To deliver a sustainable built estate; the management and operationalisation of sustainable facilities management.

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I, Samantha Price confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

This study determines the ability of FM to operationalise the management of sustainability through delivering a change in culture towards Sustainable Facilities Management (SFM). Delivering a sustainable built estate is an increasingly important aspect of society considering that it produces 45% of all UK Carbon emissions (Kelly, 2008). Through a combination of case study and observational research methods this study answers the query of where Facilities Management (FM) can fit in as part of the solution.

A mixed methodological approach was taken using both qualitative and quantitative research methods. A grounded theory was followed with the research findings developed through multiple stages. A content analysis conducted on 65 FM organisations established the current position of the industry towards SFM. Interviews were conducted with 10 FM professional to create an understanding of sustainability in the FM context. However, the main focus of the case study was a two year ethnographic study to test the response of an FM organisation to environmental policy. To test the result of this primary energy and waste data was used to analyse the impact of SFM operationally. Energy and waste were two sections of sustainability that were chosen to be used to further analysis due to the availability of measureable data. Finally, the impact of physical facilities upon the environmental behaviour of building occupants was tested through a questionnaire regarding recycling facilities; 500 questionnaires were issued, with a response rate of 38%.

The research shows that FM is in a key position to participate in delivering environmental policy for the built environment. SFM can be operationalised to deliver a consistent, methodological approach that has sustainability as a core element. This shows that the model of FM is changing. Facility design and provision does impact on occupant behaviour, physical facilities should be considered as a factor implementing environmental behaviour.

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Abbreviations

FM	Facilities Management
SFM	Sustainable Facilities Management
CRC	Carbon Reduction Commitment
SP	Sustainability Policy
IFMA	International Facilities Management Association
BIFM	British Institute of Facilities Management
IFM	Integrated Facilities Management
RICS	Royal Institute of Chartered Surveyors
IPCC	Intergovernmental Panel on Climate Change
DEC	Display Energy Certificates
WCED	World Commission on Environment and Development
CS	Corporate Sustainability
CSR	Corporate Social Responsibility
CO2e	Carbon Dioxide Equivalent
GRI	Global Reporting Initiative
KPI	Key Performance Indicators
NWF	National Wildlife Federation
EMS	Environmental Management System
NDEMS	National Database for Environmental Management System
RO	Renewable fuel Obligation
RES	Renewable Energy Strategy
DECC	Department for Energy and Climate Change
DEFRA	Department for Energy, Food and Rural Affairs
DTI	Department of Trade and Industry
OECD	Organisation of Economic Cooperation and Development
FiT	Feed in Tariffs
BERR	Department for Business, Enterprise and Regulatory Reform
SAP	Standard Assessment Procedure
HIP	Home Information Packs
CHP	Combined Heat and Power
CCS	Carbon Capture and Storage
LATS	Landfill Allowance Trading Scheme
R&D	Research and Development
CAAA	Clean Air Act Amendments
CAT	Cap and Trade
BMS	Building Management System
M&E	Mechanical and Electrical

1 Chapter 1: Introduction

It is acknowledged that Facilities Management (FM) is a changing industry and profession. It can be argued that the most recent stage in this development is incorporating sustainability elements into the FM model. The environmental threats present in the 21st Century cannot be dismissed, and the contribution that the built environment adds to this is well documented and significant. It is proposed as part of this thesis that FM organisations are able to operationalise the delivery of sustainability through developing a new business model; Sustainable Facilities Management (SFM). Sustainability throughout this thesis is viewed and framed within the scope of FM theory, as such it is a more specific approach to the subject matter than the global understanding of the term as applied as a holistic model. A model for SFM is developed which is generated through applying the FM approach to sustainability, focused within the framework of the built estate. This first introduction chapter will establish the background for this theoretical position.

1.1 Theory Grounding

The previous decades of rapid economic growth fuelled by the availability of cheap energy and cheap finance is coming to an end. This, along with changing social demands and expectations, is going put pressure on the current FM model to change. This easily available cheap energy has led to excessive consumption and in turn excessive waste. This theme can be argued to be reflected in the current FM business model as well. Along with this trend the focus of FM organisations has not necessarily been on energy reduction but rather on the alternative of providing building facilities without a thought for energy use. This economic model is no longer viable, and there is a general feeling emerging that this is no longer thought to be an attractive model to pursue as the social and environmental side effects begin to be understood by society. The Intergovernmental Panel on Climate Change's (IPPC) fourth Assessment Report

(2007) indicated that the potential to cost-effectively reduce the projected global baseline emissions from residential and commercial sector buildings by 2020 sits at about 29% (IPCC, 2007). The potential for the FM industry to participate is real.

This pressure is also seeing a change in Government reflected in recent policy introductions such as the Localism Bill, the Green Deal and the idea behind the Big Society. There is a general push to bring community focus back into the forefront of people's minds, with this now also including a community push to reduce environmental damage. However, the policy makers are certainly not giving a consistent message. Progress is continuing with the exploration of Shale Gas, there has been a relaxation in the planning process for new build house construction and there is a general culture of watering down EU Environmental targets. All these steps are counterintuitive to the new policy areas such as the Green Deal.

1.2 The influence of Government Environmental Policy

The UK Government has set a number of binding long-term environmental commitments to drive the UK towards reducing greenhouse emissions. Most notably these include; reducing greenhouse gas emissions by 80% by 2050 against 1990 levels and generating 20% of EU energy from renewables by 2020 which the UK has signed up to. The UK however is currently not leading the way. The latest review in December 2010, reported that the UK generates less than 4% of its energy from renewable sources (Ondar and Hemmingway, 2010). This is compared to Sweden that generates nearly 45% of its energy from renewables; Finland and Latvia both generate around 30%. Looking more to our neighbours, France generates just over 10% (but has a large nuclear base supply in addition) and Germany around 9%. The UK consistently underperforms against the EU average. This is going to impact the FM industry, the focus upon contractual standards and optimum building conditions is not waning, however the FM organisations will have less and less resources with which to deliver

such requirements and ever increasing pressure to deliver environmental targets at the same time (Price and Pitt, 2011b).

Such targets require the input of not only the Government but also business and individuals. To deliver binding emissions reduction targets requires the Government to translate this into strong policy directives to lead UK business, industry and even individuals to change the manner in which they operate. This has begun to happen. The latest government policy to force this issue is the Carbon Reduction Commitment (CRC). The CRC is a compulsory scheme targeting the large public and private sector organisations that are responsible for 10% of the UKs greenhouse gas emissions (Wright, 2010). They are being targeted with the aim to improve energy efficiency and reducing emissions. However, currently the change of Government has resulted in the policy undergoing a number of alterations which may affect the final outcome. It could be argued that FM organisations are best placed to be able to deliver this policy. Aside from this, the FM industry is going to be affected, as the CRC will add a new dimension to business operations.

Rising global temperatures and the process of climate change are thought by many to be the top global threat of modern times. The impact will not only be upon energy supply but also population, food supply and water supply. We rely on the world's oceans for life, global weather systems, energy generation and food as 72% of our planet consists of Ocean (Royale, 2011). Subsequently our health is reliant upon the health of the oceans; however we are getting close to Oceans limit for its ability to act as a global carbon sink. Our demand for energy is not ceasing, however we know the negative effects this is having on global temperatures. Developing countries are following in the developed world's footsteps, generating dirty energy such as coal-fired power stations. Energy security of supply is an increasing threat (Price, 2009; Price, 2010). World population is growing which is going to place increased demands upon energy generation and the production of food. By 2050 the prediction for world population is 9 billion up from 7 billion today, creating an increase in demand for food by 70% (Lang, 2001).

1.3 The influence of the built environment

The built environment has a key part to play in this global problem. Its contribution to the UKs greenhouse gas emissions cannot be ignored, especially looking at the office estate. Policy has begun to be targeted towards the polluters through the CRC however the existing office estate has not yet been targeted to reduce emissions. The policy is predominantly on a voluntary basis for new build homes. The UK is full of historic buildings; it has old cities and towns which are inefficient, but here to remain. 45% of all carbon emissions come from present buildings (around 13% of which are commercial and public buildings and 5% industrial), 87% of the existing built estate will still be here in 2050 (Kelly, 2008); the date by which the UK needs to reduce emissions by 80%. Action needs to be taken to reduce the energy use of the current built stock; whether this is through retrofitting, behaviour change or occupancy change. In reality it is going to require a dramatic combination of all three.

The natural next step you would think would be to include the operators of buildings into the climate debate. However, this does not seem to have come to fruition as yet. IT could be argued that the FM team would be best placed to deliver real differences to how buildings are operated and play a key role in retrofitting to improve environmental performance. The meaning of FM is changing; developing the understanding of the SFM model would be beneficial in the climate change debate. Indicators that the FM model is developing into SFM are apparent, yet a full understanding of this model is not yet available. Sustainable, or Green, construction has been present in the construction industry for some time and is a clear focus of Governmental policy for the built estate, especially for new build homes. Yet the management of the existing building stock and the new build stock does not carry the same weight with policy makers. It can be argued that this is wasting a vast skill level available with FM teams who often carry extensive knowledge about the buildings being managed as well technical knowledge to manage those building as efficiently as possible.

Developing policy coming into effect in autumn 2012 may be able to bridge this gap between owner/operators and funding to enable environmental initiatives to be implemented. The Green Deal using the Green Investment Bank will free up funding for owners of buildings, clients and FM teams. As funding is often cited as a key barrier to sustainable development within the new and existing built estate. However, research focusing on the triple bottom line and economic evaluation of environmental initiatives is beginning to establish a different economic model to be applied to sustainability works evaluation. This thesis will also seek to evidence that when applying a broader economic model through a development of the triple bottom line accounting method sustainability projects are in fact a benefit for the business model.

1.4 Development of the Research Scope

Understanding the operation of SFM as a business model and how this will benefit the development of sustainable business practice for FM organisations involves a number of issues. Notably what is SFM, what does it look like in practice and how could this understanding be used to develop targeted environmental policy. The intention of this thesis is to develop the issues that are underrepresented in current literature. Knowing that the office estate in the UK is mostly already constructed and currently contributing significantly to the UKs greenhouse gas emissions this thesis specifically focuses on defining the current position of SFM and the indicators of sustainable business practice.

The research for this thesis begins with a content analysis on secondary data to establish the current position of the FM industry towards sustainability. This stage of the research allows for the development of a benchmark and from this understanding of the base level more detailed research can be conducted into the subject area.

The second stage of the research introduces the case study organisation to develop an understanding of the relationship between the FM industry and sustainability. This

involves conducting interviews with ten professionals from the FM case study organisation. The number of interviewees is limited to ten as these are the staff members with the relevant technical and operational experience that allows the understanding of the topic. This stage builds up more of a picture of the understanding of sustainability as applied in the FM context, how it is introduced, what are the key topics within this subject area that are applied to FM specifically, what is the relationship with value, what are the drivers and how does it fit with measurement of business performance.

The third stage of the research introduces the observational research method. Building upon the understanding of SFM and sustainability in the context of FM gained through the first two research stages, the business model is observed first hand to evidence the reaction of the FM case study to real a environmental Directive as issued by the Government. This involves observing the reaction of the FM team to policy mechanisms included in the Directive as designed to motivate towards compliance. The main research aim for this section is to evaluate the ability of an FM organisation to lead and deliver environmental policy for the current built estate. To test this position and the findings from the observational research the results of two environmental projects delivered by the FM organisation is evaluated. The two projects are a carbon reduction Directive (the delivery of which is observed) and a waste and recycling Directive.

When evaluating the success of environmental policy delivered by an FM organisation the subject building users cannot be ignored. The final stage of the research involves evaluating the impacts that the physical facilities provided have as a situational factor versus environmental values upon the environmental behaviour of the building occupants. The research data for this is gathered through a questionnaire issued to the wider building.

The research uses a case study design, with an inductive approach. The researches stages introduced above make up the mixed methodological approach which is used for

this thesis including; a content analysis, interviews, questionnaires and technical data collection. The combination of research methods enables a detailed understanding of each research area and the building of sound theories. This research did follow a grounded theory whereby the research questions were developed throughout the research stages as information was gathered.

1.4.1 Case Study

The detailed research for this thesis focuses on a FM provider. The FM organisation is the Special Purpose Vehicle for a PFI contract to deliver managed facilities to a Government building in central London. The FM contract was for 30 years with 20 years remaining at this stage. The contract involves full FM delivery in terms of both hard and soft FM. The case study organisation is responsible to manage the delivery of the contract. There are two main contractors that are responsible for the deliver of the contract and a range of specialist subcontractors also. The case study organisation is small, consisting of 12 personnel. The team is made up of a combination of technical and non-technical employees. The technical employees responsible for managing the operations have a technical background and their role involves managing sustainability elements such as energy management and efficiency. There is no specific energy manager role.

1.5 Research Questions

The negative impact the built environment has upon the natural environment is evident, however what motivates FM organisations to act upon environmental policy requirements, if at all? The meaning of SFM and the link to the policy directives is the central theme to this thesis. This central theme presents a number of sub questions that are grouped into four areas:

1) What is the current position of the FM industry towards sustainable development in terms of organisational application and what are the key factors which are influence its implementation?

2) What is the understanding and interpretation of sustainability within the FM context?

3) The built environment is a central part to delivering UK carbon reduction targets; are FM organisations able to deliver environmental policy directives specifically for the current built estate and what are the factors which impact this?

4) There is a wealth of research surrounding the impact of environmental behaviour on the success of environmental programmes; however what level of impact does the physical facilities provision have on the success of environmental programmes in a large, open plan office environments.

This research contributes to the knowledge of how to develop environmental policy to specifically target the operation and management of existing buildings through the medium of FM organisations.

1.6 Thesis Structure

The structure of this thesis is as follows:

Chapter	**Title**
1	Introduction
2	Literature Review 1 Developing and Understanding of the FM model
3	Literature Review 2 Environmental Policy and FM
4	Literature Review 3 Fulfilling Environmental Policy
5	Methodology
6	Results 1 Current Position of SFM
7	Results 2

	Understanding Sustainability in the FM context
8	Results 3 The outcome of FM delivered environmental policy
9	Results 4 The impact of FM on environmental behaviour
10	Discussion
11	Conclusions

Table 1 Chapter Outline

1.6.1 Part 1: Literature Review and Theoretical Background

Chapters 2, 3 and 4 provide a detailed introduction to the theme of the research in the form of a literature review of the current relevant ideas. Chapter 2 begins with a detailed look at the meaning of FM, the meaning of sustainability and corporate sustainability and the indicators of sustainable business practice. This chapter also begins to look at the meaning of added value and the relationship between added value and sustainability. The specific notion of the theory of FM and its relationship with sustainability is established. Through current research it can be seen that the majority of FM organisations do have a sustainability policy (SP), however, there are still significant barriers in place towards the full adoption of SFM practice.

Chapter 3 begins with an exploration into current environmental policy acting upon organisations within the built environment. An overview of European environmental policy is to be given, exploring current Directives, Action Programmes and Policies in place as well as current EU environmental targets. There will be a focus upon The Climate Change Act 2008 and the resultant Carbon Reduction Commitment and the details within each.

A summation of the built environments' impact upon the natural environment is to be discussed to offer an indication of the reason for the developed research question. The areas of environmental policy that are to be discussed are generally specific to the built environment, including the Code for Sustainable Homes and BREEAM for example. The chosen policy areas are discussed due to their position as a possible method to

control and incentivise towards reducing future Carbon Emissions. The impact and role of Facilities Management with regard to delivering environmental improvements is to be introduced. Specific environmental topic areas that an FM organisation can impact will be considered here with particular focus upon recycling, waste management, carbon reduction, and policy creation.

Chapter 4 builds upon the policy considerations already discussed through considering the issue of compliance. The focus will be on the general barriers to compliance initially followed by specific barriers towards complying with environmental policy. Human behaviour is considered here because of its effect upon organisations regardless of policy details. There are three variables which research has shown to affect personal level of environmental behaviour; situational factors, environmental values and psychological factors. However, the knowledge an individual holds on environmental matters is also found to effect environmental behaviour.

Financial factors can also act as a barrier to policy implementation. Financial systems being incompatible with the policies financial mechanisms is one example of a barrier as well as the more simple matter of an organisations ability to avoid financial mechanisms such as tax alterations. Such issues will be explored. The effectiveness of other mechanisms notably; optional reporting, audit, managerial time required, managerial interest, community pressure, the triple bottom line and general resistance to change are to be considered alongside environmental science when aiming to create effective environmental policy.

The specifics of the CRC commitment are to be considered separately to understand the latest mechanisms used within environmental policy. From its original form the CRC has been changed to suit political agendas of the new coalition government. However, the intent of the policy is still a significant development.

1.6.2 Part 2: Research Scope, Methodology and Case Study

Chapter 5 details the research methods used to collect the required data. A mixed

methods approach was chosen, combining qualitative and quantitative research methods. A case study organisation was used as the focus for the majority of the data. Only stage 1 of the research involved data capture from the wider industry. The table below shows the split between the quantitative and qualitative research methods.

Stage	Method and Topic Area	Qualitative	Quantitative
1	Secondary content analysis. Current position of the lustry towards SFM.	None	Content survey of secondary data from 65 companies to understand prevalence of policies and implementation of such.
2.1	Interviews and survey collection. FM and sustainability	Interviews with FM service providers to understand their approach and understanding of sustainability.	A short survey to gain an understanding of areas of environmental policy within the case study.
2.2	Ethnographic observation. The response of FM to environmental policy directives.	Conduct the 2-year observational research, through monitoring the FM team in reaction to environmental policy directives.	
2.3	Primary energy data collection. Validate the success of compliance with environmental policy.		Data on energy use will be collected to test the delivery of the project aim, and therefore the success of the compliance mechanisms.
2.4	Primary recycling data collection. Validate the success of compliance with environmental policy.		A recycling project will be monitored using the above built model to test the affect of the compliance mechanisms in place.
3.	Survey collection. The influence of facilities on the success of recycling initiatives.		Survey data collected from a wider sample to understand the influence of environmental behaviour versus facility design.

Table 2 Overview of research methods

Stage 1: A content analysis carried out on secondary data published by 65 FM organisations. This was conducted to understand the current level of sustainable

business practice within the FM industry. This created an industry benchmark that was used to validate the case study company.

Stage 2: Utilising the case study and ethnographic approach.

Stage 2.1 Conducting interview and survey research with 10 members of the case study team. This is to understand their approach, opinion and understanding of sustainability and environmental management within the FM organisation.

Stage 2.2 Conduct the observational research stage; data is collected over the period of two years.

Stage 2.3 Collect primary energy use data over the period of one year. This is used to test the results of the FM team in delivering the environmental policy directives. This will validate the success of the methods observed during stage 2.2.

Stage 2.4 Collect primary waste data over the period of one year. This is used to test the results of the FM team in delivering a second environmental policy directive.

Stage 3. Carry out a survey of the wider building community to establish the strength of the impact of facility design and provision on the success of a building wide recycling initiative. 500 questionnaires were issued with 189 returned.

1.6.3 Part 3: Research Findings

Chapter 6, 7, 8 and 9 form the analysis of results. Chapter 6 discusses the findings from the content analysis and establishes the benchmark for the current position of the industry towards SFM. The chapter continues with identifying the variables of sustainable business practice and determining whether the strength a SP has in influencing the uptake of sustainable business practice along with the believed reason for having a SP. The case study is validated against this industry benchmark to ensure that it is both representative of the wider industry and operating a minimum level of SFM in order for the research to be gathered.

Chapter 7 is focused the meaning of sustainability in the context of the FM model. A definition for the meaning of sustainability within the FM context is explored and the extent to which contractual requirements drive its development is a focus of discussion. The opinions of the FM team towards a number of key topics surrounding SFM is explored; such as their own evaluation of their success in delivering SFM and opinions on the key topics for inclusion in SFM. The meaning of added value in the FM context is defined and explained and the definition of sustainable added value in the FM context is explored.

Chapter 8 uses the main body of the observational research to establish the variables used to motivate the FM case study to comply with environmental policy. The reaction of the FM team to the policy mechanisms and the affect of the situational factors are evaluated following a two-year observation period. The evaluation of the success of the policy mechanisms and project delivered by the FM organisation is tested through evaluating the outcome of two projects using primary data collected from the case study building. Waste and recycling statistics are evaluated to analyse the success of the recycling project delivered by the FM organisation and energy consumption data and subsequent CO_2e emissions are evaluated to analyse the success of the CO_2e reduction project delivered by the FM organisation.

Finally, chapter 9 concludes the evaluation of FM managed environmental projects through introducing the influence of building occupants into the analysis. Recycling remains the subject area under focus and the impact of environmental behaviour versus the impact of physical facilities provided by the FM organisation as a situational factor is evaluated.

1.6.4 Part 4: Discussion and Conclusions

Chapter 10 brings together the results of the previous chapters 6, 7, 8 and 9 to deliver a critique of SFM, mainly on the indicators, the meaning and the success of SFM. The findings can be linked to policy development specific to the built environment and the

involvement of the FM organisation with compliance. Consideration is also given to the limitations of this research and the possible routes to develop this research further.

1.7 Summary

This thesis will now continue according to the proposed layout discussed within this chapter. The text is broken down into sections within which the chapters discussed above are contained. All of the research questions will be answered and the theoretical position established against each will be discussed at the end of the thesis.

PART 1: LITERATURE REVIEW AND THEORETICAL BACKGROUND

2 Chapter 2: A developing understanding of Facilities Management

2.1 Introduction

This chapter discusses the development of the FM industry and FM organisations, along with the relationship to sustainability and the evolution of the two subjects. The first section looks at what FM is in practice and how the industry is developing to deliver a more strategic function for client organisations. The next section discusses the evolution of the idea of sustainability and the developing new idea of SFM. This includes beginning the discussion of what possible indicators of sustainable business practice might look like. The issue of value is introduced, a term which is becoming linked to the delivering of sustainable solutions. The chapter finishes on looking at the impact of a Sustainability Policy (SP), taking a lead from the importance of Health and Safety policies in modern Europe.

2.2The Evolution of the Facilities Management industry

The application of FM theory has many guises. An FM organisation can consist of a team of contractors providing a service for non-core activities, a holistic in house team and anything in-between. As such the definition of FM does vary, depending on what model is being studied. FM as a profession and an industry began in the United States in the 1970s; the International Facility Management Association (IFMA) was then established in the 1980s with the intention of training and managing staff involved in the interface between workplace, staff and processes (Shah, 2007). FM can ultimately be provided by an in house team or through external contracted companies (Mintel Report, 2005).

The function of the FM model is still in its infancy. The common view of this function as being responsible for managing buildings or being a maintenance department often does not match the holistic reality of FM processes which are being woven into core and support services of organisations (Pitt and Noor, 2009; Edum-Fotwe *et al.*, 2003). When trying to find one defining statement to explain the meaning and purpose of FM, a number of varying definitions by leading practitioners present themselves, all relevant in their own way. The IFMA Board of Directors (2004) describes FM as 'a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, process and technology'. In an exercise to create European Standards for the FM industry EuroFM and CEN/TC 348 (2008) defined FM as 'a discipline that improves and supports the productivity of an organisation by delivering all needed appropriate services, infrastructures, etc. that are required to achieve business objectives'. Alternatively, the BIFM defined five distinct areas within the FM model (BIFM, 2007):

- Large companies with in-house facilities teams that manage contracts using outsourced suppliers.
- External management suppliers that offer a range of outsourced services as a total one-stop shop.
- Smaller individual suppliers providing specific contracts for services such as cleaning or pest control.
- Product suppliers.
- Consultants.

The FM model can involve managing the delivery of services. The variation in the services delivered to each specific contract is wide and the contractual relationships possible are vast. Shah (2007) elaborates on this idea and discusses the idea of the FM organisation in terms of service areas;

- Single Service provision: the focus is upon the delivery of one type of service e.g. cleaning.

- Multiple or packaged service provision: the provision of an extensive range of services as a package. The focus is still on the delivery.
- Management contracting: A mixture of delivery and management services where the client will hire several management contractors giving the client organisation overall management control.
- Integrated facilities management (IFM): Client companies will delegate total management of their facility requirements to service providers who manage and deliver a range of services either directly or through sub contracts. The focus is on the management services.
- Management agents: here there is a focus on management alone where contractors are used to deliver the services.
- Infrastructure Management: the maintenance and management of infrastructure.
- Building operations and maintenance: Consists of buildings and content management, maintenance, plus plant and systems management.
- Business support services: Administration, finance, human resources management or procurement and insurance for example.
- Support services: Details a vast range of service streams ranging from catering to security to business support.
- Property Management: Involves asset management, design/construction, space planning and project management for example.

The above models for the FM organisation can all be seen in the industry currently. Each model will ultimately be designed to deliver a different outcome depending on the client requirements. However, regardless of the above proposed models for the FM organisation the FM industry is continually changing and adapting to wider market forces.

2.3 Drivers for Change in Facilities Management

The FM industry is developing into an important corporate discipline; increasing numbers of organisations are linking their everyday business performance to their method of managing their facilities and workplace assets (Edum-Fotwe *et al*, 2003). This is incorporated into the idea of moving away from FM as solely managing a facility but to managing all business operations including facilities such as HRM, IT and wider business support (Pitt and Hinks, 2001; Alexander, 1992a; Price and Ahklahi, 1999). One can argue that efficient FM organisations will promote effective working practices within the host organisation, and can even add value to the host organisation through increasing employee productivity. A competitive edge can be achieved for the organisation through effective use of the facilities (RICS, 1999; Pitt and Hinks, 2001). The cost for FM services represent the largest costs for an organisation, after the cost of personnel and the cost of the asset, showing the need for FM services to be part of the wider business model (Brandt, 1994). In the past ten years the UK economy has caused severe commercial and competitive pressure on businesses, these pressures have led to businesses using the working environment to create a competitive advantage (Patheridge, 2008). The FM industry is becoming increasingly important since its conception, often being incorporated as an integrated business activity supporting core functions (Puddy *et al.*, 2001; Payne and Rees, 1999).

