	44	44	44

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

9.4.7 Multicollinearity and Autocorrelation

The ideal prediction situation is when the correlation between the independent variables and the dependent variables are low. The more the independent variables are intercorrelated, the more difficult the interpretation. This is because one has greater difficulty telling the relative influence on the dependent variable. When the independent variables are correlated some of the common variance of dependent

variable on the independent variables is shared by another independent variable. In short the independent variables are redundant to some extent in predicting the dependent variable. Thus a multiple regression analysis works properly if there is no significant linear relationship between the independent variables. But there are often such relationships in the real world and we accept the result if these relationships are not too strong.

9.5 Conclusion

From the detailed analyses, it is only in respect of the variables - *SEA Framework* - and the corresponding - *Improved Institutional Context* - that substantial proportion of respondents indicated positive scores for most of the items on variables. For the rest of the variables (SEA in General, Energy Sector SEA and Sustainable Energy Plan) for which there were more negative responses than positive responses, an average of over 25% of the respondents indicated positive scores for items on the variables. These elements of the variables, for which a few respondents indicated positive responses, deal with the need to capture spatial implication of plans, have environmental goals and objectives, assess compatibility within plan options, take account of housing, industry and transport sectors in planning, use quantifying targets, assess economic impacts as well local impacts and to stress the increased use LPG use and reduction in per capita energy use. This is an indication that SEA [or perhaps elements of SEA] may be taking place although not significantly. Besides, cumulative impacts and indirect impacts are not significantly dealt with. The result also shows a lack of balance between economic, social and environmental sustainabilies.

On the other hand, those elements indicating positive signs may not be unique to SEA. For example, as Wathern (1988) argued elsewhere, there are common areas to plan making and EIA. These include recognition of environmental goals within broad context of plan making, condition for the preparation of planning documents, and the existence of policies in plans themselves for improving the environment. Other areas include the provision of consultation and public participation on the basis of these documents and for subsequent revision of the plan during subsequent stages in the plan process. Whatever the merits of the debate are, there is some progress in SEA in Ghana and this is a positive step for a developing country such as Ghana. Indeed as

discussed in Chapter Three, EIA of Plan has already had a legal backing and there are some examples of actual SEA in Ghana. Besides, Ghana's strategic plan document in 1994 recognised EIA at the strategic level (GOG, 1994). Overall, the results of this study supported the general theory that SEA provided the framework for sustainable development not only at policy level but also at plan level. Again the variations in the causal relationships were not totally explained by the linear relationships. This implied that other management tools could contribute to sustainable development.

Chapter

10

Analysis of Programme Level Data

Chapter Outline

Introduction

Characteristics of the Questionnaire

Results of the Study

Hypotheses Testing

Conclusion

10 Chapter Eight: Analysis of Programme Data

10.1 Introduction

As already discussed 'a policy is an inspiration and guidance for action, a plan as a set of coordinated and timed objectives for the implementation of policy and a programme as a set of projects in a particular area (Wood, 1991, Thérivel *et al* 1992). More specifically, a programme is a 'coherent, organised agenda or schedule of commitments, proposals, instruments and/or activities that elaborates and implements policy' (Sadler & Verheem 1996a). A programme is a defined and relatively specific sphere of government activity involving a particular package of legislation, organisation and resources (Hogwood and Gunn 1984). Programmes may generally deal with information gap in energy efficiency or with physical development, or even with financial support, technical assistance, development assistance, soft aid and development of capacity to privatise state-run enterprises (Brown, 2000:133). In the UK, energy efficiency programmes include the Best Practice Programme for the industrial sector, Local Energy Advice Centres for households and small businesses, and financial support for small to medium sized enterprises in energy efficiency consultancy and project management (Kraemer and Forlager, 1997). In the US, programmes are generally focused on mutually related actions, geographically, generically or by stage of technological development. By virtue of the California Environmental Quality Act (CEQA), for example, 'program EIRS are prepared for activities that are linked geographically, are logical parts of a chain of contemplated events, or are carried out under the same authorizing statutory or regulatory authority (Bass and Herson, 2000:221).

In Ghana, current ongoing groups of programmes mentioned in Chapter 5 include Power Factor Improvement, Energy Monitoring and Targeting, Electricity Load Management, Industrial Energy Assessment Centre, Building Energy Management, Development of Energy Efficiency Codes and Standards, Electric Motor Improvement Projects. Others are Assembly and Production Plant for Solar energy Technologies, Mini-hydro Development Scheme, Energy Efficiency Improvement in Water Pumping Operations of the Ghana Water Company, National Electrification Scheme, Energy Efficiency in the Transport Sector and the Abatement of Vehicular

Emissions as well as Photovoltaic Modules and Accessories. These are being implemented across institutions such as Electricity Company of Ghana, Ghana National Petroleum Corporation, transport and housing sectors, District Assemblies and the private sector under Ghana Energy Foundation (Chapter 5).[1] With the scope and characteristics of these programmes, it is posited that programmes are amenable to strategic level analysis in the same way as policies. Consequently, this chapter is analysed in a similar manner as Chapters Eight and Nine in terms of structure issues and methodology and examines the hypotheses at programme level. It examines the hypotheses that SEA promotes sustainable energy policy; there is a link between institutions and SEA. It argues that harmonisation of philosophical frameworks is essential for sustainable energy policy. It stresses that a framework for facilitating implementation is essential for sustainable development. Cooperation across national borders facilitated SEA as well as participation within the state is needed for SEA to produce the desired effect.

10.2 Characteristics of the Instrument

As well as redesigning some items to reflect this specific cluster of energy related projects, the questionnaires also focus on respondents in establishments who are implementing these programmes. With the exception of a few sub-variables, the sub-variables are reworded to reflect programme level SEA. For example, sub-variables 1, 2 3 and 4 of the variable SEA in General have been reworded as *Establishment Executes Programmes, Programmes designed to give rise to Projects, Considers projects in a cluster, Wide range of effects Considered* and *Impact of groups of projects assessed.* In respect of the second variable Energy Sector SEA for instance, sub-variables 1 and 2 similarly reflect programme considerations thus: *Establishment Executes Programmes giving rise to projects and Programmes designed to influence groups of energy projects.* In all, 100 programme-level questionnaires were distributed targeting the private sector comprising private practitioners and NGOs and District Assemblies in Accra and Kumasi, Electricity Sector, Transport, Petroleum and Housing Sectors. The distribution went thus: private sector (20), District Assemblies (30), Petroleum (10), Electricity (20), non-energy sector (20).

[1] The degree to which SEA is applied to these programmes depends upon whether they are private undertaking or government planning initiatives. Private undertakings are normally subject to SEA under LI1652.

Out of that, the private sector returned 65 % of the questionnaires (13 out of 20); District Assemblies 11 out of 30 (37%), Petroleum Sector 6 out of 10 (60%), Electricity Sector 13 out of 20 (65%) and non-energy sectors 3 out of 20 (15%). Overall, the response rate was 46% (46 out of 100). The internal consistency reliability coefficient alpha for the variables on the programme questionnaire range between 0.56 and 0.86 while construct validity for the variables fall between 0.17 and 0.29 These levels of reliability and validity are considered to be sufficient to validate the results of the study.[2] For the explanation of how these values are computed, see Appendix 14.14. Tiering in relation to programme SEA, within CEQA but with general application, according to Bass and Herson (2000),

> refers to the concept of a multi-level approach to preparing EIRs. A first tier EIR typically covers issues in a broad, generalised level of analysis. When individual projects are proposed under the plan or programme, second tier EIRs are typically prepared for that focus on project specific impacts. Tiering is a method to streamline EIR preparation by allowing agencies to focus on the issues that are ripe for decision, and exclude from consideration those issues that have already been decided or are yet ready for decisions

Within the context of Programmatic Environmental Impact Statement (PEIS)] tiering is so important for programme that it has been given a legal backing by the courts in the USA. As Webb and Sigal (1992:138) recalled, 'the concept of tiering was upheld by the courts, although no single test for proper tiering has emerged.' Moreover, they continued, 'environmental assessment or narrower EISs for specific projects within a programme of related actions are then tiered to the PEIS.' Furthermore, that assessments are proactive, they noted that a 'PEIS must be prepared...before specific commitments have been made at the project level.' In this light, the result of responses gauging whether programme level SEA was tiered indicates that nearly half (47.8%) of the respondents opined that their programmes were designed to affect projects compared with those who think otherwise (41.3%). To assess the extent to which programme–level SEA was proactive, over three quarters (76.1%) of the respondents indicated that programme level SEA was not undertaken at the

[2] Details of reliability and validity coefficients for the variables are as follows: General SEA (Rel 0.67 Val.0.22), Energy Sector SEA (Rel 0.56, Val 0.21), SEA Framework (Rel 0.75, Val 0.17), Improving Existing Systems (Rel 0.81, Val 0.29), Improving Institutions (Rel 0.86, Val 0.25) and Sustainable Energy Policy (Rel 0.76, Val 0.29)

beginning. A larger proportion (84.8%) of respondents thought it was not assessed during the programming process. A little under half (45.8%) of the respondents indicated that programme SEA was assessed at the end of the programme process compared with 15.2% of respondents who indicated that it was assessed at the beginning and middle. Bass and Herson (2000) helpfully list the rationale for programme level SEA and some of these have been factored into the variables.

> Programme EIRs provide an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action; ensure consideration of cumulative impacts that might be slighted by case-by–case analysis; avoid duplication and unnecessary reconsideration of basic policy consideration; allow agencies to consider broad policy alternatives and programme-wide mitigation measures at an early time when the agency has greater flexibility to deal with such issues; allow agencies to reduce paperwork through tiering. If a programme EIR is prepared in sufficient detail, it may be used to make individual project decisions. Sometimes, however, a programme EIR is quite general, and additional project-level EIRs must be prepared to complement the programme.

Thus, to find out the extent to which a wide range of effects are considered in programme assessment, nearly a quarter (71.7%) of the respondents gave negative responses compared with just about a fifth (21.7%) of them who gave positive responses. Commenting on EIA of project and programmes in Canada, Lawrence (1997:30) remarked that 'sustainability criteria can be incorporated into project and program evaluation and that EIA can facilitate the establishment of environmental databases and implementation of environmental management programs' and that EIA should also be linked to broader social, economic and environmental goals and initiatives directed toward sustainability.' In this connection, more than three-quarters (80.4%) of the respondents thought no sustainability criteria have been developed in their establishments, while about a fifth (15.2%) of them indicated that some sustainability criteria was being developed. More than two thirds (67.4%) of them thought targets and indicators were not in use but more than a quarter (26.1%) said targets or indicators were in use. Over links between economic, social and environmental goals more than three quarters (78.3%) of the respondents gave negative responses while less than one-quarter (17.4%) of the respondents thought that links between social environmental and economic parameters were established. This is further buttressed by the fact that PPP's objectives were less based on

environmental-based objectives (32.6 %) than on environmental regulations (54.3%). Again almost half (47.8%) of the respondents said assessments made use of monitoring based indicators

10.3 Results of the Study

Table 10.1: SEA in General

	Negative Responses	Not Sure	Positive Responses	Measure of Agreement	Mean	Minimum	Maximum
	%	%	%				
Establishment Executes Programmes	41.3	10.9	47.8	7.3	3.22	1.00	5.00
Programmes designed to give rise to Projects	65.2	8.7	26.1	-42.8	2.54	1.00	5.00
Considers projects in a cluster	73.9	4.3	21.7	-54.6	2.37	1.00	5.00
Wide range of effects Considered	71.7	6.5	21.7	-53.5	2.33	1.00	4.00
Impact of groups of projects assessed	63.0	8.7	28.3	-38.0	2.46	1.00	5.00
Goals deduced from Vision	47.8	6.5	45.7	-2.2	3.00	1.00	5.00
No Environmental Goals or Objectives Exist	67.4	2.2	30.4	-37.8	2.59	1.00	5.00
Programme consistent with Goals or Objectives	47.8	2.2	50.0	2.2	3.02	1.00	5.00
Within Programme Compatibility or Consistency Considered	65.2	4.3	30.4	-36.4	2.65	1.00	5.00
Compatibility and Consistency of Programme to Vision not Considered	71.7	4.3	23.9	-50.0	2.46	1.00	5.00
Compatibility with Goals or Objectives Considered	63.0	10.9	26.1	-41.4	2.54	1.00	5.00
Sustainability Criteria Developed	80.4	4.3	15.2	-68.2	2.30	1.00	5.00
Targets or Indicators Used in Assessment	67.4	6.5	26.1	-44.2	2.48	1.00	5.00
Links between Economic Social and Environment Considered	78.3	4.3	17.4	-63.6	2.09	1.00	4.00
Environmental Objective-Based Indicators	65.2	2.2	32.6	-33.3	2.48	1.00	5.00
Environmental Regulation-Based Criteria	45.7	.0	54.3	8.6	3.22	1.00	5.00
Monitoring Programme-Based Indicators	50.0	2.2	47.8	-2.2	2.89	1.00	5.00
Written Reports Up to Two	73.9	.0	26.1	-39.2	2.48	1.00	5.00
Written Reports Exceeding Two	87.0	.0	13.0	-74.0	2.26	1.00	5.00
Effects Assessed at The Beginning	76.1	8.7	15.2	-66.7	2.15	1.00	5.00
Effects Assessed at the Middle	84.8	.0	15.2	-69.6	2.15	1.00	5.00
Effects Assessed at the End	47.8	6.5	45.7	-2.2	3.11	1.00	5.00

In applying EIA to projects and programmes, Lawrence (1997:33) again clearly states: 'EIA requirements and guidelines can direct goal and evaluation criteria formulation and can provide a frame of reference for government and public review' and that 'clearly articulated visions and goals are essential. Goals should be structured. Priorities established, and interconnections considered. The limits to which conflicting perspectives, interests and ideologies can be reconciled need to be acknowledged.' In this study, more respondents indicated that their establishments had environmental goals or objectives (67.4%) than those who indicated that clear goals and objectives do not exist (30.4%). Out of this a little under half (45.7 %) of respondents believed that those goals were derived from Ghana's Vision 2020. Furthermore, almost a third (30.4 %) of respondents indicated that compatibility within policies was being considered in contrast with the other two third (65.2%) of them who gave negative responses. Similar positive responses were indicated for compatibility with broader goals and objectives as well as between programmes and vision (63%) compared with negative responses (26.1%-30.4%).

On the practical side, a little over a quarter (28.3%)of the respondents indicated programme SEA was being carried out in comparison with over half (63%) of the respondents who said programme SEAs were not carried out. But out of this figure, about a quarter (26.1%) of the respondents said that their establishments had so far written more than two SEA reports of a sort. Over three quarters (87%) of the respondents did not even believe that reports were up to two. From the Table 10.1 above, it is observed that although for almost all the variables, maximum scores exceed 3 (Not Sure), it was only for four variables shown in Table 10.1 above that the mean score exceeded the 3-point mark and these cases correspond to cases for which the measures of agreement were either positive or insignificant. The measures of agreement are also largely negative indicating a very weak SEA at plan level.

Table 10.2 deals with the second variable – Energy Sector SEA. The main issues addressed by the variable include sustainable development, the scales of environmental impact, non-energy sectors and some SEA techniques in use. As with policy and plan SEAs, a separate programme SEA variable for the energy sector was constructed to show its complementary role to other tools available in the energy and other related sectors.

Table 10.2: Energy Sector SEA

	Negative Responses	Not Sure	Positive Responses	MOA	Mean	Minimum	Maximum
	%	%	%				
Establishment Executes Programmes giving rise to projects	50.0	8.7	41.3	-9.5	2.85	1.00	5.00
Programmes designed to influence groups of energy projects	45.7	6.5	47.8	2.3	3.11	1.00	5.00
Environmental Impact Assessed	43.5	10.9	45.7	2.4	3.09	1.00	5.00
Social Impact Assessed	56.5	10.9	32.6	-26.8	2.85	1.00	5.00
Economic Impacts Assessed	39.1	6.5	54.3	16.3	3.09	1.00	5.00
Consideration Given to Housing Sector	52.2	2.2	45.7	-6.7	3.04	1.00	5.00
Consideration Given to Industrial Sector	47.8	6.5	45.7	-2.3	2.93	1.00	5.00
Consideration Given to Transport Sector	47.8	2.2	50.0	2.2	3.00	1.00	5.00
Consideration Given to Local Impacts	56.5	4.3	39.1	-18.2	2.76	1.00	5.00
Consideration Given to National Impacts	76.1	8.7	15.2	-66.7	2.35	1.00	5.00
Consideration Given to Global Impacts	58.7	15.2	26.1	-38.5	2.54	1.00	5.00
Only Key Issues are Considered	67.4	6.5	26.1	-44.2	2.63	1.00	5.00
Scenarios Used	41.3	8.7	50.0	9.5	3.07	1.00	5.00
Matrices are Used	56.5	8.7	34.8	-23.8	2.78	1.00	5.00
Modelling is Used	67.4	8.7	23.9	-47.6	2.48	1.00	5.00
Geographical Information System In Use	80.4	.0	19.6	-60.9	2.37	1.00	5.00
Quantitative Analysis in Use	43.5	4.3	52.2	9.1	3.20	1.00	5.00
Qualitative Analysis in Use	50.0	4.3	45.7	-4.5	3.07	1.00	5.00
Compatibility Matrices In Use	56.5	4.3	39.1	-18.2	2.96	1.00	5.00
Analysed Energy Cycle	87.0	8.7	4.3	-90.5	2.00	1.00	4.00
Analysed Energy Phases	89.1	.0	10.9	-78.3	2.00	1.00	4.00
Analysed Energy Processes	58.7	10.9	30.4	-31.7	2.78	1.00	5.00

For example, DETR (1998:16) refers to supply chain assessment in the industrial domain while, apart from Supply Side Management programmes, Reddy and Parikh (1997:349) mentioned significant environmental benefits of Demand Side Management (DSM) programmes associated with a reduction in energy requirements whose benefits arise from 'the avoidance/deferral of power plant construction and savings in capacity as well as fuel cost.' They identified '(1) energy efficient motors (EEM); (2) variable speed drives (VSD); (3) good housekeeping practices (GHK); (4) vapour absorption refrigeration systems (VARS); (5) electric arc furnaces (EAF);

(6) time-of-use tariff (TOU); (7) high vapour sodium lamps (HPV); (8) compact fluorescent lamps (CFL); (9) electronic ballast (ELB); (10) High efficiency fans and pumps (PUMPFAN); (11) power factor improvement (PF); and (12) industrial cogeneration (CIOGEN).' The crucial issue however is how sustainability issues are taken on board not only in the frontline energy sector but also in non-energy sectors such as housing, industry and transport (Jones, 1991).

From the data in Table 10.2 above the following observations were made. Compared with the respondents who indicated negative responses (45.7%-50%), between 41.3%-47.8% of the respondents indicated that their establishments execute programmes and that their programmes affect energy use. In respect of the issue of sustainability, more positive emphasis is placed on economic sustainability (54.3%) than environmental (43.5%) and social (32.6%) considerations. Again, substantial positive responses are observed in respect of non-energy sectors such as housing (45.7%), industry (45.7%) and transport (50%). Regarding the scale question, local issues (39.1%) commanded greatest consideration than issues on the national (15.2%) and global impacts (26.1%) scale. In terms of the use of a variety of methods, between 19.6% and 52.2% of the respondents gave positive responses to the use of scenarios, modelling geographical information systems, quantitative analysis matrices, qualitative analysis and compatibility matrices. This is in spite of a larger proportion of the respondents indicating that these methods were not used in their establishments (41.3%-67.4%). For instance out of the analysed positive responses, consideration for fuel cycle took under a tenth (4.3%) of the positive responses; analysed phases of fuel cycle took over one-third (10.9%) of the share while analysed processes associate with each phase took over half (30.4 %) of the share. The result also indicate more elements of SEA positively emerging from programming not only from the fact that some averages exceed the 3-point score but also that the measures of agreement show more positive responses overall in 9 sub-variables.

Discussing sustainability within the context of EIA of projects and programmes, Lawrence (1997:39) stressed that sustainability and framework are inextricably woven together. He said that 'EIA should be the refinement and adaptation of frameworks to varying contextual characteristics. Frameworks must be in a form

suitable for testing and adaptation at the regulatory and applied levels;' the process should begin with 'legislation, guidelines and institutional arrangements' spanning 'boundaries among agencies and between proponents and other stakeholders.' 'These fields must be linked, coordinated and integrated. Interactions among stakeholders must also be coordinated. Such initiative, as intergovernmental and interagency policy coordination, multi-stakeholder ecosystem planning and integrated resource management, reflects this interesting awareness.' Webb and Sigal (1996) also mentioned the role of inter and intra-agency cooperation.'

Table 10.3: SEA Framework

	Negative Responses	Not Sure Responses	Positive	MOA	Mean	Minimum	Maximum
	%	%	%				
Clear Legal Requirements	45.7	15.2	39.1	-7.7	2.80	1.00	4.00
Written Programme objectives Exists	58.7	10.9	30.4	-31.7	2.50	1.00	4.00
Establishment is Expressly Assigned Responsibility	50.0	6.5	43.5	-7.0	2.80	1.00	4.00
Accountability Requirement Exists	67.4	10.9	21.7	-51.2	2.30	1.00	4.00
Time frame for Accountability Exists	60.9	13.0	26.1	-40.0	2.61	1.00	4.00
The Culture of Democracy Exists	30.4	17.4	52.2	26.3	3.04	1.00	4.00
Existence of Public Participation Framework	47.8	17.4	34.8	-15.8	2.70	1.00	4.00
Existence of Institutional Framework	34.8	15.2	50.0	17.9	3.24	1.00	5.00
Capacity Building Framework Exists	26.1	15.2	58.7	38.5	3.52	1.00	5.00
A Framework of Inter-Agency Cooperation Exists	28.3	13.0	58.7	35.0	3.35	1.00	5.00
Non-interference in Institutional Affairs	56.5	13.0	30.4	-30.0	2.76	1.00	5.00
Political Will for Implementation	56.5	8.7	34.8	-23.8	2.87	1.00	5.00
Existence of Track Record of Compliance	52.2	13.0	34.8	-20.0	2.74	1.00	4.00
Framing Context for the Environment	34.8	13.0	52.2	20.0	3.30	1.00	5.00
Environmental Agenda Being Set Stakeholders	34.8	13.0	52.2	20.0	3.28	1.00	5.00
Inter Regional Environmental Policy	43.5	13.0	43.5	0.0	3.07	1.00	5.00
Inter Regional Cooperation on Energy Policy	54.3	4.3	41.3	-13.6	2.91	1.00	5.00
Inter Regional Economic Cooperation	60.9	2.2	37.0	-24.4	2.67	1.00	5.00
Existence of Staff Experience	41.3	6.5	52.2	11.6	3.11	1.00	5.00
Possibility of Using Experts and Consultants	39.1	4.3	56.5	18.2	3.13	1.00	5.00
Provision for Budgetary Allocation	67.4	4.3	28.3	-40.9	2.52	1.00	5.00
Existence of Clear Methodology	63.0	2.2	34.8	-28.9	2.57	1.00	4.00

From the point of view of the law guiding environmental assessment, between a quarter and half of the respondents indicated positively that there were clear legal requirement (39.1%), assignment of responsibility (43.5%), accountability (21.7%) and time frame (26.1%) supported by written programme objectives (30.4%) although a larger range of scores (45.7%-67.4%) disagreed with the suggestion that such a legal framework does exist. Regarding institutional considerations, half (50%) of the respondents indicated that there was an institutional framework for programme level SEA in the energy sector and still more than half (58.7%) of them agreed that a framework for capacity building was in place coupled with a clear methodology (34.8%), staff experience (52.2%) and openness to use experts and consultants (56.5%). With some level of budgetary provisions for environmental issues (28.3%) supplemented by a track record of compliance (34.8%) programme level SEA is likely to contribute to sustainable development.

Writing on the topic *Environmental Policy and the Trans-European Transport Network*, Richardson (1997:343) notes: 'the political and institutional setting of SEA development clearly shapes its scope, timing, methodology, and ultimately its impact. In this way, SEA was shaped by discourses of the single market, and political integration, by inter-institutional politics, and by the actions of interest groups.' He further noted that the EU policy in relation to ecological modernisation was a product of cultural politics by which 'environmental problems are constructed through the adoption of certain metaphors, categorizations, techniques of analysis making certain framings of reality seem plausible and closing off certain possible future scenarios while making other scenarios thinkable.' His view not only underpins political dimensions of participation but also stressed the importance of framing context in programme SEA. Thus from the political standpoint, the result of the perception of democratic culture (30.4%), public participation (34.8%), inter-agency cooperation (58.7%), inter-regional economic cooperation (37%), inter-regional cooperation on energy programming (41.3%) and inter-regional environmental programme framework (43.5%) were quite high. In terms of changing philosophical perceptions respondents indicated that some level of framing context (52.2 %) and agenda setting (52.2%). From Table 10.3 above, it is observed that although 9 out of 22 variables have maximum scores exceeding the 3-point mark corresponding to positive measures of agreement between positive and negative responses.

Table 10.4: Improving Existing System

	Negative Responses	Not Sure	Positive Responses	MOA	Mean	Minimum	Maximum
	%	%	%				
EIA of Major Projects	41.3	15.2	43.5	2.6	3.15	1.00	5.00
Assessment of Two or More Major Projects	52.2	17.4	30.4	-26.3	2.76	1.00	5.00
Effects of Minor Projects	69.6	17.4	13.0	-68.4	2.33	1.00	5.00
Combined Effect of Minor Projects	78.3	2.2	19.6	-60.0	2.17	1.00	5.00
Indirect Effect of Projects	60.9	17.4	21.7	-47.4	2.52	1.00	5.00
Combined Effect of many otherwise Insignificant Projects	71.7	8.7	19.6	-57.1	2.28	1.00	5.00
Adapting EIA Methodology to SEA	43.5	6.5	50.0	7.0	3.00	1.00	4.00
Developing a Distinctive SEA Methodology	58.7	8.7	32.6	-28.6	2.67	1.00	4.00
Using More Response Indicators	78.3	2.2	19.6	-60.0	2.22	1.00	4.00
Introducing Direction of Change in PPPs Objectives	65.2	13.0	21.7	-50.0	2.37	1.00	4.00
Introducing Quantifying Targets	60.9	13.0	26.1	-40.0	2.61	1.00	5.00
Linking SEA to PPP	71.7	4.3	23.9	-50.0	2.48	1.00	5.00
Linking EIAs, PPPs and SEA	65.2	8.7	26.1	-42.9	2.57	1.00	5.00
Linking SEA to Sustainable Development	56.5	8.7	34.8	-23.8	2.70	1.00	5.00
Introducing Carrying Capacity into PPP	78.3	2.2	19.6	-60.0	2.09	1.00	5.00
More Explicit PPP Objectives	71.7	4.3	23.9	-50.0	2.33	1.00	5.00
Removing Contradictions in PPP	69.6	4.3	26.1	-45.5	2.43	1.00	5.00
Improving PPP because of SEA	80.4	2.2	17.4	-64.4	2.11	1.00	5.00
Changing PPP because of SEA	84.8	.0	15.2	-69.6	2.02	1.00	4.00
New Objectives to Capture Sub-components	82.6	2.2	15.2	-68.9	2.13	1.00	5.00
Emphasizing Mitigation Measures	39.1	2.2	58.7	20.0	3.26	1.00	5.00
Improving Monitoring	45.7	2.2	52.2	6.7	3.07	1.00	5.00

As with policy and plan SEA, the variable *Improving Existing System* in programme SEA seeks to gauge implementation by finding out the extent to which SEA improved issues such as cumulative impacts and indeed the usefulness of plans. Webb and Sigal (1996:63) said the purpose of PEIS is to address the impacts of other programmes as part of its cumulative impact analysis. They stated: 'programmatic documents are the perfect vehicle for assessing of the cumulative impacts of multiple actions that are similar in nature, broad in scope or connected (i.e. actions that trigger

other actions or actions that cannot proceed unless other actions are taken previously or simultaneously.' Lawrence (1997:33) mentioned evaluation criteria formulation based on sustainable development to provide a frame of reference important for project and programme EIA. While the perception for the level of project level assessment of major projects was quite substantial (43.5%), consideration for cumulative, additive, induced, indirect and synergistic impacts are relatively lower (13%-30.4%). This result is even lower compared with those who felt that these considerations were not in place (52.2%-78.3%). Between 19.6%-56.8% of the respondents thought distinctive methodology for SEA was developing alongside the use of response indicators, quantifying targets as well as direction of change in PPP's objectives. About one third (32.8%) of the respondents said SEA at programme level tended to follow EIA methodology. The level of agreement regarding links between SEA, PPP and EIA, were low to moderate (19.6%-34.6%). Similarly, positive changes needed in PPP such as making PPP more explicit, removing contradictions in PPP, improving PPP because of SEA, changing PPP because of SEA and writing new objectives to capture subcomponents range were low to moderate (13.2%-26.1%). For mitigation measures and monitoring more than half of the respondents (52.2%-58.7%) agreed they were adhered to.

Table 10.5 below shows the results of improvements envisaged in institutional context as the result of SEA. That SEA improves institutional context through integration finds support in the SEA literature. Webb and Sigal (1996) said 'SEA can integrate activities and planning across agency programmes. Such a programme will enhance the coordination of...other agency programmes generating wastes requiring management such as ...nuclear energy and energy research,' but 'at the institutional level, there must be commitment to SEA and recognition throughout an organisation of its value. Without such commitment, SEA is nothing but a paper work.' Against this background, the study revealed the following results. 11 out of 22 of the variables have average scores above 3-point mark and the maximum scores of 5 for each sub-variable. The study also indicates that there are some improvements in institutional framework. In support of this observation, the following specific observations can be made. Over half (52.2%) of the respondents indicated that there was improvement in implementation structures.

Table 10.5: Improving Institutional Context

	Negative Responses	Not Sure	Positive Responses	MOA	Mean	Minimum	Maximum
	%	%	%				
Implementation Structures are not improved	52.2	10.9	37.0	-7.0	2.83	1.00	5.00
EPA's Power Over Private Developers	37.0	13.0	50.0	6.0	3.11	1.00	5.00
EPA'S Power Over Public Agencies	50.0	2.2	47.8	-1.0	3.09	1.00	5.00
Another Institution such as NDPC	39.1	2.2	58.7	9.0	3.22	1.00	5.00
Impact of Environmental Agencies Felt	47.8	17.4	34.8	-6.0	2.74	1.00	5.00
Communication and Coordination are not improved	43.5	8.7	47.8	2.0	3.09	1.00	5.00
Enforcement by Environmental Agencies are not improved	41.3	8.7	50.0	4.0	3.15	1.00	5.00
Resources or Logistical Supply is Unimproved	71.7	6.5	21.7	-23.0	2.33	1.00	5.00
Little Progress on Participation	56.5	6.5	37.0	-9.0	2.63	1.00	5.00
Partnerships Encouraged	52.2	8.7	39.1	-6.0	2.74	1.00	5.00
Improved Cooperation with Other Establishments	60.9	.0	39.1	-10.0	2.67	1.00	5.00
No Conflict of SEA with Organization Policies	41.3	4.3	54.3	6.0	3.15	1.00	5.00
Adaptability of Policies to SEA	50.0	6.5	43.5	-3.0	2.85	1.00	5.00
Can Displace or Suspend Some of its Policies	45.7	10.9	43.5	-1.0	2.93	1.00	5.00
Can Imitate Success Stories of Others	34.8	4.3	60.9	12.0	3.24	1.00	5.00
Can Take SEA on Board	47.8	4.3	47.8	0.0	3.13	1.00	5.00
Can Integrate SEA into its Policies	50.0	2.2	47.8	-1.0	2.74	1.00	5.00
Can Disseminate information on SEA	37.0	8.7	54.3	8.0	3.30	1.00	5.00
Can Incorporate the Environment into its Mission Statement	50.0	6.5	43.5	-3.0	2.91	1.00	5.00
Performance Indicators to Guide Compliance	63.0	6.5	30.4	-15.0	2.63	1.00	5.00
Establish Expert Unit in Establishment	41.3	6.5	52.2	5.0	3.11	1.00	5.00
Law in Place or being Made to Employ Environmental Consultants	41.3	17.4	41.3	0.0	3.00	1.00	5.00

As a consequence, about a third (34.8%) of them indicated that the impact of the agencies was being felt. Concerning the need for EPA to exercise power over both private and public sectors, about half (47.8%-50%) of the respondents supported the suggestion although EPA's power over the private sector found more support (50%

vs. 47.8%). In respect of another institution such as NDPC exercising power over public institutions, there were more agreements than disagreements (58.7% vs.37.1%). Touching on some conditions for a hierarchical structure, such as availability of resources, improved communication and coordination as well as improved enforcement, 21.7%-50% of them responded positively.

Table 10.6: Sustainable Energy Programme

	Low	Moderate	Very High	MOA	Mean	Minimum	Maximum
	%	%	%				
Social Cohesion and Integration	56.5	15.2	28.3	-33.3	2.70	1.00	5.00
Sense of Community and Connectedness	50.0	15.2	34.8	-17.9	2.74	1.00	5.00
Housing with Modern Lighting	52.2	15.2	32.6	-23.1	2.76	1.00	5.00
Cultural Values	43.5	8.7	47.8	4.8	3.00	1.00	5.00
Reduction in Social Inequality	43.5	6.5	50.0	7.0	3.00	1.00	5.00
Improvement in Health Services	67.4	13.0	19.6	-55.0	2.35	1.00	5.00
Accessibility to Social Services	45.7	13.0	41.3	-5.0	2.93	1.00	5.00
Limiting Unemployment	43.5	13.0	43.5	0.0	2.96	1.00	5.00
Job Creation	30.4	17.4	52.2	26.3	3.30	1.00	5.00
Raising Revenue	39.1	8.7	52.2	14.3	3.15	1.00	5.00
Sustaining Economic Growth	26.1	13.0	60.9	40.0	3.54	1.00	5.00
Private Investment	30.4	6.5	63.0	34.9	3.39	1.00	5.00
Ensuring Economic Efficiency	30.4	15.2	54.3	28.2	3.26	1.00	5.00
Increasing Supply of Services	28.3	19.6	52.2	29.7	3.39	2.00	5.00
Cost Recovery	21.7	17.4	60.9	47.4	3.48	1.00	5.00
Reducing Inflation	19.6	19.6	60.9	51.4	3.52	1.00	5.00
Maintain Natural Resource Supply	37.0	19.6	43.5	8.1	3.13	1.00	5.00
The Use of Energy Efficient Appliances	58.7	13.0	28.3	-35.0	2.59	1.00	5.00
Ensuring Energy Security	32.6	19.6	47.8	18.9	3.24	1.00	5.00
Ratio of LPG Use to Fossil Fuel	43.5	15.2	41.3	-2.6	2.93	1.00	5.00
Reducing Per Capita Energy Consumption	58.7	13.0	28.3	-35.0	2.59	1.00	5.00
Ratio of Solar Energy to Traditional Fuels	56.5	19.6	23.9	-40.5	2.52	1.00	5.00
Ratio of Public Transport use to Private Transport	56.5	19.6	23.9	-40.5	2.48	1.00	5.00
Percentage of Second-hand Vehicles or Appliances	58.7	17.4	23.9	-42.1	2.52	1.00	5.00

Moreover over a third (37%-39.1%) of the respondents indicated positive responses for participation, partnership and cooperation. Concerning sociological

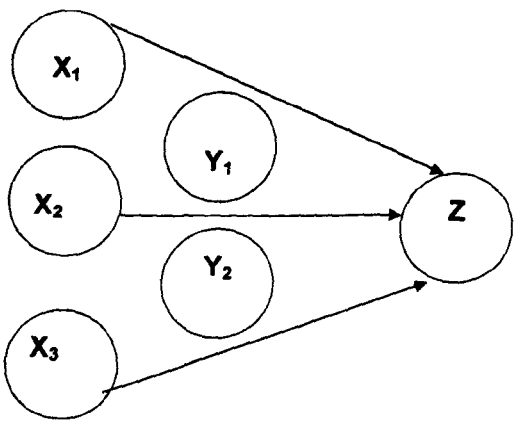
underpinnings of institutions in the areas of compatibility of SEA with their organisation's programme s, adapting establishments' programmes to SEA and the willing to displace and suspend programmes between 43.5% and 54.5% of them answered in affirmation compared with the proportion of the respondents who gave negative responses (34.8%-50%). Similarly when respondents were asked if they were willing to take SEA on board, integrate SEA into their establishments' programmes and disseminate information on SEA, a large number of them gave positive responses (47.8%-54.3%). In respect of economic institutionalism more respondents were unwilling that their establishments incorporate environmental issues into mission statements than those willing (34.5% vs. 50%). The result is similar for the suggestion of establishing expert units (41.3%-52.2%) and the use of performance indicators (30.4% vs.63%). In respect of the existence of legislation for the employment of environmental consultants the same number of respondents indicated their opinion for either view. Whether dealing with SEA of policy, plan or of programme, the integration of social, economic and environment considerations in consistent manner underlie sustainable development. Thus for project or programme EIA, Lawrence (1997:30) pointed out that 'EIA should also be linked to broader social, economic and environmental goals and initiatives directed towards sustainability.' In this regard, it will be observed in this study that 12 out of 24 sub-variables exceed the 3-point mark. Specifically, social sustainability indicators recorded between 19.5% and 50%; economic sustainability recorded between 52.2% and 63% while environmental sustainability had between 23.9% 47.8% of the positive responses. Again economic sustainability issues had more scores than social and environmental considerations.

10.4 Testing of Hypotheses.

While the above variables served as predictor variables in most of the analyses, it was necessary to reclassify some of variables so as to test other hypotheses that were supplementary to the main hypotheses. SEA Framework, for example, deals with legal, institutional, political and philosophical aspects of the framework To test a hypothesis, for instance, to establish a causal link between institutions as a predictor variable and another dependent variable, institutional elements in the broader variable – *SEA Framework* – were used as a subset of *SEA Framework*. Similarly, the variable - *Improving Institutional Context* deals with issues such as hierarchy,

integration, coordination and participation. It therefore used similar modifications where necessary. The fact that the responses to the questionnaires unearthed the strengths and the characteristics in Ghana does not yet prove that any causal links exists between the variables. The following section therefore narrows on to the various hypotheses.

10.4.1 Hypothesis No 1: SEA and Sustainable Energy Programme



Model 10.1: The link between SEA and Sustainable Energy Programme.

The model hypothesises that the more there are SEA in General (X1), Energy Sector SEA (X2) and a well-established SEA Framework (X3) simultaneously or separately, then the greater opportunity to achieve Sustainable Energy Programme (Z). Y_1 is improving the existing system and Y_2 is improving the institutional context

In this study it is first hypothesised that SEA is a tool for sustainable development. In this regard, there is a causal link between SEA and Sustainable Energy Programme. The more SEAs are carried out in the energy sector, the more sustainable energy programmes are likely to be. Conversely, the lesser SEAs are carried out in the energy sector, the lesser sustainable energy programmes will tend to be. Within the framework of the causal model designed for this thesis, the study specifically seeks to find out (a) whether in the absence of Energy Sector SEA, SEA in general will deliver sustainability; (b) whether in the absence of SEA in General, Energy Sector SEA can deliver sustainability; (c) whether an SEA Framework without SEAs in other sectors is sufficient to deliver sustainability and (d) and whether a programme-making scenario under which SEA is generally integrated into the entire programme-

making process with no exception for the energy sector and interlaced with a legal and institutional framework offered the best opportunity for sustainable development. The relationship is schematically expressed in Model 10.1. To test the hypotheses under consideration [that if X_1, X_2 and X_3, then Z where X_1, X_2, X_3 and Y_1 have the meanings already assigned to them in this study] both correlation matrix and regression models used are used and results are shown in Table 10.7 and Table 10.9 below. F-ratio statistic, probability statistic-p and coefficient of determination R^2 are used in testing the hypotheses and gauging the magnitude of the relationships.

Table 10.7: Correlations: SEA and Sustainable Energy Programme

		General SEA	Energy Sector SEA	SEA Framework	Sustainable Energy Policy
General SEA	Pearson Correlation	1.000	.268*	-.186	-.288*
	Sig. (1-tailed)	.	.036	.108	.026
	N	46	46	46	46
Energy Sector SEA	Pearson Correlation	.268*	1.000	-.255*	-.261*
	Sig. (1-tailed)	.036	.	.044	.040
	N	46	46	46	46
SEA Framework	Pearson Correlation	-.186	-.255*	1.000	.457**
	Sig. (1-tailed)	.108	.044	.	.001
	N	46	46	46	46
Sustainable Energy Policy	Pearson Correlation	-.288*	-.261*	.457**	1.000
	Sig. (1-tailed)	.026	.040	.001	.
	N	46	46	46	46

* Correlation is significant at the 0.05 level (1-tailed).

** Correlation is significant at the 0.01 level (1-tailed).

From Table 10.7 of correlations above, the relationship between the predictor variables (*SEA in General, Energy Sector SEA* and *SEA Framework*) and Sustainable Energy Programme is statistically significant ($p < 0.05$). In addition SEA Framework more significantly correlates with the dependent variable than the two other predictor variables ($p<0.01$). Furthermore, for three predictor variables, between 6.8% and 21% of the variation is explained by relationships. Combining the variables in the regression model gives the following result appropriately tabulated.

Table 10.8: ANOVA[b] SEA and Sustainable Energy Programme

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.679	3	.893	4.993	.005[a]
	Residual	7.511	42	.179		
	Total	10.189	45			

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

b Dependent Variable: Sustainable Energy Policy

Table 10.9:-Model Summary: SEA and Sustainable Energy Programme

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.513[a]	.263	.210	.4229

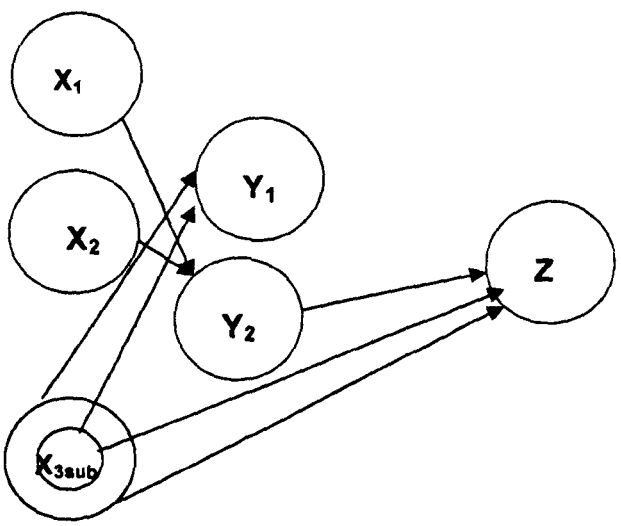
a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

The result shows that there is a statistically significant relationship between SEA measured by the three variables (SEA in General, SEA Framework and Energy Sector SEA) and sustainable development (measured by sustainable energy programme) ($F=4.993$, $p<0.01$) for which over a quarter (26.3%) of the variation is accounted for by the relationship. The result again indicates that the combined variables predict the dependent better than the separate variables. On the whole however, it can be concluded that data used in this analysis are consistent with proposed causal inference that SEA in General; Energy Sector SEA and SEA Framework concurrently and separately have a significant correlation with Sustainable Energy Programme. This in turn finds support in SEA literature that SEA at programme-level promoted sustainable development. (See Thérivel and Partidario 1996; Lawrence, 1997; Webb & Sigal, 1992 and Partidario and Clark, 2000).

10.4.2 Hypothesis No 2: Institutions and Implementation

Regarding the institutional question, it is hypothesized that the ability of institutions to implement policies is predicated on the effectiveness or suitability of the institutions, which they inhabit. SEA is an action-forcing tool. In this regard, there is a causal link between the type and suitability of the institutional framework and the

level of implementation of SEA[3]. The more effective or suitable institutions for SEA are, the more the goals of SEA are likely to be implemented and the more sustainable energy policies are likely to be. Conversely, the less effective institutions of SEA are, the less the goals of SEA are likely to be implemented in the energy sector and the less sustainable energy policies will tend to be. With this framework in mind, the study seeks to find out (a) whether the existing institutional framework (as a subset of SEA framework) can facilitate implementation; (b) whether the existing institutional framework (as a subset of SEA framework) can deliver sustainability (c) whether it is the SEA framework (including institutional framework) that can facilitate implementation and (d) whether the existing institutional framework requires improvements necessitated by SEA in order to implement policies effectively. The relationships are shown in Model 10.2 below.



Model 10.2: Regressing Y_1 over X_3 and X_{3sub} and Z over Y_1 over X_3 and X_{3sub},

This is the hypothesis that the more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), the better the implementation of programme (Y_1). The more effective or suitable the institutional framework (X_{3sub}) or SEA Framework (X_3), and the more improved institutional context (Y_2) the more sustainable energy programmes are likely to be.

[3] It was mentioned that the variable [Improving the existing system] was a measure of implementation. Thus the hypotheses being tested could also be framed as: the more suitable institutions are, the more likely cumulative impacts for example will be addressed within the SEA framework.

To test the hypothesis that institutions [represented by *Institutional Framework* (X_{3sub}) and *SEA Framework* (X_3)] contribute to implementation [represented by *Improving Existing System* (Y_1)], a correlation matrix of pairs of these variables are shown in Table 10.10 below. From the table, there is a statistically significant relationship ($p<0.01$) between the institutional framework and improved system as a surrogate for implementation. Nevertheless, only 14.4% of the variation is explained by the relationship; over 85.6 % of the variation is unexplained by the relationships. There is no significant relationship between SEA Framework and Improved System.

Table 10.10: -Correlations-Institutions and Implementation

		Institutional Framework	SEA Framework	Improved Systems
Institutional Framework	Pearson Correlation	1.000	.717**	.379**
	Sig. (1-tailed)	.	.000	.005
	N	46	46	46
SEA Framework	Pearson Correlation	.717**	1.000	.156
	Sig. (1-tailed)	.000	.	.151
	N	46	46	46
Improved Systems	Pearson Correlation	.379**	.156	1.000
	Sig. (1-tailed)	.005	.151	.
	N	46	46	46

** Correlation is significant at the 0.01 level (1-tailed).

Testing the second part of the hypothesis that institutions [represented by (i) Institutional Framework (X_{3sub}) or (ii) SEA Framework (X_3)] and their improved context [represented by Improving Institutional Context (Y_1)] contribute to sustainable energy programme (Z), the following multiple regressions models shown in Tables 10.11- 10.14 have been employed.

(i)Using the variable, *Institutional Framework*, the models are shown as follows.

Table 10.11:-ANOVA[b]-Institutions and Implementation

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.434	2	1.217	6.748	.003[a]
Residual	7.755	43	.180		
Total	10.189	45			

a Predictors: (Constant), Improving Institutional Context, Institutional Framework

b Dependent Variable: Sustainable Energy Policy

Table 10.12:-Model Summary-Institutions and Implementation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.489[a]	.239	.203	.4247

a Predictors: (Constant), Improving Institutional Context, Institutional Framework

(ii) Employing the variable *SEA Framework*, computed models are as shown below.

Table 10.13:-ANOVA[b]-Institutions and Implementation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.379	2	1.689	10.666	.000[a]
	Residual	6.810	43	.158		
	Total	10.189	45			

a Predictors: (Constant), Improving Institutional Context, SEA Framework

b Dependent Variable: Sustainable Energy Policy

Table 10.14:-Model Summary-Institutions and Implementation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.576[a]	.332	.301	.3980

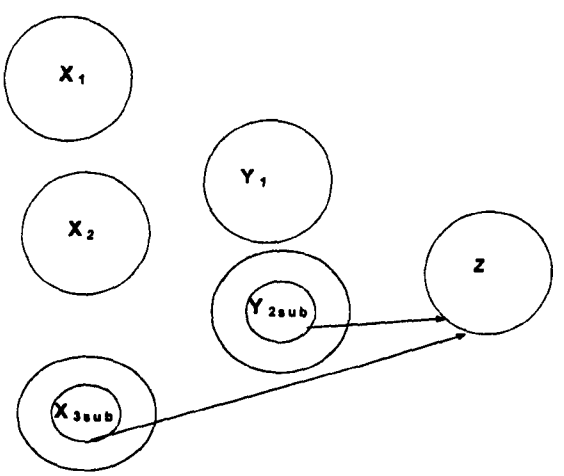
a Predictors: (Constant), Improving Institutional Context, SEA Framework

The results from Tables 10.11 and Table 10.13 above reveal that there are significant relationships between the predictor variables (*SEA Framework and Improving Institutional Context*) and *Sustainable Energy Programme* ($F=10.666$, $p<0.01$, $R^2=33.1\%$) on the one part; and between the predictor variables (*Institutional Framework and Improving Institutional Context*) and the dependent variable ($F=6.748$, $p<0.01$, $R^2=24\%$) on the other part. Overall, the hypotheses support the theory that institutions matter in programme implementation and thereby contribution to sustainability. The link between institutions and implementation in the institutional literature is expressed thus: 'effective environmental institutions are a necessary precondition for building environmental policy framework. They formulate and implement policy; carry out legislation reform; propose environmental

programmes and projects advise and support political decision-making processes; set standards, collect data; evaluate the environmental consequences of policies, decisions and projects' (Dorm-Adzobu, 1995:9).

10.4.3 Hypothesis No 3: The link between Context and Sustainable Development

This hypothesis, like the one for policy analysis, also relates to diverse philosophical perspectives. It posits that the ability of institutions to work towards a common strategy and programme such as sustainable Energy Programme is a function of context (defined to include framing context, agenda setting and problem definition) and the corresponding changes in the institutional context. In this regard, there is a causal link between context[4] (as a subset of SEA Framework), philosophical/institutional changes (as a subset of *Improving Institutional Context*) and Sustainable Energy Programme. Thus the greater the impact of context and philosophical changes are the more effective are institutions to deliver Sustainable Energy Programme. By implication, the less the impact of context and philosophical changes are, the less effective are institutions to deliver sustainable Energy Programme.



Model 10.3: Regressing Z on X_{3sub} and Y_{2sub}.

This is the hypothesis that the greater the impact of context (X_{3sub}) and philosophical changes, the more effective are institutions in delivering sustainable energy programme.

[4] Defined as framing context, problem definition and agenda setting

To determine the contribution of each variable in the relationship, the following correlation matrix is analysed.

Table 10.15: Correlations: Context and Sustainable Development

		Agenda Setting and Framing Context	Philosophical Changes	Sustainable Energy Programme
Agenda Setting and Framing Context	Pearson Correlation	1.000	.057	.473**
	Sig. (1-tailed)	.	.352	.000
	N	46	46	46
Philosophical Changes	Pearson Correlation	.057	1.000	.129
	Sig. (1-tailed)	.352	.	.196
	N	46	46	46
Sustainable Energy Policy	Pearson Correlation	.473**	.129	1.000
	Sig. (1-tailed)	.000	.196	.
	N	46	46	46

** Correlation is significant at the 0.01 level (1-tailed).

From the table of correlations, it can be deduced that there is a statistically significant relationship between both context and sustainable energy programme ($p<0.01$, $R^2=22.4\%$). The relationship between philosophical changes and sustainable energy programme was not significant ($p>0.05$).

The regression model below summarised the key parameters in a combined of the relationship.

Table 10.16: ANOVA[b]: Context and Sustainable Development

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.389	2	1.194	6.585	.003[a]
	Residual	7.800	43	.181		
	Total	10.189	45			

a Predictors: (Constant), Philosophical Changes, Agenda Setting and Framing Context

b Dependent Variable: Sustainable Energy Programme

Table 10.17: Model Summary: Context and Sustainable Development

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.484[a]	.234	.199	.4259

a Predictors: (Constant), Philosophical Changes, Agenda Setting and Framing Context

The result from Table 10.16 indicates that the relationship between context, philosophical changes and Sustainable Energy Programme is not by chance ($F=6.585$, $p<0.01$) and that 23.4 % of the variation can be accounted for by the relationship

10.4.4 Hypothesis No 4: Implementation and sustainable development

In discussing hypothesis 2 above, the emphasis was on the general effectiveness or suitability of the institutions as an instrument for implementation. This hypothesis, closely related to the second, focused on joint action and implementation and considered the forms of institutions, which could ensure effective SEA. It hypothesizes that the more hierarchically (top-down) structured institutions are [such as that of NDPC] and the more amenable the general institutional contexts are to integration, the better the opportunity for SEA and sustainable development.[5] It further hypothesized the more unhindered and empowered an implementing agency [such as EPA] is to exercise control over both private and the public sectors, the more SEA can be integrated in PPP making process. It also hypothesizes that the more institutions cooperate and work on the basis of equal partnerships, the more joint action and implementation are likely to succeed.

In testing these hypotheses, factor analysis was used based on a principal component factor analysis using varimax rotation. This was because the sub-variables were just regrouped around common themes within the same variable. For example, all the

[5] Glasson (1995:716) said SEA cascades 'relevant actions from tier to tier with the form of action at one tier inevitably conditioned by prior actions at higher tier.' For relevant environmental action to cascade from higher tiers to lower tiers of policymaking and implementation, the cascade model of institutional arrangement is considered to be the best approach to tiered forward planning (Freeman, 1996). The cascade model is essentially a hierarchical model; hence the assumption for this hypothesis (For details on the Cascade Model, see Section 6.2.1).

variables on TCE are grouped together and so were those dealing with agency theory, integration/hierarchy, conditions for top-down approach and partnerships.

Table 10.18: Rotated Matrix: Implementation and Sustainable Development.

	Component		
	1	2	3
Unimproved Implementation Structures			.883
EPA's Power Over Private Developers		.802	
EPA'S Power Over Public Agencies		.491	.582
Another Institution such as NDPC		.777	
Conditions for Top-Down Approach Created	.415	.783	
Encouraged Partnerships	.650	.380	
Agencies Amenable to Integration and Hierarchy	.590	.465	
Performance Indicators/Mission Statements(Agency Theory)	.678		.425
Incorporating Expert Units(Transaction Cost Economy)	.731		.386
Sustainable Energy Policy	.826		

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 7 iterations.

Using a regression model produces the following outcome.

Table 10.19: ANOVA[b]: Implementation and Sustainable Development.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.506	2	.753	3.729	.032[a]
	Residual	8.683	43	.202		
	Total	10.189	45			

a Predictors: (Constant), Conditions for Top-Down Approach Created, Agencies Amenable to Integration and Hierarchy

b Dependent Variable: Sustainable Energy Programme

Table 10.20: Model Summary: Implementation and Sustainable Development

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.384[a]	.148	.108	.4494

a Predictors: (Constant), Conditions for Top-Down Approach Created, Agencies Amenable to Integration and Hierarchy

From the result at Table 10.18 above, it will be observed that all the variables dealing different aspects of institutional theory and sustainable energy programme load on the first factor. The variables that share properties in common with the second factor include those relating to sociological and political underpinnings of institutions as well as different institutional structures. On the third factor are loaded improved implementation structures, EPA's power over the public sector and economic institutionalism. Conditions for top-down approach and amenability to integration and hierarchy are essential for sustainable energy programme. This is also supported from the regression model above ($p<0.05$). Furthermore, no one single institutional form is sufficient to deliver sustainability; depending on a particular situation one or more or even a mix of arrangements may be necessary to deliver sustainability. From the second factor it can be surmised that institutional theory need to inhabit institutions just as institutional structures may lack effectiveness without sound theoretical basis.

Secondly if hindrances to implementation have been minimised through the conditions under which environmental values can been integrated or through hierarchical structures, EPA's power over both private and public sectors can be effective. Thirdly, the existence of expert units and SEA related mission statements provide a platform for EPA to exercise some oversight over public sectors. Thus the two other hypotheses that [*the more unhindered and empowered an implementing agency (such as EPA) is to exercise control over both private and the public sectors, the more SEA can be integrated in PPP making process* and that *the more institutions cooperate and work on the basis of equal partnerships, the more joint action and implementation are likely to succeed*] are supported since these conditions load on the same factor.

Close to this view is Lawrence's (1997:28) observation that 'integration of sustainability into public and private decision-making is a boundary-spanning activity. Consequently mechanisms of joint planning, sharing knowledge, communication, and participation within and among stakeholders are especially important in furthering sustainability objectives. Both vertical (e.g. international, national and interregional) and horizontal (e.g. interagency, public-private) linkages will need to be established to ensure instruments are mutually supportive.'

10.4.5 Hypothesis No 5: SEA, Cooperation, Participation and Sustainable Development

The purpose of this section is to (i) test the hypothesis that cooperation, participation and partnerships are essential for sustainable energy programme and (ii) that. SEA facilitates and increases participation on environmental matters, facilitates consultation between authorities.