The current economic, business and legislative environments are also a driving force for change in the FM industry with increasing demands for efficiency, value for money and environmental compliance (Edum-Fotwe, 2001). Manufactures perceive the greatest pressure to improve environmental performance is through legislation and internal pressure (Holt and Ghobadian, 2009). Governments are using legislation and regulation to reduce carbon emissions and overall energy demand. Due to their role in managing the building stock, the FM industry will be partly responsible for achieving such

demands and to reduce the burden on the environment (Shah, 2007; Price and Pitt, 2011b). Currently the FM market is worth £106.3 billion with a predicted growth rate of 2%-3% annually (Shah, 2007).

The IPPC fourth Assessment Report (2007) indicated that the potential to cost-effectively reduce the projected global baseline emissions from residential and commercial sector buildings by 2020 sits at about 29% (IPCC, 2007; Schweiker and Shukuya, 2010). In short the FM industry is under pressure to change and has been for some time, some may say that a changing FM industry is a symptom of changing organisations (Grimshaw, 1999; Edum-Fotwe, 2001; Holt and Ghobadian, 2009). The current driver for change upon the FM industry is likely to be the rise in importance of Corporate Social Responsibility (CSR) and governmental environmental targets.

2.4 The introduction of sustainability theory to the management of the built estate

Sustainability is becoming an ever increasingly important aspect of 21st Century life. It is a long-suffering subject of debate, being defined and redefined. For most it is an acceptable reason to adjust from the modern consumerist lifestyle. It is a personal contest affecting all levels of decision-making. However, on the personal level the decisions seem easier to make, the personal advantages of a sustainable lifestyle are more acceptable, more obvious and becoming more common. The decision-making is often a clearer and the moral dilemma is easier to answer. Even though often at the personal level sustainability often represents a higher cost or increased effort. Whether that is taking public transport over the car, holidaying the UK over abroad or buying local. However, at the level of the firm and especially at the level of the UK Government the decision-making seems to be impaired at many levels.

Looking at the level of the firm, if sustainable practices are not embraced then the pro sustainable decisions at the level of the individual is impaired. The demand at the level

of the individual exists already. Policy, public services, products, services and the built environment need to embrace sustainable business practice. Environmental policy is progressively targeting businesses and the built environment. Building Standards are becoming increasingly stringent with demands for environmental improvement, such as the Code for Sustainable Homes designed to deliver a step change in the home building practice. Alternatively the CRC is designed to target the top polluting organisations to reduce their carbon footprint. However, the issue for the built environment rests with the existing buildings that are energy inefficient and require retrofitting to deliver environmental improvements. Many of the existing buildings are capable of reducing their environmental impact without major retrofitting, a point which the Display Energy Certificates (DEC) display clearly.

Whether it is a moral decision or a financial opportunity there are ample advantages to be gained from environmental improvements in the operation of buildings. The FM industry is well placed to deliver this improvement in environmental standards; however, currently the framework is often missing, the contractual relationships are prohibitive or the financial systems are not available. As a result the role that the FM industry could play in the achievement of carbon reductions and sustainable development it is not fully appreciated (DTI, 2009).

Of interest to this thesis is the way in which businesses and buildings are initiating projects to reduce energy use and carbon emissions. Of particular interest is the methods chosen to reduce energy use when faced with a tangible target, and the reaction of building users to a sustainability and environmental education programme. European Action Programmes have taken the step to formalise the climate change issue and progress a solution to drive change, however to date serious inroads towards driving compliance with individual organisations have not been delivered through this system. The general market is still nervous about investing in renewable technology. The reported advantages of sustainability projects and energy reduction projects are still not widely accepted. The change in attitudes is a painstakingly slow progress. This current situation means that policy needs to be firmer in its direction, to create an additional

non-negotiable motivational factor to create change where the current advantages are failing. This has begun to happen with the recent addition to policy through the CRC energy efficiency scheme.

2.4.1 The developing understanding of sustainability

Sustainability is not a new phenomenon. The term sustainability first emerged hundreds of years ago under the guise of forestry management in the text Sylvicultura Oeconomica written in 1713 by Carl von Carlowitz. In the 1960s Carson (2002) had used the term in Silent Spring when describing a world by chemicals and a drive for increased productivity. By the time of the 1980s the term had began to have wider meaning (Scoones, 2007). The Brundtland commission, chaired by the former Prime Minister of Norward, became a focus of the evolving sustainability debate concluding with the renowned report; Our Common Future published in 1987 (WECD, 1987; Scoones, 2007), producing the following well-known definition of sustainable development:

> 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WECD, 1987)

Following this definition other disciplines explored and defined the meaning of sustainability to understand the term as it is applied to their work. For economists the debate focused on theories of substitutable capital in terms of weak or strong sustainability (Scoones, 2007). Sustainable development, as opposed to sustainability, represents a process and framework for defining social progress and sustainable economic systems and environmental protection (Shah, 2007). This developed into the idea of the triple bottom line as a method to frame sustainability in the corporate world, adding to the development of new accounting and auditing measures (Elkington, 1997). Political scientists such as Andrew Dobson (1999) began to explore the relationships between political theory, well-being and social justice to place sustainability concerns at the centre of social and political change. Alternatively, Kates (2001) developed 'sustainability science' linking economic, environmental and socio-political

dimensions. The UN Global Compact has three principles devoted to the environment: Precautionary, Proximity and the Polluter Pays principles.

By the 1990s multiple versions of sustainability had been established along with multiple definitions, interpretations and theories competing for attention. Following the 1992 Rio Agenda the Government enlisted experts to establish frameworks, approaches and later policy developments (Carney, 1998; Carney 2002). However, the agendas were still overly ambitious, and to this day the best method to implement corporate sustainability is a topic that is still being discussed. Shah (2007) summarised the movement of developing the understanding of the term sustainable development as it developed throughout the decades. This can be summarised as the following:

During the 1980s:

- The presence of health and safety regulations governing a variety of company activities
- 'Environment' was the main concern with the growth being in the development of environmental management systems
- Large companies developed policies, staff documentation and performance management processes to reflect this

The business implications during the 1990s:

- The development and strength of compliance issues
- The concept of sustainable development increases in status and credibility- a balance between environment, social and economic activity
- Additional terms and areas introduced, including the introduction of stakeholders into the debate
- The gap emerges between companies prepared to take action and implement changes and those who still needed further encouragement

During the 2000s:

- Sustainable development begins to expand into 'corporate responsibility' for organisations
- The idea of holistic balance is viewed alongside the notion of sustainable development
- Corporate responsibility encompasses a range of issues which appear to have no priority e.g. business ethics, product stewardship, supply chains and globalisation

The term sustainability has developed in importance as a term applied to global development, economics and planning. As the term, and associated work, increases in importance globally and socially it is increasingly incorporated into organisational thinking as consumer pressure increases for organisations to adopt the meaning of sustainability beyond simply the economic bottom line.

2.4.2 The development of Corporate Sustainability

With this wide reaching understanding of sustainability, the topic has become a boundary term, one which crosses over the disciplines of politics and science. There are many different branches of thought covering different disciplines of sustainability, each conjuring up a different set of definitions, implications and practical applications. The form of sustainability within this context is corporate sustainability, the way in which sustainability is applied to and interacts with the corporate world. Marrewijk and Were (2003) define Corporate Sustainability (CS), often referred to as Corporate Social Responsibility (CSR), as a company's activities that demonstrate the inclusion of social and environmental concerns within business operations and interactions with stakeholders. As this definition suggests the actual application and interpretation of CS varies depending on the situation of the company in question; the one-solution fits all approach for CS should be abandoned (Marrewijk and Hardjono, 2003). The application of corporate sustainability will reflect the awareness, development and ambition levels

of the organisation (Marrewijk and Were, 2003). External pressures will also alter the appropriate approach to sustainability at any given time.

CS incorporates the companies approach to public and stakeholder engagement, the social aspect of business, human capital and transparency levels (Marrewijk and Were, 2003). Corporate Responsibility (CR) is a development of the traditional idea of CSR, incorporating societal issues within the idea of the Triple Bottom Line (Wempe and Kaptein, 2002). CSR can be associated with the communion aspect of people and organisations relating to transparency, stakeholder dialogue and sustainability reporting, whereas CS is the agency principle relating to value creation, environmental management, environmentally friendly production and management of human capital (Marrewijk, 2002). In reality both refer to company activities with the inclusion of social and environmental concerns within business operations (Marrewijk, 2002).

CS is linked to the idea of social responsibility, which in itself is a term that holds a variety of meanings to a range of different people (Silberhorn and Warren, 2007). With the wealth of definitions and understandings that exist around CS, it is often heralded as the answer to the global poverty gap, social exclusion and environmental degradation (Marrewijk, 2002). This is reflected by Banerjee (2008) who believes that CSR is too broad in its scope to be relevant to organisations. Henderson (2001) reinforces the notion that has provoked this research, that there is no solid and well developed consensus to provide a basis for action. Moving past the idea of stakeholder sustainability; from the idea of social responsibility of businesses remaining firmly in the pursuit of increased profits (Freeman, 1984) to the broader view of CSR as companies being responsible to society as a whole with which they are an integral part of (McGuire 1988; McGuire, 1963; CED, 1971). This notion incorporates the approach that companies operate by public consent, serving the needs of society to the satisfaction of society (CED, 1971).

CSR is forcing organisations to be more open with investment decisions; decisions can no longer be justified on cost alone (Walker *et al.*, 2007; Hannagan, 1998). Within the

wider business environment 75% of large companies are reported as being under pressure to develop non financial measures of performance (Hubbard, 2009) this is increasingly involving environmental and sustainable areas of measurement. In 2003 CSR funds were estimated to be at 35 billion Euros, and predicted to increase further (Walker *et al*, 2007). The most current catalyst for development within the FM industry could be seen to be the sustainability and environmental agenda. The UK is currently committed to reducing total Carbon Dioxide (CO_2) by at least 60% from 1990 levels by 2050 and by 26% by 2020 (BERR, 2009). Following the focus on sustainable construction, Government policy is increasingly being designed to target emissions resulting from the existing building stock. Specific schemes include the introduction of energy efficiency requirements for thermal elements into the Building Regulations, the CRC and Energy Performance Certificates for example (BERR, 2009).

Ultimately CS needs to adapt the sustainable development mantra into daily operations. Corporate development should be sustainable both in terms of the environment and commercial success. Commercial success should not come at the expense of the natural environment. This idea can be incorporated into the definition of CS, in terms of how organisations can implement this idea into practice. Keeble *et al.* (2003) developed four sustainable development questions that can be used to evaluate company strategic decision-making.

- Economic: Will the project generate prosperity and enhance the affected economies?
- Social: will the project be implemented in a socially responsible manner and benefit the affected communities in a fair and equitable way?
- Environmental Quality: Will the project cause long-term damage to the environment?
- Use of Natural Resources: Will the project protect and enhance natural capital?

If these ideas were adapted into corporate processes then this would aid the development in understanding the meaning of CS.

2.5 Sustainable Facilities Management

This concept of introducing the environment, society, transparency and the triple bottom line within corporate management and accounting is the concept of sustainability used within the modern corporate world. This is the concept used to frame the direction of research towards the understanding of SFM. Definitions of sustainability in the context of FM operations are sparse. To define sustainable facilities management the most commonly accepted definition of sustainable development created by the WECD could be used as a starting point. Taking this as a starting point, sustainable facilities management (SFM) can be considered to be a method of managing facilities that meet the needs of the current client and end user without compromising the ability of future generations to meet their own needs.

It is becoming accepted that SFM will need to take into account social, economic and environmental aspects of sustainability to deliver a rounded service which is demanded in modern times (Elmualim *et al.*, 2010). Increasingly the primary objectives of organisations are required to include environmental commitments and, therefore for FM organisations to deliver an environment where the client organisation can focus upon its core and supporting business functions, FM organisations are likely to adapt their processes to include sustainably orientated processes (Pitt *et al.*, 2011b). To deliver environmental targets and to exist in a sustainable environment it is needed not only for technological advances but also a change in attitudes and behaviour of building end users. Due to their position of influence over how the building is used, FM departments are able to have an effect upon the technological and behavioural change needed to deliver environmental targets (Elmualim *et al.*, 2010). Strategic alliances could be one method to bring about the organisational change required to take advantage of external changes in the environment and enable FM organisations to reduce the risk of testing

new technology (Pitt *et al.,* 2011a). The regulations that are being agreed by Government are going to directly impact FM activities, as FM departments are likely to be made directly responsible for implementing change to reduce emissions in an increasing number of areas (Elmualim *et al*., 2010).

FM as an organisation and an industry has the potential to be at the forefront of delivery for sustainability due to the impact upon the selection, operation and management of properties that is available to the industry (DTI, 2009). A survey carried out by the BIFM in 2007 found that over 60% believe the scope of FM will expand within their organisations over the next five years (BIFM, 2007). This scope creep is likely to be towards environmental progression. Whether this be energy reduction, increasing involvement in waste management or a holistic approach to carbon management including lifecycle development. It is through FM operations that the current building stock can be developed towards environmental progression. ISO 14001 is a framework that can be used as a method to manage and implement developing environmental and legal requirements (Watson and Emery, 2004). In order for organisations to gain accreditation there must be a framework in place through which they understand, prioritise and address their environmental impacts (Walker *et al*, 2007). ISO 14001 can provide the basis for environmental improvement, however real action will not be seen with the completion of ISO 14001 accreditation but during the work carried out to implement the framework.

FM organisations are capable of delivering environmental requirements, but they are also best placed to do so. The importance of FM providers to take on the sustainability agenda is highlighted when looking at the environmental impact of the existing building stock. The existing building stock consumes 45% of generated energy to power compared to the 5% consumed during construction phase (Elmualim *et al.*, 2010); this shows great opportunities to reduce carbon emissions through directly addressing the energy used within buildings and the method through which it is managed by FM providers. In the USA common methods of building and operating facilities leads to a 40%-50% consumption of energy produced annually (Hodges, 2005). Spence and

Mulligan (1995) indicated that new construction adds only 2% to existing building stock every year, therefore notes the importance of concentrating on improving the performance of existing buildings (Walker *et al.*, 2007).

The existing property sector has proved hard to influence, possibly due to the number of people involved in the industry, the ranging responsibilities of those people, and their differing priorities' (Cox and Townsend, 1998). Current policy does not direct any pressure upon occupiers to alter energy consumption, except for the highest polluting organisations that come under the CRC. The building stock will remain operational into the future and it is critical to ensure that the energy demand and environmental damage associated with existing buildings can be reduced. In developing countries it will be beneficial to steer towards sustainable construction (Wood, 2006), whereas in developed nations to achieve a rapid and significant reduction in emissions it is necessary to target FM organisations and service providers within existing buildings, alongside the developing framework for sustainable construction for new build.

Strategic alliances are being adopted in the FM industry as a method to develop competitiveness through adapting to environmental pressures (Price and Pitt, 2011b). Due to their knowledge of building services and their capability of bringing about change internally this is likely to become a successful partnership. This shows that the more developed view holds FM as an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organisation in order to create an environment that supports the primary objectives of that organisation (Nutt, 2004). As the primary objectives begin to include environmental commitments, FM organisations will increasingly be involved in improving and adapting (Pitt and Price, 2011b). This will focus skills on managing occupancy and the life cycle of the assets, to ensure the built environment is put to its best use (Edum-Fotwe, 2001; Nutt and McLennan, 2000). This involves the combination of many resources and personnel to design, and redesign the facilities to suit the end user and the system in which the building is used (Nutt, 2004; Edum-Fotwe, 2001).

The idea of a 'Green' or sustainable built estate is growing in popularity, with owners wanting an improved environmental performance rating for buildings (Lutzkendorf and Lorenz, 2006). FM processes have still not been established as an important component of environmental management, however, as a starting point the FM industry has been recognised as relevant (Junila 2006; Junila 2007; Nousiainen and Junila, 2008). In many studies the link between FM operations and environmental management has been made, as well as the noted contribution that FM organisations can make towards such projects (Roper and Beard, 2006; Hodge, 2005; Wood, 2006).

2.6 Variables and indicators of Sustainable Business Practice for wider industry

Organisations are aligning their activities with the principles of sustainable development resulting in a number of indicators of sustainable business practice being present in the corporate world. This leads to the development of new indicators of performance with regard to sustainability achievement. However, the indicators are not likely to be universal at this stage, as the meaning of corporate sustainability is still developing alongside government led change in demands. Indicators are likely to reflect business realities, values and culture of the organisation (Keeble *et al.,* 2003). Alternatively, because of this, the development of such indicators is not likely to benefit from prescribed methodologies (Keeble *et al.*, 2003).

Keeble *et al.* (2003) worked on identifying a number of indicators that could be used to measure the performance of corporate sustainability. Figure 1 shows the basis for development of the question.

More complex to collect

Bribery and corruption	Fair trade	Workload
Transportation	Code of conduct	Diversity and equal opportunities
Air	Working environment	Sickness
Environmental Training	Quality	Training and personal development
Water	Environmental costs	Employee benefits
Energy	Waste	Job creation

Increasingly External focus

Figure 1 Indicators to measure sustainability performance (Keeble *et al.*, 2003)

Building upon the four questions for sustainable development identified by Keeble *et al.* (2003) developed a number of indicators within each area through which sustainability performance could be measured. The table below shows the indicators developed.

Economic	Social	Environmental	Resources
Economic Investment Jobs Taxes Support the local economy	**Social Infrastructure** Local demographics Local education Local health Public safety& security Protect local culture Stakeholders engaged Uphold human rights	**Emissions** Emissions to air Emissions to water Waste Hazardous materials Nuisance	**Natural resources** Recovery factor Energy Materials Water Biodiversity Land and seabed
Financial Company profitability Suppliers profitability	**Employment** Employment conditions Job security Training& development Safety	**Risk** Manages risk	**Risk** Manages risk
Innovation Supports innovation **Risk** Manages risk	**Risk** Manages risk		

Table 3 Indicators developed to measure performance of sustainability

The table above does identify key topic areas for sustainability indicators in terms of developing a system for performance measurement. However, the indicators when present in organisational processes will identify sustainable business practice without any additional intervention of performance evaluation. An indicator that has received more publicity than others is sustainability reporting or, as it is also known as, non-financial reporting. This has resulted due to demands for information regarding environmental and social business risks from analysts, rating groups and advocacy groups (Moody-Stuart, 2003). However, it is still something that is optional for most organisations that can decide to what level they will participate with sustainability reporting. This is in part because the understanding of terms such as accountability, community involvement, human rights, and environmental responsibility varies depending on which body of knowledge or organisation is defining the term; for example even the UN Global Compact (2012) and the Global Reporting Initiative (GRI: 2002) have differing opinions (van Der Brink, 2004). It is acknowledged that

organisations are expected to act in a sustainable way, and this is increasingly required to be evidenced through reporting (van Der Brink, 2004). Increasingly due to this trend of growing importance of community groups and the public as stakeholders, conflict of interests can grow. Due to this, and corporate scandals including those that have resulted in vast environmental damage, the requirement for sustainability reporting is going to grow (van Der Brink, 2004).

2.6.1 Indicators of sustainable business practice within Facilities Management

There is limited research establishing the indicators of sustainable business practice within the FM environment. However, work has been conducted to evaluate performance management and customer perception towards FM service delivery. This work includes identifying and measuring a number of variables specifically for FM operations against business indicators. These can be adapted to incorporate indicators of sustainable business practice and also as a method to identify and measure sustainable added value. Looking at the work of Shaw and Haynes (2004) and Hinks and McNay (1999) the indicators of business practice can be split into the following key themes:

1. Business benefit
2. Change
3. Equipment
4. Maintenance/service
5. Health and Safety
6. Resources
7. Environment
8. General

Within these headings forty-one indicators that were considered the most important to business practice were identified (table 4). These included the following four indicators from the theme of 'sustainability and environment':

- Energy conservation
- Reduction in emissions
- Energy awareness
- Good water management

Combining the work carried out within the wider business community, that of performance management within the FM industry and the understanding of corporate sustainability it is possible to build an understanding of the available indicators of sustainable business practice within the FM industry.

Business benefit	**Change**
Accessibility for day to day advice	Supervision of changes
Technical competence of staff	Quality of change procedures
Training of staff to understand role	Implementation of changes
Completion of projects on time	Flexibility to special requirements
Responsiveness to problems	Reason for changes made apparent
Achievement of completion of deadlines	Removal costs
Achievement of completion of deadlines	**Maintenance/service**
Business management time spent on FM	Daily office cleaning
Services reflect business objectives	Provision of good physical environment
Timeliness	People satisfaction
Precision	Cost of disruption to movement of goods
Equipment	Window/carpet cleaning
Level of faults	Others responsibility for maintenance clearly defines
Number of equipment/plant failures	Standard of cleaning throughout the building
Maintenance induced interruptions	Quality of service provided by staff
Utility supply interruptions	Quality of end product
Correction of faults	Maintenance well planned
Cost of equipment	Management of maintenance
Resources	Applicability of systems used
Scheduling of premises/resources	Comfort
Space flexibility to meet changing business requirements	Aesthetics
Effective allocation of space	
Space meeting business needs	**General**
Allocation of FM resources	Communication of briefing
Management of time input	Administration of contracts
Communication of space requirements	Area per employee
Environment	Attitude of staff
Energy conservation	Level of politeness
Level/controllability of lighting	Staff communication
Level/controllability of ventilation	Contribution to society
Good water management	**Health and safety**
Environmental performance	Provision of a safe environment
Energy cost per m2	Statutory compliance
Energy awareness	Action on hazards
Reduction of emissions	Health and safety

Table 4 Indicators of business practice (Shaw and Haynes, 2004; Hinks and McNay, 1999)

2.7 Sustainability as added value

Sustainability and value have a varied and tense relationship depending on which angle the issue is viewed from. The term sustainability in itself, although able to be defined within many guises, is a value-based concept (Bell and Morse, 2008; Bond, 2011). The main challenge in viewing sustainability as a method to add value to an FM contract is that sustainability is still commonly viewed as a concept that encourages a compromise against natural capital (Gibson, 2006; Morrison and Fischer, 2006). Using standard short-term financial evaluation tools for decision-making, sustainability often does not deliver the desired financial results for business leaders, such as short payback period. Looking at alternative decision making tools, such as incorporating the idea of the triple bottom line, sustainability often provides added value.

2.7.1 Exploring the notion of value

Value is a term that is subjective in nature; the meaning of which varies according to the individual, as the opinion of value is decided following the degree of success in fulfilling a participant's desire and achieving satisfaction (Hoffman, 2009). Added value can be taken to mean the 'additional value provided on top of the value provided though delivering the core business deliverables' (Gronroos, 1997; Chernatony *et al*., 2000). To understand the idea or meaning of added value on any one contract it is necessary to understand the core business objectives; once these core business objectives are satisfied any deliverables further than that can be considered to add value to the baseline expectations (Barret, 2000; Smith and Jackson, 2000; Gronroos, 1997). Relationship management and the management of expectations is also an important area for consideration when looking at the meaning of added value (Parasuraman *et al.*, 1988; Tucker and Pitt, 2009; Zeithaml *et al.* 1990). One individual's expectation of a core service can differ from another's, resulting in two different opinions on the meaning of value and the expectations of value added.

The Institute of Value Management states that 'the concept of value relies on the relationship between the satisfaction of many differing needs and the resources used in doing so'; indicating the ability for sustainability to be included in value management techniques (Abidin and Pasquire, 2005). The opinion of value is dependent upon how customers/end users judge the quality of a service and, therefore, their interpretation of added value. Parasuraman *et al*. (1988) found five universal dimensions through which end users judge quality (Sarshar and Pitt, 2009):

1. Dependability (did the service provider do what was promised?)
2. Responsiveness (was the service provided in a timely manner?)
3. Authority (did the service provider elicit a feeling of confidence in the customer during the service delivery process?)
4. Empathy (was the service provider able to take the customer's point of view?)
5. Tangible evidence (was evidence left that the service was indeed performed?)

This reiterates the idea that added value and quality is dependent on what was delivered compared to what was expected to be delivered i.e. expectations (Parasuraman *et al.*, 1988; Sarshar and Pitt, 2009; Miller, 1977; Zeithaml *et al.*, 1990). This puts the opinion of quality in the hands of the end user and so the individual holds the judgment of success and quality for any given project (Miller, 1977; Zeithaml *et al.* 1990). The need to manage expectations in order to monitor the idea of quality and added value is clear. Heskett *et al*. (1994) linked four parameters into an equation for understanding customer value. The four parameters are; 'results produced for the customer', 'service process quality', 'price to the customer' and 'cost and effort in acquiring the service' (Sarshar and Pitt, 2009; Heskett *et al.*, 1994). Indicating the presence of multiple dimensions in order to gain the meaning of value, there is a need to gain the right balance to achieve the expected quality. Ultimately, relationship management is a factor that comes into value management (Sarshar and Pitt, 2009; Smith and Wheeler, 2002; Payne *et al.,* 2002), developing the idea of going further than supplying core activities and managing end user expectations.

2.7.2 The Facilities Management industry and the meaning of value

Current research highlights the difference between the FM industries idea of added value and wider global organisational interpretation of the term. Gallup carried out a study of 6,000 customers across a range of industries and i-FM carried out a study within the FM sector (Table 5). The results in the table below show the ranking of the key characteristics of value for each study; the comparative analysis shows significant differences (Sarshar and Pitt, 2009). The two surveys indicate that the FM industry is concentrating more on core services that are strategic operations, whereas the wider industry is more focused on support services.