Table 10.21: ANOVA[b] *Cooperation/Participation* and Sustainable Development.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.101	3	.367	1.696	.182
	Residual	9.088	42	.216		
	Total	10.189	45			

a Predictors: (Constant), International Framework for Cooperation, Improved Context for Cooperation, Participation and Partnerships, Local and National Framework for Cooperation

b Dependent Variable: Sustainable Energy Policy

Table 10.22: ANOVA[b] Cooperation/Participation and Sustainable Development

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.524	3	2.175	5.449	.003[a]
	Residual	16.764	42	.399		
	Total	23.288	45			

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

b Dependent Variable: Local and National Framework for Cooperation

Table 10.23: Model Summary: Cooperation/Participation and Sustainable Development

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.529[a]	.280	.229	.6318

a Predictors: (Constant), SEA Framework, General SEA, Energy Sector SEA

The result of the study revealed in Tables 10.22 and 10.23 above shows that there is no significant relationship between the predictor variables (*Improved Context for Cooperation, Participation and Partnerships, Local and National Framework for Cooperation and International Framework for Cooperation*) and *Sustainable Energy Programme* ($p>0.05$). The relationship between the predictor variables (*SEA*

Framework. General SEA. Energy Sector SEA) and the dependent variable (Local and National framework for Cooperation) is however not consistent with chance expectations ($F=5.449$, $p<0.01$) for which over a quarter (28%) of the variation is explained by the linear relationship.

Table 10.24: Rotated Matrix: Coop./Participation and Sustainable Development

	Component		
	1	2	3
SEA Framework	.848		
Improving Institutional Context		.904	
International Framework for Cooperation	.876		
Improved Context for Cooperation, Participation and Partnerships			.934
Local and National Framework for Cooperation	.630		.498
Sustainable Energy Policy	.333	.757	

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 5 iterations.

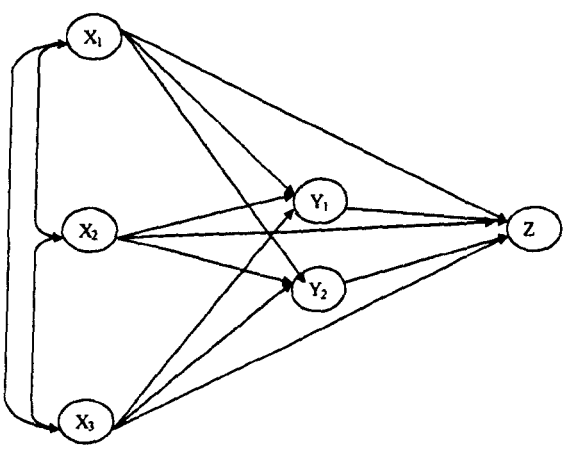
From the first factor loading, SEA Framework, Local, National and International Context for Cooperation provide the platform for Sustainable Energy Programme. Thus the hypothesis that SEA facilitates and increases participation on environmental matters and facilitates consultation between authorities found support in literature. Clark (1994:306-307) concurs with Thérivel *et al.* (1992) that SEA might encourage greater public involvement. This is partly because SEA 'can increase the scope and depth of involvement and therefore endows greater consistency, predictability and clarity, all vital requisites for effective participation.'[6] Within the context of Programmatic Environmental Impact Assessment, Webb and Sigal (1996:71) intimated that SEA is a mechanism for public involvement in the decision-making process that contributes to public acceptance of agency decisions. It also provides opportunities for federal, state and local agencies to work together so that regulators and decision makers have a basis for understanding and resolving issues related to agency activities and plans.' Citing Gardner, (989), Lawrence (1997) similarly stated: 'It can also represent a means of instituting public forum for addressing

[6] SEA can increase the scope of public participation compared with EIA. Policymaking, planning and programme implementation, by their nature, are multi-faceted and multi-layered. Each stage affects and involves different groups of stakeholders. SEA of energy policies, plans and programmes will invariably affect and involve groups of stakeholders involved in policymaking, planning and programme implementation compared with the stakeholders affected and involved in the implementation of projects.

tradeoffs and mechanism for enhancing environmental awareness [and knowledge...and that it] can contribute to local organisation, participation and democracy.'

10.4.6 Consolidating the Models

Combining the major hypotheses gives an integrated model at Model 10.4 below. The results show a significant correlation between each of the predictor variables (SEA in General, Energy Sector SEA and SEA Framework) and the dependent variable Sustainable Energy Programme on the one hand. It also indicates a strong correlation between the mediator variables (improving the existing system and improving the institutional context) and the dependent variable. While there is a strong relationship between two of the predictor variables (SEA in General and SEA Framework) and the mediator variable (improving the existing system), only predictor variable SEA Framework has a significant correlation with the second predictor variable (improving the institutional context). The study also shows a strong multicollinearity between the first, two predictor variables (SEA in General and Energy Sector SEA) and the second third variables (Energy Sector SEA and SEA Framework).



Model 10.4: Consolidated model.

Consolidating the relationships between the predictor variables and the mediator variables on the one hand, between the predictor variables and the dependent variables on the second hand, between the mediator variables and the dependent variables and the predictor and mediator variables and the dependent variable.

Table 10.25: Consolidated Model 10.4

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.513	5	1.103	9.430	.000[a]
	Residual	4.676	40	.117		
	Total	10.189	45			

a. Predictors: (Constant), Improving Institutional Context, General SEA, SEA Framework, Energy Sector SEA, Improved Systems

b. Dependent Variable: Sustainable Energy Policy

Table 10.26: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.541	.484	.3419

a. Predictors: (Constant), Improving Institutional Context, General SEA, SEA Framework, Energy Sector SEA, Improved Systems

Table 10.27: Correlations: Consolidated Model

		General SEA	Energy Sector SEA	SEA Framework	Improved Systems	Improving Institutional Context	Sustainable Energy Policy
General SEA	Pearson Correlation	1.000	.268*	-.186	-.167	-.087	-.288*
	Sig. (1-tailed)	.	.036	.108	.134	.283	.026
	N	46	46	46	46	46	46
Energy Sector SEA	Pearson Correlation	.268*	1.000	-.255*	-.143	-.231	-.261*
	Sig. (1-tailed)	.036	.	.044	.172	.061	.040
	N	46	46	46	46	46	46
SEA Framework	Pearson Correlation	-.186	-.255*	1.000	.156	.237	.457**
	Sig. (1-tailed)	.108	.044	.	.151	.057	.001
	N	46	46	46	46	46	46
Improved Systems	Pearson Correlation	-.167	-.143	.156	1.000	.485**	.613**
	Sig. (1-tailed)	.134	.172	.151	.	.000	.000
	N	46	46	46	46	46	46
Improving Institutional Context	Pearson Correlation	-.087	-.231	.237	.485**	1.000	.448**
	Sig. (1-tailed)	.283	.061	.057	.000	.	.001
	N	46	46	46	46	46	46
Sustainable Energy Policy	Pearson Correlation	-.288*	-.261*	.457**	.613**	.448**	1.000
	Sig. (1-tailed)	.026	.040	.001	.000	.001	.
	N	46	46	46	46	46	46

* Correlation is significant at the 0.05 level (1-tailed).

** Correlation is significant at the 0.01 level (1-tailed).

10.4.7 Multicollinearity and Autocorrelation

Again the existence of multicollinearity between two pairs of variables means some of the common variance of dependent variable on the independent variables is shared by another independent variable. To that extent, the independent variables are redundant in predicting the dependent variable. But there are often such relationships in the real world and using three separate variables as in this case gives a clearer meaning to the discussion than combining them into just a single variable.

10.5 Conclusion

Overall, as inferred from the size of positive measures of agreement, it can be concluded that not much Programme SEA is undertaken in the energy sector. Low level of SEA does not mean that SEA is unimportant or that there is a lack of its application. Indeed as the result indicates, scenarios, quantitative and qualitative methods are being used, among others, in forms of SEA, although to a very limited extent. There are also some energy efficiency and conservation programmes in Ghana. Moreover, the existence of a strong framework and improvement in institutional framework provide a basis for SEA in Ghana if barriers are removed. Nevertheless, as the result indicates, development programmes at this point in Ghana do not seem to integrate economic, social and environmental impacts at the same time. Neither are cumulative, indirect, synergistic and induced impacts being dealt with at programme level. Despite these limitations, the results of the study modestly support the general theory that SEA provides the framework for sustainable development. Indeed the study overwhelmingly found that SEA rendered energy programme responsive to sustainable development. SEA increased the awareness of programme makers for institutional changes needed to accommodate sustainable energy programme.

EVALUATION AND CONCLUSIONS

Evaluating the Findings

Chapter

11

Discussions and Validation

Chapter Outline

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Practical Sustainable Development

Institution and SEA

Philosophical perceptions

Sub-regional level initiative

Stakeholder participation

Validating the Findings

Large neutral responses

Confirmation of Theory

Conclusion

11 Chapter Eleven: Discussions and Validation

11.1 Introduction

The central aim of the study is to test the theory that Strategic Environmental Assessment is an effective tool for promoting sustainable development and to show how underlying theoretical, institutional, philosophical factors impinge on the relationships within the context of Ghana. Specifically, the issues addressed are framed as (i) a relationship between SEA and Sustainable Energy Policies, Plans and Programmes, (ii) a link between SEA and practical sustainability (iii) an institutional issue essential for the promotion of SEA and sustainable development (iv) a means of unifying diverse philosophies as a basis for a common energy and environmental policy (v) a need to build relationships within the subregion if common regional policies will be adopted and (vi) the need to address stakeholder participation as a basis of effective energy policies, plans and programmes. Throughout Chapters1-6, theoretical foundations of the study have been addressed. Chapter 7 addresses methodological issues while Chapters 8-10 discuss the analyses of field data at policy, plan and programme levels. In this chapter, the findings are discussed within the framework of the findings and the underlying theories. The overall findings address the six themes mentioned in Section 11.2-Section 11.7. In order to generalise and validate the findings, Section 11.8 focuses on relevant internal and external factors. Section 11.9 relates the findings to theory while the concluding remarks are addressed in Section 11.10.

11.2 Link between SEA and Sustainable Development

As the literature suggests, SEA is evolving in many countries as an important decision-making tool for sustainable development with a key strength of helping to give equal consideration to economic, social and economic objectives (Shuttleworth and Howell, 2000:70, 78). Thus the inability to use sustainability assessment tools, such as SEA, creates unequal emphasis on social, economic and environmental aspects of sustainability. This study does not suggest that equal emphasis is given to economic, social and environmental considerations across policy, plan and programme areas in the energy sector. For example, out of the 18 respondent mean

scores for sustainable energy policies in excess of 2[1], 7 are economic, 8 are environmental and 3 are social (Chapter 8). Out of the 12 respondent mean scores for sustainable energy plan in excess of 3, 8 are economic, 3 are environmental and 1 is social (Chapter 9) and similarly, out of the 12 respondent mean scores for sustainable energy programme in excess of 3, 8 are economic, 2 are environmental and 2 are social (Chapter 10). For detailed analysis, see Appendix 14.16. The study confirms the hypotheses that SEA has a significant correlation with Sustainable Energy Policy.

Thus although Ghana's Vision 2020 statement covers economic, social and environmental issues, more emphasis tends to be placed on economic parameters rather than social and environmental issues. This deduction is firmly confirmed by the respondents who could not indicate that a substantial link exists between social economic and environmental sustainabilities at policy (15.4%), plan (29.5%) and programme (17.4%) levels (See the discussions under the variable - *SEA in General* in Chapters 8-10). Moreover, the fact that the use of sustainability criteria as well as target and indicators are relegated to the background does not also seem to advance the cause of sustainable development. And as the study indicates that there is a strong link between SEA and sustainable development, weak sustainable energy policies, plans and programmes is a reflection of weak SEA in Ghana. These observations are certainly a cause for concern. This is why the introduction of SEA is encouraging. But much needs to be done to improve the quality of SEA in Ghana.

Apart from the need to maintain a balance between economic, social and environment factors of sustainability, the consistency and compatibility of policies, plans and programmes to the overall goal and vision cannot be overstressed. Bartlett (1996) partially captures this point when he suggests that there is the need

> to use all practical means and measures in a manner calculated to fulfil the social, economic and other requirements of present and future generations, economic and social rationality are not ignored or denigrated; rather their dependence on, and hope-for consistency with ecological rationality is emphasised.

[1] The benchmark used throughout in the assessment is 3 but no mean score at policy level is up to 3, so 2 is used only to illustrate the point being made.

Thus the lack of compatibility of policies to each other and to overarching goals renders policies, plans and programmes ineffective and inefficient and may even negate the positive results attained elsewhere in promoting sustainability. The study shows that in spite of the high association of energy PPP goals with Ghana's vision (31.8%-45.7%) and high goal setting in general for all levels (52.3%-67.42%) the combined effects are less than can compensate for inconsistencies and lack of priority overall and implementation in practice.

There is some further evidence of inconsistency and lack of priorities in energy-sector policies plans and programmes based on ranked mean scores for the variables sustainable energy policies, plans and programmes in descending order (Appendix 14.15). The results show no consistency in prioritisation. For instance, the first fourth policy level priorities are private investment (economic), reducing per capita energy consumption (environmental), limiting unemployment (social) and sense of community and connectedness (social) while the first fourth plan level priorities are sustaining economic growth (economics), reducing inflation (economics), cost recovery (economics) and increasing the supply of services (economics). The result for the same number of programme level variables is sustaining economic growth (economics), reducing inflation (economics), cost recovery (economics) and private investment (economics). Although sustainable plan and programme seem to be at tandem with each other in terms of more emphasis on economic concerns for the first few sub-variables, they are inconsistent for the rest of the 20 sub-variables. When the other 20 responses are analysed for all the three levels of data, the results show similar inconsistency (See Appendix 14.15 for details). If policies are truly filtering into lower tier plans and programmes, one will expect near consistency in priority but as the results indicate that is not the case.[2] This highlights an important assertion made in the SEA literature that SEA is a tool for instilling consistency and prioritisation into policies, plans and programmes.

This observation is further buttressed by the fact that overall, policies, plans and programmes are not sufficiently tiered and neither are assessments proactive. Indeed

[2] This assertion needs a further qualification. While policies are more likely to reflect national level concerns, programmes are likely to reflect local level concerns. Nevertheless, in cases where policies are specifically tiered to generate local level development actions, there is likely to be a general trend in prioritisation, even if the correlations between tiers of priorities are not very strong.

as the result indicates, not very substantial tiering has occurred in energy sector policies, (12.8%) plans (36.4%) and programmes (26.1%). The fact that environmental impacts of energy policies, plans and programmes tend to be more reactively assessed rather than being proactively approached (2.6% to 27.3%), means that prioritisation and consistency could be lacking in energy policy, plan and programme.

11.3 Practical Sustainable Development

As argued in the first chapter, the relatively early adoption of EIA in Ghana (1974), and the existence of law and policy on energy efficiency and conservation are meaningless unless they are translated into practical demonstration of sustainability and reflected in the quality of environmental assessment in Ghana. Indeed, the study shows some positive things happening in Ghana. These include the existence of Ghana's Vision 2020; written energy policies, plans and programmes; energy efficiency and conservation issues, highlighted in legislation and through public-private sector initiatives. The creation of energy funds for the promotion of energy efficiency and conversation under the Energy Commission Act 1999 was typical. Besides, the compliance of proponents with project EIA requirements and the Ghana Energy Foundation's demonstrative and education programmes deserve some applause.

For example, the Energy Foundation's educational programmes have led to the use of energy efficient light bulbs in Ghana on a large scale (EF, 2000). Nevertheless, the adverse effects of second-hand appliances, including fridge freezers, electric irons, electric ovens, cookers, sound systems, air conditioners have not been tackled. In the study, respondents who valued the reduction in the importation of second-hand vehicles or appliances are fewer than those who do not favour such a policy (2.6% vs. 56.4%) plan (25% vs.56.8%) and programme (23.9% vs. 58.7%). Ghana has to do more to demonstrate sustainability in practice.

Even so, valuing environmentally benign PPPs is meaningless unless they are backed by a culture of political will, track record of past implementation strategies and the willingness to commit budgets to environmental issues. In this research, the level of political will, track record of policy implementation and budgetary allocation for

environmental issues gauged by the respondents across policy, planning and programme areas are low (7.7%-43.2%). But since expert reports are useful in informing political decision, elements of good practice SEA such as direction of change, response indicators and quantifying targets applied in SEA are helpful in providing a more sustainable basis for political decisions. The depth to which practical parameters such as direction of change, response indicators, quantifying targets take centre stages vary from policy level (2.6%-5.1%), through plan level (27.3%-45.5%) to programme level (19.6%-26.1%). These levels, particularly for policies and programmes, are not too encouraging.

Similarly, the assessment of indirect impacts, for instance, which the law makes explicit, is not significant for policies (0%) and plans (13%) although slightly moderate for energy programmes (40.9%). Other considerations fundamental to practical sustainability such as establishing links between SEA to PPP, making PPP objectives more explicit, improving and/or removing contradictions as well as changing PPP as a result of SEAs are yet to influence SEA in Ghana significantly at policy (0%-15.4%), plan (15.9%-38.6%) and programme (15.2%-26.1%) levels. These elements will not automatically turn policies, plans and programmes along sustainable paths; nevertheless, they will increase the understanding, knowledge of the issue and compel some positive actions from all stakeholders. The study confirms the hypothesis that addressing cumulative, indirect, induced and synergistic impacts; making changes to policies as a result of SEA; and making improvement to institutions are ultimately necessary to deliver sustainable energy policies, plans and programmes.[3]

11.4 Institutions and SEA

It has been contended in the first chapter and throughout the analysis that the effectiveness of environmental assessment is predicated on a sound legal, institutional and policy framework influenced by underlying environmental

[3] If the scores for the independent and dependent variables are low, the correlation between them will be high and statistically significant. Similarly, if the values or scores for the independent and dependent variables are high, the correlation between them will be high and statistically significant. Nevertheless, if the scores for the independent and dependent variables vary in size (i.e. high – low or low – high), there will be no correlation. A strong correlation throughout these analyses indicates that if cumulative, indirect, induced and synergistic impacts as well as changes to policy are given a weak treatment, weak sustainable energy policies, plans and programmes will result. This does not disconfirm the theory. Thus the study is essentially about the relationship between the levels of policy, plan and programme SEA and the level of sustainable development.

philosophy without which there will be barriers to effective SEA. Indeed as Hazell and Benevides (2000:66) note, a legal and institutional framework improves compliance with SEA rules across government departments, as well as improving the quality of SEAs. Within the context of SEA, hierarchical structures and/or institutions amenable to integration of policies, plans and programmes cannot be overemphasised. The extent to which coordination, participation and partnership work within institutions also depend on underlying perceptions and philosophies.

The study reveals that institutions are essential not only in the implementation of policies, plans and programmes but also in contributing to sustainable energy policies, plans and programmes. The tenor of the discussion on institutional models in Chapter 6 is that although hierarchical/cascade structures are effective for coordination, it is also quite feasible to achieve coordination under thematic and cross-sectional models when agencies identify with hierarchal structures and therefore are able to influence decisions top-down. For, example, although the EPA is not hierarchically structured over other government and local level institutions, its association with institutions with hierarchies such as the NDPC, the Lands Commission, the Department of Town and Country Planning and to investors in the energy sector and other developers is advantageous. Because of the permitting services the EPA provides, most investors and developers may perhaps see the EPA as a partner in development.[4] The NDPC is structured in terms of PPP making more hierarchically, relates legally to all sectors of the economy through its sectoral functions and cross-sectoral planning groups. The NDPC is also an embodiment of all three forms of institutional models-cascade, sectoral and thematic and therefore stands a better chance to coordinate other institutions, build partnerships and capacity in the area of SEA. It is however not a service provider to investors and developers like the EPA, the Lands Commission and the Department of Town and Country Planning.

Other institutions that have links with investors in the private sector are good complements in terms of a broader appeal to the private sector. This is why the energy sector institutions as strategic business units within the framework of public-

[4] They could as well see them as unavoidable obstacles or bottlenecks; but this presumption needs further investigation.

private partnerships are essential and the representation of the Energy Commission, the Ghana National Petroleum Corporation, the Tema Oil Refinery, the Volta River Authority and the Electricity Company of Ghana, on a cross sectoral planning groups is helpful. Again since the EPA issues environmental permits for the energy sector operations, while the NDPC coordinates their broad policies, the EPA and the NDPC are joint and complementary institutions through which strategic and project level environmental assessments are carried out in the energy sector. Until capacity for SEA is developed within the NDPC, the EPA will monitor strategic EA while the NDPC coordinates strategic planning. Together the expertise of these two institutions and their links with energy/private sector institutions become a useful basis for coordinating PPP and integrating SEA into energy sector PPPs. By their greater association with the private sector, energy sector institutions can bring private sector expertise to bear on SEA and expand the scope of participation beyond government institutions. Interestingly, as the results of the study shows, substantial roles for the EPA and the NDPC in public sector SEAs are advocated by over 50% of the respondents apart from the EPA's leading role in the private sector[5].

This is the context within which the conclusions arrived at in Chapter 8 are relevant to the effect that (a) a hierarchically structured institution such as the NDPC offers the best opportunity for integration of SEA into agencies subject to the provision of conditions for top-down approach to implementation, amenability of institutions to hierarchy/integration and economic basis of institutionalism; (b) the EPA can exert considerable influence on the public sector in respect of SEA subject to the provision of the enabling environment for top-down approach to implementation and the EPA begins with institutions amenable to hierarchy and integration, (c) public-public partnerships provided a plausible and tangible framework for both the EPA and the NDPC to jointly work together to implement SEA and (d) an empowered the NDPC can provide the framework for changing unimproved implementation structures into implementable ones.

[5] See the analysis of the variable-improving Institutional Context at all the levels

In fact there is no guarantee that the apparent advantages can be translated into effect. The respondents, however, indicate that there is a clear legal requirement, responsibility, accountability, structure and written documents for policy, plans and programmes. These strong points can form the basis for responsible environmental action. This perception of framework and responsibility for SEA is further buttressed by the deductions from sociological, political and economic institutionalism. For example, based on functionalist (sociological) and political institutionalism, the study shows that there is the willingness to adopt, promote, embrace, and integrate SEA into establishments at all levels (26% and 63.6%). For moderate to high economic scores for institutionalist sub-variables at programme and plan levels (30.4%-56%), there is the willingness to work not only on the basis of public-public and/or public-private partnerships but also on the basis of incorporating expert units, and infusing performance indicators.

Based on the application of the concept of economic institutionalism in the past, the erstwhile Lands and Forestry Departments were incorporated into the Lands Commission and the Forestry Commission as expert units so that land and natural resource management can benefit from expertise resources and networks created by the defunct departments. Since organisations that are not cohesive enough cannot work at a strategic level, existing institutions with identical and duplicated functions stand a better chance to be efficient if they are merged or incorporated into another one (Clark, 2000:23). The Department of Town and Country Planning and the NDPC are likely to benefit from their fusion on the basis of economic institutionalism and this will not only be economic and political rationality but also ecological rationality. This is not to say that all institutions be merged. Indeed no such suggestion is made of the energy institutions. Because as Bartlett (1998) strongly argues, in the context of NEPA,

> Rather than attempt to achieve ecological rationality through directed reorganisation, dictated resources redistribution, or the promulgation of sweeping detailed rules and standards, the designer of NEPA sought to change the procedure used to arrive at and to justify agency choices. Decisions would be affected not only because balances of political influence will be shifted [and] not only because a different set of incentives would henceforth bear on bureaucratic decisionmakers but also because a new way of thinking would thereafter be required of bureaucratic agents.

Nevertheless to infuse ecological rationality into institutions in Ghana, political rationality is essential. Openness to economic institutionalism also supports the government's open market policy of transforming energy institutions into strategic business units. Moreover, the fact that these transformed institutions can co-exist with purely public sector institution such as the NDPC and the EPA in partnership in the management of the environment gives credence to the fact that mix management strategies can be used with adaptive capacity. Fortunately, there is also the evidence that institutional capacity is emerging in SEA evinced by the results of this study. Experience, institution capacity and methods for assessment exists at policy (2.6%-12.8%), plan and programme (52.2%-68.2%) levels although EIA based methodology is more pronounced than a distinctive SEA based approach for policy (12.8% vs. 5.1%) plan (56.8% vs. 38.6%) and programme (50% vs. 32.6%) SEAs.

This result indicates that legal and institutional, political context constantly being improved provide the springboard for local and international cooperation and partnership in the development of sustainable energy policies, plans and programmes. This context is also essential for implementation. Because SEA feeds forward into institutions, it facilitates and increases participation on environmental matters and facilitates consultation between authorities. Hierarchically structured institutions and amenability to hierarchy and integration promote effective implementation of SEA and sustainable development. Removal of hindrances/political interference from and empowerment of implementing agencies quickens coordination and enforcement. It also promotes effective integration of SEA in PPP making process.

11.5 Philosophical perceptions

In the first chapter, it was contended that the philosophical perceptions held by individuals and nations influence approaches to the environment. The more uniformly the embedding environmental concepts could be held throughout a society, the better are the chances for policies to succeed. Thus the study sees uniformity in beliefs essential for common environmental policies, plans and programmes. One source of Ghanaian belief derives from traditional religion.

As the paper discusses in the second chapter, in Ghana, like any sub-Saharan African country, the traditional beliefs are based on ecocentric, anthropocentric and homocentric[6] ethics. Man is considered a friend, the centre, (not a master) of the universe from which he derives physical, mystical and supernatural benefits. He has to live in harmony with the universe, obeying the laws of natural, moral and mystical order. Man is also expected to prevent the pollution of air and water, and the destruction of forests, land, animals, trees, plants and useful insects. He also preserves nature and uses it wisely and mercifully. Thus higher beliefs in nature and the place of human beings in the environment of nature inspire the ethics that govern human behaviour towards the environment. The limitations of the Ghanaian traditional belief are anchored to a lack of scientific basis of explanation and its secrecy.

Apart from traditional religion, foreign religions and colonialism, urbanisation, modernisation, industrialisation, globalisation and constitutional rule have created a diversity of opinions among the people of Ghana. Indeed as discussed in the third chapter, the constitution of Ghana espouses a technocentric philosophy supported by its technological and market oriented Vision 2020. The question that arises is whether these influences unify or disperse Ghanaian environmentalism. Based on the results of the West African Survey discussed in Chapter 8, the strongest leaning in the subregion is towards moderate technocentrism (54.6%) compared with moderate ecocentrism (13.6%). A smaller proportion even shows extreme technocentric tendencies (31.8%) compared extreme ecocentrism (0%). Again, while the responses show a general existence of a framing and environmental agenda setting context for policy (10.3% - 15.4%), plan and programme (52.2% -54.5%) level decisions, it is likely that privatisation and market reforms will take the centre stage for a long time yet. This is because Ghana has been a beneficiary of the World Bank assistance since April 1983 and as a consequence has been influenced by the World Bank economic and environmental agenda. The main direction of that agenda was economic reforms summarised by the Bank as follows:

[6] A homocentric ethic sets the fulfilment of human needs as a priority but gives full consideration to non-human nature in the process.

> The central objective was to help Ghana adopt and implement an adjustment agenda[7] largely keeping with the tenets of stabilisation, liberalisation and market friendly policies as advocated in particular Bank's *World Development Report 1991*. The IMF and World Bank policies... put emphasis on exchange rate rationalization, (geared to restoring export competitiveness and including rapid growth in non-traditional exports); fiscal discipline, tax and tariff reform (geared to improve incentives to production, broadening the tax base, and improving the efficiency while at the same time retaining equity objectives); price and trade liberalisation; deregulation, legal reforms and measures to secure property rights, promote competition and stimulate private investment (including foreign direct investment), privatisation and reform of state enterprises; and financial liberalization. This agenda of reform geared to getting the balances, prices, and incentives right dominated the Bank's (and IMF's) lending conditionalities' The World bank (1996:40-41).