Gallup	**i-FM**
People	Reducing cost of FM
Product and/or service delivery	Creating an environment to attract staff
Place/convenience	Improving KPIs and service level agreements (SLAs)
Price	Building internal FM team and skills
Product features/services on offer	Risk Management
Policies and procedures	
Promotion and advertising	

Table 5 Industry comparisons on the meaning of sustainability

In the FM industry there is a lack of linkage between the core business activities with FM strategies, and a missed opportunity of adding value (Barret, 2000; Smith and Jackson, 2000). This is particularly the case with contracts that involve outsourcing of FM activities; in this situation partnership developed at the project inception stage can be lost (Tucker and Pitt, 2008). A method through which value perception can be altered in the FM industry is through looking at contract provision. The current contract used in FM contracts are often short term and unsuitable (Cotts, 2003; Alexander, 1993b; Alexander 1993c); long term contracts bring with them the need to manage relationships and expectations, to look closely at clients wants and to develop the

service to the client as the contract progresses. Short-term contracts can bring with it short-term views and fewer mechanisms to increase value.

In line with the development of the FM industry to include sustainability elements within the FM business model, the notion of value within the FM industry can be developed to include sustainability. Ultimately sustainability in any form involves the improvement of a service or product due to its final aim of a reduction in damage to the natural world in some way. This idea of added value can be applied more specifically to the theory of FM and sustainability.

2.7.3 Developing the idea of sustainable added value

Economic values can be measured easily, even for organisational added value mechanisms; however, it is more difficult to measure value for sustainable and ecological measures (Hoffman, 2009). Using the rationale discussed earlier, taking the core solution as the core value and additional services as the added value (Gronroos, 1997), sustainable added value can be understood to mean the sustainable feature of an action; with the additional service on top of the core service being the factor that adds value. Sustainable methods of working add value to daily business operations in many areas other than financial and there is a need to take these areas into account when evaluating the value added by each exercise. In order to measure the value added by sustainable practise, a group of value factors can be established for use in routine evaluation to determine the benefits of the sustainable solution. Hoffman (2009) used economic, social and ecological factors to measure the benefit of generating bioenergy regionally over importing fossil fuels. This type of value factors can be adapted for a wide spectrum of initiatives. Following this, a range of indicators can be created in order to measure the progress towards achieving the value factors.

Sustainable added value takes into account the efficiency and absolute level of resource use, therefore, sustainable added value could be argued to be the extra value created when environmental and social impacts are kept constant (Figge and Hahn 2004).

Currently when looking at sustainable development the capital theory approach is often used (Harte, 1995; Prugh *et al.*, 1999; Stern 1997; Figge and Hahn, 2004). It can be argued that activities can be called sustainable if they generate constant capital over time (Costanza and Daly 1992; Hartwick, 1977; Pearce and Atkinson, 1998; Solow, 1986). Following this, the idea of weak and strong sustainability can be discussed with the question of whether one type of capital can be substituted by another (Cabeza, 1996; Pearce and Atkinson, 1993; Solow, 1993). Strong sustainability implies there are critical levels of safe practice or minimum standards (Farmer and Randall, 1998; Randall and Farmer, 1996), for example, there are now minimum standards in the UK for the level of energy generated by renewable resources; this is strong sustainability and therefore has a low substitution factor. However, other areas that do not have legislated minimum standards in place can be considered weak sustainability and will have a high substitution factor with other capital methods (Cabeza, 1996; Pearce and Atkinson, 1993; Solow, 1993).

The idea of 'Green Value Added' is also relevant when exploring the idea of sustainable added value. Green Added Value means that the added value of the company in economic terms is then adjusted by the external environmental cost resulting from an organisations activity (Figge and Hahn, 2004). In added value terms a company is likely to choose a sustainable method depending on whether the benefit of the sustainable action exceeds the cost of implementing the process. By putting a monetary value on sustainable methods and on the potential environmental and social damage if such a method is not undertaken, each sustainable initiative can be linked to organisational financial aims. Each sustainable project can be judged by existing policy on payback requirements, break-even requirements and even profit predictions for each financial year. However, for a project to be viable the environmental and social damage by not undertaking the sustainable route must be fully evaluated. 'Absolute Sustainable Value Added' can be achieved when value added is greater than the external environmental and social cost and the relative Sustainable Value Added together (Figge and Hahn, 2004). This could be an equation used when assessing the value of a sustainable project.

The resistance of many institutions and organisations to practise sustainable management in day-to-day activities outside any static environmental policy can indicate a lack of belief in sustainable added value. Often organisations contribute to sustainability only if the value added by the sustainability is greater than external damage caused (Figge and Hahn, 2004). This potentially indicates the lack of belief in the benefits of sustainable and environmental activities. Perceived, or real, high costs associated with sustainable activities can also act as a barrier to sustainable activities being used as a method to add value (Dahle and Neumayer, 2001). The increased level of information available should enhance the level of development in sustainability as a method to add value. However, sustainability is still viewed as a factor that will increase costs rather than a method of adding value, which could subsequently be included in a structured value management process (Abidin and Pasquire, 2005).

However, in some sectors the value added to projects by sustainable solutions is being documented. Eagan and Keniry (1998) for National Wildlife Federation (NWF) documented the savings that were made across the education industry in the US when implementing sustainable solutions; the average saving across all sites studied was $16,755,500, with one institution alone saving $9million. In addition greater savings can me made during the follow through of these initiatives in the longer term (Eagan and Keniry, 1998). These organisations have realised the added value of sustainable solutions which not only include the sizeable cost savings but also the reputation that will come with setting an example and leading the way.

Developing SFM systems and environmental design is widely accepted to lower energy demand and reduce waste, but it has also been shown to increase productivity and decrease absenteeism, for example. In Southern California the results of a renovation project reduced energy consumption by 59%, but also decreased employee absenteeism by 47% and increased employee productivity by 5%; this was achieved by improving the mechanical systems, introducing natural daylight, reducing volatile organic compounds and introducing ergonomic furnishings (Hodges, 2005). Labour costs can account for up to 92% of organisations running costs (Hodges, 2005) therefore, an

improvement in productivity ratings and a reduction in absenteeism is going to have wider economic benefits.

2.8 The acting role of sustainability policies

Looking at the importance that Health and Safety policies now play in all sectors of industry and business, the role that SP play in the development is key issue for discussion. The creation of a policy does not mean that a single view is fixed. A policy is created from discussion and argument, developed through analysis of language, and subsequently does not result in a policy being an established statement (Massa and Rydin, 1997). This makes a policy, and the resultant views of the organisation open to change and improvement, hopefully leading to a higher value document. However, this could result in a SP not having the ability to directly lead to action on sustainable issues, but rather lead to further discussion within companies trying to formulate opinions. The policy may be diluted to prevent a firm commitment to an agenda (Massa and Rydin, 1997). One could contend that this may result in a weak attempt to develop policy ideas throughout the company. The envisioned potential lack of solutions to accepted problems may also act as barrier to a commitment of a sustainable solution (Elmualim *et al.*, 2010).

2.8.1 Implementing sustainability policies through Environmental Management Systems

Implementing an Environmental management System (EMS) is a common way for firms to address corporate environmental concerns (Delmas, 2000). The assumption and purpose for implementing the EMS is that it will drive improvements in environmental performance through standardised practices, documentation, communication and organisational learning (Von Malmborg, 2002; Cascio, 1996; Melnyk *et al.*, 2003; Ronnenberg *et al.*, 2010). However, research has shown that the implementation of an

EMS does not necessarily deliver the desired results for improved environmental standards (Ronnenberg *et al*, 2010). This is similar to other research, which suggested that creating a sustainability or environmental policy does not necessarily result in improved environmental behaviour. Whether the method used to drive improvement is a policy or an EMS the reasons for failure to deliver the results can be seen to be the same. The apparent failure to deliver the results has been linked to the ability of the firms to incorporate the EMS into the firm's processes and culture (Ronnenberg *et al.*, 2010). Ultimately the firm's behaviour, culture and operations need to adapt according to the EMS to deliver results. The significant work is required at this stage, bridging the gap between the EMS and the company culture and operations. This involves significant change at the strategic and operational levels. This is especially the case with regard to FM organisations, where an EMS can result in a significant change in operational decision-making.

It has been found that firms implement an EMS without the consideration of the processes that employees and other firm members utilise to accept change (Hoffman and Bazerman, 2007). The simple creation and launching of the EMS does not in itself deal with the human aspect of altering the way one works to bring about the new processes that the EMS intends to introduce. The EMS by itself does not detail the urgency of the need to change, does not provide the 'behavioural road map' to enable change and it does not embed the change in culture that is required, this is what is needed to implement a strong EMS (Ronnerberg *et al.*, 2010; Cummings and Worley, 2008; Kotter, 1995; Lewin, 1947). It has been argued that achievement of better environmental performance through the use of EMS is dependent upon the implementation practices of the company, especially on the change management process (Ronnerberg *et al.*, 2010; Armenakis and Bedeian, 1999).

2.8.2 Sustainability reporting

Sustainability reporting is a likely result of a SP. The practice of sustainability reporting has often involved publishing a separate sustainability report to that of Annual Reports (Hubbard, 2009; O'Dwyer and Owen, 2005). As sustainability is often seen as a separate area of corporate risk to that of other business areas. Arguably this could have the effect of separating the area of sustainability from the financial management of an organisation. It can be argued that current methods of reporting in the field potentially could be biased, due to results published in a descriptive manor with little benchmarking and a low use of targets. Organisations are often found to focus disproportionally on the positive issues (Hubbard, 2009). However, for large companies a SP can be found to have a greater affect. Large companies are three times as likely to state their environmental policy as a reason for environmental improvements; at 50% compared to 14% for small to medium sized companies (Baylis *et al.*, 1998).

2.8.3 Sustainability policies and Facilities Management

Creating a SP and living in a sustainable society involved the balance of demands from economic, political, ecological and technological perspectives (Shin *et al*, 2008). However, this does result in wide ranging ideas of sustainability being developed. Elmualim *et al.* (2010)[1] carried out a study that found that facilities managers in many organisations do not perceive sustainability as a high priority, with 31% reporting that they do not have a SP. It has been indicated that time constraints, lack of knowledge and lack of senior management commitment are the main barriers to practising SFM (Elmualim *et al.*, 2010; Baylis *et al.*, 1998). Waste management and recycling and energy management were rated as the most common areas to be reported on at 90% and

[1] Elmualim *et al.* (2010) carried out a study on barriers and commitment of facilities management to sustainability. A group of 12 facilities managers and an academic was established to oversee the research. The research itself was an online questionnaire to establish the commitment of practising facilities managers and was carried out British Institute of Facilities Management (BIFM) and available for subscribers to the BIFM to complete the questionnaire.

85% respectively (Elmualim *et al,* 2010). One can contend that these are areas that are clearly linked to financial gains or losses, indicating that many FM companies still focus initially on financial incentives. When asked how effective their organisation is at managing its sustainability responsibilities, 33% responded as adequate, 25% as inconsistent and 16% as poor; one can argue that this is to be expected as sustainability is not yet embedded in business objectives (Elmualim *et al.*, 2010).

In addition to the impact of a SP, Baylis *et al.* (1998) found that the following aspects were push factors for developing sustainable development; the potential to increase profits by reducing costs, good neighbourliness and public concern for large companies. Other factors such as personal concern for the environment, employee concerns, and supply chain/customer pressure were considered to be less of a push factors for both small-medium companies and large companies. However, in other cases it has been found that social responsibility comes second only to legislation in driving forces behind environmental improvement (Lewis, 1997). The fact that potential cost savings from environmental progress is not a greater motivating factor could be a concern and could indicate that the advantages and cost savings of environmental improvement are not publicised enough (Advisory Committee on Business and Environment, 1991). It could be the case that the actual cost savings are little compared to the cost of implementing environmental improvements or complying with regulation and legislation (Walley and Whitehead, 1996).

However, it can be argued that this is beginning to change, as certain sectors will be put subjected to increasing pressure under the CRC agenda. It has been stated that over 50% of the world's largest companies publish environmental or CSR reports (Line *et al.*, 2002). This rate of occurrence is beginning to be is similar for FM companies. In the wider business community increasing focus on CSR is leading companies to focus on reducing environmental impacts at a strategic level (Nousiainen and Junnila, 2008; Roper and Beard, 2006). This is partly due to pressure from stakeholders and the public (Jayne, 2000).

2.8.4 The impact of sustainability policies

Regardless of a company having in place an environmental policy it does not mean that environmental and sustainable practices are implemented any further down in the company structure (Elmualim *et al.*, 2010; Carpenter and Meehan, 2002; Baylis *et al.*, 1998). Darnall and Sides (2008) conducted research on nine firms and found that firms employing voluntary environmental programmes had worse environmental performance than the firms that had not invested at all in environmental programmes. However, this is not always found to be the case. The National Database on Environmental Management Systems (NDEMS) (2003) found that overall firm level environmental performance improved over approximately eighty firms following the introduction of an EMS, but this finding was not universal. There is currently a minimum amount of research in this area for FM companies but a greater understanding of this subject can be gained through existing research within other industries. It has been established that the existence of a SP does not mean dissemination of sustainable activities throughout the company (Carpenter and Meehan, 2002; Baylis *et al.*, 1998).

Carpenter and Meehan (2002) found that there are varying levels at which organisations implement SPs. Only one institution had a direct funding agreement in place for an environmental management plan, not all had management level involvement and in some cases the SP was as far as an environmental management plan had developed. However, the survey did indicate that the FM department played a strong role in implementing environmental management policies (Carpenter and Meehan, 2002). One can believe this indicates that the FM departments will be well placed to gain ISO 14001 for their own activities.

Main findings of the Carpenter and Meehan (2002) study
• Conservation, waste management and sustainability formed key parts. • Of the ten institutions, six had formally established an environmental management committee overseeing the policy, four indicated that they had no committee structure, of those four one institution indicated that a previously running committee had now ceased to meet. • Only five institutions indicated that executive management were involved in the management of the environmental programme. • Only one institution indicated that there is a direct funding for the implementation of the environmental management plan. • Of the other institutions there were various funding procedures for potential projects as they arose, but it was highlighted that return on investment can be key in decision-making.

Table 6 Main Findings of the Carpenter and Meehan (2002) study.

Organisational makeup seems to have an influencing factor upon the uptake of sustainable business practice. Small companies often do not recognise environmental issues so readily. Baylis *et al.* (1998) found that 67% of small to medium sized companies report that their activities are harmless in terms of the environment, and 53% considered the growing pressure to target environmental issues represented neither a threat nor an opportunity. Small to medium sized companies have reported that a lack of; personnel, time, necessary skills and financial resources as reasons for not targeting environmental issues (Baylis *et al.*, 1998). Companies with environmental policies are not necessarily motivated to act on them, and thus may not implement the ideas any further into business practice; Baylis *et al.* (1998) found that 70% of large companies with a SP were motivated by said policy compared to 54% of small-medium companies. This indicates a gap between the creation of a SP and the implementation within business practice and also a difference due to the size of a company. This could again link to the pressure that companies feel to appear to be acting in a sustainable and

environmentally innovative way through the CSR arena (Hubbard, 2009). However, more research is needed to understand whether this is the case in the FM industry also.

When looking at production methods, it has been shown that compulsory methods of motivation, followed by financial methods of motivation, have the greatest affect on creating clean production methods (Shin *et al*., 2008; Baylis *et al,* 1998). One can draw comparisons between this and the development of a health and safety culture. Through the creation of Health and Safety legislation followed by financial and legal consequences of breaking legislation has brought about a Health and Safety culture. This is especially the case in the high-risk industries. One could argue that legislating for environmental awareness will have a positive effect on reducing carbon emissions from the built environment. However, currently there is evidence to show that there is a gap between what companies are capable of doing and what they are doing in reality in the 'clean production' and sustainability industry, and also conflicting views on what motivates companies to change environmental impacts of their activities (Baylis *et al.,* 1998; Shin *et al.,* 2008). There is a higher demand for a better environment than there is a willingness to invest (Shin *et al.,* 2008).

2.9 Chapter Summary

The working environment for FM organisations is changing as the focus upon sustainable operation and environmental design increases in importance. FM organisations are in a position to be able to take the lead in sustainable operation of buildings due to the functions key understand of and the role in managing the building systems. If the role of the FM organisation does not include energy management or sustainable operation then the building is likely to be operated in an inefficient manner highly focused on exceeding design parameters to avoid unavailability charges. If the FM group is motivated towards energy management and sustainable operation then the building is likely to be able to achieve a highly efficient state due to the knowledge

available in the team. Due to the developing changes in legislation, it would be unwise to not engage with the FM team.

However, the issue of motivating and engaging the FM industry in the environmental policy processes is key. It can be accepted that most organisations are driven by financial incentives, and this is reflected in the policy written to date. However, the issue of environmental behaviour and the moral debate should not be ignored. In order to motivate employees, managers of environmental projects and building users, policy may be well advised to target environmental behaviour. Understanding the motivations at the different levels of the chain from policy creation, to target delivery, is required to ensure that the UK meets its environmental policy objectives. Due to the current make up of the building stock in the UK this is likely to involve the majority of existing buildings and therefore the FM industry may be placed well in order to participate in the delivery of policy objectives.

Here the line between sustainability being a moral obligation or an addition revenue stream becomes blurred. Evidence suggests that it is financially beneficial for organisations to appear to behave in a sustainable manner. Morally focused organisational behaviour can be financially rewarding. On the face of it, it could be argued that the two factors are inextricably linked. However, in reality at the human level this is unlikely to be the case. The added value associated with sustainable development appears to remain as the key driving force, whether this added value is due to developing a Niche market product, being able to charge a higher price or reducing costs through reducing waste for example. Although that being said, the link between financial benefits and CSR could be utilised within the policy mechanisms designed to drive compliance. If research evidences a high value for sustainably produced products and services, then mechanisms could be designed to target this through methods such as non-financial performance, as mentioned earlier.

The input of building occupants should be targeted. Even in modern buildings where building environmental controls are removed from occupants, the occupants are still

able to have a significant affect. This is especially the case when the occupants are moved as a whole to act together and not simply as the individual. It is important to remember the human input into FM processes; buy in from FM professionals is needed to ensure energy systems are operating efficiently. A collaborative effort involving the FM team, the client team and the building occupants is likely to deliver results against environmental policy. It is of interest to understand the level and impact of environmental policy targeted at the FM industry, if it exists currently. New construction has received targeted policy previously to direct the industry towards sustainable construction but it is likely that this does not include the activities of the FM industry.

3 Chapter 3: Environmental Policy and the role of the Facilities Management industry

3.1 Introduction

This chapter develops further the issues introduced in chapter 2, firstly by framing the context of the environmental issues being considered as part of this thesis- rising greenhouse gas emissions and the contribution of the built environment to this. To understand this context it is necessary to discuss the relevant environmental policy existing, and emerging, from the EU and UK and also environmental policy acting specifically on the built environment and the FM industry. An initial literature review can explain the position of current environmental policy; however, there is minimal literature to enable an understanding of the current position of the FM industry to sustainability and environmental policy. It was necessary to develop this understanding as part of the thesis.

The final section of this chapter introduces the idea of environmental behaviour versus the impact of facilities upon the success of environmental policy implementation. It is likely that the facilities provided within office spaces are going to have an impact upon building occupant participation in environmental campaigns, particularly recycling.

3.2Framing the Issue

The environmental burden placed upon the planet will increase enormously if the world's population continues to grow, if individual prosperity continues to increase and if no further steps are taken to change the current approach to environmental management. It has been argued that current methods used to reduce energy use are simply designed to fit business practise to current environmental regulation (Business Council for Sustainable Development, 1993; Cramer, 1998). Put simply,

over the next 50 years the world will need to learn how to cause just one tenth of the current environmental impact through using energy and resources ten times more efficiently (Cramer, 1998; Fussler and James, 1996). Alternatively it could be argued that a reduction in the resources used would be a better method. Following this idea, the issue of carbon reduction and energy management is becoming an increasingly important topic within the sustainability area. Energy management incorporates many of the modern threats to our current way of life; management of natural resources, security of supply, diversification of supply, cost of supply and reducing wastage and inefficiency (Price, 2009; Price 2010). It affects not only businesses and industry but also affects each and every one of us in the home; with fuel poverty affecting an increasing number of households year on year.

3.2.1 Energy consumption and reduction targets

It is clear that to deliver the carbon reduction targets, as well as reducing energy use, the energy systems in the UK will have to be adapted to incorporate an increasing amount of renewable energy (Walker and Cass, 2007; Stern, 2007; European Union Council, 2007). In addition to these targets the UK set the target to generate 15% of total energy consumed in the UK from renewable sources by 2020 (CEC, 2008). To deliver this the Government has set up two renewable fuel obligations:

- Renewable fuel obligations (RO) for electricity generation
- The Renewable Transport fuel obligation for road transport fuels

The UK signed up to the Renewable Energy Strategy (RES) 2009, which has a target to deliver 15% of energy from renewable sources by 2020 (from 2008 levels). During 2008 the renewable generation rate was 2.25% (DECC, 2009b). This strategy includes the Renewable Heat Programme that requires 12% of heat energy to come from a renewable source in commercial, public and residential buildings (DECC, 2009a). Even with The Climate Change Act 2008 and the ambitious, yet entrenched, targets the UK is currently not a leader amongst the EU in terms of utilisation of renewable energy and environmental protection. In 2009 the UK featured third from the bottom of a league table showing the European countries consumption of renewable energy. In fact energy demand in the UK is rising, not

falling. Demand for heat and power between 1990 and 2005 rose by 15% (DEFRA, 2007b). In the non-domestic sector between 1990 and 2003 the demand increase was 17% (DTI, 2003). This is thought to be due to (Clarke *et al*, 2008):

- The dramatic increase in IT equipment
- Poorly regulated and designed developments
- Unnecessary installation of air conditioning; The energy consumption associated with air conditioning is expected to rise by 25% by 2020 (AEA Technologies, 2007 b)

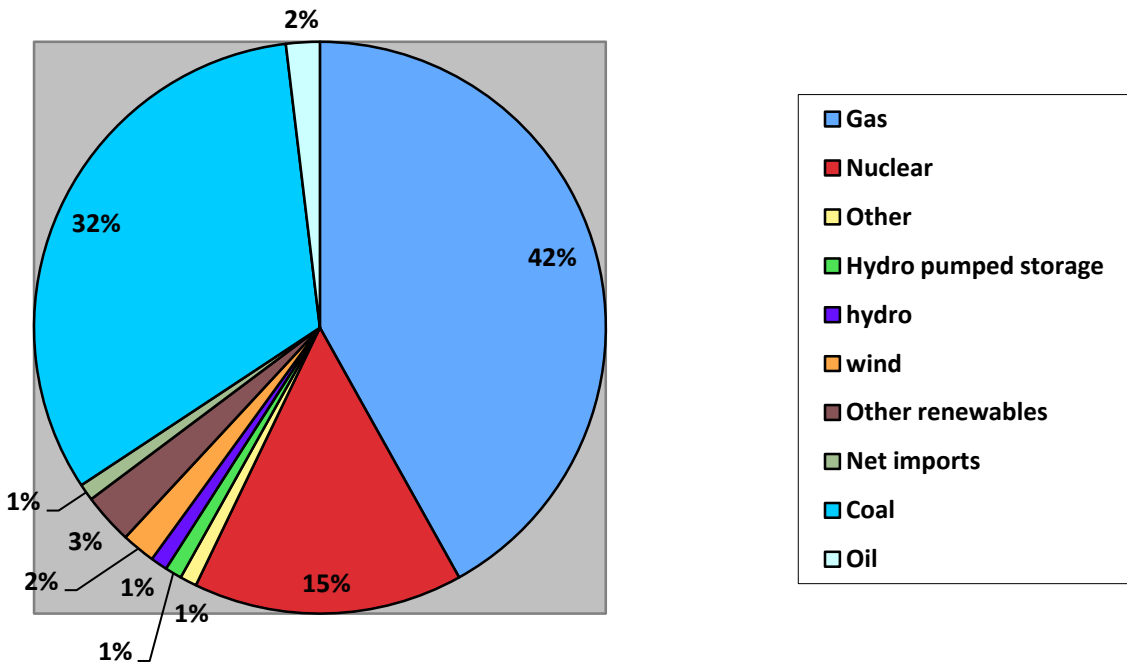


Figure 2 UK electricity supply in 2008 (total: 401 TWh) (DECC, 2009, b)

Despite recent governmental commitments to sustainable development and UK energy reduction, the world CO_2 emissions are predicted to double in the period between the Kyoto base year of 1990 and 2030 (Cooper, 2008). Even if the OECD (Organisation of Economic Co-operation and Development) countries cut their emissions back to zero the world would only reduce back to 1990 levels, which have been deemed to be too high, due to the rate in increase of CO_2 emissions from non-OECD countries. This increase from non-OECD countries is expected due to predicted heavy reliance on fossil fuels and strong economic growth (EIA, 2010). This calls for a worldwide approach to climate change policy not one that is limited to what are defined as the current world's richest countries (Cooper, 2008).

World Carbon Dioxide emissions (billion metric tons)					
	1990	**2005**	**2010**	**2020**	**2030**
World	21.2	28.1	31.1	37.0	42.3
North America	5.8	7.0	7.1	7.6	8.3
USA	5.0	6.0	6.0	6.4	6.9
OECD Europe	4.1	4.4	4.5	4.8	4.8
OECD Asia	1.5	2.2	2.2	2.3	2.4
Japan	1.0	1.2	1.2	1.2	1.2
Total OECD	11.4	13.6	13.8	14.7	15.5
Total non OECD	9.8	14.5	17.3	22.3	26.8
Russia	2.4	11.7	1.8	2.0	2.1
China	4.2	5.3	6.9	9.5	12.0
India	0.6	1.2	1.3	1.8	2.2
Brazil	0.2	0.4	0.5	0.5	0.6
Other	4.4	5.9	6.8	8.5	9.8

Table 7 EIA. International Energy Outlook (2008) Table A10

The recent UK Government back tracking over environmental policy is not going to help progress the issue of rising global emissions. This has been reflected in recent attempts at watering down the Green Deal and the CRC, numerous changes to the CRC and reduction in the Feed in Tariffs (FiT) for Solar PV. Although the Green Deal is promising to deliver an effective way forward for generating funding the Bill still has to go through a number of consultation stages before it is presented in its final form to industry in Autumn 2013 (DECC, 2011). Confusion continues at the policy level through the approval by MPs for Shale gas drilling at the same time as preparing for the UN Climate Change Conference. Such conflict from policy makers not only gives mixed signals but also deters investment in the green agenda as business and industry are left wondering what next. This is bound to impact the FM professional who will be involved in reducing energy use and maintaining the security of supply.

3.3 An overview of current EU and UK Environmental Policy

The European Union has overriding influence on the development of UK environmental law and policy (Ross and Nash, 2009). It is estimated that 80% of national environmental law is driven from the European Union's environmental policy (COM, 2007). The EU reform Treaty agreed in 2008 reinforces the significance of the environment within the EU and provides an insight into the future of environmental policy within the EU and member states (McEldowney and McEldowney, 2010). Currently there are EU directives that are not enforceable, which enable member states to be flexible in the interpretation and implementation of the policy (McEldowney and McEldowney, 2010).

3.3.1 Action Programmes

To embed environmental matters into the policy making process a system of Action Programmes were established as a mechanism to build consensus and create legally binding actions (McEldowney and McEldowney, 2010). There have been six Action Programmes to date, starting with the 'polluter pays' principle in 1973. The next three targeted strengthening the protection of health and management of natural resources as part of the economic and social policy (McEldowney and McEldowney, 2010). The fourth action programme was linked to economy and jobs in 1987 and the fifth in 1992, 'towards sustainability', introduced the concept of sustainable development and was considered ground-breaking (McEldowney and McEldowney, 2010). Around this time came the realisation that the legal instruments being developed would not be effective unless they were tied to fiscal and other financial incentive mechanisms. The Sixth Action programme was ambitious and sets environmental policy for four distinct areas; climate change, nature and biodiversity, health and the quality of life and natural resources and waste. This sixth Action Programme includes the 20% emission reduction target and the 20% renewable energy production target.

3.3.2 Political leadership

Although the majority of the existing legislation focuses on energy management, the UK is committed to sustainable development holistically. The UK's commitment can be demonstrated by Gordon Brown in his speech to the UN Ambassadors on 20th April 2006 (Brown, 2006, Holt and Ghobadian, 2009):

"*Environmental sustainability is not an option – it is a necessity. For economies to flourish, for global poverty to be banished, for the well-being of the world's people to be enhanced – not just in this generation but in succeeding generations – we have a compelling and ever more urgent duty of stewardship to take care of the natural environment and resources on which our economic activity and social fabric depends".*

More recently the Labour- Conservative coalition government, formed in 2010 set the target to become the *Greenest Government ever*. This began with the directive being set to reduce CO_2 emissions from the government Head Office estate buildings by 10% in a year. This acted to show the UK as a whole a leading example of energy reduction. It will also clearly be advantageous with regard to the current budgetary constraints on departments. Looking at the wider Government environmental targets it can be seen that waste, water use and procurement are key target areas for their environmental plan. The following targets are to be achieved by 2015:

- **Reduce greenhouse gas emissions by 25% from a 09/10 baseline from the whole estate and business-related transport**
    - Cut carbon emissions from Central Government offices by 10% in 2010/11 and all ministerial HQs to publish online real time energy use information
    - Cut domestic business travel flights by 20% by 2015 from a 09/10 baseline
- **Reduce the amount of waste we generate by 25% from a 2009/10 baseline**
    - Cut our paper use by 10% in 2011/12

- Government will go to market with a requirement for "closed loop" recycled paper in 2011, subject to approval from the Government's Procurement Executive Board
- Ensure that redundant ICT equipment is re-used (within government, the public sector or wider society) or responsibly recycled

- **Reduce water consumption from a 2009/10 baseline, and report on office water use against best practice benchmarks:**
  - ≥6 m^3 water consumption per FTE poor practice
  - 4m^3 to 6m^3 per FTE good practice
  - ≤4m^3 per FTE best practice
  - % offices meeting best/good/poor practice benchmark
- **Ensure government buys more sustainable and efficient products and engages with its suppliers to understand and reduce the impacts of its supply chain:**
  - Embed the Government Buying Standards in departmental and centralised procurement contracts, within the context of Government's overarching priorities of value for money and streamlining procurement processes
- Improve and publish data on our supply chain impacts, initially focusing on carbon, but also water and waste – setting detailed baselines for reducing these impacts

3.3.3 New policy areas: The Carbon Reduction Commitment

The Carbon Reduction Commitment (CRC) energy efficiency scheme is a key environmental policy development targeting large polluting organisations. It is built upon the principle that the polluter pays (Guidance Note 65, 2010). Placing a charge on CO_2 emissions by tonne and requiring organisations to purchase allowances to cover predicted emissions reinforces this. From 2013 the number of allowances available to purchase will be capped, this will result in the cost of allowances ever increasing and those organisations successfully reducing will be able to sell their excess allowances to generate a new revenue and profit stream. The results of the trading are placed in a league table showing the organisations that have made the efforts to reduce emissions triumphant at the top of the table followed by the highest

polluters down the table. Senior management are ultimately responsible for ensuring compliance to the scheme with a named personnel responsible. Civil and criminal penalties are imposed upon fraudulently compiled data (Guidance Note 65, 2010). To enforce this 20% of the organisations involved in the scheme will be audited each year (Guidance Note 65, 2010) as the reporting is based on self-reporting meter readings to Environment Agency.

Organisations in the scheme are required to keep records of all energy purchased except that for transport, domestic energy use or those covered by EU ETS. This forms the carbon footprint of the organisation and from this organisations are required to report annually upon this. Currently the allowances are fixed at £12 per tonne/CO_2, however, after April 2013 the allowances are going to be traded via auction and so the price will subjected to market forces (Guidance Note 65, 2010). The number of allowances available through the auction will begin to diminish, forcing organisations to reduce energy use.

During the change of Government from Labour to the Conservative and Liberal Democrat coalition the macroeconomic ideals of the scheme have been changed. The CRC was designed to be revenue neutral for the Government (Guidance Note 65, 2010). The revenue was intended to be recycled into the scheme proportional to participant's emissions through giving bonuses to best performing organisations. However, the revenue generated through organisations purchasing allowances will no longer be recycled into the scheme, the revenue will be used to support the public finances (HM Treasury, 2010). This means that the revenue generate is not even set aside for environmental projects within the public finances, the revenue disappointingly goes into the general public purse.

What the CRC does well is translate environmental concern into corporate language through putting a price on carbon. It removes the climate change debate and focuses upon the organisations bottom line. The policy includes numerous mechanisms to drive compliance, which are discussed later in chapter 4. To deliver the aims the policy does have a wide breadth of mechanisms to deliver compliance, with the result of non-compliance varying in severity.

3.4 Key policies targeting the built environment

There is a need for change, a need for speedier development of sustainable business practice and direction from top-level government policy is needed to provide the direction. Currently the direction is coming bottom up through organisation and community groups demanding the change they see that is needed. The current action programmes and UK and European Policy make a good step in the right direction, but out of the fraction of the policy that is focused upon the built environment it is predominantly focused upon new built construction or on housing. It is necessary to explore what the FM industry could achieve if they were formally introduced into this process for existing office and industrial buildings. This area is relatively new and little understood.

3.4.1 The built environment's contribution to the environmental problem

The Built Environment is responsible for nearly half of the country's carbon emissions, half of our water consumption, about one third of landfill waste and one quarter of all raw materials used in the economy (BIFM, 2009). Methods to tackle climate change compliment methods to increase security of supply and offset rising energy prices in the UK. These are real threats to businesses as the UK is a net importer of oil, gas and coal. Gas imports increased by 41% in 2006, imports of coal have been rising by 15% a year since 2002 and the net import of oil stands at -£2.2 billion (BERR, 2007). Addressing climate change and ensuring security of supply in the UK are two of the main drivers of the Climate Change Act 2008 (BERR, 2007).

The built environment is engaging in energy reduction programmes as a response to such legislation and fiscal stimulus. The most important of the legislation to the UK is The Climate Change Act 2008. The Climate Change Act 2008 introduced the world's first legally binding framework detailing how to deal with climate change. The act set out legally binding targets to reduce carbon emissions from the UK by

34% by 2020 and 80% by 2050, set against the baseline of 1990 (DECC, 2009 a). Through the targets DECC intended to use the act to take the UK towards a low carbon economy and demonstrate UK leadership internationally (DECC, 2010).

The built environment is responsible for around 40% of EU energy demand (Ekins and Lees, 2008; Clarke *et al.*, 2008) and it has been argued that the built environment contributes to 50% of all UK emissions. However, currently available energy efficiency methods are predicted to be able to save around 28% of this (Ekins and Lees, 2008) and EU policy has identified increasing energy efficiency in buildings as an objective for the EU climate change policy (CEC, 2006). The 2007 White Paper on Energy outlined methods to reduce carbon emissions from the built environment at the level of 11.7 MtC/year by 2020 (DTI, 2007; Clarke *et al.*, 2008), which is the equivalent to 8% of UK total emissions in 2005 (AEA Technologies, 2007a).

The Climate Change Act 2008 is a grand step forwards, creating a formal aims and targets for the UK PLC to achieve. However, in order for the UK to achieve the reduction targets efforts are needed at the level of individual organisations and homes. The collective effort of the individual entities is the only route to deliver holistic energy reductions from the UK PLC. It is this method to engineer this process that is of key importance. Unless the policy documentation transfers the targets towards organisations and homes, then currently there is no feeling of individual responsibility or accountability. Current phenomenon in the energy market are producing naturally occurring motivating factors; such as the rising cost of energy, security of energy supply and the marketing of environmental protection. However the built environment needs to be targeted directly, with a method to motivate and incentivise action by all organisations and homes. The new revised Code for Sustainable Homes and the CRC are the first mover examples of driving down the energy policy towards to energy users.

3.4.2 The Code for Sustainable Homes

The Code for Sustainable Homes was introduced as a mandatory initiative but became compulsory for all new homes from 2008 (Planning Portal, 2011). The aim of the code is to reduce carbon emissions and create more sustainable homes (Planning Portal, 2011). The code evaluates the level of sustainability of a new home on a rating of 1-6 against design elements of the home. In addition to the evaluation the code sets minimum standards that have to be achieved for water and energy use (Planning Portal, 2011). However the new Government has reduced the impact of the code, through the removal of the Home Information Pack's (HIPs) and removing the need for sellers of new homes to provide a sustainability certificate (Planning Portal, 2011). This is likely to have an impact on the effectiveness of the code.

The latest report shows that the average efficiency rating according to the Standard Assessment Procedure (SAP) of a new home in England was 79.0 and in Wales 78.8 during March 2010, with the scale being 1-100 with higher the number the greater the sustainability standard (Communities and Local Government, 2010). The SAP assesses the energy performance of dwellings based on the energy costs linked to space and water heating, ventilation and lighting minus the cost saving from energy generation technologies (Communities and Government, 2010).

The Code for Sustainable Homes takes a whole house approach measuring the sustainability of the dwelling against a nine point criteria, which includes energy/CO_2, waste, materials, surface water runoff and heath and well being which all have mandatory performance standards (Communities and Government, 2010). If a dwelling does not reach the mandatory standard or the minimum score for a one star rating it will receive a certificate with no stars. One star is the lowest level of achievement, with six being the maximum indicating a carbon neutral home. Since April 2007 15,434 dwellings have received a rating of three stars and 104 have received a six star rating for the design stage. However for the post construction stage in the same time frame, only 4,384 dwellings have achieved a three star rating and 7 have received a six star rating (Communities and Government, 2010).

3.4.3 The focus on new construction

Disappointingly much of the legislation to deliver efficiency savings in the built environment covers new build buildings, especially for housing. Even though the majority of the buildings expected to be around in the UK in 2050 are already built, meaning efforts need to be made on the existing building stock. It is estimated that 40% of energy used in buildings over 10 years old is wasted due to poorly maintained plant and fabric (Johnson, 1993; Clarke *et al.*, 2008). New Building developments over 1000m^2 are required to consider the technical, environmental and economic feasibility of decentralised energy supply based on; renewables, combined heat and power (CHP), district heating or cooling and heat pumps (Ekins and Lees, 2008).

3.4.4 The impact of the Green Deal

The Green Deal is part of the Energy Bill that was introduced into Parliament on the 8th December 2010. The Energy Bill is a follow on from the UK Low Carbon Transition Plan 2009, which outlines the policies and proposals to be put into place to decarbonise the UK economy to achieve the 34% reduction in CO_2 emissions based on the 1990 levels, along with the seven fold increase in energy from renewable sources. The main elements to the Act are the following (Energy Act, 2010; Crisp, 2010):

- Carbon Capture and Storage (CCS) Incentive: Delivering a financial support mechanism to bring forward up to four commercial-scale demonstration projects on coal-fired power stations. This will permit the retrofit of additional CCS capacity to such projects.
- Mandatory Social Price Support: reducing the energy bills of more of the most vulnerable by increase levels of spending by energy companies on social support (rising from £150 million in 2010-2011 to £300 million by 2013-14).
- Clarify Ofgem's Remit: making it clear that Ofgem must consider reducing carbon emissions and delivering secure energy supplies as an interest of

consumers; and step in proactively to protect consumer interest as well as longer term actions to promote competition.

- Tackling Market Power Exploitation: Giving Ofgem additional powers, through the introduction of a Market Power Licence Condition to prevent companies exploiting market power resulting from constrained capacity in the electricity transmission system.

The Green Deal establishes a framework to enable private companies to offer consumers energy efficiency improvements to homes, community spaces and businesses at no upfront cost through recouping the payment through a change in instalments on the energy bills (DECC, 2010). In reality, the loan is repaid through reductions in the energy bill as the financial savings resulting from the initiative must be equal to or greater than the costs attached to the energy bill (DECC, 2010). The Green Deal in combination with the Green Investment Bank enables owners and occupiers of buildings to apply for loans to implement environmental initiatives to reduce the CO_2 emissions from their buildings. The loan repayments remain with the building and not the tenant or occupier which opens up the option for longer term projects, with the funding available for projects up to 25 years (DECC, 2011).

The Green Deal should also allow projects with a greater payback period to be more appealing, making many renewable projects more viable that previously may have been seen as too greater financial risk. With the energy costs generally expected to continue to rise for the foreseeable future, the Green Deal creates many opportunities to develop larger scale long-term energy efficiency projects that will continue to deliver benefits to the facility long after the loan is repaid. However, priority for loans will be given to the most polluting buildings, as the funding available is limited (DECC, 2011).

3.5 Waste management policy

Waste management is a key focus of FM operations and therefore is a second area worth consideration when looking at UK and EU policy areas. Waste management is an immense issue for the UK, as an average of 500 million tonnes of waste is

produced a year (McEldowney and McEldowney, 2010). Traditionally the UK disposes of the vast majority of the waste to landfill, previously up to 80%, with recycling strategies typically receiving little success, achieving only around 12% of the total (McEldowney and McEldowney, 2010). Although, the success of recycling schemes are on the increase. The EU has driven changes to this state; however local government powers and responsibilities for waste management have been retained. The EU has increased its pressure for change in waste management through setting targets and establishing high level strategies for waste management (McEldowney and McEldowney, 2010).

In recent years the efforts of the EU to increase recycling and reuse of waste has taken affect. The use of landfill as a disposal method is diminishing, recycling and incineration treatment methods have increased and local authorities are now engaged in the regulatory system for waste disposal (McEldowney and McEldowney, 2010). The negative impact that landfill has on the environment is commonly accepted. However this is not the only reason for the decreased use in landfill as a disposal technique. Landfill sites are typically located on low-lying inexpensive land. This is now a rare phenomenon in the UK due to rising land prices (McEldowney and McEldowney, 2010). The release of carbon dioxide and methane through the breakdown of organic material is of key concern now that the UK has binding emission reduction targets.

3.5.1 Policy direction

Waste management has a common framework within the EU, with the legal definition of waste contained in article 1(a) of the Framework Directive on Waste (75/442/EC) (McEldowney and McEldowney, 2010). Waste is defined as ‘any substance or object in the categories set out in annex 1 (of the directive) which the holder discards or intents or is required to discard’ (European Parliament, 2006). There is a wealth of EU waste Directives acting on the UK. The waste framework directive was consolidated into the Directive 2006/1/EC, and then this was extended with further directives over the following years (table 8).

Directive	Topic
75/439	Waste oils
75/422	General Framework, now replaced by 2006/12
78/176	Titanium Dioxide
86/728	Sewage sludge
91/156	General Framework
91/157	Disposal of batteries and accumulators
91/689	Hazardous waste
94/62	Packaging and packaging waste
96/59	Waste PCBs
96/61	Integrated pollution control (replaced by 2008/1)
99/31	Landfill
2000/53	Management of end-of-life vehicles
2000/76	Incineration (amended previous directives)
2000/96	Waste electrical and electronic equipment
2004/12	Amends Dir. 94/62 Packaging and packaging waste
2006/12	Consolidates and replaces Dir. 75/442 Waste Framework
2008/1	Integrated pollution control (replaces Dir.96/61)

Table 8 EU Waste Directives (McEldowney and McEldowney, 2010)

In the UK the Environment Agency, under the Environment Act 1995, licences and supervises waste management activity. The responsibility of the collection and disposal of waste is passed down to the Local Authority, as well as the responsibility for creating recycling plans, and there are numerous targets in place to drive change. The EU landfill Directive requires biodegradable waste disposed of by landfill to be reduced to 2.5 million by 2020. This target was incorporated into the Landfill Allowances Trading Scheme (LATS) 2005. This creates one of the incentive systems in place to promote the reduction of landfill. The Landfill tax is imposed upon local authorities and organisations against the volume of waste they send to landfill (McEldowney and McEldowney, 2010). Since the creation of the landfill tax there has been the introduction of the landfill accelerator, which increases the cost of landfill charges, and a Landfill Tax Credit Scheme to encourage alternative disposal systems. Landfill owners are responsible for paying the tax, the cost of which is typically passed on to the waste producers (McEldowney and McEldowney, 2010). In addition to this tax there is an additional licence cost for waste sites and disposal (McEldowney and McEldowney, 2010).

To achieve the requirements of the European Landfill Directive the UK has set a number of targets (DEFRA, 2007b):

- By 2010 to reduce the landfill to 75% of that produced in 1995
- By 2013 to reduce landfill to 50% of that produced in 1995
- By 2020 to reduce landfill to 35% of that produced in 1995

In order to achieve this the LATS comes into force. The 121 waste disposal authorities are able to trade permits with other authorities, meaning that those who are likely to produce too much waste can trade with those that are not (McEldowney and McEldowney, 2010). This is a key mechanism to drive the Local Authorities to reduce waste.

Waste management and recycling policy is a common feature within UK legislation and within organisational processes. This waste management policy includes varied mechanisms to motivate compliance, including WEEE regulations, landfill charges and recycling targets. The motivations come from both the potential financial advantages and the moral obligation of reducing an organisations negative impact on environment. The crossover of advantages is similar to that experienced for wider environmental policy. The method and issues surrounding motivation towards compliance can be viewed at many levels when thinking of recycling policy. Compliance can be targeted towards motivating organisations, personnel in the organisation managing waste and recycling policy and alternatively building users to recycle their waste.

3.5.2 The issue of waste disposal options

Reducing landfill use is an aim of the Government, and is being reinforced through motivating organisations to comply with waste policy through landfill taxes and other such initiatives. A key aim of the legislation is to move away from landfill towards reuse, recycling or incineration for energy recovery. However, arguably large-scale recycling programmes are the most effective method to reduce landfill use (Pitt, 2003). The tax cost for landfill is currently £56 per tonne from April 2011 (HM Treasury, 2011). The government is promoting support for the waste hierarchy

that will assist in reducing landfill use; this is reinforced in the 2011 Waste Review. The hierarchy favours ‘prevention’ first, with a particular focus on reducing material use in the design and manufacture stages, followed by ‘re-use’ (e.g. through refurbishment or reusing parts), ‘recycling’, ‘recovery’ (e.g. incineration with waste recovery, anaerobic digestion) and lastly ‘disposal’ (e.g. landfill) (DEFRA, 2011).

A large focus for the local authorities is on domestic recycling. In organisations it is going to be down to the organisations themselves to promote recycling or alternatively incur the high charges for waste generation and disposal. However, achieving high levels of recycling in the office environment is not necessarily simple. Motivating individuals to participate is difficult, and benefits may be negligible due to contamination issues (Pitt, 2003).

Looking at commercial and industry waste, currently the majority is sent to landfill; in 1999 commerce and industry produced 75million tones of waste, 68% went to landfill, 29% was recycled and 4% was incinerated (Waste Online, 2010). Not only is this detrimental to the environment but it also leads to considerable additional business costs; Envirowise estimates that waste costs companies 4.5% of their turnover annually. Recycling and waste management are a key part of organisational environmental policy formation; it is key to understand the link between policy requirements and the impact of facilities and human behaviour upon the outcome of this.

It can be assumed that organisations are motivated by financial incentives or penalties with regards to waste management specifically. Firstly, organisations can use the procurement department to manage the waste generated initially through purchasing and deliveries, through such schemes as sending packaging back to suppliers. This is applying the waste hierarchy in practice. After that the key issue for large organisations or office buildings is daily waste generate by building occupants. This is not likely to be a system that can be targeted by financial incentives or penalties. A key theme to this is environmental behaviour of the building occupants. This has a strong link to facility design and provision and ultimately should involve the FM organisation.

3.5.3 Facilities Management and waste management

Facility delivery and design plays a vital role in the success of driving compliance amongst building users to recycle. Facilities as a term for this section of the thesis means the physical facilities provided to deliver environmental directives such as waste receptacles, food composting facilities and information posters. The research carried out within the commercial environment has found that information heavy recycling programmes are influential; with the actual information provided being more motivational than the presence of an environmental policy within the organisations (Marans and Lee, 1993; Vinings and Enreo, 1990). For example, councils use information leaflets as a method of distributing recycling information, but unfortunately this process and impact is often affected by budgetary constraints (Timlett and Williams, 2009). This may also be a similar problem in the commercial environment with recycling often seen as a non-core business element. The facilities themselves have been identified as playing a role in motivating recycling (Austin *et al*., 1993). Looking to the domestic arena Research for information, research has also shown two things, that public educational programmes increase recycling rates and regulation has a positive effect on recycling levels (Sidique *et al.,* 2010).

Depending on the recycling facilities provided a key factor in the success rate of recycling rates is the efficient collection and separation of waste one site in offices, high recycling rates and efficient disposal of the waste is reliant upon this (Ayres, 1997; Reijnders, 2000; Krook *et al.*, 2007; Krook and Eklund, 2010). Cross contamination of waste reduced the possible usage and value and recycled material. Studies in Sweden have shown that up to 20% of waste at recycling centres is incorrectly sorted, even though there is often facilities staff on site to assist (Krook and Eklund, 2010). This results in rare materials being unintentionally sent to landfill (Björklund and Finnveden, 2005; Krook and Eklund, 2010). This incorrect sorting is thought to be due to a number of issues mainly; the layout and structure of the collection systems, a lack of information available, low staffing levels, waste terminology misunderstandings, users knowledge (or lack of) and personal attitudes (Petersen, 2004; Engkvist *et al.*, 2008; Krook and Eklund, 2010). Parallels can be certainly be drawn from these suggested factors to the cause of contamination in office recycling facilities.

An investigation at BAA airports found that goal setting and feedback as methods to motivate individuals yield advantages (Pitt, 2003; Lingard *et al.*, 2001). When designing solid waste management systems there needs to be a sound understanding of the composition of waste and the processes that generate the waste (Vega *et al.*, 2008; Acurios *et al.*, 1997). When looking at office recycling this also needs to extend to understanding the human factor, and how to engage the individuals in the process. The role of social and institutional factors as a catalyst to turn environmental concerns and attitudes into action has been the focus of many researchers in the past (Crete and Mercier, 2001; Black *et al*., 1985; Derksen and Gartrell, 1993; Guagnano, Stern, and Dietz, 1995; Brand, 1997).

3.6 Environmental behaviour versus the impact of physical facilities

It is clear that the FM industry can have a positive impact on delivering environmental progress within the current building stock through the operation, provision and management of current facilities. However, the most effective model to deliver this is currently not established. Of interest for the FM industry in particular is the debate regarding the impact of environmental behaviour that is intrinsic to the individual compared to the services and facilities that are provided to aid environmental behaviour. As FM organisations will provide the services to enable occupants to act pro environmentally, for example with recycling facilities, green IT options, through to bike parking, it is essential to know whether the services provided will encourage and engineer environmental behaviour or whether it will have little affect due to predisposed environmental attitudes.

3.6.1 Variables effecting environmental behaviour

Guerin *et al.* (2001) conducted research focusing on personal level explanatory variables in their investigation into recycling behaviour. It was found that individuals who participate in local programmes to protect the environment tend to participate in recycling behaviour. Showing a link between recycling habits and

general wider opinions regarding the environment. Global environmental concerns and a favourable opinion of government efforts to protect the environment also cause individuals to be more inclined to adopt environmentally friendly behaviours such as recycling (Guerin *et al*, 2001). If the government shows clear direction, it is likely to generate a positive response from the public. The recent occurrence of key climate change scientists being accused of concealing key information could go against the climate change debate and affect the environmental behaviour of individuals. Media reporting is likely to influence public opinion.

Research has shown that there are three main variables involved in influencing environmental behaviour (Barr, 2002; Barr *et al* 2003);

- Environmental values; an individual's orientation towards the environment and the natural world, (O'Riordan, 1985) ranging from eco-centric to techno-centric (Dunlap and Van Liere, 1978; Dunlap *et al.*, 2000). Barr *et al.* (2003) summarised this idea that eco-centric values tend to represent a more environmentally conscious individual compared to techno-centric values representing an opinion of technology providing the solutions.
- Situational factors; variables representing an individual's situation at a given time may affect their environmental action, such as access to services, age or gender (Ball and Lawson, 1990; Derksen and Gartell, 1993; Guagnano *et al.*, 1994).
- Psychological variables; variables representing personality and perception traits involving philanthropic and motivation qualities, social pressures, environmental threats and a belief in the benefits of individual actions (Barr *et al.*, 2003; Hopper and Nielsen, 1991; De Young, 1986; Chan, 1998; Baldassare and Katz, 1992; Arbutnot, 1977; Tucker, 1992).