Open market agenda is not without negative effects. Regarding the downside to privatisation, Shramm (2000:102) notes:

> Both positive and negative environmental effects are possible from economic shifts. Expansion of economic activity may result in more pollution and resource use. Conversely, trade liberalization may strengthen incentives for efficient resource use (e.g. removing subsidies that contribute to resource waste). Realising environmental gains from price corrections however is not automatic. Potential benefits from macroeconomic policy reform often go unrealised because price corrections are not accompanied by complementary policy and institutional reform

Furthermore, the evolution of Ghanaian environmentalism traced through legal provisions from the 1970s shows the shifting emphasis from the term 'environment' to 'environmental assessment' owing to constant framing of the terms by papers, environmental managers, NGOs, academics and practitioners. It is no wonder that the impression of a substantial proportion of respondents is that major projects are

[7] As the World Bank (1996) reviewed Ghana development path in the 1990s, it traced the extent to which it was substantially responsible for its agenda. The World Bank's (1981) publication *Accelerated development in Sub Saharan Africa: Agenda for Action* set the agenda for the 1980s. The Agendas of the 1990s for Ghana contained in Country Strategy Paper (CSP) did contain measures to address 'environmental issues that were seen to ultimately determine the economic and social sustainability of the reform programme. As in other cases, however, no specific performance criteria or targets were established'. They also include steps to reduce uneconomic subsidy on water, electricity and transport.' The Bank's assistance strategy for the period 1983-93 is embedded in many strategy-related documents, including business plans, annual country assistance management systems (CAM) statements of objectives country programs and budget papers, sectoral strategy papers and policy framework papers among many others'

being assessed. The implication is that policies, plans and programmes along the lines of moderate technocentrism and market economy coloured by homocentric ethics are likely to be accepted by many Ghanaians. These observations together with the openness to integration in respect of assessment revealed in institutional analysis above provide an enabling environment for a unified policy. Context and unified philosophical perspective are essential for a more effective working of institutions to deliver sustainable energy policies, plans and programmes.

11.6 Sub-regional level initiative

In theory, environmental compliance in terms of pollution, mitigation and monitoring costs, increase the marginal cost of production. If compliance means investment in productive efficiency, then short-term high productive costs will be translated into long-term savings through efficiency. Thus, although expensive in the short-term, improvement in productive efficiency results in long-term benefits. A country with stricter environmental laws than others incurs high marginal productive than others in the short-term. Since investors think in terms of short-term payback periods, there must be other short-term considerations to encourage compliance. These considerations include strategic advantage and the desire to act responsibly. Ghana, in comparison with other nations in the sub-region, appears to be ahead in term of economic reforms and environmental assessment law and practice. The study finds that while cost savings by industry has been a factor, Ghana also enjoys some strategic advantages in terms of donor support and funding. For instance, the World Bank has projected Ghana as the Gateway to the subregion. That means access to more technical as well as financial assistance if other World Bank conditions are met. The World Bank (1996:36) notes that 'Ghana has often been cited by senior Bank managers and others as an African success case insofar as it sustained its reform program for more than a decade.' The Bank furthermore, expressed Ghana strategic advantage as follows:

> The 1990 country strategy paper was the first CSP for Ghana. By that time, Ghana had attained the status of a model client. In the Banks annual county performance ratings (used to establish "norms" for IDA allocations), Ghana had received very high ratings for several years. This was reflected in an "excellence premium" in both IDA allocations and administrative resources for economic and sector work, policy dialogue, and lending (CAM resources). Thus, actual IDA allocations to Ghana in the late 1980s

> were averaging more than 5200 million per year—more than double the level requested in the 1986 CPI'. The FY88-91 country assistance management systems allocated to Ghana an average of 32 staffyears per year—more than for any African country save Nigeria. The government's ability to pursue its reform agenda during the years between 1986 and 1990 was enhanced by the fact that this period was relatively uneventful in terms of either major political changes or external shocks... Ghana ...was being extolled as a "success story" and some Bank staff and managers' thoughts flirting as to how to accelerate Ghana's growth to the level of the fast-growing countries of East Asia[8].

Historically, Ghana has often sought to play a leading role in sub-regional matters. Ghana was the first independent country; it has a stable democracy and economy and a proponent of the idea of West African Power Pool and Gas Pipeline Projects. As part of its long-term objectives Ghana's privatisation policy aims

> to ensure that the existing state-owned entities transform themselves, through public-private partnerships and joint ventures, into commercially viable Ghanaian power utilities and, in turn, assume a leadership role in the development of the proposed West Africa Power Pool (MOME, 1999).

This objective is further in recognition of the greater mutual benefits that are likely to accrue to the subregion as a whole as a result of common economic, environmental and energy policies. In this connection, Ghana has organised West Africa wide conferences on the proposed gas pipeline and power pool projects and even convened an Africa wide conference on energy. In return Ghana has received some supported from donor countries towards environmental and energy sector reforms. Formalisation of SEA is another effort to lead the subregion and to act responsibly.[9] The length to which these regional reforms could be taken is a function of existence of a credible framework for cooperation, partnership and participation in interregional economic, environmental and energy issues. From this study there is some evidence of a framework for cooperation, partnership and participation

[8] In the early 1990s, references were being made to Ghana as a prospective 'tiger' of Africa.

[9] Ghana is the only country to formalise SEA in the sub-region. By the time other countries in the sub-region formalise SEA, Ghana would have had much more experience in SEA than any other country. With the history of training other countries in the sub-region in EIA, Ghana will also be in a better position to lead in SEA. By applying environmental assessment to policies, plans and programmes, Ghana's policies, plans and programmes will incorporate more responsible environmental principles than countries limited to project EIA.

interregional economic, environmental and energy policies (7.7%-10.3%) plans and programmes (37%-43.5%). Luckily, the proposed gas pipeline and power pool projects are generally perceived to provide a strong platform for future cooperation and as the study finds, in Section 8.5.5, Ghana's strategic advantage in terms of resources and leadership coupled with the mutual benefits from the proposed gas pipeline projects provide an impetus for cooperation in other policy areas. Acknowledgement of their common needs, recognition of mutual benefits and the perception of possible benefits from the resourcefulness of others promotes cooperation in a common policy such as sustainable energy policy even if one nation has a strategic advantage over others and emerges as a natural leader (See Chapter 8, Section 8.5.5). Thus scope and context of SEA provide a springboard for local and international cooperation and partnership in the development of sustainable energy policy and on matters of common concern, mutual benefits and strategic advantages. In this connection, argument of strategic advantage is meaningless unless it is linked with the exploration of the common needs and mutual benefits of the peoples of the sub-region.

11.7 Stakeholder participation

Environmental issues transcend disciplines, organisations and nations. This is why participation is so important for effective SEA. As Therrien-Richards (2000:145-146) point out 'the selection of representatives to participate in the SEA is a key factor in the quality of the assessment. All disciplines must be represented in order to ensure that the assessment is complete' as 'public participation may serve as a tool in democratisation efforts (Shramm, 2000:102). To this view Wiseman (2000:160) concurs and stresses consensus between stakeholders as perhaps the best foundation for the initiation of SEA. But as Arntein (1969) and Wilcox (1994) suggest, efforts are required to move stakeholder attitude from 'non-participation' to partnership and from 'informing' to 'acting together' on the participation ladder. The means by which this can be achieved is suggested elsewhere by Clark (1994), Freeman *et al.* (1996) and Mitchell *et al.* (1996) to include informing, education and communication. Monnikhof and Edelenbos (1999) employed the terms demand[10],

[10] This means finding out what stakeholders want and trying to work this up into the policy alternatives.

design[11], deal[12] and decide[13] involving meeting stakeholder needs and interests as well as involving them in problem definition and solution process while building partnerships in a win-win context. In addition, the overall framework for participation, improved implementation. democratic culture, communication and education at all levels are essential.

Fortunately as the study indicates, there is an enabling environment for participation. This is supported by respondents' opinion across all levels of this investigation that a framework for democratic structures, participation, partnership and local cooperation framework does exist (12.9%-65.9%). Notwithstanding some level of political interference (10.3%-30.4%), some progress has been made in encouraging participation and interagency cooperation (43.6%-68.2%). Nevertheless, the fact that a substantial proportion of the respondents indicated that there were unimproved implementation structure for policy (59%), plan (56.8%) and programme (37%) making, the fact that less than a tenth of the respondents (7.7%) thought there were clear legal requirement and assigned the legal responsibility when in fact there exists such a framework, may be an evidence of lack of education in that respect. Again the evidence of large neutral responses from the policy level data (Chapter 8) might be due to respondents' unfamiliarity with SEA or decision-making. It might well be that respondents were only telling the researcher what they thought the researcher wanted to know. Furthermore, the fact that a large proportion of the respondents averred that communication by environmental agencies have not improved for policy (38.5%), plan (47.7%) and programme (47.8%) level actions, is a barrier to participation. Cooperation and working on the basis of equal partnerships encourages joint action and implementation.

11.8 Validating the Findings

The goal of good research is not only to ensure that results are dependable, stable, consistent and reproducible but also lack distortions. Research also seeks to rely on

[11] This implies letting stakeholders themselves participate in the creative process of (re) designing solutions but also in (re) designing the problem statement.

[12] This is the process of looking for interests. Stakeholders can be involved (or represented) in bargaining about solution packages that aim at the highest amount of 'win-win' solutions through mitigation, combining a number of solutions for different problems and/or compensation.

[13] This involve more than the final decision. A decision process will also be strewn with smaller and larger decisions (about solutions, participants, information, research, screening and problem statement). In the larger and smaller solution, participants matter.

measuring instruments or questionnaires that truly measure phenomena under investigation. To achieve this goal, a high level of reliability and internal validity are used as a basis of evaluation and redesign.[14] While strength in reliability and internal validity are essential measures of a good research they are not sufficient to validate a research. It is equally important to establish the extent to which the findings can be relied upon and replicated under different condition and settings. This is particularly important when in a study such as this, perceptions of informants form the basis of deductions. The extent to which external factors can confirm or controvert the findings of the research, so that it can be generalised, is referred to as external validity. The generalizability of a research also establishes the strength and weakness of the research. Against this background, the following Sub-Section 11.8.1 begins by discussing the external validity of the study while Sub-Section 11.8.2 analyses the impact of large neutral responses on the findings.

11.8.1 External Validity

External validity defines representativeness or generalizability of a research. This is the ability to generalize the results of the study to persons, settings and other times (past and future) beyond the one studied. Thus the representativeness of the sample population and study location[15] as well as variable representativeness for all occasions are aspects of the problem of external validity, and thus of generalizability. Isaac and Michael (1997) cite Campbell and Stanley (1963) presenting four threats to external validity to include (i) reactive or interaction effects of testing; (ii) multiple-treatment interference, (iii) reactive effects of experimental procedures and (iv) interaction effects of selection bias and the independent variable.

Regarding the expression *reactive or interaction effect of testing*, the reference is to the use of a pilot survey or a pretest prior to administering treatment. This decreases or increases the respondents' sensitivity to the main questionnaire by alerting them on issues, problems or events that they might not ordinarily notice. Consequently these respondents may no longer be representative of the unpretested or unpiloted

[14] Internal consistency and validity measures are adopted repeatedly as measures after field testing. Until adequate scores are obtained on consistency and validity scales, the questionnaires or instrument are not useful and therefore must be redesigned and re-evaluated.
[15] This is also referred to as ecological representativeness.

population from which they came. Multiple-treatment interference occurs when the same respondents are repeatedly exposed to many research interviews or questionnaires or, in an experimental situation, are exposed to more than one treatment condition. The effects of the previous questionnaires or experimental trials are not usually erasable and this may influence a new instrument and responses; hence the findings may be generalised only to persons who experience the same sequence of treatments repeatedly. The strength of this research lies in the fact that reactive or interaction effects of testing as well as multiple-treatment interference are not likely to affect the external validity of the findings. This is because the respondents of the pilot survey are different from those of the main survey. Secondly, research in the general area of environment, environmental assessment and energy is relatively new. The research environment[16] and the respondents cannot be said to be over-researched.

The expression *interaction effects of selection bias and the independent variable* indicate that the selection of participants or items on the questionnaire can very well affect generalization of the results. This may occur when selected respondents and items on the questionnaire are not representative of the population. Variations in factors and characteristics such as socio-economic status, experience, exposure, knowledge and intelligence may affect the representativeness of a sample population. Isaac and Michael (1997) noted that although field studies are strong in realism, significance, strength of variables, theory orientation and heuristic quality, maintaining variable representativeness is not easy. The question as to whether respondents will construe the variables (such as sustainable energy policy) in the same manner as the researcher is problematic. Its weakness also stems from its non-experimental character. In an experimental study, these variables can be controlled to a large extent but in a field study they must somehow be controlled by more indirect and less satisfactory means. Another weakness is the lack of precision on the measurement of field variables. The field situation almost always has a plethora of variables and variances. In this research interaction effects of selection bias and the independent variable (representativeness of variables and sample population) could constitute a threat to external validity of this study. Although the ideal situation is to

[16] This is the location, country, neighbourhood, area, city or town where the survey or research is taking place.

achieve 100% response rate, this is not possible in practice. Indeed the response rates for this study range between 35% and 44% and even so the results are not evenly spread among all the sectors. Respondents from the environmental sector returned the largest number of questionnaires followed by respondents from the energy sector and then by the private sector. Apart from weaknesses that may relate to the respondents, the items on the questionnaire are essential. There is an unlimited number of possible combinations of constructs that can describe sustainable energy policies, plans or programmes as well as other variables.[17] While too many items on the questionnaire may impose time constraints on respondents (Waters, 1997:86),[18] too few items would also limit the reliability and validity of the instrument (See Kerlinger and Lee, 2000:671-671).[19] Thus the items used in this research cannot represent the entire universal set of all variables. To this extent, the research is limited in external validity.

The expression *reactive effects of experimental procedures* refer to the attitude of respondents as a direct result of the presence of observers, instrumentation, laboratory environment, recording equipment, filming equipment or questionnaires in a research. When participant change their normal behaviour because they are aware that they are participating in a research and that they are not in their natural setting, the validity is compromised. Reactive effects of a research on respondents take several forms: These include the 'guinea pig' effect, preamble effect, response set, interviewer effect, change in the research instrument and role selection. To the extent that one feels like a 'guinea pig' being used in a pioneering research and one feels that one must do ones best, affects the outcome of the research. It also manifests itself if the method of data collection starts trains of thought not previously characteristic of the respondents. Alternatively, an instrument or measurement process which makes respondents defensive, antagonistic, unusually cooperative or changes the respondents' attitude biases the research results.

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[17] The literature on sustainability and sustainable energy PPP, discussed in Chapter 2 and 3, is extensive. Not all the dimensions of theories can be reduced into a questionnaire for research purposes. For each of the questions on each level of questionnaires there were at least 134 questions. From the survey experience, many respondents complained the questions were many; and that they took much of their time.

[18] Waters (1997:86) argues that respondents may not even answer a long questionnaire.

[19] Content validity is undermined if the questions are so few that they do not measure the total universe of the construct or variable under examination (See Section 8.3, Chapter 8).

The preamble effect may occur when the instructions to a questionnaire induce certain attitudes in the respondents. For instance, initial 'don't know' answers in opinion surveys frequently set into motion opinion forming processes which otherwise would not have happened. Response set is a tendency of subjects to respond to questions in certain predictable ways. The acquiescence response set is a phenomenon under which respondents will more frequently endorse a positive statement than disagree with its opposite; alternatively, response set may occur when respondents prefer strong statements to moderate or inconclusive ones. The combined effect of the response set problem is to introduce some errors into the research such as over-rater, under-rater and central tendency errors. The over-rater error occurs when the respondent rates scales on the side of leniency or favourableness; the under-rater error occurs when the respondent rates scales on the side of severity or unfavourableness and central tendency error occurs when the respondent rates scales toward the middle of the scale. A change in the research instrument and differences within the interviewer over time (increasing skill, sensitivity, sophistication, fatigue, boredom, or a shifting adaptation level) that modify the interviewer's effect as a stimulus upon the respondents also limits the generalizability of the research. Another source of error is social desirability response set and the interviewer effects where one alternative of variable is more acceptable socially than another. Besides sex, age, race, manner of dress, and speech patterns or accents of the interviewer all interact with the attitudes or expectations of the respondent to influence the results. Furthermore, when a respondent assumes a role-play attitude in research, validity also decreases.

In this research factors such as 'guinea pig' effect, preamble effect, rater error and response set discussed under reactive effects of experimental procedures (the questionnaire and its influence on the respondents) are likely to limit the generalizability of the findings. This means that the existence of large neutral response in respect of policy level analysis is a weakness. Because of the presence of a larger proportion of public sector respondents than their private sector counterparts, further analysis is made in section 11.8.2 below to determine the extent to which the research could be relied upon. In addition, some external evidence was adduced beyond the perceptions of respondents to validate the fact that SEA is in fact being

undertaken and that sustainable energy policies, plans and programmes are taking place.

11.8.2 Large neutral responses

A large proportion of neutral responses may be attributed to several factors. But before exploring the possible reasons, a further analysis was carried out using cross tabulation and chi square analysis to find out the sector(s) that accounted for the largest proportion of neutral responses. The significance (χ^2), magnitude (Cramer's V), level of significance ($p<0.05$), overall measure of agreement (Kappa) between the private, energy and environmental sector respondents and their contribution to neutral responses are computed to eliminate chance expectations. The overall result indicates that the private sector responses accounted for the greatest proportion of neutral scores. The next highest proportion of contribution to neutral scores is from non-energy sector respondents; energy sector respondents contributed lower proportion of neutral scores to the results compared with non-energy sectors while the respondents from the environmental sector gave the fewest neutral scores. Specifically, in relation to the variable *SEA in General,* the result indicates that the relationship for the general trend (that the private sector accounts for the largest share of neutral responses) is not by chance (χ^2 =65.7, $p<0.001$). Concerning the variable *Energy Sector SEA* the relationships are also statistically significant (χ^2 =27.7, $p<0.001$). In relation to the variable *SEA Framework*, the relationships are not consistent with chance expectations (χ^2 =48.8, $p<0.001$). For the variable, *Improving limitations in the existing system*, the relationships violate chance expectations (χ^2 =11.7, $p<0.05$). Regarding the variable, improving *institutional framework*, the relationships are similarly statistically significant (χ^2 =136, $p<0.001$). Details of computations are shown in Appendix 14.10.

The above result indicates that because there is probably a greater understanding of SEA within the environmental sector than in other sectors, the environmental sectors account for the lowest proportion of neutral scores than the private sector. It is also probably due to the fact that fewer policies are made in the private sector than in the public sectors. Besides, there may be a small proportion of the respondents directly involved in decision-making and knowledgeable in SEA. It could well be that because SEA is relatively new in Ghana, and the respondents are unfamiliar with or

uncertain about what is being rated, there are large neutral responses. Although an assessment guide makes reference to the term SEA, the lack of explicit reference to the expression 'SEA' in the assessment laws may account for lack of knowledge in the area. Even if the interpretation of the laws is not problematic, the laws only provide for plan and programme SEA. Furthermore, protection of confidentially particularly in the energy sector, may have accounted for the presence of large neutral responses. Energy sector officials are often unwilling to divulge information they consider confidential or damaging to the reputation of the establishment. Moreover, it could well be that there are some limitations inherent in the measuring instrument (questionnaire) itself in eliciting policy-level responses. It might well be that the respondents were unfamiliar with SEA or decision-making. It was also possible that the respondents were just telling the researcher what they think he wanted to know. Overall, although the sample population is skewed more towards the public sector rather than the private sector, it does not limit the general interpretation of the level findings at least at plan and programme levels.

Notwithstanding these limitations, there is a positive development of SEA in Ghana through legal reforms and practice. Some examples and external studies have been discussed extensively in Chapter 4. These examples and studies confirm the perceptions that SEA is indeed being carried out in Ghana. While SEA under the EIA system tends to be written, SEA under the decentralised planning system does not necessarily end in written reports. It is however necessary to extend the good practice SEA[20] to the decentralised planning system. Chapter 5 has also discussed some sustainable energy PPPs to which SEA may be applied.

11.9 Confirmation of Theory

The general theory of SEA is that it is a useful tool for sustainable development through a tiered forward planning process and a more proactive approach to assessment. The study overwhelmingly found that SEA rendered energy policy very responsive to sustainable development. SEA would enable the fuller integration of energy and environmental objectives by providing a framework and boundaries for project EIA and PPPs, SEA transforms sustainability ideas into practice. Since the

[20] Good practice SEA includes written SEA reports.

variations in the causal relationships were not totally explained by the linear relationships, SEA should be viewed as a complement to other management tools in contributing to sustainable development.[21]

As reviewed in the second chapter, ecological rationality refers to processes of choice, or choice per se. As discussed in detail, it is understood in terms of substantive and functional/formal/procedural ecological rationality. Substantial ecological rationality is exhibited when a decision or action takes account of the possibilities and limitations of a given situation and reorganises it so as to produce, increase, or preserve a good-namely, the capacity, the diversity, and resilience of the biotic community, its long-term life support capability. These are choices made in the light of limits. This is an ecologically appropriate behaviour or actions, denoting the extent to which such actions are within the limits of imposed by a given conditions and constraints. For example, restrictions imposed on enterprise by policy, law or economic instrument in terms of environmental compliance affects choices made by enterprise. In the same way limitations imposed on development action due to carrying capacity considerations, or limitations imposed on assessment of lower tier actions by virtue of macro-level restriction will constrain the choice made by developers. Thus the provisions of Environmental Impact Regulation, 1999, L.I. 1652 (EIR) constitute standards of substantive ecological rationality by which development actions decisions are judged. No undertaking designated under the schedules to EIR could take place without the appropriate permit from EPA and where the undertaking is at a plan or programme level, SEA is mandatory. Thus investors cannot just carry out their undertakings without dealing with constraints imposed by EIR and industries cannot discharge pollutants without reference to constraints imposed by regulation. The size or scale of proposed undertakings determines the possibilities and limitations open to proponents. Through the process of tiering and the application of such principles as sustainable development, carrying capacity and ecological footprint, higher tier SEAs set constraint and limits for lower

[21] This study is based on an implicit *a priori* assumption that SEA is the only tool for sustainable development. The conclusions do not support this assumption. The statistical measure - coefficient of determination (R^2) did not produce a 100% result for all the three levels of analysis. Any listing of tools that have not been tested would be a mere speculation. Other management tools not explored in this study will be investigated in future studies.

tier EAs. Formal, functional or procedural rationality refers to an attribute of an action selected by choice process rather than by an attribute of the process.

Formal ecological rationality is the degree to which conduct is organised according to rationally calculable ecological principles inherent in societies, systems or organisations based on human cognitive powers. It is also manifested in organisations structured to produce, increase, or preserve some good - long-term life support capability in a consistent, dependable fashion. As a strategic level tool, in this regard, SEA focuses on strategic level view of institutions and their underlying theories and philosophies and exposes their strategic level barriers so as to present policy makers with institutional choices and changes necessary to accommodate sustainable development. EIR requires proponents of undertakings to use procedural ecological rationality in their plan, programme and project level decision-making and with the processes documented and publicised in an environmental impact statements, be it in the form of application assessment, preliminary environmental report or environmental impact assessment. The application of human cognitive powers is evinced in institutional choices.

Since ecological relationships are seldom unidirectional, linear or simple and that causal linkages are often reciprocal, indirect, multiplicative, interactive and synergistic, development actions constitute a perturbation on ecological and natural systems producing cumulative, direct, indirect and synergistic impacts. By adopting an assessment tool that critically recognises these ramifications of the ecosystem so as to addresses them through SEA, development decisions exhibit functional ecological rationality. The proposition that some institutions be structured so as to respond to ecological rationality is to subject political rationality[22] to ecological rationality. Ecological rationality, like social rationality, is perceived not only in terms of interdependencies and integration, adaptation and compatibility, but also in terms of preservation and maintenance of the non-social environment.[23] The concept

[22] Political rationality is fundamental kind of reason because it deals with preservation and improvement of decision structure, and decision structures are the source of all decisions. Unless a decision structure exists, no reasoning and no decisions are possible and the more rational a decision structure is the more rational are the decisions it produces.

[23] In the Ghanaian context, colonialism has had a negative impact on interdependence; while globalisation has had a negative impact on the physical environment (non-social environment). The concepts are therefore very relevant.

of interdependencies of systems, societies and institutions inspire cooperation, partnerships and negotiation within the context of participation. Further inspiration can be drawn from the concept of joint action and implementation as an effective mechanism for participation, partnership and cooperation that requires the identification of actors and participants, their intent, manoeuvrings and resources in order to reach an agreement between actors. Adaptability can manifest itself in terms of methodology, adaptive capacity and adaptive management discussed within the context of Ghana in Chapter 6. Considering the evolution of SEA and limitations imposed by institutional capacity, emerging SEA methodology includes the adaptation of EIA methodology, adaptation of policy analysis, and the development of distinctive SEA methodology.

An ecological perspective is one of inclusiveness, synopsis, and synthesis - the understanding of how complex parts combine to form a coherent whole. SEA, similarly, provides the framework for considering the inclusiveness, synopsis and synthesis of social, economic and environmental sustainabilities as well as diverse policies, plans and programmes of sectors. SEA also combines these complex issues and parts in a coherent and consistent manner. This is why SEA is a tool for practitioners, policy makers, planners, proponents and stakeholders for addressing contradictions, inconsistencies and incompatibility in policies at different levels. Certainly in Ghana where contradictions, inconsistencies and incompatibility in policies at different levels of policymaking, planning and programme implementation are a great concern, SEA will be very useful when fully integrated into the PPP-making processes.

With the basic assumption of institutional theory that operative norms in social life are anchored to, and form part of, particular forms of life, and that we cannot properly understand the norms in isolation from those forms, norms and philosophical assumptions underlying sociological, political and economic institutionalism are important.

11.10 Conclusion.

From the discussions above, the study shows that SEA promoted sustainable energy policies, plans and programmes both in theory and in practice. Any contribution SEA makes to promote sustainable development is nevertheless subject to effective legal

and institutional framework. Other issues such as addressing stakeholder participation, unifying diverse philosophical perspectives and building local and regional relationships as a basis for a common energy and environmental policies, plans and programmes cannot be overstressed. On the basis of the evidence adduced above, the study does not only have some strengths, it also has some limitations in terms of internal validity, and external validity. Throughout the study, it has been implied that SEA promotes sustainable development using sustainable energy policy, plan and programme as surrogates based on the perception of informants during the survey. Indeed, it has been shown that although the sample is skewed in favour of the public sector, it does not limit the outcome of the research since the private sector contribution was not very useful at least at the policy level. The weakness due to large neutral responses, which could have threatened the external validity of the study, has been limited to policy level SEA. Since the SEA regulations in Ghana cover plan and programme SEA rather than policy SEA, the relatively limited neutral responses in those two levels of analysis strengthens the outcome of the research particularly when the evidence in Ghana, such as those cited as case studies, relate to plan and programme SEA. Moreover, the existence of some local and external evidence to support the fact that some forms of SEA are taking place in Ghana supplemented by some demonstration projects strengthens the findings of the research. Indeed the success or failure of some of the findings is conditional on the assumption that at least two threats of validity do not affect the results and other two threats are minimal. To the extent that these assumptions hold, the study can be relevant to the entire Ghana and indeed to West Africa.

Chapter

12

Concluding Remarks

Chapter Outline

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12 Chapter Twelve: Concluding Remarks

12.1 Introduction

In determining the role of SEA in the development of sustainable energy policies, plans and programmes, the study has reviewed the relevant literature; analysed field data based on the energy sector in Ghana and discussed the findings. Specifically, based on the theoretical foundations of the study (Chapters1-6) and methodological issues (Chapter 7), policy, plan and programme level data have been analysed (Chapters 8-10), further discussed, validated and triangulated (Chapter 11). Before drawing the final conclusions (Chapter 12), it is necessary not only to discuss the distilled essence of the key findings of the study but also to address the extent to which the study meets the purpose and the hypotheses under consideration. It is also essential to examine the general weaknesses in the assessment framework in Ghana, the strengths and limitations of the study and key recommendations for redress. In a study such as this, it is not possible to tackle every issue; this therefore leaves gaps to be addressed in future work. This chapter therefore begins by summarising the major findings of the study, discusses how the aims of the study have been achieved and hypotheses tested; it then discusses the strengths and weaknesses of the assessment framework in Ghana as well as the limitations and strengths of research. Major recommendations are made before the study draws final conclusions and proposes future directions for further research.

12.2 Major Findings

Based on the overall research design, literature review, data analysis and discussions the study presents the findings based on the hypotheses under review. The *first hypothesis* indicates that the more SEA is generally undertaken and/or specifically undertaken in Energy Sector SEA supported by an SEA framework, the more sustainable will energy policy, plan and programme be. The study finds that although SEA within the energy sector in Ghana is essential for the delivery of sustainable energy policies, plans and programmes, it is not sufficient to deliver effective sustainable energy policies, plans and programmes unless it is complemented simultaneously by SEA generally undertaken in all other sectors set within a workable framework for SEA. The study also shows that SEA has to be

supplemented by other sustainability tools[1] for a total contribution to sustainable development.