Many studies have focused research on individual attitudes, knowledge and recycling behaviour as explanatory reasons for participation in recycling programmes within Universities (Jennings, 2004; Kelly *et al.*, 2006; Hansen *et al.*, 2008). Key results found that students with pro-environmental attitudes demonstrated pro-environmental behaviours with increased environmental knowledge; therefore increasing the impact of pro-environmental attitudes on their behaviour (Meinhold and Malkus, 2005).

3.6.2 Perceived inconvenience and impact upon recycling

On another point previous studies have shown the relationship between perceived inconvenience and actual personal efforts required to recycle in reducing participation in recycling schemes (DeYoung, 1990; Domina and Koch, 2002; Do Valle *et al.*, 2004; Ewing, 2001; Kelly *et al.*, 2006). If people perceive the process to be difficult they are less likely to participate regardless of the actual level of difficulty in reality. In the University environment it was reported that the number of aluminium cans recycled increased when the receptacles were moved from the corridors to the classrooms (Ludwig *et al*., 1998); making the location easier for recycling due to it being closer to the point of consumption (Kaplowitz, 2009). In the domestic arena, convenient recycling schemes have been associated with greater participation rates than less convenient methods such as drop off recycling requiring personal efforts and transportation which act as barriers to high levels of participation (Boldero, 1995; Domina and Koch, 2002; Guagnano *et al.*, 1995; Vining and Ebreo, 1992; Woodard *et al.*, 2005). However, self-organising of recycling and arranging the waste and facilities can also assist the recycling process (Hansmann, 2006; Werner and Makela, 1998).

3.6.3 The impact of environmental knowledge

Achieving an increase in recycling levels involves both the facility provision by the FM team and behavioural aspects of the individuals involved (Austin *et al.*, 1993). It has been found that higher rates of recycling can be achieved through; informing people of what materials can be recycled, where they can be recycled, and informing people more effectively about the benefits of recycling (Vinings and Ebreo, 1990). In addition knowledge of the environmental benefits of recycling and harms of not recycling are related to recycling and the awareness of consequences (Bratt, 1999; Hopper and Nielsen, 1991; Schwartz, 1977; Vining and Ebreo, 1992). The ability for a person to locate the recycling facility is not sufficient to generate high levels of recycling (Austin *et al.*,1993), however for persons whom are motivated to recycle

there must be clear directions as to where to locate the facility; the three points above must all be implemented.

The existence of a link between environmental knowledge and environmental behaviour has been established previously (Hansmann, 2006). Of interest to office level recycling is that it is also known that specific knowledge of a particular recycling scheme is positively correlated with recycling (Gamba and Oskamp, 1994; Scott, 1999; Vining and Ebreo, 1990; Hansmann, 2006). Surveys focusing on attitudinal factors have found that those who recycle are better informed about; which materials are recyclable, where these materials can be recycled, and the benefits of recycling on the environment, than are their non-recycling counterparts (Vining and Ebreo, 1990). These factors are interlinked and all aspects must be combined for a recycling programme to be effective (Austin *et al.*, 1993).

3.6.4 The impact of facility signage

Signs for recycling facilities have an important role to play, being linked to the distribution of information as discussed above. However, attention is required to understand the possible variety of interpretations possible for the information signs as research has shown that prior attitudes can affect how information is processed (Wood and Kallgren, 1988; Wood *et al*., 1985; Wood *et al.,* 1995; Werner *et al.*, 2009). In relation to recycling; when someone who is favourable to recycling views a sign displaying weak reasons to recycle, they respond with their own more favourable arguments (Werner *et al.*, 2009). Werner *et al.* (2009) found two results of interest; participants preferred to see a factual sign which listed strong environmental reasons for why recycling is important, and secondly all signs (weak and strong) were effective at increasing recycling relative to a baseline level pre sign. Posting information on recycling receptacles about the percentage of materials correctly separated and weight of materials collected at the location increased the percentage and number of correctly separated aluminium cans and paper (Kim *et al*., 2005; Kaplowitz, 2009).

A behavioural study conducted by Austin *el al.* (1993) at Florida State University showed an increase in recycling following informative cues. Following the installation of signs above the bins (labelled 'trash' and 'recyclable materials') recycling in office one increased from a mean value of 51% pre prompt, to a mean value of 89% after prompt (Austin *et al.,* 1993), and office two increased from a mean level of 51% to a mean level of 60% during the initial prompt and a mean value of 66% proximal condition. The second prompt condition was a relocation of the bins to be located next to each other rather than separately in the room. The investigation shows the effects of prompts in the form of signs on the recycling habits of office personnel as well as the location of facilities.

Separation at source is seen as a model for the modern recycling process, however this brings with it associated problems such as low recovery rates and contamination (Peterson, 2004). These problems however can be rectified through effective implementation during the start up of the system and through adequate information and feedback systems being in place to encourage participation (Hornik and Cherian, 1995; Peterson, 2004). It has been highlighted that it is important to have insight into the attitudes, knowledge and practical conditions of the recyclers (Peterson, 2004; Hornik and Cherian, 1995; Aberg, 2000; Fehr, 2003).

3.6.5 Recycling habits at home versus recycling in the work place

There may be differences between the recycling habits of an individual at home compared to at the work place; considering the environmental behaviour of an individual should be constant, this could indicate that facilities, options available and material usage must differ at home to work. Marans and Lee (1993) found that 64% were frequent recyclers at home; however, half of the respondents agreed that the arrangement of the work place makes it easy to recycle yet only 16.3% were frequent recyclers in work. The link between facilities available and recycling seems definitive; frequent recyclers were more likely to agree with the statements than non-recyclers; "*the arrangement of the work space makes it easy for me to recycle"* and "*recycling at work is convenient*"'. A link was also displayed between

companies with a recycling programme and employees who recycled more actively (Marans and Lee, 1993).

It can be said that people, at home or in the work place, believe they are recyclers when in fact waste investigations show otherwise. WRAP[2] (2008) (in collaboration with MEI[3]) found that the majority of the people questioned (41%) were considered to be 'trying their best' with recycling and recycled a 'fair amount'. It was found that within this group, staple items were recycled but confusion existed around whether other materials could be recycled. It was established that education and the dissemination of information is needed within the recycling industry to encourage recycling. It was also established that there are myths about recycling and scepticism about the benefits. Financial spending on recycling programmes has been shown to increase recycling, with $1 spend generating a 2% increase in the rate of recycling (Sidique *et al.*, 2010).

It is likely that high level policy incentives from the government acting upon local authorities and organisations are best when financially focused, however in order for both the local authorities and organisations to actually reduce their waste volumes they are likely to need to understand environmental behaviour. Ultimately, driving waste reduction is likely to be a financial and a moral issue. There has been much talk about the introduction of a system which introduces some sort of charge linked to volume for kerb side recycling in England, however the leap has not been taken to introduce this yet.

3.7 Chapter summary

The Climate Change Act 2008 set legally binding targets to reduce carbon emissions in the UK by 34% by 2020 and 80% by 2050 (set against the baseline of 1990). The UK is aiming for a low carbon economy; which as well as reducing the impact on global warming, will assist in the process of developing security of energy supply in

[2] Material Change for a Better Environment; an organisation which exists to help individuals, businesses and local authorities reduce their waste and recycle more.
[3] Measurement Evaluation Learning; a consultancy specialising in helping clients develop better public services.

the UK and reduce energy costs. The Green Deal, to be launched in Autumn 2012, should accelerate the uptake of renewables through providing the much needed funding to the domestic, business and public sector. The developing policies, such as the Green Deal, and the existing CRC are targeting organisations specifically and this will in turn lead to targeting the buildings in which they operate. Progress with environmental policy is key, as legislation remains a strong push factor for energy efficiency. Other push factors include reducing energy costs, good neighbourliness and public concern. Corporate Social Responsibility comes second only to legislation as a motivating factor in this field.

The built environment is responsible for 40% of the UK and EU energy demand, it has been shown that 28% of energy demand could be saved by energy efficiency methods that are already available and understood; the EU has identified increasing energy performance of buildings as a key target. This is where the potential for the FM industry to deliver process towards environmental policy could be seen. Energy demand is rising, with demand for heat and power increasing significantly. In the non-domestic sector power demands increased to an even greater extent; this is thought to be because of a dramatic increase in IT equipment, inefficient and poorly regulated developments and an increase in air conditioning. FM organisations are well placed to deliver change in the methods used to manage energy and resource consumption in buildings and it is likely that this would make a positive contribution to environmental policy directives. This would especially be the case if environmental directives were written and targeted at the FM industry, specifically with the FM processes in mind.

This chapter frames the issue surrounding climate change and energy in the UK. Ultimately, the topics of climate change, FM theory, environmental behaviour and facility design are interlinked. It can be argued that the FM industry is best placed to reduce the greenhouse gas emissions from the built environment- due to their knowledge, skill and proximity to the operation of building systems- and so ultimately environmental policy has an important impact upon the changing nature of the FM industry. The building occupants have varying levels of intrinsic environmental behaviour, however it is likely that this can be affected significantly by the facilities that surround them. When designing facilities to deliver

environmental policy, such as recycling receptacles or lighting systems the impact of building users upon this should be considered in the design.

Ultimately the issue of environmental policy for the FM industry is two fold. It is likely that due to the position of FM organisations in relation to the client organisations they are able to deliver on environmental policy for both broad scope policy aimed at the built environment and policy aimed at achieving client sustainability targets. Secondly FM led environmental policy directives are likely to be a success when designed and managed specifically for their facility. This will involve the interaction of building occupants and it can be proposed that the physical facilities will have an impact upon this.

4 Chapter 4: Fulfilling Environmental Policy

4.1 Introduction

The previous chapter covered the theory of Environmental law at the level of the EU, the UK and the firm. However, what the issue of how effective EU environmental law is at driving compliance has not been considered. Nor has it been considered whether policy and legislation contain standards that are directly enforceable. The issue of climate change has been around since the 1930s (Bazerman, 2008), yet even now its severity, cause and even existence is still being debated. Scientists and researchers have delivered many a technical solution to the problem, yet barriers have prevented much sensible policy from being implemented or acted upon (Bazerman, 2008).

This chapter discusses the issue of compliance with environmental policy and the surrounding situational factors that will ultimately impact on the success of delivering the policy requirements. The first stage of the chapter looks at an introduction to policy mechanisms mainly financial, voluntary and audit mechanisms, as well as the impact that people have upon this. The second section looks at the wider issues that influence the uptake of, and compliance, with environmental policy. This includes aspects such as managerial influence, politics and issues relating to organisational change. The third section looks at possible methods of structuring the analysis of the success of complying with environmental policy. Two existing frameworks used to analyse different organisational factors are viewed for their suitability. The final section looks at compliance within FM operations, such as building occupants, pressure on energy use and technological impacts.

4.2 A introduction to policy mechanisms

All policy and Directives can be said to include clauses or outcomes that are designed to motivate towards compliance. There is a wealth of examples of compliance mechanisms available when reviewing existing policy each with a different method of driving compliance. However, it is not clearly understood which are effective in achieving their aim. Recent mechanisms used to gain compliance with environmental policy include (Newell *et al.*, 2006):

- Funding for Research and Development (R&D)
- Tax credits for purchasing energy efficient equipment
- Public- private partnerships to deliver energy efficient technologies
- Carbon cap-and-trade systems
- Renewable energy performance standards for electricity generation
- Energy efficiency standards for products
- Carbon trading systems and emission fees

This chapter will start with looking at the current use of such mechanisms. It is likely that some mechanisms are better than others at generating compliance. Or possibly some mechanisms are more effective under certain conditions than others. It is necessary to understand their current use and application in preparation for observing the FM teams reaction to policy mechanisms.

4.2.1 Financial stimulus

There are many cases indicating the economists' preference for financial policy instruments over those which provide command and control (Requate, 2005). The most recent example in the UK is the CRC, which has been introduced as part of the Climate Change Act 2008. The basis of the CRC emissions trading scheme is firstly to offer incentives to organisations to reduce emissions and secondly to provide financial penalties if organisations fail to register for the scheme. Discussions of the drawbacks of such a method already exist in current literature, with focus often on research from the US on areas such as the 1990 Clean Air Act Amendments

(CAAA). Laffont and Tirole (1993) highlight that such schemes disregard regional pollution issues. Such schemes can have low levels of trading and therefore low realisation of potential gains due to market uncertainty (with the unknown demand for permits) and regulatory uncertainty due to no legal property rights to the permit and the lack of understanding over tax and regulatory treatment of the permits (Laffont and Tirole, 1993). Zhang *et al.* (2008) found that regulatory pressure upon organisations in China does not show significant affects on environmental management. This finding is echoed in other research also (Zeng *et al.*, 2007). Another financial regulatory mechanism used for environmental policy is the tax system. However, tax policy has been found to not always be enforceable, as the ability to under report emissions is possible due to the difficulties in monitoring the firm's emissions because of the high cost and lack of understanding or ability to ensure accuracy (Macho- Stadler and Perez-Castrillo, 2006).

However, some methods of financial penalties are deemed to be effective such as levying a charge on CO_2 emissions, targeting CO_2 emitting activities (Cooper, 2008). Due to there not yet being viable substitute for all CO_2 emitting activities, a system of cap-and-trade (CAT) must be used where allowable emissions are capped and traded using permits (Copper, 2008). This still holds the disadvantage that globally it will be difficult to agree realistic and useful targets (Cooper, 2008). Tradable carbon permits are likely to be effective through raising the cost of fossil fuels (Nordhaus, 1991; Jorgenson and Wilcoxen, 1992; Goulder, 1995; Pizer, 1999). This may be expected to cause a reduction in energy consumed, an increase in the installation and use of energy efficient technology, a further increase in R&D into efficient technology to create a greater choice in the market (Newell *et al*., 2006). However, this cycle of invention, innovation and diffusion is likely to be greater than the actual utilisation of the results, with technological change overwhelming the short-term results (Hogan and Jorgenson, 1991). However, having a global financial carbon trading system is likely to be difficult to establish and implement, particularly because developing nations are particularly likely to resist any emissions cap due to the fear that it is likely to limit their economic development (Cooper, 2008).

The Clean Water Act involved organisations purchasing permits to release specific amounts of pollution (Arguedas, 2008). However, research found evidence of non-compliance with the policy and programme regulations. Harrington (2003) carried out a study finding that from the mid 1980's to mid-1990's non-compliance with direct dischargers was between 9% and 11% and up to 54% for indirect dischargers. The non-compliance did not stop with violating permit restrictions, but also included self-monitoring and reporting. The penalty included in this policy is of a financial nature. There are two stages to the penalty; firstly the severity of the penalty is linked to degree of non-compliance followed by an extra stipulation depending on the economic impact of the penalty on the violator or economic benefit of non-compliance e.g. illegal profits (Arguedas, 2008). The first penalty is considered a gravity component, the second penalty, linked to the results of the non-compliance is a non-gravity component. Oljaca *et al.* (1998) found that the resultant penalty was influenced by the seriousness of the violation, historical compliance records and company size. The first two factors being gravity based and the third being non-gravity based (Harrington, 2003). Fixed sanctions have been found to be ineffective causing sanctioning costs but no change in organisational behaviour (Harrington, 2003). Market based instruments such as emissions tax, subsidies and tradable permits have the advantage of static cost efficiency which firms take advantage of (Requate, 2005).

Through deterrence and remuneration instruments organisations ultimately take the decision to obey or disobey the law resulting from a cost/benefit analysis; in that the benefit of complying outweighs the risk of fines, jail terms and other such penalties (Stigler, 1970). This is likely to still be the case now with environmental policy. For instruments to be effective key factors are the speed, certainty and severity of penalties (Jacob, 1980). A drawback of this method is that the system requires constant and visible surveillance which organisations are aware of coupled with penalties that organisations do not desire (Burby and Paterson, 1993). However, excessive use of the deterrence mechanisms can foster resentment from organisations resulting in political pressure to alter policy (Burby and Paterson, 1993; Danaceau, 1982; Shover *et al*. 1986). Alternatives to sanctions include incentives such as tax reduction and cost sharing that are used to increase and stimulate required behaviour or policy compliance (Burby and Paterson, 1993). An

alternative to this, known as cooperative techniques, builds upon social and ethical reasons to comply with policy, such as a good reputation, the potential of awards, positive relationships (Burby and Paterson, 1993). Organisations respond to factors affecting their bottom line. Increasing energy prices and increasing the cost to emit carbon will directly affect organisations bottom lines and as a result may generate rapid change (Wehrmeyer *et al.*, 2009).

The Chartered Management Institute (Wehrmeyer *et al.*, 2009) concluded that in 1998 businesses did not see the added value potential of environmental business practice rather only the added cost it represented; the environment was not a factor that influenced day to day business practice neither was it a core driver. The latest Wehrmeyer *et al.* report (2009) has established that the green agenda has increased in importance, however, at the level of the firm the urgent action that is required to create a low carbon economy in the UK is not being delivered and boardroom leadership has been highlighted as a block in the reform process.

4.2.2 Voluntary Penalties – The Kyoto example

The Kyoto Protocol includes a compliance mechanism in the form of a penalty (30% penalty) that is enacted during the commitment period two, if a country fails to comply with the commitment period one. However, it is believed that this mechanism will fail to deliver compliance as the penalty only applies if the country chooses to sign up to it, and the penalty applies to a future control period and the country would have to agree to the emission limit for that period (Aldy *et al.*, 2003). It is widely reported that the parties involved in the Kyoto Protocol hold a differing assessment of their proportion of the blame for climate change (Bazerman, 2008); this egocentric behaviour is only going to deter further the participation in the voluntary penalty mechanism. The human inability to view issues objectively and due to the highly complex issues and solutions involved in this case enables egocentric behaviour to flourish (Bazerman, 2008; Wade-Benzoni *et al.*, 1996).

4.2.3 The impact of audit requirements

Research has shown that the audit mechanism is successful in motivating compliance. Research conducted by Macho- Stadler and Perez-Castrillo (2006) found the following range of impacts relating to the position of an audit function within policy:

- Under the condition of no threat of audits organisations pollute freely and report no pollution
- Under the condition of minor audit pressure organisations decrease emissions but continue to report no pollution
- Under the condition of strong audit pressure organisations are found to report more accurately

However, within environmental policy the audit function should be developed further into a system of inspection policies alongside the use of sanctions for non-compliance (Macho-Stadler and Perez-Castrillo, 2006). Implementing the audit process can be costly due to the requirement for expert personnel to execute it; unfortunately this may act as a disincentive (Campbell and Byington, 1995). Secondly, research has shown that organisations are wary of voluntary audits because of the option that they pose a risk of self-incrimination as many audit bodies have the right to inspect the results (Campbell and Byington, 1995). Even organisations, which devote much effort to complying with environmental policy, may find that there may be a non-compliance result because of the difficulty that some may find in understanding the policy requirements (Mishra *et al.,* 1997). This can result in fines; negative publicity and tort liability suits and this awareness will result in regulatory access to audit results being a disincentive (Mishra *et al*., 1997).

4.2.4 Involving people as a policy mechanism

Wehrmeyer *et al.* (2009) found that managers use and trust internal sources and professional bodies for environmental advice. Wehrmeyer *et al.* (2009) argue that due to this professional bodies have a responsibility to assist managers with the present day environmental challenges. This should be recognised at the policy

formation level and written in as a mechanism to generate compliance. The statistics confirm this argument, out of a survey of 1,500 organisations, 64% agreed that carbon management will become a more important agenda whilst only 26% report that their organisations manage their carbon footprint even though 69% believe they could cut emissions (Wehrmeyer *et al.*, 2009). It was found that as management seniority increases so does their environmental scepticism, with directors most likely to be climate change cynics (54%) (Wehrmeyer *et al.*, 2009).

The research also found that managerial scepticism is linked to there being a lack of resources available for achieving environmental policy objectives (Wehrmeyer *et al.*, 2009). Employee age has been highlighted as a factor, with younger junior managers found to be more passionate about the environmental agenda (Wehrmeyer *et al.*, 2009). The report found that chief executives must show leadership through showing commitment to the environmental agenda with clear board level responsibility and accountability for delivering specific projects. Organisations should set environmental targets, but this also needs to be included in employee annual aims. Customer pressure, impact upon brand image, ethical responsibility and influential external groups (especially the media) are important factors for environmental action for managers (Wehrmeyer *et al.*, 2009).

4.3Influencing factors

There are many barriers to compliance with policy generally and also environmental policy specifically. Previous research has even found that regulations following on from policy directives themselves have been identified as a factor preventing compliance. In particular the complexity of the regulations were identified as a problem, especially so for smaller companies (Wehrmeyer *et al.*, 2009). In the study it was found that there was a view held by the majority of managers that environmental regulations act as a barrier towards achieving overall organisational strategic goals and create a bureaucratic system (Wehrmeyer *et al.*, 2009). Directors are particularly likely to hold this view. However resources, or more particularly a lack of resources, was seen as a barrier towards compliance. The possible barriers to

compliance need to be considered to build an understanding of how to develop mechanisms to motivate towards compliance with environmental policy.

4.3.1 People as an influencing factor

Patters of human behaviour are able to affect the success of policy or organisational action. Ultimately humans write the policy, humans interpret the policy, and humans are responsible for delivering the policy. The humans are involved in organisations and are influenced by culture and group think. A typical human behaviour trait is failure to act in time creating the notion of predictable surprise (Bazerman and Watkins, 2004). Research conducted by Kahneman and Tversky (1979) is relevant here. Kahneman and Tversky (1979) found that humans rely on simplifying strategies which lead to predictable errors including; overconfidence, anchoring of judgements, being influenced by how problems are framed, escalation of commitment and ignoring decisions of other parties. It is likely that these predictable human errors will play a part in the non-compliance with environmental policy unless there are specific mechanisms included which are designed to overcome these challenges.

People and therefore the organisations that they run, or the projects that they manage, tend to have a grossly exaggerated discounted rate regarding the future (Loewenstein and Thaler, 1989). This in turn results in 'overweighting the present' (Bazerman, 2008) and failure to see the long term benefit of environmental actions, often involving capital intensive technology to reduce energy use. Gore (1993) observed on this subject that many environmental decisions are made as if the earth was a business in liquidation; meaning that we discount to a greater degree when the future is uncertain (Wade-Benzoni, 1999). Humans also tend to be over optimistic about the future or hold positive illusions, and this action can be argued to prevent us from acting in time for climate change (Bazerman and Watkins, 2004; Bazerman and Moore, 2008). Especially since the argument over the cause and severity seems to continue to rumble on within the British press, which is likely to influence the public. Environmental policy should include within it realistic and enforceable time frames for delivery. This will go some way to removing the ability for organisations

to exaggerate the discounted rate of return regarding the future and therefore to not see the benefit of working towards reducing environmental impact in the present. For this to be effective it is likely that there will need to be significant penalties imposed upon organisations that do not deliver the policy aims within the time frame.

4.3.2 Management as an influencing factor

The conflicting pressures upon managers in organisations will affect the level of compliance with policy if responsibility and accountability for delivery is passed down to individual managerial level. Incentive compensation can be devised to manage the exchange manager's face between improving profit and reducing environmental risks (Gabel and Sinclair-Desgagne, 1993). It could be argued that financial incentives should become a stronger feature, however, with 'workaholic' managers the salary incentives are likely to become irrelevant (Gabel and Sinclair-Desgagne, 1993). The alternative of using monetary sanctions at the level of the individual or team could be a solution here, echoing Macho-Sadler and Perez-Castrillo (2006) who reported the success of organisational level sanctions. The bonus system currently in place in many organisations could be the route to deliver this.

4.3.3 Politics as an influencing factor

Within the UK and indeed Europe and the USA there are key groups whose interest lies in maintaining the status quo, which the issue of climate change is threatening to unbalance. Obfuscation is a key tool of special interest groups (Bazerman, 2008). For climate change the method lies in creating confusion, in order to create doubt and block policy formation. This method can be seen as successful when one remembers that people are less likely to invest in uncertain policies, especially with an uncertain future (Bazerman, 2008). Discounting for the future comes into play once again. Politicians are going to be deterred from introducing environmental

related taxes on this generation to prevent an undefined impact on future generations, until the public will is amenable.

4.3.4 Community pressure as an influencing factor

Community pressure has been found to have a positive effect on environmental behaviour, and has been linked to over compliance with environmental regulation (Zhang *et al.,* 2008). Self reported community pressure has been found to have an effect on an organisations decisions to implement an environmental plan (Henriques and Sadorsky, 1996) and environmental management practices (Dasgupta *et al.,* 2000). Providing local communities' access to organisations environmental performance data is a method to engineer this process (Zhang *et al*., 2008). This could be extended to the built environment, engaging communities surrounding high profile public buildings or new build housing schemes.

4.4 Organisational resistance- resistance to cultural change

Implementing a new environmental strategy means change (David, 2000) and so resistance to change is also a significant issue affecting the implementation of policy directives as well as other cultural change programmes. A policy directive is likely to result in a requirement for organisational and strategic change from high level. Therefore, the policy should contain mechanisms to overcome this resistance to change (Bazerman, 2008; Bazerman and Hoffman, 1999). A change in policy forcing change upon organisations, households and individuals is likely to generate resistance to change. It is important to acknowledge this in the formation of policy, especially when designing mechanisms to drive compliance. For example, if general resistance to change in strong then mechanisms which focus on optional enforcement are unlikely to drive compliance successfully.

4.4.1 Success of change policy

Executing strategy is a difficult task, with the failure rate typically being 70% (Beer and Nohria, 2000; Bruch *et al.,* 2005; Sirkin *et al.,* 2005; Worley and Lawler, 2006). When strategic change is executed fully, typically only 60% of the potential value is realised, due to inadequate planning and implementation (Mankins and Steele, 2005). In addition to that only around 15% of organisations track results against the initial strategic plans (Mankins and Steel, 2005). Figure 3 demonstrates five key reasons why strategic change fails.

Figure 3 Adapted from Huczynski and Buchanan (2001)

The route to success for managing strategic change varies depending on the context of change. There are many variables that influence the design of the change management programme. The length of time available to deliver strategic change has an effect, the longer the time available the greater ability to plan in detail. In some occasions certain aspects of the business will want to be preserved, possibly because they lend themselves to the aim of the change programme. Preserving one aspect of the organisation over another could cause tension (Johnson *et al.,* 2005). A long history of experience under one strategy may again cause resentment to change and can impede the progress of the change programme (Johnson *et al.,* 2005). Over time the current strategy will attract and cultivate a set of values and philosophies;

this will in turn then limit the future choice available for strategic direction if aspects of the business still want to be preserved (Guth and Taguri, 1965).

Capability, capacity and readiness for change are three factors that will have a significant effect on the success of the change programme. If the organisation has managers that are experienced in managing change, and are positive towards the strategic change programme then this will be of an advantage. The financial and time resources are other key aspects of influence; this could influence the quality of the change programme. Investment in personnel, capital and time required to deliver strategic change is likely to be significant, and will impact on the ability of the organisation to deliver the change programme (Freemand and Boeker, 1984). This is especially likely to be an important point when considering the development and implementation of SFM. This will require leadership from the top of the hierarchy, it will require investment in the team members to develop their knowledge or possibly through recruiting specialists to the team, and it will certainly involve significant capital investment for initiatives and organisational procedural change. When developing the change programme in response to environmental policy directives, it is important to take these factors into consideration.

Figure 4 Context and influence on strategic change, Bogun and Hailey (Romanelli and Tushman, 1994)

4.4.2 Nature and context of change

Strategic change can be engineered in different ways. Balogun and Hailey (1999) described the nature of change as either incremental or dramatic. It was argued that incremental change was better for an organisation as it will build on skills, routines and beliefs of those in the organisation (Johnson *et al*., 2005). This has the advantage of being efficient and more able to win commitment, but what if the routines and beliefs need to be changed or if these are holding back the organisation from developing successful competitive strategy? This could be argued to be the case that the FM model is developing into SFM. Current routines within FM operations could be preventive to establishing SFM. Alternatively, to work the new strategy within the current paradigm of organisational beliefs and assumptions is to deliver a realignment of strategy (Johnson *et al.*, 2005). According to Balogun and Hailey (1999) a paradigm change would be a transformation, delivering a change in organisations belief, assumptions and possible values.

Figure 5 Types of strategic change (Balogun and Hailey, 1999)

When combining the ideas of nature of change and scope of change four types of strategic change develop (figure 5). Adaption by nature is change that can be accommodated within the current organisational positioning and be developed incrementally, building upon prior strategy (Balogun and Hailey, 1999). Reconstruction also builds upon the current paradigm but occurs rapidly and not

without causing upheaval. Evolution however is a change programme that requires adaptation to the organisational beliefs, and values (Balogun and Hailey, 1999). This process occurs over time, and is able to be planned and evolve not without structure. Finally revolution is a change process that requires rapid and major changes to the structure and grounding of an organisation. It usually occurs when the rigid and engrained paradigm is not developing as required by environmental and competitive pressures (Balogun and Hailey, 1999).

4.4.3 Communication as a tool

It is essential for those executing change and for those affected by change to understand the reasons behind the change programme (Franken *et al.,* 2009). New legislation is a straightforward reason, but this would still require selling to the organisation in order to develop a change in process. The key force behind this is communication. It is argued that effective communication is the single most important factor in overcoming resistance to change (Johnson *et al.*, 2005). This will be a relevant point also when communicating the change in services to building users as a result in the change in facilities operation for example. Inspirational communication can be used to persuade others to accept and support the new strategy, and is conducive to creating a culture of change (Franken *et al.*, 2005). There is a variety of media available to communicate the vision and intent of the strategic change, and the most effective communication method will depend on the nature of change.

Figure 6 Effective and ineffective communication of change (Johnson *et al*., 2005)

4.4.4 The impact of leadership

The management of change is usually linked to a strategic leader. Leadership is the process of influencing an organisation (or a group within an organisation) in its efforts toward achieving an aim or goal (Johnson *et al.*, 2005). When looking at delivering a change programme the leader is not necessarily someone at the top of the organisation but someone who is in a position of influence (Johnson *et al.*, 2005). For delivering environmental policy this change could be delivered by the project manager or project team who are accountable for the policy deliverables. There are many styles of leadership, and each has its merit depending on the nature of the change programme. The idea of a change agent is also of importance. A change agent is the individual or group that effects the strategic change in an organisation (Johnson *et al.*, 2005). It can be beneficial to develop the role of a change agent as part of the soft side of the change management programme. This could be useful when forming mechanisms in environmental policy. There have been examples in many fields, notably Health and Safety, where the policy directs that individual persons in organisations be named as the responsible person for certain Health and Safety regulations, a single person accountable for the deliverables. This knowledge of the success of change agents could be used to design mechanisms that empower individuals to manage the environmental policy directives.

Style	In Practice	Competencies	When to use
Coercive	Demands compliance	Drive to achieve, self control	In a crisis, with problem people
Authoritative	Mobilises people	Self confidence, change catalyst	When new vision and direction is needed
Affiliate	Creates harmony	Empathy, communication	To motivate people under stress, heal wounds
Democratic	Forges consensus	Collaboration, team building	To build consensus, to get contributions
Pacesetting	Sets high standards	Initiative, drive to achieve	To get fast results from a motivated team
Coaching	Develops people	Empathy, self-awareness	To improve performance, to develop strengths

Table 9 Goleman's six leadership styles (Huczynski and Buchanan, 2001)

4.4.5 Behavioural factors for resistance

The behavioural element to delivering change will be a requirement whether sustainability is deemed as a revenue source or moral obligation. Regardless of the ultimate motivating factor, attitudes to change will play an equal part. Elizur and Guttman (1976) envision attitudes as a tri-dimensional concept composed of cognitive, affective and intentional/behavioural concepts. The affective element relates to a set of feelings about change (whether positive or negative), the cognitive element refers to the opinion the person has about the advantages, disadvantages, usefulness and knowledge required to handle the change, and finally the behavioural reaction refers to the action taken or to be taken towards change (Bouckenooghe, 2010). There has been extensive literature on attitudes to change since Coch and French (1948) first discussed the methods available to overcome resistance to change. Since then research has developed to define attitude types (Lines, 2005; Vakola *et al.,* 2004; Yousef, 2000; Lau and Woodman, 1995), readiness for change and resistance to change. The issue of change attitudes is considered important in planning and managing change projects. Theories of change should incorporate many levels, and the relationships between these levels needs to be explained (Dansereau *et al*., 1999; Poole and Van de Ven, 2004), with employees at different

levels in organisational hierarchy perceiving change differently (Caldwell *et al.*, 2004).

Resistance to change can be described as an 'inability or unwillingness to discuss or accept organisational changes that are perceived in some way damaging or threatening to the individual' (Buchanan and Huczynski, 2001). Bedeian (1980) references four causes of resistance of change;

1. *Parochial self-interest*: A desire to protect the status quo with which one is content. Perceived and actual threats to interests and values will generate resistance.
2. *Misunderstanding and lack of trust*: it is more likely to have resistance to change if individuals do not understand the reasons behind it, its nature or possible consequences. Incomplete and incorrect information creates uncertainty. The methods used to introduce change can be resisted rather than the change itself.
3. *Contradictory assessments*: Individuals differ in the way they judge and receive costs and benefits of change. Personal values affect which changes are welcome and promoted and which fail. The personal assumptions are more likely to take hold during inadequate communication of information.
4. *Low tolerance for change*: People differ in their ability to cope with change; and change that requires individuals to behave in differently can challenge the concept of self. Change tests ability and ideas of our competencies.

However, there are more than four behavioural reasons that are accepted to be reasons for resistance to change. Eccles (1994) cites thirteen reasons:

1. Ignorance: failure to understand the problem
2. Comparison: the solution is disliked because an alternative is preferred
3. Disbelief: a feeling that the proposed solution will not work
4. Loss: the change has unacceptable personal costs
5. Inadequacy: the rewards from change are not sufficient
6. Anxiety: the fear of being unable to cope with the new situation

7. Demolition: the change threatens to destroy existing social arrangements
8. Power cut: sources of influence and control will be eroded
9. Contamination: new values and practice are repellent
10. Inhibition: the willingness to change is low
11. Mistrust: management motives for change are considered suspicious
12. Alienation: other interests are more highly valued than the new proposals
13. Frustrations: the change will reduce power and career opportunities

Such models for resistance to change are well researched. However, there are methods and processes equally well researched to manage their influence. Throughout managing change projects it is necessary to be aware of such attitudes and behaviours to ensure project success.

4.4.6 A model for dealing with resistance

Dealing with resistance and attitudes are key issues. Kotter and Schiesinger (1979) identified six methods to deal with resistance that can be applied to the development of compliance mechanisms in environmental policy:

1. Education and commitment: Managers should share their knowledge, experience and perceptions with staff. The can involved major programmes of training, face to face liaising and extensive communication methods. Resistance may be based on misunderstanding.
2. Participation and involvement: Those who might resist change should be involved in planning and implementation. Collaboration can have the knock on effect of reducing resistance, and can reduce fears which individuals have about the impact of change upon them.
3. Facilitation and support: Employees may need to be given counselling and therapy to overcome fears about change. Changing inherent attitudes towards change could be a benefit.
4. Negotiation and agreement: It may be necessary to reach a mutually acceptable compromise and the nature of the change may have to be adjusted

to meet the needs and interests of powerful and influential resistors. Where groups have enough power to resist management, change may have to be negotiated rather than imposed.

5. Manipulation and co-optation: Undertaking attempts to sidestep potential resistance. Managers should put forward proposals which appeal to specific interest and emotions of key groups or stakeholders. The information disseminated is selective, emphasising benefits. Co-optation involves giving key resistors access to the decision-making process being carried out.
6. Implicit and explicit coercion: Here management deserts attempting to achieve consensus. When there is great disagreement between those anxious about change this may be an appropriate method. This involves the use of threats and force; in terms of transferring employees or removing promotion opportunities.

It is likely that when considering such models within the framework of delivering cultural change within the FM organisation not all of the above are likely to be suitable. Coercion and manipulation for example would be excessive in their aim and are likely to be unnecessary given the subject of the cultural change. Participation and involvement is likely to be the type of model to be beneficial as it would allow the resistors to be brought on board and would also allow the knowledge of the change agents to be used to aid and progress the change more effectively.

4.4.7 Hard elements to strategic change: The DICE model

In recent years, the focus of research has been upon the soft issues of management including, culture, leadership, motivation and power issues (Sirkin *et al*., 2005). Sirkin *et al.* (2005) argue that although these issues are of importance, considering these issues alone is not sufficient for implementing strategic change programmes. Change programmes must involve the implementation of hard and soft elements; however, most organisations tend to focus on the soft elements of transformation. The hard elements need to be managed first to enable the project to commence,

following that the soft elements should be managed to aid success (Sirkin et al, 2005).

Sirkin *et al.* (2005) developed the DICE model, involving four key elements of the hard side of strategic change. The four key elements are duration, integrity, commitment and effort. Duration has two aspects; the length of the project and/or the length between project reviews. Integrity in the DICE model means the extent to which the organisation can rely on managers, staff, and supervisors to deliver change projects successfully. Inherently all managers and staff have different skills and different levels of abilities. The selection of staff is an important point. Commitment here is a twofold issue; commitment of senior management/ executives and the staff who will be affected by the change programme. The effort-element is concerned with the increase in effort staff will require as a result of the change project and the size of the increase in workload due to the change programme. The gap between strategic planning and realising the full value of a strategy can be credited to a combination of factors including; poor planning, misdirected resources, breakdowns in communication and limited accountability for results (Mankins and Steel, 2005).

The DICE elements can be incorporated into mechanism design. The duration is an important issue. Policy directives should take into account the two conflicting time frames and aim to strike a balance between the short time frame available to reverse rising global temperatures and the length of time required for industry to develop new behaviour, culture and technology. Commitment can be engineered through the requirement of naming specific personnel as being accountable for delivery. The effort element is a key point. The policy created should deliver the desired outcome through the simplest method possible. If the policy requirements are excessive, laborious and confusing then managers are going to back away from the policy requirements. This has been recognised with the CRC which has recently been streamlined following an industry consultation process.

Figure 7 The DICE framework (Sirkin *et al*., 2005)

These four elements can be calculated and planned to provide structure to the change programme, as opposed to the soft side of change management programmes. The framework can be used to provide a methodical route to establishing the correct conditions for a change programme. Once establishing the team, processes and aim, the DICE framework can be used to give the project a score and possibly identify weak points in the structure.

$$\textbf{DICE score} = D + (2 \times I) + (2 \times C_1) + C_2 + E$$

Figure 8 An explanation of the DICE calculation (Sirkin *et al*.,2005)

The overall score of the DICE gives an indication of the likely success of the project. Between seven and fourteen points the project is very likely to succeed (called the win zone), scores between fourteen and seventeen the risk to the project is increasing (called the worry zone), and with scores over seventeen the project is deemed to be particularly risky (called the woe zone). It could be possible to use

this model in the FM context to thoroughly plan strategic change programmes, in particular strategic change to deliver SFM.

4.4.8 Environmental policy driving strategic change

Specific types of mechanisms within the environmental policy could target the above factors. Self-interest could be overcome by incorporating compulsory mechanisms, such as a fixed financial cost for carbon, and the threat of imprisonment for polluting the natural environment for example. This factor can also be targeted along with the lack of trust through steps such as a consultation period for policy design. Discussion, consultation and incorporating industry requirements and vision for the policy are likely to gain participation, which can be reinforced through compulsory mechanisms. Contradictory assessments can be overcome by incorporating a range of mechanisms. This can be demonstrated by the initial CRC policy. The use of league tables and the acknowledgment of the action government is making of the environmental problem is likely to motivate organisations or individuals with a pro-environmental attitude. Those with an agnostic attitude are likely to be motivated by the monetary link to the environment, so the cost of landfill and again the price on carbon is likely to impact their bottom line and so motivate behavioural change.

Environmental policy is likely, and hopefully, going to pressurise strategic change within organisations. Strategic change being a process involving new patterns of actions and routines, creating a new alignment between the external environment and the firm which will affect a sizeable proportion of the population (Schein, 1990; De Wit and Meyer, 2005). The key feature of implementing change through environmental improvement is the final stage of embedding that change in culture (Cummings and Worley, 2008). Lewin (1947) implemented a model that highlighted the implementation and institutionalisation stages of change management. This model detailed the need for an interruption to the state of equilibrium in order for change to occur through removing the forces acting against the change or by exerting greater force on the change process (Ronnerberg *et al*., 2010).

The current state of a SP, Environmental Management System (EMS) and other environmental policy frameworks often do not take into account these steps of creating change (Ronnerberg *et al*., 2010). An example is the ANSI/ISO 14001-1996 standard which outlines the implementation steps of environmental policy, planning, technical implementation, checking and corrective action and finally management review but does not take into account the change management process as an integral part of the process (Bazerman and Hoffman, 1999).

Alternative research has highlighted the importance of cultural change as part of the environmental improvement process (notably; Balzarova *et al.*, 2006; Kitazawa and Sarkis, 2000). Alternatively other studies have highlighted factors that affect culture e.g. teams, training, empowerment, rewards and top management support (Balzarova *et al.*, 2006). There is a lack of a comprehensive model that incorporates all of the key aspects highlighted in different research as required for successful implementation of environmental change. However, it is a topic that has began to be explored, notably by Bazerman and Hoffman (1999) advocating change management interventions with Lewin's model as part of the solution to environmentally destructive behaviour. Finally, with Huq (2005) and Yeung *et al.* (2005) conducting empirical work on the support of quality management on the benefits of change related activities.

The development of climate change knowledge is a driving force for strategic change at all stages throughout the UK PLC. Government targets for carbon reduction, changing demands from clients and customers and a changing energy market are all putting demands upon FM organisations to manage energy use more efficiently. The current environmental pressures on all organisations are a force for strategic change. The changing environment is not only demanding energy efficiency but clients are also demanding greater knowledge of energy use through smart reporting and monitoring. This requires a new skill set within the FM group. The Carbon Reduction Commitment is forcing organisations to focus on the environment, energy use and ultimately carbon emissions by creating financial incentives to reduce usage. The impact is great, and it will fundamentally alter the core functions of the FM industry. Energy management historically was not an

important role of FM, and pre 2000 usually did not feature in FM contracts. Design parameters in FM contracts were usually broad, allowing facility Managers to operate buildings inefficiently near the high end of the design parameters to avoid non-achievement of design conditions or non-availability conditions.

4.4.9 Specific policy for environmental change: the CRC mechanisms

As discussed in chapter 3 the CRC is effective at translating environmental concerns into corporate language through putting a price on carbon and focusing on the organisations bottom line. To deliver the aims the policy does have a wide breadth of mechanisms to deliver compliance, with the result of non-compliance varying in severity. The following mechanisms are found:

- Purchase of allowances
- Accelerating cost of allowances
- Ability to sell allowances
- League table
- Named person of responsibility
- Civil penalties
- Criminal penalties
- Audit
- Annual report
- *Financial reward/incentive*- this has been removed through the coalition

The mechanisms chosen to generate compliance are a mix of financial and reputational factors. Purchasing allowances, the accelerating cost of allowances and the ability to sell excess allowances will all appeal to business minded managers as they will directly affect profit ratios. The league table will appeal to organisations where corporate social responsibility is a key factor in organisational reputation and image. For the few organisations who are not affected by or motivated by profit or image there are additional factors which act as the ‘stick’; a senior member of the organisation will be named as accountable, civil and criminal penalties and the

threat of an external audit should generate compliance regardless of organisational beliefs or purposes. However, this will be affected by the severity of the result of non-compliance and the rate at which 'offenders' are penalised.

4.5 Analysing the impact of environmental policy

When evaluating the effectiveness of environmental policy, ultimately the success of the policy in delivering change within organisations is being evaluated. If the policy is successful the organisation should be doing something different post policy compared to pre policy, unless of course the organisation was already achieving the policy out lines – but that is not what is being measured here. Therefore taking into account the policy mechanisms and barriers discussed above the models of analysing organisational performance or the make up of culture could be an applicable method shaping the evaluation of success.

4.5.1 Culture in Organisational Analysis

Taking Hofstede (1990) people acquire 'mental programmes' or 'the software of the mind' which creates patterns of thinking, feeling and action. This is then extended, with culture being the collective programming of the mind that distinguishes one group or category from another. Is this not what new policy is attempting to do within organisations; reprogramming culture and process to deliver a new model of behaviour or production? Within the field of organisational theory there is considered to be a growing acknowledgement that structure, even including informal structure, can only go so far in providing the social mechanisms for coordination and control from a managerial perspective or in explaining human behaviour from a theoretical point of view (Dawson, 1996). Dawson (1996) presents a model that analyses culture within the context of other aspects of the organisation.

Figure 9 A map of the Corporate World: how culture may be revealed and created in organisations (Dawson, 1996, pp 143)

In the centre of the diagram is the core of shared values, beliefs and assumptions. The relationship between the values people hold within an organisation and the organisations structure, practices, technology and strategy are considered to be complex and interactive. Each of the outer rings are the creation of people, the subject of decision-making and the results of actions taken or not. Such actions are the results of values, and therefore the influence stems from the value at the centre outwards. The values are two way; in that each layer once created impacts upon the way value are developed. In reaction to events outside the organisation, the actions and decisions are no guided by values alone. This is where the model becomes

useful in the policy aspect. The organisation will react to policy mechanisms as well as inherent values; each will impact upon the other to deliver SFM. Taking this approach as a starting point the model could be adapted to consider and evaluate the approach that the FM organisation makes under the conditions of policy mechanisms, which are exerting pressure to deliver change. The following model has been adapted to display possible mechanisms that may impact the result of SFM.

Figure 10 A map of the corporate world: how culture may be revealed and created in organisations. Adapted from Dawson (1996) to reflect policy and culture implications on the formation of FM operations

This model above displays how possible policy mechanisms can drive through the current processes, rules and procedures in place within an organisation to deliver cultural change in the pursuit of SFM. Ultimately policy mechanisms will drive change throughout the organisation if they are successful. Alternatively the current rules, processes, and rituals could prevent the policy mechanisms delivering change to the centre of the FM model and the status quo could remain.

4.5.2 Environmental Policy as a method of transformation

An alternative way of viewing this subject is through looking at the production process of generating goods and services. Dawson (1996) explains how variety between organisations can be seen through the products and services they create, yet the commonality between all organisations can be seen through the system of inputs which are transformed through processes to create outputs. The transformation process involves a variety of smaller workflow sequences, which identify and acquire materials and then distribute the outputs. Dawson (1996) takes this model and uses a man-made fibre manufacturing plant as an example. The three transformation processes are constructed using the notion of development, production and finally sales as the output. This treats technology as a multidimensional concept, as according to Mohr (1971).

Inputs into Products and processes	**Transformation Processes**	**Outputs of Goods and Services**
Raw Materials	Labour	Finished Products
Energy		
Manufacturing Components		Components
Data/information	Skills	Information
Cash	Data	Services
Services	Plant	Skills
Skills	Energy	Knowledge
Knowledge	Machinery	Experience

Table 10 Organisations as arenas for the transformation of inputs into outputs (Dawson, 1996)

Looking at this model with reference to environmental policy, the inputs could be viewed to be a combination of current relevant organisations inputs. The policy mechanisms could be viewed as a method to drive the transformation process. The outputs will be indicators of sustainable business practice.

4.6 Facilities Management and compliance with Environmental Policy

Elmualim *et al.* (2010) carried out a study on barriers and commitment of facilities management to sustainability in which there were 251 respondents. One of the findings was that 31% of FM companies do not have a SP (Elmualim *et al.*, 2010) indicating that a large proportion of organisations may not perceive sustainability as a high priority. Of that 31% it has been indicated that time constraints, lack of knowledge and lack of senior management commitment are the main barriers to practising SFM (Elmualim *et al.*, 2010). Of the 69% that do report on sustainability, waste management and recycling and energy management were rated as the most common areas to be reported on at 90% and 85% respectively (Elmualim *et al.*, 2010); areas less reported on are building disposal, ethical purchasing, and carbon foot printing. When asked how effective their organisation is at managing its sustainability responsibilities 33% responded as adequate, 25% as inconsistent and 16% as poor; a small proportion replied as very good or excellent, 15% and 11% respectively (Elmualim *et al.*, 2010). This does show that a large proportion does report on sustainability and industry press are beginning to highlight not only the environmental issues associated with the existing building stock, but also the growing value of the industry and the potential to be gained by participating in that market.

The current opinion of what SFM means is a reduction in costs through reducing energy demand, water demand and a reduction in waste and an increase in recycling (Hodges, 2005). The current established incentive does not seem to stretch beyond immediate cost savings and energy reductions (Elmualim *et al.*, 2010). There is a pressure on facilities managers to reduce costs 'now' rather than looking at the longer term plans for the building which could potentially reduce costs further but may have an associated higher capital outlay initially (Hodges, 2005). A move towards considering costs in terms of life cycle cost and asset management is taking place leading to the idea of total cost ownership (Hodges, 2005); this should lead to a more holistic cost evaluation for maintenance and refurbishment leading to more of a scope to develop SFM.

The following diagram illustrates the challenges, solutions and benefits to sustainability from the FM perspective (Hollander, 2004). The diagram is intended to illustrate the challenges that need to be overcome if FM organisations are going to adopt more sustainable practises, along with the benefits that FM organisations will also reap (Hollander, 2004).

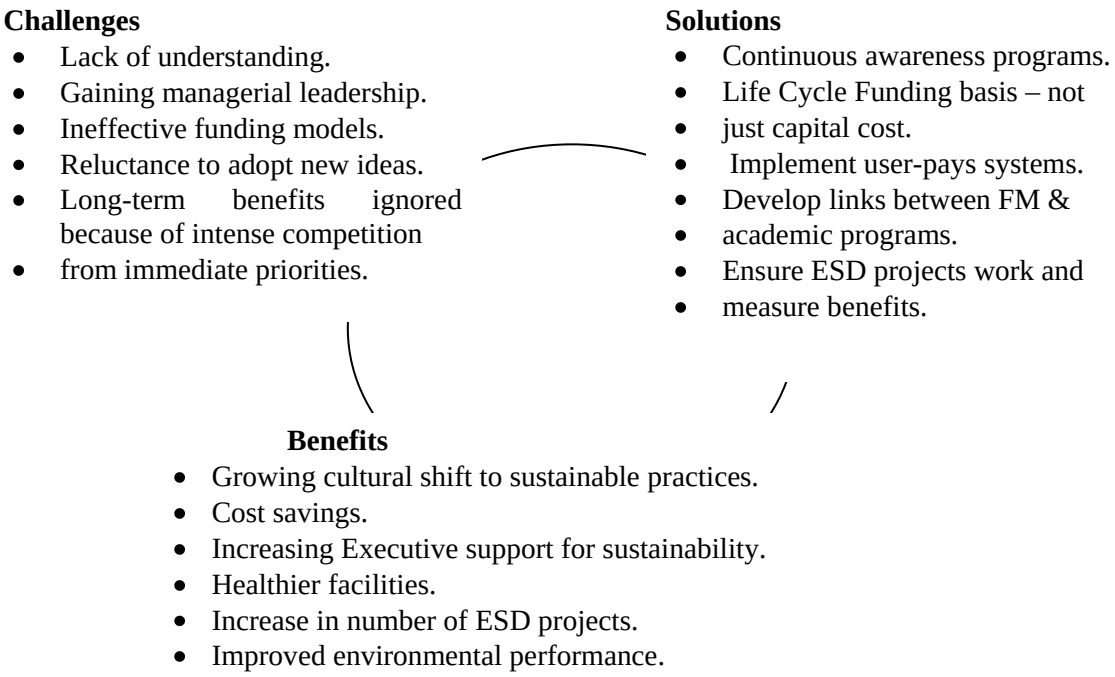


Figure 11 Challenges, solutions and benefits to sustainability (Hollander, 2004)

Service providers can be very short term focused due to the nature and formation of the contracts (Cotts, 2003). FM providers' perception of service provision is focused around reducing costs, attracting staff, building skills, managing risks and improving performance on KPIs (i-FM, 2005).