The essence of the *second hypothesis* is the implicit assumption that the existing institutions in Ghana are not suitable for effective implementation of SEA. Thus the study proposes essentially that the more the existing institutions are improved, the better the framework for implementation. The study finds that the existing institutional framework in Ghana will not facilitate the implementation of policy, plan and programme SEA in the energy sector without the complement of a constantly improving overall legal, social, political and economic framework for SEA (For suggestions to redress this limitation, see Section 12.6). *Third,* it is hypothesised that the greater the impact of context and philosophical changes, the better the opportunity for energy sector PPP to be more sustainable. The study confirms that context[2] and philosophical changes[3] provide a common denominator for designing sustainable energy policy, plan and programme across institutions in Ghana. *Fourth,* implementation of SEA is largely predicated on a top-down institutional model. The study further finds that a hierarchically structured institution such as Ghana's NDPC offers the best opportunity for integration of SEA into agencies provided implementation gaps are tackled beginning with institutions more amenable to integration and hierarchy. Even where the institutions such as Ghana's EPA is not so hierarchically structured, public-public partnerships and cooperation on the basis of equality provide a plausible and tangible framework for them to jointly work together with other more hierarchical structured institutions to implement SEA.

Fifth, the research asserts that common need, mutual benefits, resourcefulness and strategic advantages form the basis of sub-regional cooperation, participation and partnership. The findings of the study highlight the fact that common needs such as energy security and mutual benefits such a gas pipeline project can provide a rallying

[1] Throughout the analysis, the coefficient of determination R^2 could not explain 100 % of the variations. Only a proportion of the relationships was explained. In statistical terms, therefore, SEA alone cannot be said to contribute to sustainable development. There are other tools such as EIA, Life cycle analysis and integrated environmental assessment; but these have not been investigated in this study. These belong to future investigation.

[2] Defined in this study to include agenda setting, problem definition and framing.

[3] Defined in this study to include amenability to economic, social and political institutionalism.

ground and the opportunity for a common energy policy subject to a strong political will and a framework of partnerships and cooperation. At the same time national frameworks for SEA and constantly improving institutions within the sub-region provide the springboard for local and international cooperation and partnership in the development of sustainable energy policy. Ghana's stable democracy and resources can be turned into a strategic advantage and become the springboard for its leadership role in the sub-region. *Sixth,* the study confirms the hypothesis that whereas participation is essential for effective SEA, SEA in turn facilitates consultation between authorities and increase participation on environmental matters.

In addition to the confirmation of key hypothesis, the examination of key constructs, variables and sub-variables (Chapters 8-10) reveal some elements of good practice SEA in Ghana. These elements include existing legal framework, written SEA-based environmental impact statements and the application of SEA to national and local environmental action plans. Notwithstanding these observations, SEA is just in its initial stages and the analysis chapters uncover a number of vital limitations within the assessment context of Ghana needing redress.

Another finding relates to Ghanaian environmentalism. As discussed extensively in Chapter 2, colonialism and globalisation have had some positive effects on Ghanaian environmentalism. For example, they have shifted traditional Ghanaian environmentalism away from two extreme polar positions (of ecocentrism and technocentrism) towards the centre ground to accommodate both 'development' and 'the environment.' Apart from being secretive, traditional Ghanaians maintain a sustainable livelihood, develop their traditional ecological knowledge, and show great creativity and adaptive capacity in dealing with the environment. By their strong conception of intergenerational equity and value for nature, traditional Ghanaians are, in effect, committed to strong sustainability principles. Their familiarity with the concept of control can enable them to value SEA as a tool to control lower tier developments.

Unfortunately, colonialism and globalisation are conceived to have threatened social, economic and environmental sustainability. Indeed, the traditional Ghanaian environmentalism blames colonialism and globalisation for weak community

interconnectedness, geographical dislocation, weak humanistic, and cultural values (weak social sustainability). Globalisation is blamed for over-exploitation of natural resources, environmental degradation and deforestation as well as for eroding the religious basis for conservation (weak environmental sustainability). Besides, a strong market value orientation, privatisation and structural adjustment (strong economic sustainability) are attributed to globalisation. (For details of the debate, see Sections 2.4.2-2.4.4, Chapter 2). Since there is a serious threat to social, economic and environmental dimensions of sustainability in Ghana, a strong case for SEA in Ghana is imperative.

12.3 Limitations within the SEA framework of Ghana

In this section, the imitations of Ghana's SEA framework will be discussed under the following sub-headings: guidelines and regulation, links to sustainability, tiering, links to PPP and decision making, methodology, interest groups, the roles of government, environmental, energy and energy-related sectors in general as well as those of the Environmental Protection Agency and the National Development Planning Commission. Regarding *Guidelines and regulation on SEA,* it could be said that although there is an explicit regulation on plan and programme level SEA, there is no explicit legal requirement for statutory bodies to submit SEA reports of their strategic level actions within a prescribed time frame. Besides, no guidelines, thresholds and methodology on SEA exist. That being the case, no time frames can be set for the submission of SEA reports, thereby undermining accountability, budgetary commitments, the placement of SEA seriously on the environmental agenda, and the pace of emergence of best practices SEA.

Sustainability and Tiering: Throughout the study it was observed that while there are some objectives drawn from Ghana's vision 2020 in respect of energy sector PPPs, methods and techniques for predicting and evaluating impacts and alternatives do not necessarily incorporate the principles and objectives of sustainable development. The Vision 2020 document is also not linked to the framework of long-term global conventions such as on biodiversity, climate change, and desertification. The use of sustainable objectives, targets and indicators (Pressure-State-Response) with links between economic social and environmental aspects of sustainable development are minimal and no sustainability or carrying capacity criteria have been used in the

assessments. Apart from unequal emphasis on economic, social and environmental aspects of development, there is an imbalance between the consideration of local, national and global impacts. The result shows that tiering between tiers of PPPs is poor. Besides, other impacts such as cumulative impacts, regional and global impacts are not addressed. Again, most of the PPPs' objectives lack coherence and consistency. There are therefore very weak linkages between other levels of SEA and EIA. Even if Plan SEA is tiered to cascade to project level development actions, it will be disjointed from strategic level policies, as the requirement for policy level SEA is not so obvious.

PPP and Decision Making: The structure of the NDPC, the disproportionate representation of MDAs on the NDPC's governing council compared with the private sector, and similarly the cross sectoral consultations of MDAs give the indication that PPP making process is essentially a political process which should lie outside the domain of SEA requirement particularly at the policy level. With the evidence of political interference in institutions and a poor track record of compliance, decision-making continues to be problematic. The duplication of planning functions particularly the placement of the Department of Town and Country Planning outside the NDPC as well as the assignment of EIA functions outside the planning system will not enable the expose of planners to daily demands of EIA and SEA to the extent that they see what new elements of sustainability SEA can bring to PPP. Besides, two years since Environmental Impact Assessment Regulations, 1999 (LI 1652) was passed appears to be too early to demonstrate the benefits of SEA to policy makers, politicians and planners to its universal application. Hopefully, within five to ten years, the benefits can be evident.

Interest groups: The NDPC is the main focal point for PPP making in Ghana but the process of participation in the design of strategic level work within the NDPC has been dominated by the ministries, departments and agencies (MDAs). To increase private sector interest and make public sector participation more effective has meant that there should be the assurance that outcomes of decisions will be actualised. An evidence of poor track record of implementing past suggestions is a hindrance to continuous stakeholder participation and commitment to the development of SEA.

This is why the weak track record of implementation ought to be a concern to public agencies. In addition supply of advance information, education, communication, campaigns on the process, objectives, methodology and expected outcomes for potential participants are weak.

Government: The significant findings of the study include lack of political will, political interference in the work of institutions. Section 6.4 bemoaned the absence of any mechanism to subject government policy, cabinet decisions and parliamentary bills to SEA. Though Parliament usually passes laws to create environmental functions and institutions, it is the cabinet that initiates such laws. Thus political decisions often resulting in the duplication of environmental and planning institutions are essentially the creation of governments and a means of interference. Lack of provision of sufficient resources for statutory bodies to carry out their environmental function is another weakness of government.

Environmental sector: Apart from the Ministry of Mines and Energy which has undertaken some energy conservation exercises in its building, the Ministry responsible for the environment and other agencies do not implement any serious energy conservation strategy in areas of their operations. Outside the broad statement of sectoral policies in Ghana's Vision 2020 document, there has also been a wave of policy making in a number of establishments including the National Lands Policy and the Forestry Policy. These sector policies, which have environmental implications, have not been subjected to SEA. This may be as the result of poor coordination and enforcement by the EPA or lack of expertise.

Environmental Protection Agency: The EPA is one single institution vested with the overall power on the environment. It has wide discretionary power that gives it flexibility in management. By the enactment of L.I.1652 in 1999, the stage has been set for implementing SEA by public and private institutions and establishments. It is also yet to develop detailed procedures for SEA. The lack of significant subjection of planning schemes to SEA by the Department of Town and Country Planning and Local Authorities may be symptomatic of weak enforcement power by the EPA over these institutions. Although there is a unit that oversees EIA generally, the need for a separate unit or a committee to oversee and coordinate SEA has not yet been felt.

Energy and Energy-related sector: Although there are integrated energy planning framework, energy sector reforms and the promotion of energy efficiency, SEA is not integrated into the entire energy sector PPPs. The use of scenarios by the EPA to feed some energy production permutations and implications into strategic energy policies is not widely applied to all energy sector assessments which span modern fuels (such as electricity and petroleum products) and traditional biomass fuel wood. There is neither a fully developed SEA practice to deal with energy-related (non-energy) sectors (such as housing, transport and industry). SEA expertise is also yet to develop in the energy sector.

National Development Planning Commission: Although the National Development Planning Commission Act, 1990 requires the NDPC to integrate macroeconomic, sectoral, spatial/ physical as well as environmental, social and economic aspects of development action, essential elements of SEA are not well developed to integrate these aspects. The mechanism utilised by the NDPC to prepare draft policy frameworks, which is then reviewed and finalised before planning guidelines, are issued is the CSPGs. There is however no specific sustainability or SEA led CSPG; neither is there a specific energy related CSPG. This in turn limits the capacity of the NDPC to ensure that sustainability issues are truly integrated into the planning framework. Ministries Departments and Agencies (MDAs) are represented on cross sectoral CSPGs and participate in the development of the frameworks generally coordinated by the NDPC. Nevertheless, coordination between the NDPC and the MDAs regarding the preparation of sector strategic plans is ineffective, as the NDPC is not represented at those lower tiers. Besides, District Assemblies (DAs) responsible for implementation PPPs are at no stage represented at the Cross-Sectoral Planning Groups whose output influences district level PPPs. Thus the continuity and implementation of policy beyond policymaking phase, at lower levels, are problematic.

12.4 Limitations of the research

In addition to the above limitations, this section focuses on the limitations relating to the research itself based on questionnaire design, quantitative analysis of data, standardisation of research design, limited variety of items elicited, likely

unavoidable errors and detachment from reality. *First,* by designing questionnaires that are appropriate to all respondents, the study might miss what is most appropriate to most respondents. *Second,* standardisation often seems to result in the fitting of round pegs into square holes. A set of questions may not be suited for every case and situation. They enable the researcher to see only those issues of interest to him (and not to see other important issues). In this sense surveys often appear superficial in coverage of complex topics and do not ordinarily penetrate very deeply below the surface. *Third,* quantitative analysis of data is highly statistical and does not make for easy reading by an ordinary reader. *Fourth,* it lacks variety in the variables used. For example, the data elicited are essentially in likert format. *Fifth,* a research using sampling is subject to sampling error. Other errors include Type I and Type II errors associated with hypothesis testing. Type I error occurs by rejecting a null hypothesis that is true; while Type II error occurs by not rejecting a null hypothesis that is false. These errors normally increase with limited sample size. Given the level of response rate in this study, the result can not be said to be free from these errors.

Sixth, by imposing preordained structure on phenomena and ignoring the human observer as the primary instrument of data collection, multiple realities in data are ignored. Data interpretations are likely to be nomothetic (in terms of law-like generalizations across cases) rather than idiographic (in terms of particulars in each case). In real life situations, cause and effect are interactive and inseparable. This study fails to deal with the context of social life as it fails to place the study in a natural setting. Human behaviour is best understood in its real-world context. Consequently, sensitivity and insight attached to phenomenon is lost and multiple human perspectives is lost; the research therefore fails to tap the tacit or intuitive knowledge of informants; it also fails to tap the subtleties of human interaction that can more accurately reflect the value patterns of the investigation.

The question that arises is whether given the above limitations, another approach would have been appropriate. In fact there is no research approach that is free from limitations. Not only are the alternative methods such as case studies not appropriate, they also have some inherent limitations. It is further observed that case studies have at least seven limitations in addition to eight ethical problems (Section 7.3, Chapter

7). Besides. the Ghanaian context for SEA imposes its additional limitations for case studies (Chapter 7).

More positively, the approach adopted in the study has some strong points (See Section 12.5 below). Thus under the current circumstances and assumptions; and on the basis of the purpose of the study (hypothesis testing); as well as the ontological, epistemological, axiological and methodological arguments advanced (Section 7.2, Chapter 7); the best approach to this research is the quantitative method.

12.5 Strengths of the Study

Notwithstanding these limitations, quantitative methodology has tremendous strengths in research, which more than compensate for the limitations. The strengths of this study are in terms economy[4], amount of data that can be collected, and the potential chance of applying data collection instrument to sample large populations in the future. A great deal of information, which is broad brush in nature, has been obtained from the population investigated. A carefully selected sample with standardised questionnaires offers the possibility of making refined descriptive assertions about a population. For example, in this study, a wide range of descriptive data about elements of SEA in general, or specific to the energy sector across policy, plan and programme levels have been collected in addition to the use of mean score to test hypotheses. In fact over 20 characteristics of each of the 6 variables studied at each level have been described with ease, allowing for a considerable flexibility in the analysis. Standardisation also means that it is easy and cheap to replicate the research across many more sectors and geographical areas within the sub-region. It is a relatively cheap exercise compared with other methods such as postal and telephone survey. The three levels of analysis have also been standardised following the same format thereby making comparison across levels easy as well as making broad application of the findings easy. Being a quantitative research, the strength of this research also lies in its quick analysis and the amenability of the data to the use of statistical tools such Microsoft excel and SPSS. Other tools for gauging reliability, internal validity and hypothesis testing have been demonstrated. For example because of the use of multiple regression analysis, several variables are analysed

[4] The cost of undertaking a survey research is relatively cheaper than a long-term qualitative case studies, for example.

simultaneously. Consequently, it can be easily adapted to extensive research where large data or variables are to be analysed.

It is a comprehensive research inasmuch as it takes all aspects of strategic environmental issues (i.e. policies, plans and programmes) on board and confirms all hypotheses. Moreover it is based on a strong theoretical framework. Not only does the study address sustainability and related theories such as ecological rationality; it also explores African as well as Ghanaian ramifications of environmental thinking allowing for comparison to be drawn between the third world and western perspectives of environmentalism. In addition the study reviews the concepts of energy policies, plans and programmes and strategic environmental assessment and their links to ecological rationality and sustainable development. It also assesses the past role of EIA as well as SEA in Ghana, discusses the constraints and opportunities of the legal and institutional framework for energy-sector SEA in Ghana, examines the scope for the transferability of techniques such as SEA in different politico-cultural contexts and explored how all types of SEAs might be used to improve energy-sector policymaking at policy, programme and plan levels. The study also reveals some gaps needed to be addressed in future research.

12.6 Recommendations

SEA Guidelines, Regulation and Methodology: Since most people do not consider the requirement for Policy SEA to be legally explicit, it is recommended that legal reforms address it as early as possible. Such legal provision could require that annual or periodic assessment and reviews of impacts of sectoral or departmental policies and parliamentary bills be put in place. Such provisions should also set time frames within which sectoral EISs should be submitted thereby building accountability into the process, ensuring that SEA is placed on the agenda, forcing budgetary commitments to SEA and creating the enabling environment for best practices to emerge.

Links to Sustainability: There is the need to link Ghana's Vision 2020 to global conventions such as on biodiversity, climate change and desertification. The EPA and the NDPC should jointly develop sustainability indicators together with

stakeholders. The development of SEA methodology should take account of targets and indicators (Pressure-State-Response). The use of compatibility matrices should also be explored to ensure consistency between economic social and environmental aspects of development.

Methodology: Appropriate and simple transferable techniques are needed for the development of visions. Methods for predicting impacts, evaluating impact and alternatives should be established. This could include the issue of scenarios (forecasting) of the future to provide alternatives or fallbacks based on scenario analysis. Techniques would also have to be designed to link objectives, targets and indicators to sustainability criteria and carrying capacity in the evaluation process. Besides, other impacts such as cumulative impacts, regional and global impacts should be addressed. Efforts should also be made and capacity developed in adopting good practices in the overall assessment framework. While weak tiering can be addressed through the promotion of SEA methodology that examines the compatibility between tiers of PPP in relation to objectives, targets and indicators, lack of legal backing for Policy SEA could only be addressed by legal reform and voluntary SEA. This study concurs with Partidário and Moura's (2001:31) recommendation that:

> sustainability criteria for decision-making is established and included in key decision-making points; clear sustainability targets are established that satisfy sustainability criteria; flexible mechanisms are introduced to ensure that before planning and decision-making takes place, policy-makers and other stakeholders adapt the sustainability criteria and targets to their correspondent level of decision (local, regional/state, global) and mechanisms are introduced to highlight situations that go beyond the thresholds defined by the sustainability criteria and targets.

PPP and Decision Making: It is recommended that PPP making process should involve more private sector participation. Politicians may have to limit (if not stop) their interference in the work of officials charged with statutory responsibility in respect of the environment. The possibility of re-examining the re-location of the Department of Town and Country Planning within the planning and environmental set-ups is necessary if efficiency is to be ensured. To demonstrate the importance of compliance, the institutions charged with the environment should demonstrate their

care for the environment by taking responsible action in promoting energy conservation and efficiency in their buildings and the vehicles they use. They could also undertake SEA of their sectoral PPPs. Key institutions may have to intensify education on SEA, provide information and guidelines on SEA. Many forms of SEA (from incremental, stapled, concurrent and holistic models) should be encouraged and demonstrated among both government institutions and private sectors alike until full integration is achieved.

Interest groups: The reforms in the energy sector should be used as the basis for broadening the scope of stakeholder participation particularly in the private sector if the ownership of and commitment to the Vision are to be achieved. Government and government agencies charged with the responsibility for the environment should provide the assurance and the enabling environment that ensures that outcomes are actualised to enhance future commitment. In addition, information, education and communication, campaigns on the process, objectives, methodology and expected outcomes for all potential participants are necessary to promote participation overall.

Government: Government should limit unnecessary interference in the work of institutions, support frontline institutions, and provide administrative mechanism to implement SEA. Government could also demonstrate its commitment by subjecting parliamentary bills to SEA. Government decision also requires more openness and balancing between the issues considered confidential and those, which can come into the public domain. Besides, government has to work in concert with lawmakers to address institutional areas where there is duplication of planning and environmental functions. Governments and lawmakers could avoid the symbolic nature of some policies and laws. It also needs to match legal reforms with resources at the levels of implementation.

Environmental Sector Institutions: To ensure greater responsibility, environmental values and accountability across government departments and in different tiers, there is the need to establish the institutional and administrative frameworks within the EPA and/or the NDPC to oversee the SEA process and coordinate it. Such a body should have sufficient weight that it could make inputs into other sectors and spheres of government. Such a unit or body should also be responsible not only for technical

assessments but for understanding and overseeing the need for SEA development and deployment. It should also monitor and evaluate the application of SEA in sectors and encourage self review by sectors in respect of their application of SEA. undertake external audits of government-wide SEA and conduct and/or commission empirical research to compare and evaluate case studies. This body could also undertake quality studies to ensure that basic standards are maintained.

More radically, the engagement of other environmental and planning institutions in SEA may require political leadership from the highest level to coordinate such sectors on the matters of the environment. The designation of a high official to be responsible for its coordination will enable SEA to be placed on a high agenda. This is because in reality, not much is likely to be achieved as long as SEA remains an afterthought to EA or PPP making with sponsorship intended partly to satisfy public relations. Attitudes towards SEA could change, but SEA would still be struggling against a strong institutional imbalance. Though the Department of Town and Country Planning may have limitations, the position of its head office within the Ministry responsible for the environment can be used as an opportunity to disseminate sustainability ideas from its strategic position to the grass root levels if it is seriously involved in SEA work at policy level. Other sectors such as Agriculture, Land, Forestry, Mining and Tourism development may have to be engaged by the Ministry responsible for the environment and the EPA on matters of SEA.

Environmental Protection Agency: While the EPA may not shirk its responsibility in enforcing SEA regulations, it might be difficult to exercise immediately control over some powerful departments of state. The EPA can use its sector Ministry to educate and influence such departments. The EPA should provide a flexible and innovative framework for the development of guidelines, thresholds and methodology to develop. It has to forge greater ties with experts, practitioners to develop procedures backed by vigorous education, information, coordination, dialogue and negotiations. Measures by the EPA should also include quality studies put in place jointly with the Ghana Branch of IAIA and other experts to ensure that basic standards are maintained. In addition, the EPA could encourage continuous dialogue with politicians, by which the implications of their inaction in respect environmental problems are better appreciated so that they can be willing politically to deal with

practical sustainability issues. This dialogue should be supported by technical reports that can capture the attention of politicians. In addition, circulars, publications in newspaper columns, will go a long way to set the future agenda for SEA and related environmental management tools. But this has to be done with the involvement of stakeholders, academics, national and international environmental NGOs as well with the mass media if SEA and other related tools will take a centre stage in Ghana.

Energy and Energy-related sector: Because of the diversity of energy types and institutions, institutions such as the Energy Commission needs to take on a significant coordinating role for the activities and PPPs across sectors and within sectors and in concert institutions such as the Energy Foundation and the EPA on matters relating to SEA and energy sector PPPs. It can also set up an expert unit to coordinate the environmental aspects of its sectoral actions. Considering the sustainability orientation of SEA and having regard to the existing integrated energy planning framework, it is also essential that new procedures, methods and techniques tailored to the needs of the sector be developed in cooperation with the EPA and the NDPC. The opening up of the sector to private participation should be used as an opportunity for the sector to expand the scope for participation. To promote SEA in this way targets and incentives could also be used to benchmark and assess the take up of good practice SEA supported by periodic training schemes for departments on methods and procedures. In addition such regulatory utility such as the PURC and the EC could make SEA as a precondition for new licenses and for the renewal of licenses. Energy sector institutions should begin to undertake SEA of existing energy technologies as well as improvements being initiated through Energy Foundation programmes. The experience gained from such exercises can form the basis of future assessments particularly in view of the future implication of the Kyoto Protocol for the developing countries in relation to clean technology transfers.

National Development Planning Commission (NDPC): The NDPC would have to closely work with stakeholders and the EPA to develop simple and workable techniques for integrating macroeconomic, sectoral, spatial/physical, and, as well as integrating environment, social and economic aspects of development. There is the need for a specific sustainability or SEA led CSPG to be established. This CSPG would have to explore means of ensuring coordination between the NDPC and

MDAs regarding the preparation of sector strategic plans. The NDPC would also have to design a means by which implementation gap between it and the lower tier local authority PPPs are coordinated and integrated. The capacity, feasibility and resources availability for lower tier local authorities needs to be balanced by the NDPC in designing the scope of PPPs.

Economic Community of West African States (ECOWAS): Building on Ghana's strategic advantage, common needs and mutual benefits to be derived from cooperation, the Ministry responsible for Economic Planning and Regional Integration should have to work with the Ministry of Foreign Affairs, undertake the analysis and evaluation of the legal and institutional, policy and decision frameworks of member states as a basis of harmonising environmental and energy policy frameworks. Common strategies, procedures, techniques and methods should be exchanged among member states drawing inspiration from areas such as the EU. Another focus of sub-regional initiative should address institutional capacity and transboundary impacts.

Ghanaian Environmentalism: The contribution of the traditional Ghanaians to sustainable livelihood; their creativity and adaptive capacity; their traditional ecological knowledge and their tendency to be secretive calls for their active involvement through public participation (Gyeke, 1997; Dzobo, 1996). Then their wealth of knowledge, experience, creative talents and skills could be tapped. Lessons from the post-colonialist critique also mean that if policy makers wish to understand reality from traditional Ghanaian perspectives, they must include local people in decision-making. Lessons from the post-colonialist critique, which indicate the use of oral communication, imply that environmental problems and solutions could be framed from the perspectives of the local people; education on environmental issues could take the form of stories and plays rather than written brochures. It is also pertinent to remark that while written SEA reports are invaluable for the development of good practice SEA, emphasis on written SEA reports may not always be desirable in Ghana. After all, Partidario (1996) argues that it is the process of SEA that is important and not the product (See Section 4.8, Chapter 4).

The erosion of religious basis for conservation means that policy-makers should canvass other bases for the conservation of critical, irreversible and units of significance. These bases could include scientific or environmental capital[5] basis for conservation. The effects of geographical dislocation created by colonialism calls for international co-operation. If transboundary impact assessment is taken seriously, it will also encourage international co-operation. That is why other programmes, such as the West African Pipeline Programme, are useful in promoting co-operation (See Sections 1.2 and 8.4). Apart from addressing transboundary impacts, the effects of globalisation discussed in Section 2.4.3 also imply that the scope of SEA should be expanded to address issues such as privatisation and the World Bank structural adjustment programmes.

12.7 Conclusion

It is hoped that if these recommendations are implemented, positive aspects of Ghanaian environmentalism will be applied to SEA and SEA will be widely carried out in Ghana. Moreover, it will also enable good to excellent practice to develop; and cumulative, additive, synergistic impacts, ancillary impacts, induced, indirect, secondary, time-crowded or space-crowded, non-project, threshold/saturation, regional and global impacts will be dealt with. Then environmental solutions to strategic level decisions will be addressed proactively. Apart from the strengthening of institutions, cooperation, partnership and participation will improve and where cooperation extends beyond national borders, good neighbourliness with countries in the sub-region, will be strengthened. Sustainability will be evident not only in energy policies, plans and programmes, but also in other sectors of the economy. Since sustainable energy policies, plans and programmes give rise to efficiency and cost savings, benefits in terms of extra savings can be channelled into RD and D and to improve institutional capacity necessary for renewable energy resource base. Then the efficiency in the production and use of energy resources will also improve. In the long run, energy supply security will improve and living standards will also be affected if gains are translated into more environmental benign development action that puts people into jobs. Furthermore, there will be a coherent legal and economic framework to attract private investment and strong institutional capacity to transform

[5] See Section 2.6.

the energy sector in accordance with the aspirations of Ghana Vision 2020. Environmental consequences of energy production and use will be tackled. Besides, deforestation and desertification as well contribution CO_2 and other anthropogenic gases from burning wood is likely to be curtailed. Overall, local, national and global environment will be less polluted.

12.8 Further Research

The study is not without gaps. It does not focus on specific policy areas in depth such as energy efficiency or renewable energy. It is not a comparative study on sub-regional EIA/SEA initiatives in relation to energy and environmental issues. It also fails to address transboundary issues prior to and after full regional integration. Ghana's legal framework generally and more specifically in relation to EIA, SEA and energy shares a lot in common the UK (legal system in general), the USA (energy policy and the EPA system) and the EU (scope of SEA). The research is not a comparative study against the systems of SEA in the UK, the USA and the EU. SEA implication for technological evolution in the energy sector and its future implications in relation to clean technology transfer under the Kyoto Protocol could not be dealt with. Links with strategic planning and SEA, quality and effectiveness issues in SEA have also not been tackled. It is not a research to design models and hands-on tools for assessment. It does not explore qualitatively specific experiences of actors in the environmental and energy sectors. Besides, its focus is limited to only the energy sector. Based on these research gaps, future research will address the issues discussed as follows.

- ***Comparative studies:*** Future study will focus on comparative studies of environmental and energy policies, plans and programmes of the West African sub-region to identify regional commonalities and priorities for SEA. Such studies will also explore the legal and institutional frameworks as well as the EIA/SEA capabilities of the sub-region. Other research interest will focus on comparative studies with the UK, the EU and the USA systems of SEA.
- ***SEA of Energy Technologies:*** Future studies will address socio-economic impacts as well as SEA of current evolving technologies and future potential technologies in sectors. Research will also deal with market potentials of

introducing clean technologies in key sectors of Ghana. This will include renewable potentials of wind energy, solar energy as well as biomass options.