4.6.1 Impact of Environmental Legislation

Previous studies have highlighted the role of environmental legislation as a motivating force for change (Williams *et al.*, 1993; Kok and Saint Bris, 1994, Edum and Fotwe, 2001; Baylis *et al.*, 1998 for example). This is reflected in company

reports, with environmental and CSR aspects of business activity usually featuring in annual reports (Walker *et al.*, 2007; Napper, 2003). Organisations are not likely to be by one factor; however, environmental legislation may be the initial push factor for change in certain circumstances. It has been found in studies that compliance with Environmental Legislation was often the greatest stimulus for environmental change for large organisations (Baylis *et al.*, 1998; Williams *et al.*, 1993; Kok and Saint Bris, 1994; Hillary 1995; Cramer, 1998; Edum and Fotwe, 2001; Holt, 2008). Legislation remains a greater force for environmental change than the voluntary movement of companies, with 65% of small to medium sized companies and 86% of large companies citing it as the most important push factor (Baylis *et al.*, 1998); indicating that organisations may not see the potential benefit for environmental improvement. However, it cannot be assumed that the perceived push factors stem from the current legislation as only 13% of small to medium sized companies are aware of current British waste legislation (Baylis *et al.*, 1998). It has been found that there is confusion over environmental legislation and a presumption that the environmental legislation follows the same strict template as Health and Safety legislation; 64% of small to medium companies reported to be motivated by environmental legislation whereas 37% reported to be under pressure from environmental regulators (Baylis *et al.*, 1998; Hillary, 1995).

4.6.2 The pressure of energy performance

Since 1982 the energy performance of buildings has begun to be regulated, providing the incentive to improve performance. Building regulations have been steadily improving, and now include carbon emissions for heating, hot water, ventilation and lighting in design compliance calculations (Office of the Deputy Prime Minister, 2007). In the non-domestic sector possible energy savings vary significantly depending on the building type. In recent years legislation has set targets at the high level for UK PLC strategic direction, but has used fiscal incentives to target the individuals and businesses.

When the topic of greening buildings established itself the cost of energy could be seen to be a negative force on the decision to implement energy saving initiatives.

Early research suggests that energy represents a minor financial significance in most organisations, with the initial investment costs for energy conservation dwarfing the expected return generated through energy savings (Davies and Chan, 2001; Junnila, 2007). The difference between costs for energy and labour and operating costs can put more weight to that argument, with energy costs typically less that 1% of an organisations running cost (Junnila 2007b; Junnila, 2004; Kats *et al.*, 2003; Leibowitz, 2001). However, energy costs in recent years have taken a significant increase. This coupled with the fines from the CRC, and the fiscal incentives to invest in renewables are changing the perceived cost of energy. Building users behaviour towards energy reduction and energy conservation programmes are an unused resource that can provide energy saving methods with little to no cost (Masoso and Grobler, 2010).

4.6.3 The impact of the building occupants

The EU recognises the importance of education to the energy and sustainability campaign. Priority Number eight from the EUs Energy Efficiency Action Plan calls for raising awareness on energy efficiency (Commission of the European Communities, 2006). It has been found that energy education in schools can lead to improvements in energy knowledge in society (Zografakis *et al.*, 2008). Depending on the type of building the occupants themselves can have a varying degree of input into an energy reduction programmes in office buildings. Regardless of whether occupants can make a large or minimal input it is advantageous to gain buy in and participation for a buildings energy reduction programme. In a relatively modern office building it can be expected to find that most of the building controls are not accessible by building end users.

The age of a building can have an impact; in older buildings end users may have control over lighting and room temperatures for example, where large energy reductions can be made through educational programmes. However, in a more modern building the areas where building user behaviour have an effect decreases, but by no means is it insignificant. Occupancy behaviour can be argued to be the weakest link in the energy efficiency programme, due to not only the direct impact

of behaviour on building energy use but the human operation of building services resulting in inefficient operation of the building services (Masoso and Grobler, 2010).

Previous research has shown that building users do have an effect on energy use. Levermore (1985) compared the energy use in nine identical children's homes in London and found that between them there was a 40% difference in gas consumption and 54% difference in electricity consumption (Levermore, 1985). Bahaj and James (2007a) found a differential in energy use of 600% between the electricity consumption in nine identical low energy social housing units (Bahaj and James, 2007a). Research has indicated that climatic background, i.e. the conditions a person has spent the early ten years of their life experiencing, has a significant impact on occupant's attitudes towards air conditioning (Schweiker and Shukuya, 2009).

It can be argued that it is essential to get occupant buy in to energy reduction programmes to ensure that complaints regarding changes in the building environment can be kept to a minimum, so that end users can identify areas within their office which are wasteful and so that the small changes can be made in behaviour such as using the stairs rather than the lifts. It is also a method to manage or control, to a certain degree, expectations of the building users. It is known that not all people are the same and comfort levels within office vary depending on the personnel (Schweiker and Shukuya, 2010).

The service industry is prone to complaints. This can prove to be a problem during energy and sustainability programmes. Sustainability and energy management programmes are invariably about reducing the use of resources, changing working patterns and behaviour patterns. Modern buildings and society have become wasteful in the way they operate, this also results in attempts to change to working patterns through sustainability led projects being viewed negatively. Small changes in temperature or removing desk bins for example, are likely to lead to complaints, and if too higher rate of complaints are received following a change to the building then there is the risk that the client will request the initiative to be removed. It can be

thought that building wide educational programmes could reduce complaint levels, and therefore, increase the strength of an energy efficiency programme.

Research has shown that building users can impact on energy reduction programmes through their use of technology. Energy reduction methods applied to office equipment can save from 60% - 80% of energy (Junnila, 2007b). Building users can participate in, or even initiate this by turning equipment, such as PCs, monitors, printers and fax achiness off at night. Typically, the majority of building users do not turn off their PCs or monitors overnight, around 32% (Webber *et al.,* 2006). Similarly, monitors are usually left in a low power state rather than off, around 65%, due to building users misunderstanding of the technology (Webber *et al.,* 2006; Webber *et al.,* 2001). However, major energy savings for PCs can come from either newly available software that optimise PC operation and server efficiency or through replacing IT equipment with more efficient models for example. In offices which have light switches as opposed to proximity sensors, it has been found that around 10% of energy can be saved through either; turning off lights when no one is in the room or turning of lights when there is enough natural daylight (Junnila, 2007b). It is essential to have end-user buy in if such aims are to be successful.

Research conducted by Walker and Cass (2007) creates a good grounding for understanding the different roles that people, especially occupants, can assume in energy reduction programmes. In this research the focus is upon renewable energy systems in the UK and how the approach to this needs be more multidisciplinary in understanding roles and technology. To understand the combination of technological solutions and social aspects of renewable energy infrastructures, Walker and Cass (2007) developed the idea of hardware and software configuration:

- Hardware: the engineering side to the subject, focusing on the variable technological solutions that can be utilised for any one request
- Software: the social and infrastructural side consisting of varying interacting arrangements and relations between actors and institutions

This research identifies ten different forms of ‘public’, with public being the relation between the people and technology in this case. The ten roles are; captive consumer, active customer, service user, financial investor, local beneficiary, project protestor,

project supporter, project participant, technology host, and energy producer (Table 11).

Role	Definition	Proximity to technology	Level of awareness/active engagement with renewable technology
Captive Consumer	Pay bills	End of wire, distanced.	All energy customers (unknowingly) consume some energy from renewable sources.
Active consumer	Actively chooses between suppliers, including green tariffs	End of wire, distanced.	Green tariff customers actively choose renewable energy supply.
Service users	Use the services provided by the energy generated by renewable energy	Not be spatially close to technologies, but are explicitly so in heat networks and household/ community modes of implementation.	The derivation of the energy services may be totally unknown to the user – or visibly, actively and deliberately promoted as being from renewable sources.
Financial investors	Invest in shareholding or interest arrangements for specific projects	Investment opportunities may be locally restricted or aspatial.	Investment in renewable energy whether personally, locally or through companies' portfolios is generally, but not exclusively, active and aware.
Local beneficiaries	Receive benefits in addition to energy service; financial, educational, intangible.	Benefits may be direct or explicitly tied spatially through community funds.	Such benefits may be visible and known to local people, or hidden and unknown.
Project protestors	Actively object to projects, through attending meetings, lobbying etc.	While some campaign groups are not spatially linked, most protestors are focused on local projects.	Protest activity is by definition aware and actively engaged.
Project supporters	Actively engage in similar actions to protestors, although support is typically less visibly organised and vocal.	Linked to local projects, tend to overlap with participants. Campaign groups may be spatially distant.	Supporter activity is by definition aware and actively engaged.
Project participants	Get involved in community mode of implementation; membership of organised groups or hands on.	Explicitly linked to spatially tied community or household modes.	Theoretically any member of a community, in practice involvement is variable and participation can take different forms.
Technology hosts	Owners of buildings or land, but not the technology itself.	Necessarily spatially linked	Intentionally through institutional arrangements and 'Company Driven' micro-gen; but potentially less so.
Energy producers	Directly owns and operated energy generating technology.	Normally proximate and part of household	Necessarily active and aware, although may be acquired with house purchase rather than actively installed.

Table 11 Public roles and renewable energy (Walker and Cass, 2007)

Research on occupant behaviour is often concerned with the impact of the behaviour on the energy usage (Bahaj and James, 2007b; Faiers *et al*., 2007; Gyberg and Palm, 2009; Lindelof and Morel, 2006). Bahaj and James (2007b) found that connecting users to the impact of their behaviour is key to energy efficiency. This was concluded through looking at a set of identically constructed eco houses, and reporting a great variation in energy use. However, this is occupant behaviour at home, which is a topic with different issues to the impact of behaviour in an office. What is of interest here is that it was found that visible renewables, such as PV technology on the roof, could help with behaviour change (Bahaj and James, 2007b). This is of interest to energy efficient programmes in offices; it could be key to ensure that there is a visible aspect to the programme to ensure building occupants can visualise the aim.

Bahaj and James (2007b) discussed reasons why behaviour change in offices may be more difficult; building users do not pay the energy bill, and are not impacted by it reducing, and the actions of individual building users do not have a great effect on the energy use. It is key that building occupants can understand the building systems and strategies in place (Bahaj, 2007b), and this could be aided by introducing a visual side of the project. Research more recently has been focusing on analysing variations in the behaviour resulting from changing built- environmental conditions (Rijal *et al.,* 2007; Haldi and Robinson 2008; Nicol *et al.,* 2001).

4.6.4 The impact of technological solutions

The technological solutions cannot be considered in isolation. Previous research has shown that technological solutions are not simple engineering or scientific solutions, but part of a wider sociotechnical solution involving producers, infrastructure, consumers regulators and other third parties (Walker and Cass, 2007; Bijker *et al.,* 1987; Coutard 1999; Elzen *et al.,* 2004). This is especially the case when dealing with multiple supply chains trying to engineer energy reduction solutions in office buildings full of occupants. Past studies have mainly focused on the direct reaction of building occupants to specific building environmental conditions, such as thermal

comfort (Nicol and Humphreys, 2002; Nicol and Humphreys, 1973; Rjal *et al.*, 2007; Fanger and Toftum, 2002), illumination levels and light switch location (Lindelof and Morel, 2006; Mahdavi *et al.*, 2008).

4.7 Summary

Clearly the movement by the Government to create Environmental Policy such as the CRC Energy Efficiency Scheme is a strong step forwards towards the UK achieving the targets set out within the Climate Change Act 2008. However, without logical and effective compliance mechanisms designed into the policy there is no guarantee that organisations will be successful in delivering the policy requirements. A mixture of mechanisms within policy is likely to generate higher compliance than the focus upon either behaviour or enforcement singularly. There are many aspects that needs to be considered first which are not only limited to ideas of environmental attitude.

It is clear that the wider issue of influencing factors such as organisational culture, resistance to change, community pressure and managerial influence are key factors to consider when writing environmental policy requirements. The mechanisms within the policy will need to be designed to target these areas as well. For example a policy requirement to name an accountable individual who is responsible for policy delivery would ensure that a manager would remain focused on delivery regardless of their level of interest. When looking at FM organisations specifically there are also other areas that could be incorporated to ensure success, such as the involvement of building users.

Ultimately the literature reviewed in this chapter frames the subject and highlights the key issues that are involved in understanding FM organisations compliance with environmental policy. However, current research does not provide an in depth understanding of the reaction of FM organisations to environmental policy and

therefore the links that lead FM organisations towards compliance. FM organisations are placed in a good position to deliver a number of outcomes with regard to cultural change. Cultural change is required to deliver the latest stage of development in the FM model towards SFM. This will require to some extent the adaption of the FM processes used in order to deliver the requirements of the new model. FM organisations are also able to assist with the process of cultural change within the client organisation in order to deliver their environmental policy directives which will impact upon their wider business strategy.

Again as concluded in the previous chapter targeting FM organisations and the industry as a whole in environmental policy formation is likely to be a success in terms of outcome. This chapter shows that it is also likely to be a success in achieving long-term commitment to the implementation and applications of cultural change to establish the model of SFM into practice. What is needed is targeted research to understand the realities of cultural change towards delivering an entrenched model of SFM and an understanding of whether FM organisations react positively and effectively to environment directives in their current form.

PART 2: RESEARCH SCOPE, METHODOLOGY AND CASE STUDY

5 Chapter 5: Research Scope and aims

5.1 Introduction

The overarching subject of this thesis is 'SFM'. The aim of the research and analysis is to allow a conceptual position to be developed to aid the understanding of the field of SFM. In particular what sustainability means in the FM context and how, if indeed at all, FM providers are motivated to comply with environmental policy. Chapters 2 to 4 have identified the key themes central to this subject, notably sustainable development, sustainable business practice, sustainable added value, environmental policy, policy mechanisms and compliance. These issues are all key when trying to engage in the process to conceptualise the meaning of SFM.

Chapter 2 began through using the existing theoretical framework as a basis for understanding the changing nature of the FM industry, as currently there is no established position for the meaning of SFM or theory grounding the indicators of sustainable business practice. Extensive theory exists on the meaning of sustainable business practice within the context of the wider industry, with ideas based in CSR and CR; however, the identification of specific indicators of sustainable business practice within the FM industry is not available. Keeble *et al.* (2003) identified a number of indicators that can be used to identify and measure corporate sustainability performance for businesses. Shaw and Haynes (2004) and Hinks and McNay (1999) identified a number of indicators of business practice, broken down into themes that included the 'environment'. The combination of this research based on sustainable business practice within the wider industry and indicators of general business practice within FM organisations can be used as the basis to construct a conceptual framework to identify key indicators of sustainable business practice for the FM industry. The case study is used to gather the data and research required to build this conceptual framework.

Realising added value potential through sustainable business practice is a key issue, and one where there is currently little convergence of opinion. One school of thought still views sustainability as a threat to the pursuit of natural capital (Gibson, 2006; Morrison and Fischer, 2006 for example). Extending this, there is a view that the FM industry still does not consistently take advantage of value adding opportunities (Barret, 2000; Smith and Jackson, 2000 for example). The term sustainable added value is ambiguous, especially in the FM context. The discussion on the subject currently involves discussion on resource use (Figge and Hahn 2004), weak and strong sustainability (Cabeza, 1996; Pearce and Atkinson, 1993; Solow, 1993) and green added value (Figge and Hahn, 2004). However, work does exist which evidences the value added resulting from sustainable business practice (Eagan and Keniry, 1998; Hodges, 2005). This thesis aims to use the ideas based in the current discussion surrounding added value and sustainable added value to establish the meaning these terms hold in the FM environment and whether they are openly pursued through daily operations.

Chapter 3 establishes the current relevant environmental policy acting on Europe and the UK and discusses current environmental policy affecting the built environment. There are very little, if any, policy directives that currently impact FM organisations directly. However, it is widely realised that the FM industry has a key role to play in the delivery of environmental policy for the built environment. There is a minimal basis for understanding how FM organisations react to current environmental policy within the available literature. To answer this key theme an ethnographic research method is enacted to observe in the first instance how the FM case study operates when faced with environmental policy containing fixed targets. Current research from the wider industry is used to gain an understanding of what the key mechanisms included within this policy directive may look like. What this thesis does is test the influence of such mechanisms upon an FM organisation specifically and uses primary research data to evaluate the final result. This subject is unable to avoid the question of the strength of influence facilities have upon environmental behaviour.

In summary, there are many interrelated themes that are involved in the pursuit of understanding SFM. It is necessary to understand each of the themes to develop the conceptual position SFM. This has led to the following research questions:

1) What is the current position of the FM industry towards sustainable development in terms of organisational application and what are the key factors which are influence its implementation?

2) What is the understanding and interpretation of sustainability within the FM context?

3) The built environment is a central part to delivering UK carbon reduction targets; is FM able to deliver environmental policy directives specifically for the current built estate and what are the factors which impact this?

4) There is a wealth of research surrounding the impact of environmental behaviour on the success of environmental programmes; however what level of impact does the physical facilities provision have on the success of environmental programmes in a large, open plan office environments.

The above research questions are systematically answered within four separate chapters. The following sections within this chapter detail the research methodology used to gather the data required to answer such questions.

5.2 The Research Philosophy

A realist epistemological position is the basis for the research philosophy for this thesis. The realist philosophy is grounded in assuming the existence of a social world external to the researcher that can be accessed through sense and research. This epistemological position focuses on the ideas of social forces and processes acting independently of human thoughts and beliefs (Saunders *et al.,* 2003). Alternatively, the positivist philosophy is based in empiricism, the idea that observation and measurement is core using a combination of deductive logic and

predominantly quantitative methods (Payne and Payne, 2004). Following this philosophy lends itself to high structured methodology with quantifiable observations (Saunders *et al*., 2003).

However, realism and positivism do share some philosophical aspects, relating to the external and objective macro aspects of society, however realism remains routed in the idea people themselves are not objects to be studied in the style of natural science (Saunders *et al.*, 2003). Saunders *et al.* (2003) continues with explaining that realism applied to the study of human subjects recognises the importance of socially constructed interpretations, meanings and subjective reality in seeking an understanding of the broader social forces, structures and processes that influence peoples views and behaviours.

There are elements of positivism within this thesis, where the aim is to generate fixed generalisations, made through detached interpretations gained from collected data, however this is only reflected in one element of the research and it is not the philosophical stance followed throughout the thesis in order to gain the desired conclusions. The element of the positivist ideal appears when developing an understanding of the current position of the industry towards sustainability.

5.3 Research Approach

Following on from the realist epistemological position an inductive approach to the research is applied. An inductive approach examines the specific information to derive a general principle (Znanieki, 1934). This involves the testing of a new truth to see its validity through theoretical application to empirical facts. It is the development of a new truth or theory. Alternatively, a deductive approach would be to apply general principles to reach specific conclusions (Znanieki, 1934). This involves applying a general theory to deduce the conclusion and test the validity of a new truth. Although the research applies the inductive approach more deductive element is found within the thesis when establishing the current position of the industry towards SFM; this stage involves gathering data to establish the current

position of the industry, the initial idea is tested through utilising other characteristics as a measurement tool and the researcher remains independent.

Overall, this research does use existing theory to establish a level of understanding for the researcher, it does use existing frameworks to guide the formation of new theory, but ultimately the theory is new, or using the words of Znanieki (1934) the truths are new and therefore ultimately an inductive philosophy is applied. An initial truth is established, the data is gathered and analysed and the result of the analysis is the formation of a new theory (Saunders *et al.*, 2003). The deductive approach has a tendency to construct a rigid methodology whereas the inductive approach applies the ideals of context within which events occur (Saunders *et al.,* 2003). This is a vital differential to the research approaches; for this thesis the nature of the subject is new, the aim is to establish theory through looking at a wide range of research techniques and basing them in a context of a case study research. The current level of knowledge available within this field would not lend itself to a deductive approach; this would be too rigid and minimal in its approach and outlook. This ultimate aim is to build a conceptual framework based on the development of the new truths.

5.4 Research Strategy

The chosen strategy did not follow one 'typical' strategy but was a combination of case study and observational research. The research involves a case study where ethnographic (observational) research is carried out through in depth observation. The methods chosen have a link to the grounded theory approach, as the data collection begins with the formation of an initial theoretical framework (Saunders *et al.*, 2003) that in this case is created through the secondary data content analysis. The inductive research philosophy does lend itself to the use of a grounded theory approach to a research strategy, as data collection starts without the formation of an initial theoretical framework.

Grounded theory is developed from a series of observations that in turn lead to the generation of predictions, which are then tested with further observations to confirm

or reject the observations (Saunders *et al.,* 2003). The findings from the initial research stages are developed further through the observational research stages to form assumptions within the research topic that are then tested further again through more focused qualitative and quantitative research methods. The research methods are varied and include in depth interviews and a short questionnaires for the FM small team, large scale questionnaires, energy consumption data from live meters and finally ethnographic style observations used to formulate the diagnostic model.

5.4.1 Case study

A case study can be defined as a detailed examination of an event, which the researcher believes exhibits the operation of some identified general theoretical principles (Mitchell, 1983) or alternatively 'a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence' (Robson, 2002). Both definitions are a reasoned justification for using this strategy in this case. The development of environmental policy which targets the built environment is relatively new but increasing in its intensity and focus. The effect of this on an FM working group is crucial to understanding how to drive compliance. However, the detailed research and understanding gained from this FM case study will be able to be generalised to other built environment circumstances.

A case study was used to gain a 'real life' understanding of the issues in this area, with a focus on the reality of the situation in a live organisation (Amaratunga and Baldry, 2001; Yin, 1994; Zonabend, 1992). This ensures that the definitions gained and the understanding of the issues is firmly set within the FM context, in a working example of an FM contract involving multiple organisations. The case study strategy is beneficial to gain an understanding of the process being enacted as well as the context of the subject (Morris and Wood, 1991).

5.4.1.1 Case Study selection

The case study was an FM provider on a PFI contract. The FM team, or Project Company, was responsible for managing the delivery of the contract as the special purpose vehicle. The project company is set up by the PFI consortium to manage the delivery of the contract and the relationship with the finance provider. The project company manages the FM contract for a public sector organisation and is based in London, UK. The FM contract provides services for two of the client buildings, which are strategic Head Office Buildings. Quality and standard of delivery are of key importance. Sustainability and environmental management are of key interest to the client who is affected by the CRC Energy Efficiency Scheme and Government targets set under the Climate Change Act 2008. The researcher was based within the case study organisation for the duration of two years to carry out the observational research.

The project company provides a full management service for the FM contract and subcontracts the delivery of the hard and soft FM services to two major international contractors. The soft FM services managed include; cleaning, catering, conferencing facilities, video conferencing, reprographics and meeting room management. The hard FM services managed include all plant and machinery, Building Management Systems (BMS), access and all hardware in the building.

The case study was ultimately a convenience case study, as the researcher was placed within this company. However it held the following important attributes:

- It was a dedicated FM organisation
- It has a large supply chain supporting the organisations activities
- It had an environmental policy or environmental management system; however, this was not developed extensively
- It was part of government energy reduction programme requiring compliance
- It had a recycling and waste management policy, albeit once again this was not developed extensively

It was necessary for the case study to be involved in both hard and soft FM elements as sustainability crosses over both types of services. It was necessary for the team to be open to interviews as well as statistical data collection through energy modelling and waste statistics for example. It was absolutely necessary for the FM organisation to be involved in sustainability management to some extent, as this is the activity being measured. Enough work has to be delivered by the FM team so that an understanding of how SFM might look could be theorised. It had to be possible to gain access to statistics relating to sustainability. In addition the case study also was required to be reflective of the wider industry. To ensure this the case study was validated against the industry benchmark using a number of standard variables for comparison.

5.4.1.2 Case Study validation

The first stage of the research is to carry out a content analysis of the wider industry. This firstly enables the first question to be answered to understand the current position of the FM industry towards SFM. This will identify the commitment of the industry through using a number of variables as a measurement tool. This will then be used to validate the case study against. This will validate, or not, the choice of case study. The methodological approach for the content analysis is covered in section 5.7.1.

5.4.2 Ethnography: Observational research

Ethnography is a research strategy that focuses upon describing and interpreting the social world through first hand field studies (Saunders *et al.*, 2003). This method rooted in the inductive approach was chosen due to the requirement to understand the human aspects of the subject in order to answer the research questions. To understand the influence of different policy mechanisms, to understand the meaning of sustainable added value and to identify the indicators of sustainable business practice within the FM industry it was necessary to conduct observational research.

Delbridge and Kirkpatrick (1994) describe participation as a strategy of 'immersion by the researcher in the research setting, with the objective of sharing in people's lives while attempting to learn their symbolic world'. Due to this, the method typically needs to be flexible in approach (Saunders *et al.,* 2003), meaning that one has to attempt to understand the meaning of social behaviour before trying to explain the significance of its meaning. This is a research strategy linked to the inductive approach. This involves systematic observation, recording, description, analysis and interpretation of people's behaviour and the organisational culture (Saunders *et al.,* 2003). The method chosen here is participant observation, where the researcher attempts to participate in the lives and activities of the subjects through, in this case, becoming a member of the organisational team (Saunders *et al.,* 2003).