- ***Planning:*** Future studies will also develop strategies for sustainable development at national, sub-national levels (e.g. district) and local levels; promote more sustainability-orientated approaches, such as SEA and the environmental appraisal of development plans, to rural and urban land use planning, integrated planning (e.g. for spatial areas such as river basins), and interaction between rural and urban planning processes.
- ***Effectiveness Studies:*** New research will also review the existing SEA procedures and effectiveness with the view to contributing to national and sub-regional guidelines and to improve the procedures and quality of SEA in Ghana. This will also address the effectiveness of monitoring and auditing of impacts.
- ***Methodology:*** Further effort will seek collaborative research with relevant agencies, bodies and institutions on the development of simple methodology for assessment, and on effectiveness and quality issues in EIA/SEA methodology.
- ***Other research methodology.*** Qualitative as well as action researches will consider in depth studies on traditional ecological knowledge, rural energy and sustainable livelihoods in relation to energy and the environment in general.
- ***Sectoral Studies:*** This aims to extend SEA studies to other sectors such as Transport, Housing, Industry, and Forestry, which exert influences on energy use. Future research interests will also examine case studies in other sectors such as water, land management, transport, housing and industry; waste a management, and mining.

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14 Appendices

Appendix 14.1: Policy-Level Questionnaire

STRATEGIC ENVIRONMENTAL ASSESSMENT GHANA SURVEY

I am a research student in School of Planning, Oxford looking at Strategic Environmental Assessment (also known as Environmental Assessment of Policies, Plans and Programmes). Briefly a *policy* may be defined as an inspiration for action; a *plan* is a set of co-ordinated and timed objectives for the implementation of policy and a *programme* is a set of projects in a particular area. It will be appreciated if you could take a few minutes to complete this questionnaire. The information you give will be treated completely confidential.

A. STRATEGIC ENVIRONMENTAL ASSESSMENT IN GENERAL

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely Not [1]	Probably Not [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	My establishment directly or indirectly initiates or implements environmental policies					
2	Policies are designed to affect plans or programmes					
3	My establishment is able to consider a limited number of policy options					
4	My establishment is able to consider a wide range of effects					
5	My establishment assesses the environmental impact of its policies					
6	My establishment has deduced some of its goals from Ghana Vision 2020					
7	My establishment does not have environmental goals or objectives					
8	My establishment's policies flow from its goals and objectives					
9	My establishment considers the compatibility or consistency of its policies to one another.					
10	My establishment does not considers how compatible and consistent its policies are to the Ghana Vision 2020					
11	My establishment considers the compatibility or consistency of its policies to its establishment goals or objectives					
12	My establishment has developed a set of sustainability criteria against which					

	objectives are tested					
13	My establishment has a set of targets or indicators against which objectives are tested					
14	My establishment considers the link between social, economic and environmental effects of its actions					
15	Indicators are developed based on environmental objectives					
16	Criteria are developed based on environmental regulations					
17	Indicators used in policy assessment are based on monitoring programmes					
18	To date written environmental assessment reports exceed 2					
19	To date written environmental assessment reports are below 2					
20	Environmental Assessment of Policies is made at the initial stages of policy formulation.					
21	Environmental Assessment of Policies are made during policy implementation phase					
22	Environmental Assessment of Policies are made at the end of policy implementation phase					

B. ENERGY SECTOR SEA

Indicate by a tick [✓] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	My establishment directly or indirectly evolves or initiates energy policies					
2	The policies of my establishment may affect energy use.					
3	My establishment assesses the environmental effects of its policies					
4	My establishment assesses the social effects of its policies					
5	My establishment does not assesses the economic effects of its policies					
6	Energy policy making takes account of housing development					
7	Energy policy decisions does not take account of the industrial sector					
8	Energy policy making takes account of the transportation sector					
9	Criteria for environmental assessment consider local impacts					
10	National impacts are considered in the assessment of environmental impacts of energy policy.					
11	Criteria for assessment consider global					

	impacts					
12	Key issues affecting decision-making are the focus of policy assessment					
13	Policy assessment methods include scenarios					
14	Policy assessment methods include matrices					
15	Policy assessment methods include models					
16	Policy assessment methods include Geographical Information Systems					
17	Environment Assessment of Policies make use of quantitative analysis					
18	Environment Assessment of Policies makes use of quantitative analysis					
19	Policy assessment methods include compatibility matrices					
20	Analysed Fuel Cycle					
21	Analysed Phases of Fuel cycle					
22	Analysed Processes Associate with each phase					

C. SEA FRAMEWORK

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	There are clear legal requirements for environmental assessment of policy					
2	There exist clear written policy frame for reference					
3	There is a clear requirement and/or time frame for accountability					
4	There is a good practice or clear methodology for reference					
5	There exist a culture of democracy or participation					
6	A clear framework for public participation is provided					
7	The cost and benefit of participation assessed					
8	A clearly defined institutional framework exists					
9	A framework for institutional capacity building exists					
10	A framework for inter-agency co-operation exists					
11	Institutions are insulated from political interference					
12	There is a strong political will to implement environment policy					
13	There exists a good track record of compliance					

14	There is a framework for framing or redefining environmental problems					
15	Many stakeholders are involved in setting the environmental agenda					
16	There is a framework of Inter Regional Environmental Cooperation					
17	There is a framework of Inter Regional Cooperation on Energy Policy					
18	There is a framework of Inter Regional Economic Cooperation					
19	Staff experience in environmental assessment exists					
20	Clear mandate for the use of consultants or experts in assessment or review exists					
21	There is adequate budgetary allocation for environmental assessment.					
22	My establishment is clearly assigned the responsibility for environmental assessment of policy					

D IMPROVING THE EXISTING SYSTEMS

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	Addressing the environmental effects of major projects such as dams or power stations					
2	Addressing the environmental effects of 2 or more major projects such as dams or oil refinery put together					
3	Addressing the environmental effects of minor projects					
4	Addressing the combined environmental effects of several minor projects put together					
5	Addressing the indirect environmental effects of activities or projects induced by a major project					
6	Not addressing the environmental effects of many scattered insignificant projects whose effects put together can be very significant					
7	Adapting EIA Methodology to SEA					
8	Developing distinctive SEA methodology					
9	Introducing more response indicators in the assessment of policy impact assessment					
10	Introducing direction of change in PPP objectives					
11	Maintaining quantified targets for					

	assessment					
12	Linking SEA to PPP					
13	Linking and coordinating EIAs, PPPs and SEAs					
14	Linking SEA to sustainable development					
15	Introducing carrying capacity assessment in PPPs					
16	Making PPP's objectives more specific or explicit					
17	Removing contradictions in PPPs					
18	Improving or fine tuning PPPs as a result of policy impact assessment					
19	Changing or modifying PPPs as result of policy impact assessment					
20	Writing new objectives to capture subcomponents of policies					
21	Emphasising or improving mitigation measures					
22	Improving monitoring measures					

E. IMPROVING THE INSTITUTIONAL CONTEXT

Please indicate your agreement or disagreement with the following statements by ticking (√) the response that most nearly coincides with your own.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
1	There is no improvement in the implementation structures of my establishment.					
2	EPA should be empowered to enforce Environmental Assessment of Policies in private institutions.					
3	EPA should be empowered to enforce Environmental Assessment of Policies in public institutions.					
4	Another institution such as NDPC should oversee the environmental assessment of policies in public institutions					
5	I believe that the impact of environmental agencies are generally being felt.					
6	There is no improvement in communication and coordination among agencies.					
7	There is no improvement in the enforcement of regulations in the environment and energy sectors					
8	There is no improvement in logistical and resources supply for the effective execution of the work of my establishment.					

9	There is little progress in encouraging participation among stakeholders in energy and environmental issues					
10	Partnerships are generally encouraged					
11	There is improved cooperation with other establishments.					
12	Environmental assessment of policies may not be in conflict with my departmental policies					
13	My establishment can adapt to any environmental concerns or assessment requirements					
14	My establishment can displace or suspend some of its goals for the sake of the environment					
15	Environmental assessment of policies should be taken on by my establishment					
16	Environmental assessment of policies can be integrated into other principles upon which my department operates					
17	My organisation may imitate the success story of another organisation in terms of environmental compliance					
18	Environmental assessment of policies can be promoted or disseminated by my department					
19	My establishment's mission statement should include environmental assessment of its policies					
20	To guide departmental compliance to environmental issues performance indicators are needed					
21	What is important is to have an expert unit in out establishment to oversee Environmental Assessment of Policies					
22	There is a law in place to make the employment of consultants easy					

F. SUSTAINABLE ENERGY POLICY

Indicate, on a scale of 1 (lowest improvement) to 5 (highest improvement), the extent to which the following improvements have occurred in the quality of the economy, society and the environment as a result of the energy policies of your establishment.

		Very Low	Low	Moderate	High	Very High
	SOCIAL	1	2	3	4	5
1	Fostering social cohesion and integration					
2	Enhancing social sense of community and connectedness					
3	Housing with modern lighting					
4	Enhancing cultural values of society					

5	Reducing social inequalities					
6	Improving health services					
7	Increasing access to social services					
8	Limiting unemployment					
	ECONOMIC					
9	Creating Jobs					
10	Raising revenue.					
11	Sustaining economic growth					
12	Private investment in the energy sector					
13	Ensuring economic sufficiency					
14	Increasing the supply of services or products					
15	Recovering cost for energy supply					
16	Reducing inflation					
	ENVIRONMENTAL					
17	Maintaining the supply of natural/biomass resources					
18	The use of energy efficient appliances					
19	Energy security is being ensured through efficient management policies					
20	The ratio of the use of LPG to other fossil fuels in domestic use					
21	Reducing energy consumption per capita					
22	The ratio of the use of solar products to traditional energy products					
23	The ratio of public transport use to private transport use					
24	Reducing the percentage of used vehicles or appliances imported into the country					

Name of Establishment.....

Status of Respondent.....

Date [ ] [ ] [ ] [ ] [ ] [ ] [ ] Time [ ] [ ] [ ] [ ] Interview Number [ ] [ ]
Day Month Year 24 hour clock

Thank you.

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Appendix 14.2: Plan-Level Questionnaire

STRATEGIC ENVIRONMENTAL ASSESSMENT GHANA SURVEY

I am a research student in School of Planning, Oxford looking at Strategic Environmental Assessment (also known as Environmental Assessment of Plans, Plans and Programmes). Briefly a *policy* may be defined as an inspiration for action; a *plan* is a set of co-ordinated and timed objectives for the implementation of policy and a *programme* is a set of projects in a particular area. It will be appreciated if you could take a few minutes to complete this questionnaire. The information you give will be treated completely confidential.

A. STRATEGIC ENVIRONMENTAL ASSESSMENT IN GENERAL

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely Not [1]	Probably Not [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	Spatial implication of sectoral plans have been captured					
2	Plans are designed to affect plans or programmes					
3	My establishment is able to consider a limited number of plan options					
4	My establishment is able to consider a wide range of effects					
5	My establishment assesses the environmental impact of its plans					
6	My establishment has deduced some of its goals from Ghana Vision 2020					
7	My establishment does not have environmental goals or objectives					
8	My establishment's plans do not flow from its goals and objectives					
9	My establishment considers the compatibility or consistency of its plans to one another.					
10	My establishment does not considers how compatible and consistent its plans are to the Ghana Vision 2020					
11	My establishment considers the compatibility or consistency of its plans to its establishment goals or objectives					
12	My establishment has developed a set of sustainability criteria against which objectives are tested					

13	My establishment has a set of targets or indicators against which objectives are tested					
14	My establishment considers the link between social, economic and environmental effects of its actions					
15	Indicators are developed based on environmental objectives					
16	Criteria are developed based on environmental regulations					
17	Indicators used in plan assessment are based on monitoring programmes					
18	To date written environmental assessment reports exceed 2					
19	To date written environmental assessment reports are below 2					
20	Environmental Assessment of Plans is made at the initial stages of plan formulation.					
21	Environmental Assessment of Plans are made during plan implementation phase					
22	Environmental Assessment of Plans are made at the end of plan implementation phase					

B. ENERGY SECTOR SEA

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	My establishment has planning functions					
2	My departmental goals does not capture spatial implications of energy PPP					
3	My establishment assesses the environmental effects of its plans					
4	My establishment assesses the social effects of its plans					
5	My establishment does not assesses the economic effects of its plans					
6	Energy plan making takes account of housing development					
7	Energy plan decisions does not take account of the industrial sector					
8	Energy plan making takes account of the transportation sector					
9	Criteria for environmental assessment consider local impacts					
10	National impacts are considered in the assessment of environmental impacts of energy plan.					
11	Criteria for assessment consider global impacts					
12	Key issues affecting decision-making are the focus of plan assessment					
13	Plan assessment methods include scenarios					
14	Plan assessment methods include matrices					

15	Plan assessment methods include models					
16	Plan assessment methods include Geographical Information Systems					
17	Environment Assessment of Plans make use of quantitative analysis					
18	Environment Assessment of Plans makes use of quantitative analysis					
19	Plan assessment methods include compatibility matrices					
20	Analysed Fuel Cycle					
21	Analysed Phases of Fuel cycle					
22	Analysed Processes Associate with each phase					

C. SEA FRAMEWORK

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	There are clear legal requirements for environmental assessment of plan					
2	There exist clear written plan objectives for reference					
3	My establishment is clearly assigned the responsibility for environmental assessment of plan					
4	There is a clear requirement for accountability					
5	There is a clear time frame for accountability					
6	There exist a culture of democracy or participation					
7	A clear framework for public participation is provided					
8	A clearly defined institutional framework exists					
9	A framework for institutional capacity building exists					
10	A framework for inter-agency co-operation exists					
11	Institutions are insulated from political interference					
12	There is a strong political will to implement environment plan					
13	There exists a good track record of compliance					
14	There is a framework for framing or redefining environmental problems					
15	Many stakeholders are involved in setting the environmental agenda					
16	There is a framework of Inter Regional Environmental Cooperation					
17	There is a framework of Inter Regional Cooperation on Energy Plan					

18	There is a framework of Inter Regional Economic Cooperation					
19	Staff experience in environmental assessment exists					
20	Clear mandate for the use of consultants or experts in assessment or review exists					
21	There is adequate budgetary allocation for environmental assessment.					
22	There is a good practice or clear methodology for reference					

D IMPROVING THE EXISTING SYSTEMS

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	Addressing the environmental effects of major projects such as dams or power stations					
2	Addressing the environmental effects of 2 or more major projects such as dams or oil refinery put together					
3	Addressing the environmental effects of minor projects					
4	Addressing the combined environmental effects of several minor projects put together					
5	Addressing the indirect environmental effects of activities or projects induced by a major project					
6	Not addressing the environmental effects of many scattered *insignificant projects* whose effects put together can be very significant					
7	*Adapting EIA Methodology to SEA*					
8	Developing distinctive SEA methodology					
9	Introducing more response indicators in the assessment of plan impact assessment					
10	Introducing direction of change in PPP objectives					
11	Maintaining quantified targets for assessment					
12	Linking SEA to PPP					
13	Linking and coordinating EIAs, PPPs and SEAs					
14	Linking SEA to sustainable development					
15	Introducing carrying capacity assessment in PPPs					
16	Making PPP's objectives more specific or explicit					

17	Removing contradictions in PPPs					
18	Improving or fine tuning PPPs as a result of plan impact assessment					
19	Changing or modifying PPPs as result of plan impact assessment					
20	Writing new objectives to capture subcomponents of plans					
21	Emphasising or improving mitigation measures					
22	Improving monitoring measures					

E. IMPROVING THE INSTITUTIONAL CONTEXT

Please indicate your agreement or disagreement with the following statements by ticking (√) the response that most nearly coincides with your own.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
1	There is no improvement in the implementation structures of my establishment.					
2	EPA should be empowered to enforce Environmental Assessment of Plans in private institutions.					
3	EPA should be empowered to enforce Environmental Assessment of Plans in public institutions.					
4	Another institution such as NDPC should oversee the environmental assessment of plans in public institutions					
5	I believe that the impact of environmental agencies are generally being felt.					
6	There is no improvement in communication and coordination among agencies.					
7	There is no improvement in the enforcement of regulations in the environment and energy sectors					
8	There is no improvement in logistical and resources supply for the effective execution of the work of my establishment.					
9	There is little progress in encouraging participation among stakeholders in energy and environmental issues					
10	Partnerships are generally encouraged					
11	There is improved cooperation with other establishments.					
12	Environmental assessment of plans may not be in conflict with my departmental plans					
13	My establishment can adapt to any					

	environmental concerns or assessment requirements					
14	My establishment can displace or suspend some of its goals for the sake of the environment					
15	Environmental assessment of plans should be taken on by my establishment					
16	Environmental assessment of plans can be integrated into other principles upon which my department operates					
17	My organisation may imitate the success story of another organisation in terms of environmental compliance					
18	Environmental assessment of plans can be promoted or disseminated by my department					
19	My establishment's mission statement should include environmental assessment of its plans					
20	To guide departmental compliance to environmental issues performance indicators are needed					
21	What is important is to have an expert unit in out establishment to oversee Environmental Assessment of Plans					
22	There is a law in place to make the employment of consultants easy					

F. SUSTAINABLE ENERGY PLAN

Indicate, on a scale of 1 (lowest improvement) to 5 (highest improvement), the extent to which the following improvements have occurred in the quality of the economy, society and the environment as a result of the energy plans of your establishment.

		Very Low	Low	Moderate	High	Very High
	SOCIAL	1	2	3	4	5
1	Fostering social cohesion and integration					
2	Enhancing social sense of community and connectedness					
3	Housing with modern lighting					
4	Enhancing cultural values of society					
5	Reducing social inequalities					
6	Improving health services					
7	Increasing access to social services					
8	Limiting unemployment					
	ECONOMIC					
9	Creating Jobs					
10	Raising revenue.					
11	Sustaining economic growth					

12	Private investment in the energy sector					
13	Ensuring economic sufficiency					
14	Increasing the supply of services or products					
15	Recovering cost for energy supply					
16	Reducing inflation					
	ENVIRONMENTAL					
17	Maintaining the supply of natural/biomass resources					
18	The use of energy efficient appliances					
19	Energy security is being ensured through efficient management plans					
20	The ratio of the use of LPG to other fossil fuels in domestic use					
21	Reducing energy consumption per capita					
22	The ratio of the use of solar products to traditional energy products					
23	The ratio of public transport use to private transport use					
24	Reducing the percentage of used vehicles or appliances imported into the country					

Name of Establishment.....

Status of Respondent.....

Date [ ][ ][ ][ ][ ][ ][ ] Time [ ][ ][ ][ ] Interview Number [ ][ ]
Day Month Year 24 hour clock

Thank you.

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Appendix 14.3: Programme-Level Questionnaire

STRATEGIC ENVIRONMENTAL ASSESSMENT GHANA SURVEY

I am a research student in School of Planning, Oxford looking at Strategic Environmental Assessment (also known as Environmental Assessment of Plans, Plans and Programmes). Briefly a *policy* may be defined as an inspiration for action; a *plan* is a set of co-ordinated and timed objectives for the implementation of policy and a *programme* is a set of projects in a particular area. It will be appreciated if you could take a few minutes to complete this questionnaire. The information you give will be treated completely confidential.

A. STRATEGIC ENVIRONMENTAL ASSESSMENT IN GENERAL

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely Not [1]	Probably Not [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	My establishment executes programmes					
2	Programmes are designed to give rise to projects					
3	My establishment considers effects of projects in a cluster.					
4	My establishment is able to consider a wide range of effects					
5	My establishment assesses the environmental impact of groups of projects or programmes					
6	My establishment has deduced some of its goals from Ghana Vision 2020					
7	My establishment does not have environmental goals or objectives					
8	My establishment's programmes do not flow from its goals and objectives					
9	My establishment considers the compatibility or consistency of its programmes to one another.					
10	My establishment does not consider how compatible and consistent its programmes are to the Ghana Vision 2020					
11	My establishment considers the compatibility or consistency of its programmes to its establishment goals or objectives					
12	My establishment has developed a set of sustainability criteria against which objectives are tested					
13	My establishment has a set of targets or					

	indicators against which objectives are tested					
14	My establishment considers the link between social, economic and environmental effects of its actions					
15	Indicators are developed based on environmental objectives					
16	Criteria are developed based on environmental regulations					
17	Indicators used in programme assessment are based on monitoring programmes					
18	To date written environmental assessment reports exceed 2					
19	To date written environmental assessment reports are below 2					
20	Environmental Assessment of Programmes is made at the initial stages of programme formulation.					
21	Environmental Assessment of Programmes are made during programme implementation phase					
22	Environmental Assessment of Programmes are made at the end of programme implementation phase					

B. ENERGY SECTOR SEA

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	My establishment executes programmes giving rise to projects					
2	My departmental programmes are designed to influence groups of energy projects.					
3	My establishment assesses the environmental effects of its programmes					
4	My establishment assesses the social effects of its programmes					
5	My establishment does not assesses the economic effects of its programmes					
6	Energy programme making takes account of housing development					
7	Energy programme decisions does not take account of the industrial sector					
8	Energy programme making takes account of the transportation sector					
9	Criteria for environmental assessment consider local impacts					
10	National impacts are considered in the assessment of environmental impacts of					

	energy programme.					
11	Criteria for assessment consider global impacts					
12	Key issues affecting decision-making are the focus of programme assessment					
13	Programme assessment methods include scenarios					
14	Programme assessment methods include matrices					
15	Programme assessment methods include models					
16	Programme assessment methods include Geographical Information Systems					
17	Environment Assessment of Programmes make use of quantitative analysis					
18	Environment Assessment of Programmes makes use of quantitative analysis					
19	Programme assessment methods include compatibility matrices					
20	Analysed Fuel Cycle					
21	Analysed Phases of Fuel cycle					
22	Analysed Processes Associate with each phase					

C. SEA FRAMEWORK

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	There are clear legal requirements for environmental assessment of programme					
2	There exist clear written programme objectives					
3	My establishment has a clear responsibility					
4	There is a clear requirement for accountability					
5	There is a clear time frame for accountability					
6	There exist a culture of democracy or participation					
7	A clear framework for public participation is provided					
8	A clearly defined institutional framework exists					
9	A framework for institutional capacity building exists					
10	A framework for inter-agency co-operation exists					

11	Institutions are insulated from political interference					
12	There is a strong political will to implement environment programme					
13	There exists a good track record of compliance					
14	There is a framework for framing or redefining environmental problems					
15	Many stakeholders are involved in setting the environmental agenda					
16	There is a framework of Inter Regional Environmental Cooperation					
17	There is a framework of Inter Regional Cooperation on Energy Programme					
18	There is a framework of Inter Regional Economic Cooperation					
19	Staff experience in environmental assessment exists					
20	Clear mandate for the use of consultants or experts in assessment or review exists					
21	There is adequate budgetary allocation for environmental assessment.					
22	My establishment is clearly assigned the responsibility for environmental assessment of programme					

D IMPROVING THE EXISTING SYSTEMS

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
1	Addressing the environmental effects of major projects such as dams or power stations					
2	Addressing the environmental effects of 2 or more major projects such as dams or oil refinery put together					
3	Addressing the environmental effects of minor projects					
4	Addressing the combined environmental effects of several minor projects put together					
5	Addressing the indirect environmental effects of activities or projects induced by a major project					
6	Not addressing the environmental effects of many scattered insignificant projects whose effects put together can be very significant					
7	Adapting EIA Methodology to SEA					
8	Developing distinctive SEA methodology					

9	Introducing more response indicators in the assessment of programme impact assessment					
10	Introducing direction of change in PPP objectives					
11	Maintaining quantified targets for assessment					
12	Linking SEA to PPP					
13	Linking and coordinating EIAs, PPPs and SEAs					
14	Linking SEA to sustainable development					
15	Introducing carrying capacity assessment in PPPs					
16	Making PPP's objectives more specific or explicit					
17	Removing contradictions in PPPs					
18	Improving or fine tuning PPPs as a result of programme impact assessment					
19	Changing or modifying PPPs as result of programme impact assessment					
20	Writing new objectives to capture subcomponents of programmes					
21	Emphasising or improving mitigation measures					
22	Improving monitoring measures					

E. IMPROVING THE INSTITUTIONAL CONTEXT

Please indicate your agreement or disagreement with the following statements by ticking (√) the response that most nearly coincides with your own.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
1	There is no improvement in the implementation structures of my establishment.					
2	EPA should be empowered to enforce Environmental Assessment of Programmes in private institutions.					
3	EPA should be empowered to enforce Environmental Assessment of Programmes in public institutions.					
4	Another institution such as NDPC should oversee the environmental assessment of programmes in public institutions					
5	I believe that the impact of environmental agencies are generally being felt.					
6	There is no improvement in communication and coordination among agencies.					

7	There is no improvement in the enforcement of regulations in the environment and energy sectors					
8	There is no improvement in logistical and resources supply for the effective execution of the work of my establishment.					
9	There is little progress in encouraging participation among stakeholders in energy and environmental issues					
10	Partnerships are generally encouraged					
11	There is improved cooperation with other establishments.					
12	Environmental assessment of programmes may not be in conflict with my departmental programmes					
13	My establishment can adapt to any environmental concerns or assessment requirements					
14	My establishment can displace or suspend some of its goals for the sake of the environment					
15	Environmental assessment of programmes should be taken on by my establishment					
16	Environmental assessment of programmes can be integrated into other principles upon which my department operates					
17	My organisation may imitate the success story of another organisation in terms of environmental compliance					
18	Environmental assessment of programmes can be promoted or disseminated by my department					
19	My establishment's mission statement should include environmental assessment of its programmes					
20	To guide departmental compliance to environmental issues performance indicators are needed					
21	What is important is to have an expert unit in out establishment to oversee Environmental Assessment of Programmes					
22	There is a law in place to make the employment of consultants easy					

F. SUSTAINABLE ENERGY PROGRAMME

Indicate, on a scale of 1 (lowest improvement) to 5 (highest improvement), the extent to which the following improvements have occurred in the quality of the economy, society and the environment as a result of the energy programmes of your establishment.

		Very Low	Low	Moderate	High	Very High
	SOCIAL	1	2	3	4	5
1	Fostering social cohesion and integration					
2	Enhancing social sense of community and connectedness					
3	Housing with modern lighting					
4	Enhancing cultural values of society					
5	Reducing social inequalities					
6	Improving health services					
7	Increasing access to social services					
8	Limiting unemployment					
	ECONOMIC					
9	Creating Jobs					
10	Raising revenue.					
11	Sustaining economic growth					
12	Private investment in the energy sector					
13	Ensuring economic sufficiency					
14	Increasing the supply of services or products					
15	Recovering cost for energy supply					
16	Reducing inflation					
	ENVIRONMENTAL					
17	Maintaining the supply of natural/biomass resources					
18	The use of energy efficient appliances					
19	Energy security is being ensured through efficient management programmes					
20	The ratio of the use of LPG to other fossil fuels in domestic use					
21	Reducing energy consumption per capita					
22	The ratio of the use of solar products to traditional energy products					
23	The ratio of public transport use to private transport use					
24	Reducing the percentage of used vehicles or appliances imported into the country					

Name of Establishment.....

Status of Respondent.....

Date [ ][ ][ ][ ][ ][ ] Time [ ][ ][ ][ ] Interview Number [ ][ ]
Day Month Year 24 hour clock

Thank you.

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Appendix 14.4: West African Survey

I am a research student in School of Planning, Oxford looking at Environmental Assessment and Energy Policy as it relates to Ghana and West Africa. It will be appreciated if you could take a few minutes to complete this questionnaire. The information you give will be treated completely confidential.

Indicate by a tick [√] the extent to which you agree to the following statements.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
1	Energy security is a common problem for West Africa					
2	Insufficient rainfall is a common concern for West Africa					
3	A common energy policy for West Africa is important					
4	Ghana's stable democracy is advantageous to West Africa					
5	Ghana's natural resources is advantageous to West Africa					
6	Ghana's past leadership role makes Ghana a natural leader in West Africa					
7	The Proposed West African Gas Pipeline will be mutually beneficial to the Sub-region.					
8	The Proposed West African Power Pool will be mutually beneficial to the Sub-region.					
9	Any energy policy for the sub-region to focus mainly on its benefits to humankind.					
10	Any energy policy for the sub-region to focus on its overall benefit for nature					

My country.....

Date [ ][ ][ ][ ][ ][ ] Time [ ][ ][ ][ ] Interview Number [ ][ ]
Day Month Year 24 hour clock

Thank you.

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Appendix 14.5: Pilot Questionnaire

STRATEGIC ENVIRONMENTAL ASSESSMENT GHANA SURVEY

I am a research student in Oxford looking at Strategic Environmental Assessment (also known as Environmental Assessment of Policies, Plans and Programmes). Briefly a *policy* may be defined as an inspiration for action; a *plan* is a set of co-ordinated and timed objectives for the implementation of policy and a *programme* is a set of projects in a particular area. It will be appreciated if you could take a few minutes to complete this questionnaire. The information you give will be treated completely confidential.

A. VALUE OF STRATEGIC ENVIRONMENTAL ASSESSMENT

Indicate by a tick [√] the extent to which the following statements are true about your establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
a	My establishment directly or indirectly evolves environmental policies, plans and programmes					
b	My establishment directly or indirectly implements environmental policies, plans and programmes					
c	My establishment is concerned with the effects of its policies, plans and programmes on the environment					
d	My establishment assesses the environmental impact of its policies					
e	My establishment assesses the environmental impact of its plans					
f	My establishment assesses the environmental impact of its programmes					
g	My establishment has deduced some of its goals from Ghana Vision 2020					
h	My establishment considers the compatibility or consistency of its policies to one another.					
i	My establishment considers how compatible and consistent its policies are to the Ghana Vision 2020					
j	My establishment considers the compatibility or consistency of its policies to its establishment goals or objectives					
k	My establishment has developed a set of sustainability criteria against which objectives are tested					
l	My establishment has a set of targets or					

	indicators against which objectives are tested					
m	My establishment considers the link between social, economic and environmental effects of its actions					

2 How many environmental assessments are carried out annually by your organisation?

3 How much is spent your reports annually?

4 Indicate on a scale of 1 (lowest priority) and 7 (highest priority) the extent to which your establishment prioritises the following in its policies. plans and programmes.

SOCIAL	1	2	3	4	5	6	7
Strengthening social relationships and institutions							
Fostering social cohesion and integration							
Enhancing social sense of community and connectedness							
Fostering social security through community institutions							
Enhancing cultural values of society							
Reducing social inequalities							
Reducing Poverty							
Improving health services							
Improving education							
Increasing access to social services							
Limiting unemployment							
ECONOMIC							
Creating Jobs							
Raising revenue and recovering cost.							
Sustaining economic growth							
Maintaining allocative efficiency							
Ensuring economic sufficiency							
Increasing the supply of services or products							
ENVIRONMENTAL							
Maintaining the supply of natural resources							
Improving the waste absorption capacity of the environment							
Enhancing the environment's utility satisfaction.							
Reducing global warming							
Reducing energy consumption per capita by a %							
Reducing CO_2 emissions per capita by a %							
Improving environmental health							

B. ENERGY SECTOR SEA

Indicate by a tick [√] the extent to which you agree with the following statements with respect to energy policy, plan and programme.

	Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
a My establishment directly or indirectly evolves or initiates energy policies, plans					

	and programmes					
b	The policies, plans and programmes of my establishment may affect energy use.					
c	The policies, plans and programmes of my establishment may not affect energy use.					
d	The development actions of my establishment may affect energy use.					
e	A lot of consideration is given to the environmental implications of energy use in the performance of the functions of my establishment					
f	Land use planning and management have implications for the environment					
g	Land use planning and management have implications for energy use					
h	It matters is the national vision 2020 is reduced into energy goals					
i	It matters if compatibility and consistency between energy policies are considered					
j	It matters if compatibility and consistency between energy policies and the national vision are considered					
k	It matters if compatibility and consistency between energy policies and departmental goals are considered					
l	It is important that sustainability criteria take account of energy savings (e.g. reduction in per capita energy consumption)					
j	It is important that sustainability criteria take account of renewable energy options such as solar energy					

C. ADDRESSING LIMITATIONS OF EIA

Please tick (√) by ranking the following statements in an order of importance on a scale of 1 (least important) to 7 (most important) in terms of their importance to your establishment.

	1	2	3	4	5	6	7
Assessing the environmental effects of major projects such as dams or power stations							
Assessing the environmental effects of 2 or more major projects such as dams or oil refinery put together							
Assessing the environmental effects of minor projects such installation of generators or corn mills.							
Assessing the combined environmental effects of several minor projects put together							
Assessing the indirect environmental effects of activities or projects such as markets, businesses induced by a major project							

Assessing the environmental effects of many scattered insignificant projects whose effects put together can be very significant							
Extreme weather conditions such as floods and droughts should be avoided for the welfare of other life forms							
Intensification of education is important to environmental protection.							

D. CHANGING THE INSTITUTIONAL CONTEXT

Please indicate your agreement or disagreement with the following statements by ticking (√) the response that most nearly coincides with your own.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
a	It matters how organisations are structured if environmental management is to be effective					
b	Only training and capacity development are essential for environmental management					
c	A well structure environmental agency whose governing council is composed of relevant institutions is what really matters					
d	There is the need to restructure my organisation to respond to efficient environmental management.					
e	It is desirable to merge my establishment with another one involved in environmental management					
f	My establishment is not required by law to carry out environmental assessment of its policies plans and programmes					
g	There is the need to amend the relevant laws to enable my establishment assess the environmental impacts of its policies					
h	My department does not have the capacity to asses the impacts of its policies on the environment					
i	My department should develop its own capacity to assess the impacts of its policies on the environment					
j	My department should contract private practitioners to assess the impacts of its actions on its behalf.					
k	There is the need for my establishment to produce environmental reports (environmental					

	impact statements)					
l	Only the body charged with environmental management should assess the impacts of policies on the environment					
m	My department should not be concerned with the environment					

2. Please tick [√] the following statements on a scale of 1 (lowest priority) and 7 (highest priority) in terms of their importance to you

	1	2	3	4	5	6	7
For the sake of human well being energy policy should be taken seriously							
For the sake of other life forms energy policy should be taken seriously							
To enhance environmental quality for the survival of man energy policy, plan and programme is important							
It is important to consider the well being of mother earth							
Extreme weather conditions such as floods should be avoided for the well being of man							
Extreme weather conditions such as floods should be avoided for the well being of other life forms							
Intensification of education is important to environmental protection.							

3 Please tick [√] the following statements indicating your agreement to the following statements.

		Strongly Disagree [1]	Disagree [2]	Not Sure [3]	Agree [4]	Strongly Agree [5]
1	It matters the importance placed on stakeholder participation in environmental issues					
2	Environmental assessment must be left to experts in the public sector					
3	Environmental assessment must be left to private practitioners					
4	There are clear periodic time frame for accountability					
5	It does not matter whether many people are consulted. Government will take the decisions irrespective of who participates					

6	Public participation is a waste of time					
7	Public participation is just a waste of resources					
8	People are apathetic to meetings					
9	There is the need to raise people's awareness in public matters					
10	Poverty is the cause of apathy in public consultation					
11	Lack of trust in state Agencies or developers in the cause of apathy among the public					
12	Government agencies should pay everybody involved in public consultation.					
13	Information flow and communication are poor					
14	There is no apathy at all in the country					
15	Poverty is the cause of poor pubic participation.					

E. INTERNATIONAL CONTEXT

3 Please tick [√] the following statements indicating your agreement to the following statements.

a	It matters to Ghana if other nations in the sub-region have strong environmental policies					
b	Cost of environmental compliance in Ghana can affect its competitive advantage in the sub-region					
c	ECOWAS should harmonise its environmental policies in the sub-region					
d	Environmental problems in one part of the sub-region is like to affect other parts.					
e	Businesses can have long-term benefits from environmental compliance					
f	Businesses can have long-term benefits through the development of niche markets					
g	Businesses can have long-term benefits through donor funding for its environmental compliance					
h	Businesses can have long-term benefits through legitimacy					
i	Businesses can have long-term benefits through gaining strategic advantages over other non-compliant firms.					

F. SUSTAINABLE ENERGY POLICY. PLAN AND PROGRAMME

The following measures are in place or are being promoted by my establishment.

		Definitely No [1]	Probably No [2]	Not Sure [3]	Probably Yes [4]	Definitely Yes [5]
a	Reduction in CO_2 emissions					
b	Ensuring energy security					
c	Ensuring energy efficiency and conservation.					
d	Instituting energy/carbon tax					
e	Preventing the use of second hand cars and appliances					
f	Regulating energy use in the housing and industrial sectors					
g	Encouraging Solar energy					
h	Exploiting wind energy use					
i	Regulating biomass use					
j	Undertaking more hydro/mini-hydro-electric projects					
k	Encouraging more use of LPG					
l	Encouraging more thermal plants using gas or imported crude oil.					
m	Encouraging energy efficient lighting					
n	Encouraging energy efficient cooling					
o	Encouraging energy efficient cooking					
p	Regulating land use planning which promotes efficient energy use					
q	Regulating the transport industry.					

Name of Establishment.....

Status of Respondent.....

Date [ ][ ][ ][ ][ ][ ] Time [ ][ ][ ][ ] Interview Number [ ][ ]

Day Month Year 24 hour clock

Thank you.

Joseph Somevi MSc (Oxon). AGIS

School of Planning

Oxford OX3 OBP

UK

Appendix 14.6: Mean Values (Policy Level)

GENSEA	ENESEA	FRASEA	IMPSYS	IMPINST	SDENPOL
3.32	2.91	3.09	3.00	3.91	2.42
2.64	3.14	3.23	2.41	4.32	2.58
3.36	3.09	3.05	3.00	3.82	2.42
2.59	2.86	2.36	2.32	3.36	1.71
2.68	2.50	2.68	2.77	3.55	2.04
2.64	2.27	2.18	2.32	3.32	1.67
3.14	2.91	2.23	2.95	3.32	2.33
2.32	2.23	2.73	2.32	3.59	1.63
2.73	2.68	2.86	2.86	3.68	2.17
2.82	2.73	2.45	2.86	3.45	2.25
3.36	2.82	1.64	2.55	3.14	1.92
2.68	2.41	2.77	2.09	3.64	1.54
2.86	2.86	2.41	2.86	3.32	2.17
2.41	2.32	2.73	2.32	3.41	1.71
2.82	2.73	2.82	2.41	3.50	1.88
3.00	2.64	2.59	2.68	3.59	2.00
2.77	2.59	2.59	2.82	3.77	2.08
3.14	2.68	2.41	2.77	3.23	2.04
3.05	2.95	2.41	2.73	3.23	2.04
3.00	2.50	2.05	3.00	3.45	1.96
2.82	2.50	3.05	2.59	3.45	1.88
2.86	2.59	2.14	2.36	3.68	2.04
2.68	2.55	2.55	2.64	3.55	1.83
2.59	2.50	2.59	2.59	3.50	1.63
2.86	2.77	2.18	2.82	3.50	1.58
2.68	2.36	2.64	2.27	3.41	1.58
2.73	2.55	2.64	2.27	3.59	1.92
2.50	2.05	2.41	2.86	3.36	1.96
2.82	2.36	2.36	2.27	3.36	1.96
2.82	2.82	2.41	2.32	3.41	1.83
2.91	2.68	2.18	2.86	3.32	2.29
2.86	3.05	2.45	2.86	3.45	1.83
2.77	2.45	2.45	2.41	3.45	1.96
2.68	2.45	2.68	2.73	3.55	2.13
2.86	2.55	2.82	2.64	3.64	2.21
2.95	2.59	2.68	2.59	3.55	1.96
2.82	2.41	2.86	2.64	3.68	2.17
2.55	2.82	2.45	2.68	3.45	2.08
2.77	2.82	2.59	2.82	3.50	2.04

Appendix 14.7: Mean Scores (Plan Level)

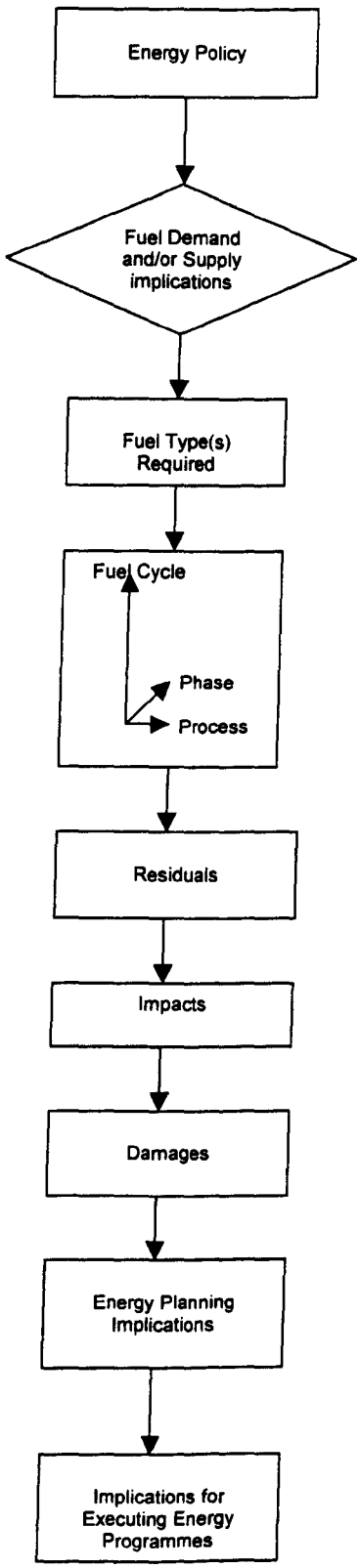
GENSEA	ENESEA	FRASEA	IMPSYS	IMPINST	SDENPL
3.32	3.09	3.82	2.86	3.23	2.33
3.95	3.77	2.82	3.64	3.41	2.58
4.18	3.86	3.86	3.95	3.45	3.08
3.86	3.73	2.77	3.59	2.18	2.58
3.55	3.45	3.82	3.09	1.86	2.42
3.86	3.68	3.55	3.45	2.82	2.54
2.27	2.23	2.91	2.23	2.55	2.04
3.63	3.45	3.45	3.14	2.50	2.54
3.59	3.45	4.09	3.14	2.55	2.42
2.73	3.50	2.23	2.45	2.27	2.08
3.68	2.14	4.05	3.23	2.55	2.54
2.00	3.77	3.55	2.18	2.68	1.96
4.00	3.82	3.77	3.77	2.36	2.63
4.00	3.64	2.86	3.77	1.82	2.67
3.77	2.23	3.73	2.86	2.00	2.58
2.05	2.50	3.59	3.00	2.14	2.00
2.59	3.86	3.59	3.36	2.32	2.08
4.05	3.55	2.95	3.82	2.32	2.67
3.77	2.32	3.64	2.18	2.73	2.58
2.50	3.00	3.77	3.18	2.14	2.04
3.18	2.86	3.36	3.36	2.23	2.33
3.09	3.05	3.05	3.00	2.05	2.21
3.64	2.59	3.59	3.05	2.23	2.54
3.64	2.82	2.95	2.73	2.59	2.13
3.00	3.32	3.55	2.95	2.18	2.38
3.05	3.18	3.23	3.23	2.09	2.25
3.32	2.77	3.09	2.68	2.27	2.25
3.50	2.91	3.55	2.41	2.36	2.38
3.00	2.50	3.27	2.68	1.91	2.29
3.09	3.23	3.05	2.45	2.55	2.21
2.91	3.09	3.23	2.68	1.91	2.25
3.23	2.91	3.32	2.50	2.27	2.33
3.36	3.50	3.27	3.00	2.09	2.33
3.73	2.82	3.00	3.14	2.41	2.17
3.05	3.50	3.27	2.68	2.09	2.29
3.41	3.09	3.00	2.77	2.09	2.21
3.00	2.50	3.00	2.59	1.91	2.21
3.09	2.68	2.95	2.50	2.32	2.13
3.41	2.55	3.50	2.73	1.91	2.38
2.91	3.55	3.73	2.59	2.09	2.58
3.36	3.32	3.45	3.05	1.91	2.38
2.91	3.00	3.27	2.73	2.18	2.33
3.36	3.18	3.00	2.45	2.05	2.17
3.45	3.27	3.73	2.64	2.36	2.58

Appendix 14.8Mean Scores (Programme Level)

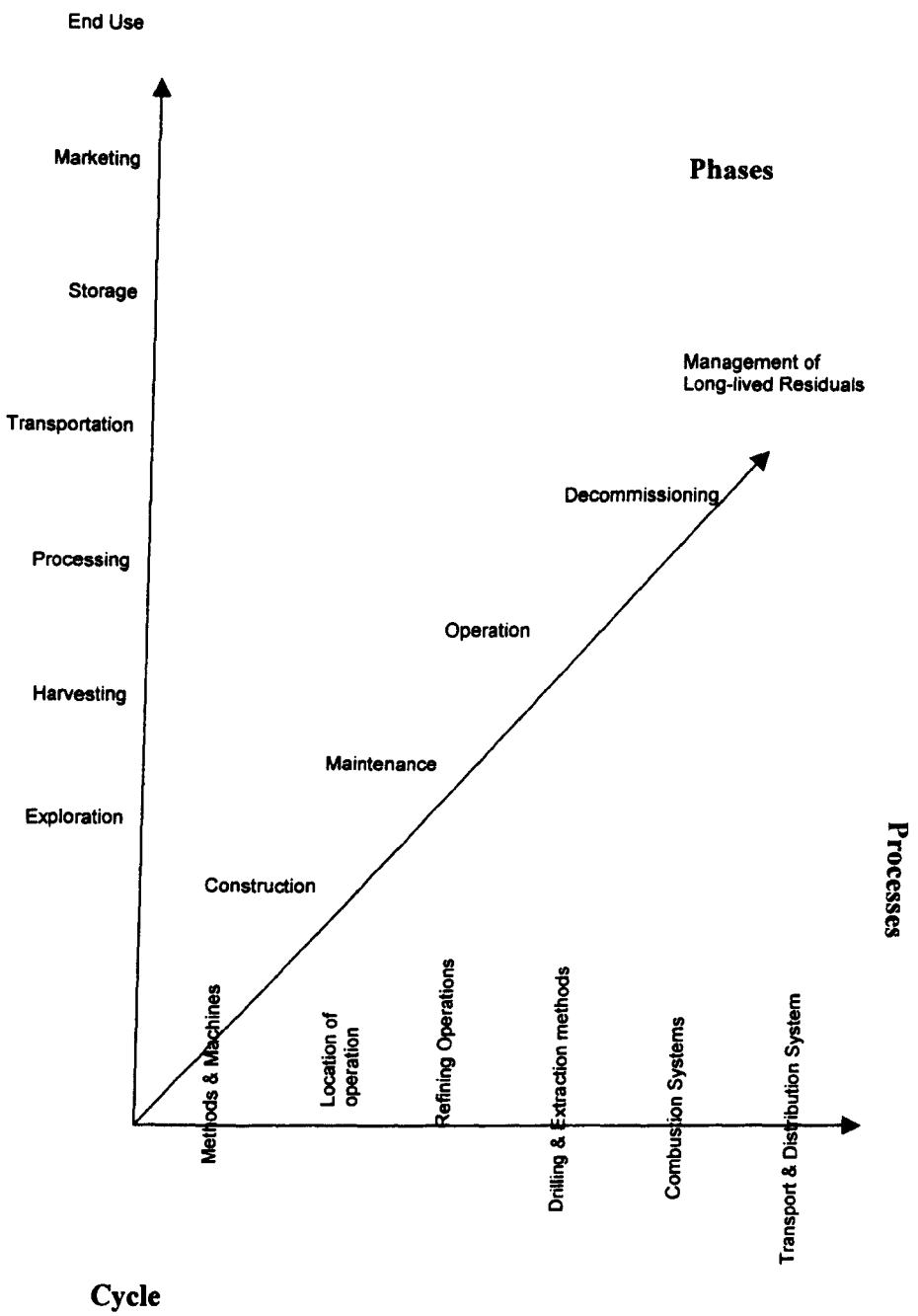
GENSEA	ENESEA	FRASEA	IMPSYS	IMPINST	SDENPR
2.68	2.91	2.68	2.55	3.77	3.38
2.45	2.77	3.14	1.95	2.18	2.58
2.91	2.82	3.27	2.73	3.95	3.71
2.64	2.64	3.14	1.82	3.50	3.25
3.00	2.91	3.36	3.50	3.14	3.08
2.73	3.18	3.09	2.41	2.27	2.67
2.73	2.73	2.73	4.09	4.45	4.29
2.59	2.59	3.64	2.50	3.23	3.08
2.50	3.23	2.14	2.77	2.91	2.92
2.32	2.00	3.27	3.50	4.27	4.21
2.18	2.45	3.45	2.77	3.77	3.38
2.32	1.86	3.59	2.73	3.82	3.38
2.50	2.18	2.82	2.64	3.00	3.13
2.23	2.14	2.59	2.27	1.95	2.75
2.23	2.23	2.59	2.14	2.18	2.46
2.32	3.45	2.41	2.73	1.77	2.79
2.50	3.18	2.95	2.55	2.14	3.04
2.36	2.64	3.09	3.41	1.95	3.88
1.86	2.45	2.86	2.23	2.68	3.42
3.14	3.23	2.73	2.18	2.32	2.75
2.45	3.09	2.86	2.05	2.18	3.50
3.41	2.82	3.73	2.27	2.64	2.67
1.77	2.55	3.73	2.64	2.86	3.17
2.23	2.45	3.27	2.59	2.59	2.92
2.36	3.14	3.14	2.64	4.05	3.04
3.23	2.73	1.68	1.73	2.77	2.04
1.86	2.50	3.23	3.18	3.82	3.67
2.68	2.91	2.86	1.73	2.77	2.50
2.18	2.68	3.32	2.32	3.55	3.29
2.68	2.32	2.86	2.68	3.36	2.58
2.32	2.91	3.50	2.95	3.36	3.25
2.45	2.86	2.77	2.41	1.73	2.75
2.05	2.91	2.68	1.91	2.27	2.67
2.36	2.91	2.45	2.77	3.86	2.29
2.32	3.18	3.00	2.14	2.32	3.08
2.50	2.55	2.59	2.05	3.41	2.88
2.23	3.45	2.77	2.45	3.95	2.63
2.68	2.59	2.05	2.27	2.23	2.54
2.50	2.64	2.36	3.09	3.09	2.63
2.45	2.41	2.68	2.95	3.36	2.83
2.91	3.27	2.18	2.36	2.64	2.63
2.64	3.27	3.14	2.45	2.91	2.63
3.00	2.50	3.32	1.55	2.27	2.67
2.73	3.27	2.91	2.05	2.27	2.88
2.73	3.18	2.18	2.73	2.82	2.75
2.59	2.73	2.59	2.14	2.68	2.42

Appendix 14:9: Fuel Cycle

SEA of Energy Policy



The Fuel Cycle



Residuals

- Consumption of materials induced (land. biomass energy and inorganic matter)
  - Land for heap
  - Pre-emptive land for surface building
  - Land for open cast working
  - Water for mineral washing
  - Biomass for pit props
  - Energy to drive machines and pumps
  - Constructional steel
- Material Effluents or Fuel Characteristics
  - Solid
  - Liquid
  - Gaseous
  - Calorific value
  - Moisture content
  - Ash content
  - Sulphur content
  - Carbon content
  - Trace metals
  - Impurities
  - Tar content
  - Inert, chemically active, radioactive
- Non-Material Effluents
  - Noise
  - Heat
  - Electromagnetic radiation
- Physical Transformations
  - Modification of surface topography (land for building)
  - Modification of underground water topography (dredging)
  - Vegetation removal
- Socio-political influences
  - Changes in employment opportunities
  - Changes in demand for services
  - Changes in population density and distribution

Impact of Residuals

- Reduced availability of Environmental resources
- Altered Chemical Concentrations (in air, water, soil, biota)
- Altered circulation patterns (in the atmosphere, water bodies & ground water)
- Altered temperature, humidity & precipitation
- Altered electromagnetic fields
- Absorbed radiation dose
- Perceived noise
- Alteration to/loss of habitat

- ❖ Socio-economic stresses

Damages caused by impacts

- ❖ Direct, to human health and safety resulting from accidents, sabotage, routine emissions and exposures harmful to humans, either short or long term
- ❖ Direct, to economic goods and services accidents, sabotage, effluents and other environmental transformations
- ❖ Impairment to environmental goods and services
- ❖ Impaired visibility, dust, and ugly structures, annoying noise and odours, reduced diversity.
- ❖ Disruptions of socio-political conditions and processes Increased centralisation political power, loss of civil liberties, excessive burden on social services
- ❖ Psychological distress Physical displacement or employment; fears of the above damages, whether or not they materialize

Appendix 14.10: Crosstabulation of Neutral Responses

SEA in General: Cumulative Neutral Responses

Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	21	45	23	194	283
		% within Sectors	13.8%	28.8%	20.9%	44.1%	33.0%
	Neutral	Count	111	89	63	176	439
		% within Sectors	73.0%	57.1%	57.3%	40.0%	51.2%
	Positive Responses	Count	20	22	24	70	136
		% within Sectors	13.2%	14.1%	21.8%	15.9%	15.9%
Total		Count	152	156	110	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	21	68	194	283
		% within Sectors	13.8%	25.6%	44.1%	33.0%
	Neutral	Count	111	152	176	439
		% within Sectors	73.0%	57.1%	40.0%	51.2%
	Positive Responses	Count	20	46	70	136
		% within Sectors	13.2%	17.3%	15.9%	15.9%
Total		Count	152	266	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	65.650[a]	4	.000
Continuity Correction			
Likelihood Ratio	68.395	4	.000
Linear-by-Linear Association	23.838	1	.000
N of Valid Cases	858		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.09.

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.277			.000
	Cramer's V	.196			.000
Measure of Agreement	Kappa	-.022	.019	-1.066	.286
N of Valid Cases		858			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Energy Sector SEA: Cumulative Neutral Responses

Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	94	84	64	180	422
		% within Sectors	61.8%	53.8%	58.2%	40.9%	49.2%
	Neutral	Count	45	52	32	200	329
		% within Sectors	29.6%	33.3%	29.1%	45.5%	38.3%
	Positive Responses	Count	13	20	14	60	107
		% within Sectors	8.6%	12.8%	12.7%	13.6%	12.5%
Total		Count	152	156	110	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	94	148	180	422
		% within Sectors	61.8%	55.6%	40.9%	49.2%
	Neutral	Count	45	84	200	329
		% within Sectors	29.6%	31.6%	45.5%	38.3%
	Positive Responses	Count	13	34	60	107
		% within Sectors	8.6%	12.8%	13.6%	12.5%
Total		Count	152	266	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.706[a]	4	.000
Continuity Correction			
Likelihood Ratio	27.968	4	.000
Linear-by-Linear Association	18.641	1	.000
N of Valid Cases	858		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.96.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.180			.000
	Cramer's V	.127			.000
Measure of Agreement	Kappa	.010	.019	.541	.588
N of Valid Cases		858			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

SEA Framework: Cumulative Neutral Responses by Sectors

Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	45	89	240	374
		% within Sectors	29.6%	33.5%	54.5%	43.6%
	Neutral	Count	95	148	160	403
		% within Sectors	62.5%	55.6%	36.4%	47.0%
	Positive Responses	Count	12	29	40	81
		% within Sectors	7.9%	10.9%	9.1%	9.4%
Total		Count	152	266	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	45	52	37	240	374
		% within Sectors	29.6%	33.3%	33.6%	54.5%	43.6%
	Neutral	Count	95	90	58	160	403
		% within Sectors	62.5%	57.7%	52.7%	36.4%	47.0%
	Positive Responses	Count	12	14	15	40	81
		% within Sectors	7.9%	9.0%	13.6%	9.1%	9.4%
Total		Count	152	156	110	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.842[a]	4	.000
Continuity Correction			
Likelihood Ratio	49.274	4	.000
Linear-by-Linear Association	22.973	1	.000
N of Valid Cases	858		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.35.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.239			.000
	Cramer's V	.169			.000
Measure of Agreement	Kappa	.000	.018	.023	.982
N of Valid Cases		858			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	59	61	40	201	361
		% within Sectors	38.8%	39.1%	36.4%	45.7%	42.1%
	Neutral	Count	85	90	55	194	424
		% within Sectors	55.9%	57.7%	50.0%	44.1%	49.4%
	Positive Responses	Count	8	5	15	45	73
		% within Sectors	5.3%	3.2%	13.6%	10.2%	8.5%
Total		Count	152	156	110	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	59	101	201	361
		% within Sectors	38.8%	38.0%	45.7%	42.1%
	Neutral	Count	85	145	194	424
		% within Sectors	55.9%	54.5%	44.1%	49.4%
	Positive Responses	Count	8	20	45	73
		% within Sectors	5.3%	7.5%	10.2%	8.5%
Total		Count	152	266	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.749[a]	4	.019
Continuity Correction			
Likelihood Ratio	11.973	4	.018
Linear-by-Linear Association	.356	1	.551
N of Valid Cases	858		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.93.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.117			.019
	Cramer's V	.083			.019
Measure of Agreement	Kappa	.026	.018	1.419	.156
N of Valid Cases		858			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	12	44	15	13	84
		% within Sectors	7.9%	28.2%	13.6%	3.0%	9.8%
	Neutral	Count	99	70	32	141	342
		% within Sectors	65.1%	44.9%	29.1%	32.0%	39.9%
	Positive Responses	Count	41	42	63	288	432
		% within Sectors	27.0%	26.9%	57.3%	65.0%	50.3%
Total		Count	152	156	110	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	12	59	13	84
		% within Sectors	7.9%	22.2%	3.0%	9.8%
	Neutral	Count	99	102	141	342
		% within Sectors	65.1%	38.3%	32.0%	39.9%
	Positive Responses	Count	41	105	286	432
		% within Sectors	27.0%	39.5%	65.0%	50.3%
Total		Count	152	266	440	858
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	136.019[a]	4	.000
Continuity Correction			
Likelihood Ratio	131.778	4	.000
Linear-by-Linear Association	74.666	1	.000
N of Valid Cases	858		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.88.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.398			.000
	Cramer's V	.282			.000
Measure of Agreement	Kappa	.112	.025	4.354	.000
N of Valid Cases		858			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Sustainable Energy Policy: Cumulative Neutral Responses by Sectors

Sustainable Energy Policy: Level of Agreement * Sectors Crosstabulation

			Sectors				
			Private Sector	Non-Energy Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	94	99	78	372	643
		% within Sectors	57.0%	58.6%	65.0%	77.2%	68.7%
	Neutral	Count	68	67	37	100	272
		% within Sectors	41.2%	39.6%	30.8%	20.7%	29.1%
	Positive Responses	Count	3	3	5	10	21
		% within Sectors	1.8%	1.8%	4.2%	2.1%	2.2%
Total		Count	165	169	120	482	936
		% within Sectors	100.0%	100.0%	100.0%	100.0%	100.0%

Sustainable Energy Policy: Level of Agreement * Sectors Crosstabulation

			Sectors			
			Private Sector	Energy Sector	Environmental Sector	Total
Level of Agreement	Negative Responses	Count	94	177	372	643
		% within Sectors	57.0%	61.2%	77.2%	68.7%
	Neutral	Count	68	104	100	272
		% within Sectors	41.2%	36.0%	20.7%	29.1%
	Positive Responses	Count	3	8	10	21
		% within Sectors	1.8%	2.8%	2.1%	2.2%
Total		Count	165	289	482	936
		% within Sectors	100.0%	100.0%	100.0%	100.0%

Sustainable Energy Policy: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.853[a]	4	.000
Continuity Correction			
Likelihood Ratio	35.909	4	.000
Linear-by-Linear Association	25.170	1	.000
N of Valid Cases	936		

a. 1 cells (11.1%) have expected count less than 5. The minimum expected count is 3.70.

Sustainable Energy Policy: Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.196			.000
	Cramer's V	.138			.000
Measure of Agreement	Kappa	.000	.015	-.015	.988
N of Valid Cases		936			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Appendix 14.11 Partial and Path Analyses (Policy)

Partial Regression Analysis

When the relations discussed in Chapter 8 are further analyzed using partial correlation so that the mediator variables are controlled, the result does not alter the conclusions earlier reached. For example, the probability for the correlation between SEA in General and sustainable energy policy is p=0.001; when the mediator variables are controlled the probability p=0.007. It is noted that all the relationships satisfy the null hypothesis for p<0.01. Similarly, for the correlation between Energy Sector SEA and Sustainable Energy Policy, the statistic-p is 0.001 for both controlled and uncontrolled conditions, satisfying the null hypothesis p<0.01. The relationship between SEA Framework and Sustainable Energy Policy are statistically insignificant for controlled (p=0.102) and uncontrolled situations (p=0.178).

Table of Partial Correlation Coefficient

Controlling for.. IMPSYS IMPINST

	GENSEA	ENESEA	FRASEA	SDENPOL
GENSEA	1.0000	.5455	.1959	.4044
	(0)	(35)	(35)	(35)
	P=.	P=. 000	P=. 123	P=. 007
ENESEA	.5455	1.0000	.3001	.4983
	(35)	(0)	(35)	(35)
	P= .000	P= .	P= .036	P= .001
FRASEA	.1959	.3001	1.0000	.1559
	(35)	(35)	(0)	(35)
	P= .123	P= .036	P= .	P= .178
SDENPOL	.4044	.4983	.1559	1.0000
	(35)	(35)	(35)	(0)
	P= .007	P= .001	P= .178	P= .

(Coefficient / (D.F.) / 1-tailed Significance)

". " is printed if a coefficient cannot be computed

Path Analysis

Below is the path diagram showing the regression weights and coefficients between paired relationships labelled against the respective paths. They depict the essential hypothesis tested in this study. See the tables below for the summary of the path coefficients.

Path Diagram with Path Coefficients

Below is a correlation matrix summarising product-moment and path coefficients of all the variables under investigation. From the table of (product-moment) correlation matrix, the variable SEA in General, Energy Sector SEA, SEA Framework, Improved Systems and Improving Institutional Context positively correlate by 0.470 (p=0.001), 0.506 (p=0.001), 0.279 (p=0.043), 0.567 (p=0.000) and 0.431 (p=0.003) with Sustainable Energy Policy respectively. Controlling for the effects of the mediator variables, the correlation coefficients linking SEA in General, Energy Sector SEA and SEA Framework to Sustainable Energy Policy from the partial correlation above are 0.404 (p=0.007), 0.498 (p=0.001) and 0.156 (p=0.178) respectively. The results of the partial regression are very similar in term statistically significance except for the relationship between SEA Framework and Sustainable Energy Policy where p>0.05. The path coefficients linking these variables with Sustainable Energy Policy are 0.231 for SEA in General, 0.144 for Energy Sector SEA, 0.066 for SEA Framework, 0.399 for Improved Systems and 0.364 for Improving Institutional Context.

Moment Product Coefficients (Policy Analysis)

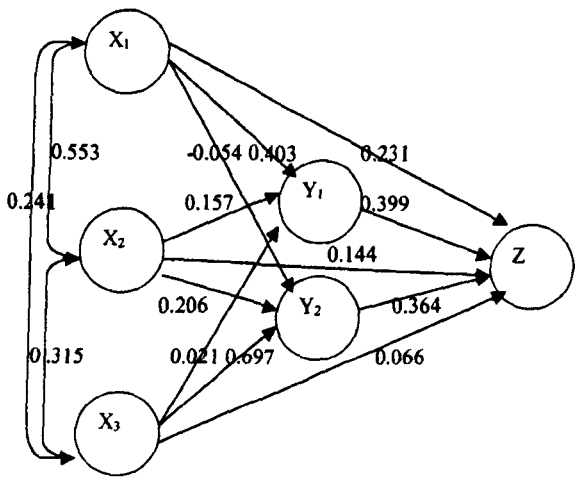
	SEAGEN	ENESEA	SEAFRA	IMPSYS	IMPINST	SDPOL
SEAGEN	1					
ENESEA	0.553	1				
SEAFRA	-0.175	0.058	1			
IMPSYS	0.486	0.381	-0.041	1		
IMPINST	-0.062	0.217	0.718	0.01	1	
SDPOL	0.470	0.506	0.279	0.567	0.431	1

Path Analysis (Direct Effects)

	SEAGEN	ENESEA	SEAFRA	IMPSYS	IMPINST	SDPOL
SEAGEN	1					
ENESEA	0.553	1				
SEAFRA	-0.175	0.058	1			
IMPSYS	0.403	0.157	0.021	1		
IMPINST	-0.054	0.206	0.697	0.01	1	
SDPOL	0.231	0.144	0.066	0.399	0.364	1

Path Analysis (Indirect Effects)

	SEAGEN	ENESEA	SEAFRA	IMPSYS	IMPINST	SDPOL
SEAGEN	0					
ENESEA	0	0				
SEAFRA	0	0	0			
IMPSYS	0.083	0.224	-0.062	0		
IMPINST	-0.008	0.011	0.021	0	0	
SDPOL	0.239	0.362	0.213	0.168	0.067	0



Path Analytical Framework

These path coefficients are similar to but not identical to partial correlation coefficients in that they represent the strength of the association between pairs of variables partialed[1] out. It can be noted that path coefficients linking the predictor variables (SEA in General, Energy Sector SEA, SEA Framework) with Sustainable Energy Policy are considerably lower than the product moment coefficients from (See correlation matrix). This means that the predictor variables have both direct and indirect effect on the dependent variable Sustainable Energy Policy. The total indirect effect of a predictor variable on the dependent variable is the difference between the product moment coefficient and the path coefficients between them. Thus for the product-moment coefficient between SEA in General and Sustainable Energy Policy being 0.470 and their path coefficients being 0.231, the indirect effect of the variable SEA in General on Sustainable Energy Policy is 0.239 (0.470-0.231). By similar computation, the indirect effect of Energy Sector SEA on Sustainable Energy Policy is 0.362 compared with the direct effect of 0.144. Between SEA

[1] The expression was borrowed from Wentzel (1993) cited in Gall et al (1996).

Framework and Sustainable Energy Policy, the indirect effect was 0.213 with 0.066 direct effects. This implies that, SEA in General, Energy Sector SEA and SEA Framework require improvement in the existing system as well as institutions to deliver sustainable energy policy.

Appendix 14.12: Partial and Path Analyses (Plan Level)

When the relations are further analysed using partial correlation so that the mediator variables are controlled the result does not alter the conclusions earlier reached in Section 6.4.6 above. For example, the probability for the correlation between SEA in General and Sustainable Energy Plan is p=0.001; when the mediator variables are controlled the probability p=0.001. It is noted that all the relationships satisfy the null hypothesis for p<0.01. Similarly, for the correlation between Energy Sector SEA and Sustainable Energy Plan, the statistic-p is 0.004. For uncontrolled conditions, the probability p=0.06, satisfying the null hypothesis p<0.01. In the like manner, the relationship between SEA Framework and Sustainable Energy Plan are statistically significant under both controlled (p=0.042) and uncontrolled (p=0.000) situations.

Partial Correlation Coefficient

Controlling for.. IMPSYS IMPINST

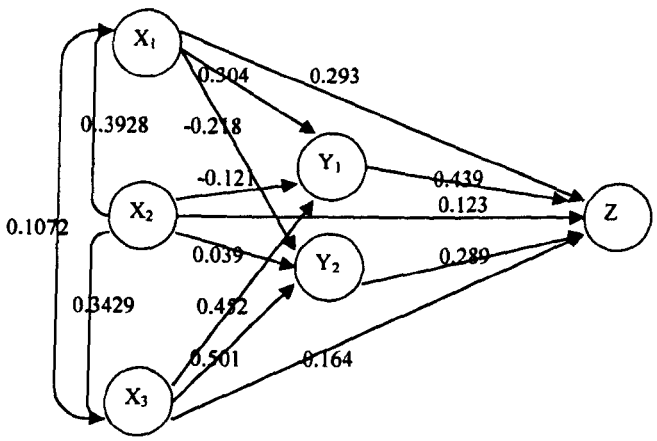
	GENSEA	ENESEA	FRASEA	SDENPOL
GENSEA	1.0000	.3902	.0753	.4817
	(0)	(40)	(40)	(40)
	P= .	P= .005	P= .318	P= .001
ENESEA	.3902	1.0000	.2977	.3883
	(40)	(0)	(40)	(40)
	P= .005	P= .	P= .028	P= .006
FRASEA	.0753	.2977	1.0000	.2700
	(40)	(40)	(0)	(40)
	P= .318	P= .028	P= .	P= .042
SDENPOL	.4817	.3883	.2700	1.0000
	(40)	(40)	(40)	(0)
	P= .001	P= .006	P= .042	P= .

(Coefficient / (D.F.) / 1-tailed Significance)

Path Analysis

Below is the path diagram showing the regression weights and coefficients between paired relationships labelled against the respective paths. They depict the essential hypothesis tested in this study.

Path Diagram with Path Coefficients



The table below is a correlation matrix summarising product-moment coefficient; correlation matrix[2] of path coefficients (direct and indirect effects) of all the variables under investigation. From the table of (product-moment) correlation matrix, the variable SEA in General, Energy Sector SEA, SEA Framework, Improved Systems and Improving Institutional Context positively correlate by 0.448 (p=0.001), 0.394 (p=0.004), 0.574 (p=0.000), 0.657 (p=0.000) and 0.398 (p=0.004) with Sustainable Energy Plan respectively. Controlling for the effects of the mediator variables, the correlation coefficients linking SEA in General, Energy Sector SEA and SEA Framework to Sustainable Energy Plan from the partial correlation above are 0.482 (p=0.001), 0.388 (p=0.006) and 0.270 (p=0.042) respectively. The results of the partial regression are very similar in terms of statistically significance .for all the relationships. The path coefficients linking these variables with Sustainable Energy Plan are 0.293 for SEA in General, 0.123 for Energy Sector SEA, 0.164 for SEA Framework, 0.439 for Improved Systems and 0.289 for Improving Institutional Context.

[2] A correlation matrix is an arrangement of rows and columns that make it easy to see how each measured variable in the set of such variables correlates with all other variables in the set.

Product-Moment, Path (direct and indirect) Coefficients

	GENSEA (X_1)	ENESEA (X_2)	FRASEA (X_3)	IMPSYS (Y_1)	IMPINST (Y_2)	SDENPLA (Z)
GENSEA	1.0000					
ENESEA	0.3828	1.0000				
FRASEA	0.1072	0.3429	1.0000			
IMPSYS	0.3058	0.1498	0.4428	1.0000		
IMPINST	-0.1494	0.1271	0.4906	0.1293	1.0000	
SDENPOL	0.4485	0.3940	0.5735	0.6568	0.3979	1.0000

Path Coefficients (matrix)-Direct Effects

	GENSEA (X_1)	ENESEA (X_2)	FRASEA (X_3)	IMPSYS (Y_1)	IMPINST (Y_2)	SDENPOL (Z)
GENSEA (X_1)	1.0000					
ENESEA (X_2)	0.3828	1.0000				
FRASEA (X_3)	0.1072	0.3429	1.0000			
IMPSYS (Y_1)	0.3040	-0.1210	0.4560	1.0000		
IMPINST (Y_2)	-0.2180	0.0390	0.5010	0.1293	1.0000	
SDENPOL (Z)	0.2930	0.1230	0.1640	0.4390	0.2890	1.000

Indirect Effects

	GENSEA	ENESEA	FRASEA	IMPSYS	IMPINST	SDENPLA
GENSEA	0.0000					
ENESEA	0.0000	0.0000				
FRASEA	0.0000	0.0000	0.0000			
IMPSYS	0.0018	0.2708	-0.0092	0.0000		
IMPINST	0.0686	0.0881	-0.0104	0.0000	0.0000	
SDENPOL	0.1555	0.2710	0.4095	0.2178	0.1089	0.0000

These path coefficients are similar to but not identical to partial correlation coefficients in that they represent the strength of the association between pairs of variables partialed out. It can be noted that path coefficients linking the predictor variables (SEA in General, Energy Sector SEA, SEA Framework) with Sustainable Energy Plan are considerably lower than the product moment coefficients from (See correlation matrix). This means that the predictor variables have both direct and indirect effect on the dependent variable Sustainable Energy Plan. The total indirect effect of a predictor variable on the dependent variable is the difference between the product moment coefficient and the path coefficients between them. Thus for the product-moment coefficient between SEA in General and Sustainable Energy Plan being 0.448 and their path coefficients being 0.293, the indirect effect of the variable SEA in General on Sustainable Energy Plan is 0.155 (0.448-0.293). By similar computation, the indirect effect of Energy Sector SEA on Sustainable Energy Plan is 0.271 compared with the direct effect of 0.123. Between SEA Framework and Sustainable Energy Plan, the indirect effect was 0.271 with 0.164 direct effects. This

implies that, SEA in General, Energy Sector SEA and SEA Framework require improvement in the existing system as well as institutions to deliver sustainable

Appendix 14.13: Partial Regression Analysis at Programme level

While the analysis of product –moment coefficients reveal the relationship between sustainable energy programme and the predictor variables, SEA in General ($p<0.05$), Energy Sector SEA ($p<0.05$) and SEA Framework ($p<0.01$) are significant, the analysis of partial coefficients reveal that only the correlation between SEA Framework and Sustainable energy programme is significant ($p<0.01$).

Partial Correlation Coefficients

Controlling for.. IMPSYS ADDINST

	GENSEA	ENESEA	FRASEA	SDENPOL
GENSEA	1.0000	.2538	-.1656	-.2435
	(0)	(42)	(42)	(42)
	P= .	P= .048	P= .141	P= .056
ENESEA	.2538	1.0000	-.2107	-.1895
	(42)	(0)	(42)	(42)
	P= .048	P= .	P= .085	P= .109
FRASEA	-.1656	-.2107	1.0000	.4411
	(42)	(42)	(0)	(42)
	P= .141	P= .085	P= .	P= .001
SDENPOL	-.2435	-.1895	.4411	1.0000
	(42)	(42)	(42)	(0)
	P= .056	P= .109	P= .001	P= .

(Coefficient / (D.F.) / 1-tailed Significance)

" . " is printed if a coefficient cannot be computed

Path Diagram with Path Coefficients

Above is the path diagram showing the regression weights and coefficients between paired relationships labelled against the respective paths. The path coefficients linking the mediator variables with Sustainable Energy Programme are -0.1260 for SEA in General, -0.051 for Energy Sector SEA, 0.319 for SEA Framework, 0.477 for Improved Systems and 0.119 for Improving Institutional Context.

Table Moment product Coefficients

	GENSEA	ENESEA	FRASEA	IMPSYS	ADDINST	SDENPRG
GENSEA	1.0000					
ENESEA	0.2684	1.0000				
FRASEA	-0.1857	-0.2551	1.0000			
IMPSYS	-0.1667	-0.1426	0.1556	1.0000		
ADDINST	-0.0868	-0.2307	0.2367	0.4850	1.0000	
SDENPRG	-0.2884	-0.2613	0.4573	0.6128	0.4483	1.0000

Path Model (Direct Effects)

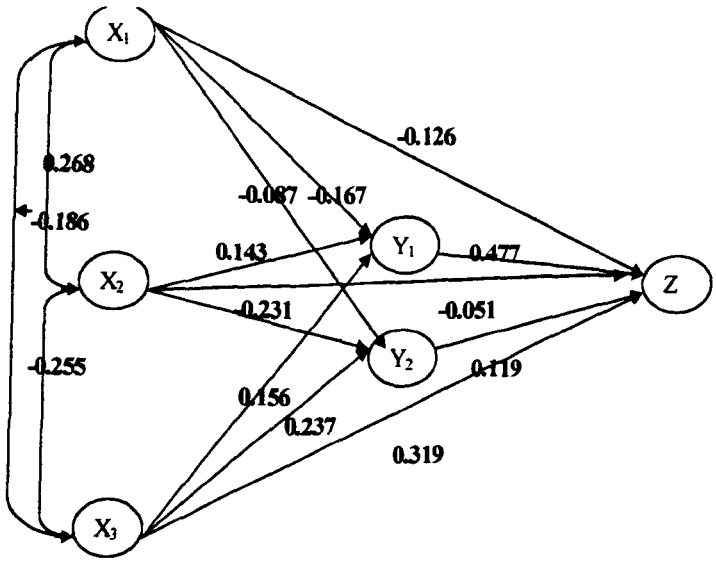
	GENSEA	ENESEA	FRASEA	IMPSYS	ADDINST	SDENPRG
GENSEA	1.0000					
ENESEA	0.2684	1.0000				
FRASEA	-0.1857	-0.2551	1.0000			
IMPSYS	-0.1240	-0.0840	0.1120	1.0000		
ADDINST	-0.0030	-0.1820	0.1900	-0.2142	1.0000	
SDENPRG	-0.1260	-0.0510	0.3190	0.4770	0.1190	1.0000

Path Model (Indirect Effects)

	GENSEA	ENESEA	FRASEA	IMPSYS	ADDINST	SDENPRG
GENSEA	0.0000					
ENESEA	0.0000	0.0000				
FRASEA	0.0000	0.0000	0.0000			
IMPSYS	-0.0427	-0.0586	0.0436	0.0000		
ADDINST	-0.0838	-0.0487	0.0467	0.6992	0.0000	
SDENPRG	-0.1624	-0.2103	0.1383	0.1358	0.3293	0.0000

The above data are analysed using correlation matrix summarising product-moment coefficient and path coefficients (direct and indirect effects) of all the variables under investigation. From the table of (product-moment) correlation matrix, the variable SEA in General, Energy Sector SEA, SEA Framework, Improved Systems and Improving Institutional Context positively correlate by -0.288 (p=0.026), -0.261 (p=0.040), 0.457 (p=0.001), 0.612 (p=0.001) and 0.448 (p=0.001) with Sustainable Energy Plan respectively. Controlling for the effects of the mediator variables, only SEA Framework correlates significantly with Sustainable Energy Programme 0.441 (p=0.001). The path coefficients linking these variables with Sustainable Energy Programme are -0.126 for SEA in General, -0.051 for Energy Sector SEA, 0.319 for

SEA Framework. 0.477 for Improved Systems and 0.119 for Improving Institutional Context.



These path coefficients are similar to but not identical to partial correlation coefficients in that they represent the strength of the association between pairs of variables partialed out. It can be noted that the magnitude of the path coefficients linking the predictor variables (SEA in General, Energy Sector SEA, SEA Framework) with Sustainable Energy Programme are considerably lower than the product moment coefficients from (See correlation matrix). This means that the predictor variables have both direct and indirect effect on the dependent variable Sustainable Energy Programme. The total indirect effect of a predictor variable on the dependent variable is the difference between the product moment coefficient and the path coefficients between them. Thus for the product-moment coefficient between SEA in General and Sustainable Energy Programme being -0.228 and their path coefficients being -0.126, the indirect effect of the variable SEA in General on Sustainable Energy Programme is -0.162 (-0.288- -0.126). By similar computation, the indirect effect of Energy Sector SEA on Sustainable Energy Programme is -0.210 compared with the direct effect of -0.051. Between SEA Framework and Sustainable Energy Programme, the indirect effect was 0.138 with 0.319 direct effects. This implies that, SEA in General, Energy Sector SEA and SEA Framework require improvement in the existing system as well as institutions to deliver sustainable Energy Programme.

Appendix 14.14: Validity Computations

To compute reliabilities and validities of instruments, Kerlinger and Lee (2001:680-683) suggested the above formula. Reliability $r_{tt} = (V_A + V_B + V_{sp})/V_t$ where V is variance, V_t is total variance. Validity represented by $h_2 = (V_A + V_B)/V_t$ where V_A and V_B are variances of variables A and B. In this study, the formula is used mainly for the computation of validities since SPSS model enables direct computation of reliabilities. In this regard, the commonalities h_2 of the variables are computed using factor analysis.

$$\underbrace{\frac{V_t}{V_t} = \overbrace{\frac{V_A}{V_t} + \frac{V_B}{V_t}}^{h_2} + \frac{V_{sp}}{V_t} + \frac{V_e}{V_t}}_{r_{tt}}$$

For the computation of the total variance of the variables, multiple regression analysis is used. These figures are then substituted in the above formula to compute validities. For example, the validity of the policy level questionnaire will be computed by dividing h_2 in the Table A below by the total variance (2.357) extracted from Table B below. This gives validities ranging between o.25 and 0.37. Similar computations are made for the rest of the questionnaires to arrive at the range referred to in the study.

Table A : Communalities

	Initial	Extraction (h_2)	Total Variance	Validity (h2/2.357)
General SEA	1.000	.726	2.357	0.31
Energy Sector SEA	1.000	.601		0.25
SEA Framework	1.000	.835		0.35
Improved Systems	1.000	.606		0.26
Improving Institutional Context	1.000	.861		0.37
Sustainable Energy Policy	1.000	.768		0.33

Extraction Method: Principal Component Analysis.

Table B: ANOVAb

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.373	5	.275	9.212	.000a
	Residual	.984	33	2.981E-02		
	Total	2.357	38			

a Predictors: (Constant), Improving Institutional Context, Improved Systems, Energy Sector SEA, General SEA, SEA Framework b Dependent Variable: Sustainable Energy Policy

Appendix 14.15: Comparison Between Policy, Plan and Programme Priorities

Variable		RankPol	RankPlan	RankProg
Private Investment (Econs)	Eco	1	5	4
Reducing Per Capita Energy Consumption(Env)	Env	2	9	19
Limiting Unemployment(Soc)	Soc	3	14	13
Sense of Community and Connectedness (Soc)	Soc	4	18	17
Ensuring Energy Security (Env)	Env	5	7	8
Maintain Natural Resourse Supply (Env)	Env	6	13	10
Ensuring Economic Efficiency (Eco)	Eco	7	8	7
Reducing Inflation (Eco)	Eco	8	1	2
Cost Recovery (Eco)	Eco	9	3	3
Percentage of Second-hand Vehicles or Appliances (Env)	Env	9	21	21
Ratio of LPG Use to Fossil Fuel (Env)	Env	9	11	14
Sustaining Economic Growth (Eco)	Eco	12	1	1
Job Creation(Eco)	Eco	12	6	6
Ratio of Solar Energy to Traditional Fuels (Env)	Env	12	22	21
The Use of Energy Efficient Appliances (Env)	Env	15	14	19
Ratio of Public Transport use to Private Transport (Env)	Env	15	22	23
Raising Revenue ((Eco)	Eco	15	10	9
Improvement in Health Services (Soc)	Soc	20	24	24
Cultural Values (Soc)	Soc	18	16	11
Accessibility to Social Services (Soc)	Soc	19	17	14
Reduction in Social Inequality (Eco)	Eco	21	12	11
Increasing Supply of Services (Eco)	Eco	22	4	4
Social Cohesion and Integration (Soc)	Soc	23	19	18
Housing with Modern Lighting (Soc)	Soc	24	20	16

Appendix 14.16: Sustainable Energy Policies, Plans and Programmes

	Policy Mean	Mean > 2.0	Σ	Plan Mean	Mean > 3.0	Σ	Prog. Mean	Mean > 3.0	Σ
Social Sustainability									
Social Cohesion and Integration	1.69			2.73			2.70		
Sense of Community and Connectedness	2.26	◄►		2.77			2.74		
Housing with Modern Lighting	1.64			2.61			2.76		
Cultural Values	2.00	◄►		2.91			3.00	◄►	
Reduction in Social Inequality	1.90			3.00	◄►		3.00	◄►	
Improvement in Health Services	1.92			2.30			2.35		
Accessibility to Social Services	1.97			2.86			2.93		
Limiting Unemployment	2.28	◄►		2.95			2.96		
Sub- Total			3			1			2
Economic Sustainability									
Job Creation	2.08	◄►		3.30	◄►		3.30	◄►	
Raising Revenue	2.05	◄►		3.14	◄►		3.15	◄►	
Sustaining Economic Growth	2.08	◄►		3.52	◄►		3.54	◄►	
Private Investment	2.44	◄►		3.36	◄►		3.39	◄►	
Ensuring Economic Efficiency	1.15			3.23	◄►		3.26	◄►	
Increasing Supply of Services	2.87	◄►		3.41	◄►		3.39	◄►	
Cost Recovery	2.10	◄►		3.48	◄►		3.48	◄►	
Reducing Inflation	2.13	◄►		3.52	◄►		3.52	◄►	
Sub-Total			7			8			8
Environmental Sustainability									
Maintain Natural Resource Supply	2.21	◄►		2.98			3.13	◄►	
The Use of Energy Efficient Appliances	2.05	◄►		2.95			2.59		
Ensuring Energy Security	2.23	◄►		3.25	◄►		3.24	◄►	
Ratio of LPG Use to Fossil Fuel	2.10	◄►		3.07	◄►		2.93		
Reducing Per Capita Energy Consumption	2.35	◄►		3.18	◄►		2.59		
Ratio of Solar Energy to Traditional Fuels	2.08	◄►		2.48			2.52		
Ratio of Public Transport use to Private Transport	2.05	◄►		2.48			2.48		
Percentage of Second-hand Vehicles or Appliances	2.10	◄►		2.50			2.52		
Sub-Total			8			3			2
Total			**18**			**12**			**12**

Variables greater than 2 or 3 are marked ◄►