This research method has its roots in social anthropology; in the 1920s and 1930s the Chicago School of Social Research encouraged its students to apply this method of research during the changing social phenomena during that time (Saunders *et al*., 2003). It is a less common method used within business and management research; however, there are important examples of this research method being used previously for understanding the social elements of business research and management. One such example is Roy (1952) who worked in a shop for ten months to understand how and why the employees operated the piecework bonus system. A second example Rosen (1991) worked as a participant observer in an advertising agency, to understand how organisations used social drama to create and sustain power relationships and social structures.

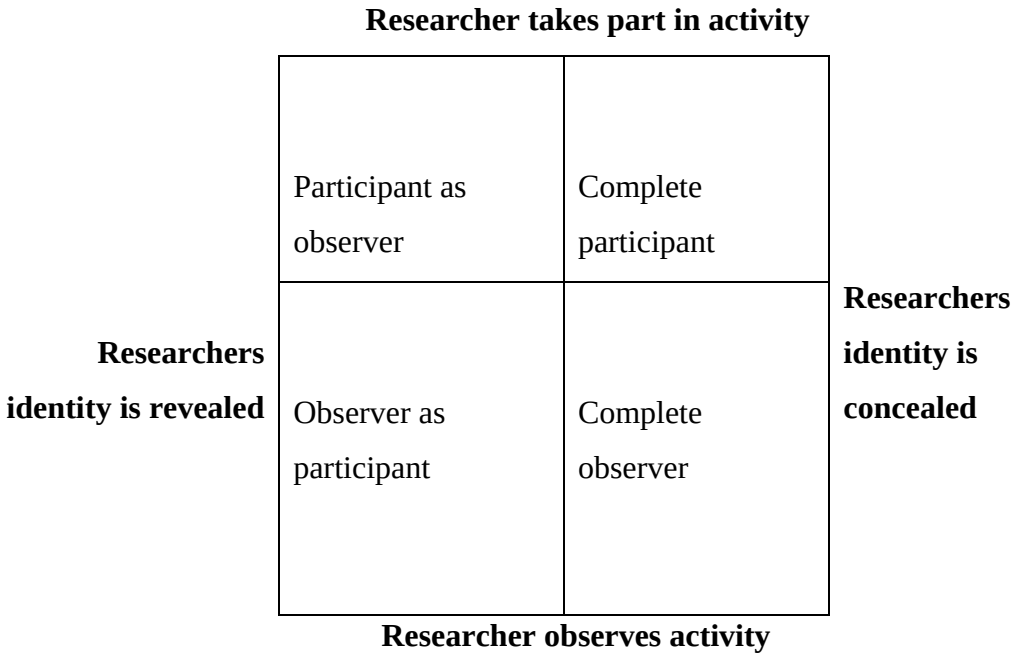


Figure 12 (Gill and Johnson, 1997) Topology of varying participant observer researcher roles.

For this research the researcher is a participant observer. There are two elements to the case study research in this regard; there are the interviews with the FM providers and the manipulation of the primary energy data that the case study organisation is fully aware of. The second element is the purely observational section where the researcher has observed the behaviour of the FM team for two years in reaction to environmental policy directives. The FM team were no aware this ethnographic research was being conducted.

5.5 Ethics

When talking in the context of research, ethics refers to the appropriateness of researcher behaviour in relation to the rights of those who become the subject of the work or are affected by it (Saunders *et al.*, 2003). The appropriateness of behaviour as researchers will be affected by the broader context of what is considered the social norms of behaviour (Robson, 2002; Zikmund, 2000). This will mean that the accepted norms of behaviour are to some extent going to be affected by the subject area of the research, in that a research technique or method may be acceptable for medical research but would not be deemed acceptable for research within the built

environment. This idea is reinforced by Wells (1994), who recognises the norms of behaviour which prevail allow for a range of ethical positions. However, regardless of the norms of behaviour within the FM team, approval was sought from all participants prior to interviews.

For business research the key ethical issues can be summarised around the following (Saunders *et al.*, 2003):

- Privacy of possible and actual participants
- Voluntary nature of participation and the right to withdraw partially or completely from the process
- Consent and possible deception of participants
- Maintenance of the confidentially of data provided by individuals or identifiable participants and their anonymity
- Reaction of the participants to the way in which you seek to collect the data
- Effects on participants of the manner in which you use, analyse and report on data
- Behaviour and objectivity of the researcher

Ethical considerations start at the beginning of the research project, and the research methods should take into consideration ethical implications in the particular research area. When seeking initial access to data and information, pressure should not be applied to participants in order to gain access (Robson, 2002; Sekaran, 2000). Access to secondary data may also have similar ethical issues, whereby during the ethnographic research strategy data is accessed, either intentionally or unintentionally, without the suitable consent being received (Saunders *et al.*, 2003).

The key ethical issues that are an issue during this study are related to the process of ethnographic research. As discussed later for the ethnographic research the researcher was a 'complete participant' (i.e. the role is concealed). This does carry with it ethical issues, as the participants are not aware that they are part of the research process during this stage. However, the research collected within the case study involved multiple methods, the observational stage was the only stage that the participants were no aware of and therefore ethical concerns are raised. For other

research stages with the case study, such as the interviews and survey stages, consent was gained from all participants. This is where they believed the research stopped. However, because the case study was willing to participate in the initial research stages, it is deemed likely that there would be no objection to the continuation of the research through observation. In addition the observation aspect of the research is to record the success of policy mechanisms in driving compliance with environmental policy. So it can be judged that the topic in question does not infringe upon personal activities or beliefs.

5.6 Data collection: The mixed methods approach

A mixed method approach was adopted, utilising both quantitative and qualitative research methods to add strength to the findings. Mixed methods containing both qualitative and quantitative research methods add strength to the findings by accessing knowledge that would not be generated through using just one of those methods individually (Molina-Azorin, 2011). The first stage of the research utilises a quantitative research method to understand the current position of the FM industry, following that a case study research strategy was used for the remainder of the research. The case study was a typical FM contract, in a large inner city office building, which are involved in many aspects of SFM and delivering sustainable business practice. For the final stages of the research a pure observational research strategy was used to gather the data in order to understand the affect of policy mechanisms on compliance with environmental policy. This chapter details the specific quantitative and qualitative research methods used in order to gather the data to achieve the research objectives. Table 12 highlights an overview of the methodological approaches taken at each stage of the research.

The use of a mixed research approach is argued to produce more realistic results, and the two approaches used together are found to be complementary (Amaratunga and Baldry, 2001). The main purpose for using a mixed approach here is achieving research integrity and enhancement of the significance of the findings, however it is also known for enhancing the participant experience (Collins *et al.,* 2006). Therefore it can be said that using one method of data capture could produce weakness in the

results that a mixed method approach reduces through design (Amaratunga *et al.*, 2002). Single research methods can result in missing insight or understanding due to the narrow focus of individual techniques, using mixed methods broadens the content area and therefore the scope for understanding (Molina-Azorin, 2011).

Another term used to describe the theory of mixed method research is triangulation. Triangulation is another method of confirming the validity of the processes used (Stake, 1995). Triangulation within case study research can be achieved by using multiple sources of data (Yin, 1994). This builds confidence in the research findings, with each potential weakness in any one of the methods being compensated through the strengths of another (Amaratunga and Baldry, 2001). The concept of triangulation was the rationale used to dilute the strength of the argument put forward for a singular research methods by its purist's followers (Tashakkori and Teddlie, 1998). A key feature of mixed method research is its methodological strategy, which has been found to deliver a superior standard of conclusion especially when trying to understand complex phenomena (Johnson and Onwuegbuzie, 2004; Creswell and Plano Clark, 2007). Ultimately it combines the strengths of many methods and as a result reduces the risks associated with using any one method singularly (Molina-Azorin, 2011).

Greene *et al.* (1989) identified four additional purposes to conduct a mixed method approach:

- Complementary: the different methods seek elaboration, illustration and one method seeks enhancement and clarification over the other
- Development: the findings from one research method are used to inform or develop the other research method
- Initiation: the greater depth leads to discovering paradoxes and inconsistencies that leads to research questions being outlined
- Expansion: extending the breadth and range of inquiry by using a suitable research method for the different areas of research

The findings of this thesis would be flawed if only one research philosophy was followed or only one research strategy taken. The ethnographic research will

establish a clear understanding of what this FM organisation think of sustainability, it would establish indicators of sustainable business practice and it would certainly develop the understanding of sustainability in the FM context. However this would be relatively meaningless when there is no established understanding of such issues and terms for the wider industry. The terms would be floating without any context for an anchor. The anchor for the context comes from the other qualitative techniques such as interviews used to establish the indicators of sustainable business practice. Thirdly through using raw energy and recycling data it is possible to conduct quantitative analysis to evaluate the success of the policy mechanisms by understanding whether the outcome of the project was a success (i.e. a reduction in energy). In turn the ethnographic research adds depth, and meaning to the subsequent detailed research methods.

5.7 Overall research structure

The research project involves multiple research strategies, with many layers of data capture. The research begins with a content analysis to gain an understanding of the industry; the ethnographic research within the case study contract then follows on from this and includes the multiple primary research data capture methods. The different stages to the research are as follows:

Stage 1: A content analysis carried out on secondary data published by 65 FM organisations. This was conducted to understand the current level of sustainable business practice within the FM industry. This created an industry benchmark that was used to validate the case study company.

Stage 2: Utilising the case study and ethnographic approach.

> **Stage 2.1** Conduct interviews and surveys with the case study team, with a sample size of 10. This is to understand their approach, opinion and understanding of sustainability and environmental management within the FM context. This second stage of the research was to understand the FM teams

approach to sustainability within the case study organisation, building upon the research in stage 1 to gain a deeper understanding of the current position of SFM.

Stage 2.2 Conduct the observational research stage; data is collected over the period of two years. The in depth observation of the FM team whilst managing environmental projects is designed to identify the motivations and restrictions acting upon the team, the individuals and the organisation in response to a demand to achieve environmental targets.

Stage 2.3 Test the conclusions from the observational research. Primary data consisting of energy use data collected over one year is used to test the success of the FM team complying with an environmental policy directive to deliver a 10% reduction in CO_2e emissions. The data to be collected will include Carbon foot printing data.

Stage 2.4 Test the conclusions from the observational research. The second process of this consists of collecting primary research data regarding recycling and waste statistics, to test the success of the FM team in complying with recycling policy directives.

Stage 3. A questionnaire will be issued to the building users to test the understanding of the building occupants to the recycling system through recycling rates. Taking a specific environmental target, to recycle 40% of all waste, the actions of the FM team and the building occupants will be tested against achieving this target following a communications programme and improvement to the recycling facilities.

Stage		Qualitative	Quantitative
1	Current position	None	• Content survey of secondary data from 65 companies to understand prevalence of policies and implementation of such. • The case study is benchmarked against the industry standard.
2.1	FM and sustainability (Part of the ethnographic research)	Interviews with 10 FM case study professionals to understand their approach and understanding of sustainability.	A short survey issued to 10 FM case study professionals gain an understanding of areas of environmental policy within the case study.
2.2	Variable selection	From the literature review, observations and interview data a model showing the mechanisms used for gaining compliance will be built.	
2.3	Validation 1 (Carbon reduction)	A carbon reduction project will be monitored using the above built model to test the affect of the compliance mechanisms in place.	Data on energy use will be collected to test the delivery of the project aim, and therefore the success of the compliance mechanisms.
2.4	Validation 2 (Recycling)		A recycling project will be monitored using the above built model to test the affect of the compliance mechanisms in place.
3.	Facilities versus behaviour		The issue of 500 questionnaires to the case study building (189 returned) to test the impact of facilities versus environmental behaviour on participation with the recycling scheme.

12 Overview of research methods

5.8 Quantitative Methods

For this thesis the following quantitative methods were used:

1. A content analysis of data from 65 companies to establish the current position for the FM industry (Appendix one)
2. A comparison, or validation, between the findings for the above content analysis and the situation for the case study organisation
3. A small-scale survey of 10 FM professionals from the case study to build upon information gained from the qualitative methods- delivered in two stages (Appendix two)
4. Collection of primary energy data to identify trends to test the success of the project in line with compliance observations
5. Collection of primary recycling and waste management data to test the success of the project in line with compliance observations
6. Large-scale survey to the wider case study building (500 questionnaires issued and 189 returned) to understand the impact of recycling behaviour versus environmental policy on the success of recycling initiatives (appendix three)

5.8.1 Content Analysis using secondary data

A content analysis is a research technique for making replicable and valid inferences from text (or other meaningful matter) to the contexts of their use (Krippendorff, 2004). This technique is expected to be reliable and results should be replicable (Krippendorff, 2004). Secondary data was used to establish the current position of the FM industries approach to SP and sustainable business practice. Numerous previous researchers have worked to categorise the classifications of secondary data (Bryman, 1989; Dale *et al.*, 1988; Hakim, 2000, Robson, 2002). However, it can be argued that they can be summarised in the following three categories; documentary data, survey based data, and multiple source data (Saunders *et al.*, 2003). The approach to the content analysis for this research falls under the documentary

category. Using secondary data has the advantage of saving resources, particularly of time and money (Ghauri and Gronhaugh, 2002). Using secondary data is also unobtrusive in nature, a method utilised to access data quickly and the findings are often of a higher quality than self-collected primary data, especially if the data is Government or professionally generated (Saunders *et al.*, 2003).

However there are drawbacks to using secondary data. It may have been collected for a purpose different to the researchers own and therefore, not directly related (Denscombe, 1998) or may not be current due to the time when it was collected. The original research will have been summated in some way to draw conclusions for their original research aim; this may mean that the data is not as suitable for the following researcher's aims. Researcher quality control cannot be executed over secondary data, and the quality of the initial data collection will have to be assumed. It could be predicted that all companies which list their information and company data are going to be companies that all act in a sustainable manner, and, therefore, publish the same material. This was not found to be the case, and no variations were found in the results.

A content analysis of secondary data was chosen over primary research methods such as interviews and surveys for multiple reasons, including time requirements and sample size. However, the main reason for this was to avoid bias and inconsistencies in the findings. This has been found to be an issue in previous studies where findings from research into corporate social responsibility, and sustainability issues, were seen to be affected by the level of publicity the organisations face (Holt and Ghobadian, 2009; Baylis *et al.*, 1998). Previously it has been found that during primary research exercises companies have answered affirmatively to having a SP in place, only for there to not be one when the company was visited for further research (Baylis *et al.*, 1998). Using secondary data in a content survey mitigates this problem.

5.8.1.1 Target population, sampling and response

A non-probability, purposive sampling method was used to select the sample for the content analysis. This type of sampling was chosen due to its ability to deliver an in depth understanding of the key theme, a requirement set out in the objective (Saunders *et al.*, 2003). However, using this method does mean the sample cannot be considered representative of the whole population. This does carry the disadvantage that the sample cannot be guaranteed to be representative of the population, in this case the FM industry (Foreman, 1991). To increase the reliability of the results statistical tests will be carried out test the significance. When forming the sample it was found that small companies often did not have the correct data available as required for the study. Using this type of sampling method it was possible to choose to not include companies with insufficient data, therefore ensuring that all companies within the sample were relevant. Heterogeneous sampling was chosen to due to its ability to enable key themes to emerge within the group. Patton (2002) argues that this is adds strength to the sampling method, with any patterns emerging are likely to be of key interest and value.

The findings are to be developed throughout the thesis and so the results allow for the shaping of the new ideas to be formed in the further research. Probabilistic and systematic sampling methods are not appropriate due the population being too large to label each individual within the population or to choose using a ratio method. Stratified sampling would have been a good method in theory as it would have allowed for a reflective number of small, medium and large companies to be chosen for the sample. However, due to the number of companies and the difficulty in identifying very small companies this method carried the risk of producing an unrealistic stratified sample. To ensure maximum variation within the sample the sample selection criteria should be identified before selecting the sample (Saunders *et al.*, 2003). A specific set of criteria was developed following the literature review.

The survey was carried out using published company accounts, company policies, and records of accreditation and awards. This removed the scope for human interpretation of organisational positions that has been highlighted as an issue

previously in this subject area. A sample size of 65 was chosen with a spread of characteristics to represent the wide-ranging company structures that feature within the FM industry. There was no response for this sampling method as publicly available data for 65 companies was selected and analysed.

The sample was taken from members of the British Institute of Facilities Management (BIFM). The researcher was a member of the BIFM and so was allowed access to the contact database. Membership of the BIFM means that the organisations and individuals have a certain level of commitment to engaging in development of the FM industry and a level of involvement in industry wide activities. Thus ensuring that the sample selected is most likely to be aware of factors that will affect sustainable development in the professional arena. The companies chosen were a mix of small, medium and large organisations with a wide geographical spread. Due to the method of data capture used, a drawback is that only companies who publish a certain level of data can be used, which is of particular significance with regard to small companies. The resultant sample has fewer small companies due to the nature of material that they publish.

5.8.1.2 Data collection strategy

The data was collected through the internet using information published on the company website and the FAME database. This was deemed to be advantageous due to the quick method of obtaining data and the minimal cost this would involve. Firstly an evaluation of the spread of company types was carried out on every third organisation listed. If the company had listed information of sufficient type and depth publicly available then they were selected as part of the sample. FAME was then used to access the financial data to determine the organisation size. This showed that there was not a high enough representation within the sample of small companies, and so another 5 small companies were selected using the previous process. The chosen sample was then listed in the SPSS database and the next stage was to visit the company websites to collect the data. The data that was required from the organisations is the following:

- Financial data including turnover and employee numbers
- Company documentation, such as annual reports
- Location details

5.8.1.3 Question Design

The variables were chosen to develop the link between organisation type and the position of sustainable business practice within the modern environmental climate. The affect of size, structure and the existence of a SP were recorded to place any links to embedded sustainable business practice. The variables have been used in previous studies (Elmualim *et al.*, 2010; Carpenter and Meehan, 2002; Baylis *et al*., 1998), as they are effective at giving a good indication of organisational type, position and environmental awareness. They will also give a key indication to the affect of increased environmental pressure on organisations.

Within the survey the following nominal data was collected to capture organisational positioning:

- Turnover
- Employees number
- Size according to employee numbers
- Whether the company was an FM provider only (FM) or a FM subsidiary department (FM+)
- The existence of a SP or not

It was of interest to see if larger organisations with a FM subsidiary (FM+) implement more elements of sustainable business practice. This could be expected to be the case for construction companies, who are used to adopting new Health and Safety procedures and complying with developing Health and Safety Law.

The following were the predetermined variables used to identify sustainable business practice:

- The prevalence of sustainability as topic of consideration in business contexts,
- The existence of environmental targets
- The achievement of environmental awards or accreditation
- The existence of a reporting structure for environmental factors

The questions were written up for the researcher to apply a methodical approach to data collection using the secondary data. The data was inputted into SPSS. As the questions are not going to be asked to an individual the style of write up was not an important factor.

5.8.1.4 Data collection, management and validation

The data was collected via the internet. Using the list of sample organisations, the financial data was collected using the FAME database and inputted into SPSS under predefined codes. The data regarding organisational sustainability behaviour was collected using the company published data and inputted into SPSS, again under predefined codes (Table 13). This process was conducted for each 65 of the organisations in the sample. Given the nature of the sample and the data collected the data was managed simply using SPSS.

Data area	Coding	Comments
Company Turnover	Number in millions of GBP	
Number of employees	Number of employees	
Size	Large= 1 medium= 2 small= 3	By size of employees **Small**= 50 or fewer **Medium**= 250 or lower **Large**= 250+
Solely FM or is it an FM subsidiary	FM only= 1 FM department as part of wider company= 2	
SP (SP)	Yes= 1 No= 2	
Prevalence of sustainability	Features highly= 1 occasionally= 2 never= 3	Within company documentation
Awards/accreditation	Yes= 1 No= 2	
Reports	Yes= 1 No= 2	
Targets	Yes= 1 No=2	

Table 13 Coding for the data gathered through the content analysis

5.8.1.5 Data Analysis

To analyse the data both descriptive and inferential statistics were explored. The following analysis procedure was carried out for the test areas:

- Frequency distribution tests: identifying initial trends in percentages
- Multiple Correspondence analysis: to graphically represent the correspondence between parameters
- Chi squared test: To test the statistical significance of the data

The initial analysis began with a descriptive analysis of the results, looking at the frequency percentages showing the number of organisations that fall into the various categories. This was followed by a multiple correspondence analysis that shows the correspondence between the variables, indicating the strength of the relationship. The final stage of the analysis was to carry out a Pearson's Chi Squared test. This is a statistical test to determine the probability that two data variables are associated (Healey, 2011); and it involves a test statistic, the degrees of freedom and the probability (p-value) of the test result occurring by chance alone (Saunders *et al.*, 2003). If the probability of the test statistics occurring by chance is low then the

relationship is statistically significant (Saunders *et al.*, 2003). For this research we are testing to a significance level between 0.00-0.05, so where $p < 0.05$ the result can be deemed to be significant. A probability of 0.05 means there is a 5% chance of the data occurring by chance alone (Saunders *et al.*, 2003).

The Chi Squared test relies on:

- The categories used in the contingency table being mutually exclusive i.e. each observation falls into one category
- No more than 20% of the cells in the table have expected values of less than 5. Or for contingency tables of two or more rows and columns no expected values of less than 10 (Hays, 1994)

5.8.2 Survey Research

Surveys were used on two occasions during this thesis for two different stages of the research agenda. The following two occasions were the following:

- Stage 2.1 (appendix two): With the 10 professionals from the case study organisation- to measure their opinion on the current level of sustainable business practice implemented in the case study organisation, to develop variables to identify sustainable business practice and to gain their understanding of what SFM should consist of.
- Stage 3 (appendix 3): A questionnaire distributed to the wider case study building within which the FM case study operates to understand the impact of the facilities (as a situational factor) versus environmental attitude on recycling behaviour.

Survey research can be used for descriptive or explanatory research. Descriptive research is of the type that carries out attitude and opinion questionnaires that enable the identification and description of various phenomena (Saunders *et al.*, 2003). Alternatively, explanatory research enables the examination and explanation of relationships between the variables, particularly cause and effect relationships (Saunders *et al.*, 2003). The design of the questionnaire depends on how it is going to be administered. For stage 2.1 the questionnaire will be interviewer administered,

for stage 3 it will be a self-administered questionnaire, left for building occupants to complete individually. The two different surveys therefore have two entirely different approaches.

5.8.2.1 Sampling and response

Stage 2.1: FM case study

A sample of 10 personnel was chosen; this was governed by the small size of the case study organisation and within that group the number who held the technical knowledge operational position. The sampling method was a purposive, non-probability method. In theory this approach is a homogeneous method, where one particular sub-group was the focus for the research, in this case the operational level employees from the FM case study organisation. The group chosen was management level employees within the case study organisation and direct supply chain contractors. This method clearly delivered a 100% response rate.

Stage 3: Recycling behaviour

The target of this survey was the building user, in particular to understand the impact of their inherent recycling behaviour versus the impact of the facilities provided on the success of recycling initiatives. The FM case study is situated in the office for which the facilities are delivered, thus giving access to a large population for this survey research. The population of the building is 3,500 building occupants. Due to this a self-selection non-probability sample method was used; the building users were required to self-select and complete the questionnaire individually. A delivery and collection method of distribution does typically have a high response rate, around 30%-50%, a much higher return rate than the highly quoted 10% response rate for other distribution methods (Saunders *et al.*, 2003). In total for this survey 500 questionnaires were issued and 189 were returned, giving a response rate of 38%.

5.8.2.2 Data collection strategy

Stage 2.1: FM case study

Survey research can be collected in many ways; face-to-face, over the telephone, via email and by post for example. A face-to-face method was chosen and the survey was given to the participant by the researcher. Ordinarily this method would have negative cost and time implications; however, for this sample size, and due to the ethnographic research strategy it was a quick method to ensure that all the relevant individuals completed the questions.

A one-on-one meeting was arranged in order to administer the questionnaires. A private meeting room was booked on site and the researcher and the interviewees attended only. The meetings with all the case study personnel were held over a matter of weeks. The participant completed the questionnaire in hard copy. The researcher did not read out the questions, and the only interaction was when a question was not fully understood. In order to ensure that the questions were on the whole understandable a pilot study was arranged; a selection of questionnaires were completed by neutral personnel and following this the questions were amended according to comments. Following the data collection the answers were coded and inputted into SPSS to enable analysis.

Stage 3: Recycling behaviour

For this stage of the research the target sample size was much larger. Ordinarily an electronic distribution method would have been used for this stage, due to its speed and minimal resources being required. However, the nature of the case study did not allow this, due to the concern that it would produce a very low response rate. Due to the IT set up it was also not possible to get the required contact details from a central database. Due to this hard copy approach was taken; five hundred questionnaires were printed and distributed in the canteen and cafe, as these locations were popular with building users. The building occupants could then self-select whether they wanted to complete the questionnaires.

This method does have drawbacks:

- The likelihood of the sample being representative could be low, due to the self-selection
- Those who self-select to complete the questionnaire could be the extremes, either very enthusiastic over the facilities and want to offer further suggestions, or those who feel aggrieved by the process and want to air the frustration

Generally, with this method there is little way of checking that the targeted group has completed the questionnaire. However, this is of little importance here as the majority of the people in the building use the recycling facilities, and so are the target audience. There is a chance that the answers could be contaminated or distorted by interaction with other participants. This is especially the risk with the distribution method chosen. To try to overcome these drawbacks and make the sample more representative, a reward, a chocolate bar to go with their coffee or lunch, was offered to those choosing to complete the questionnaires. The questionnaires were collected and stored by the personnel at the distribution points. The researcher collected the completed the questionnaires twice daily, firstly at 11am, then secondly at 14.30pm.

5.8.2.3 Survey Design: Question Design

It is important to spend time planning and designing questionnaires, as the questions cannot be explained, reworded or altered once they have been distributed. It was important to spend time as part of the ethnographic study to understand the organisation and the personnel in order to focus the questions on the key areas of interest. Without an understanding of the organisation the views held could be misunderstood and the data collected will be meaningless. In addition to organisational understanding an extensive literature review was carried out to understand the potential variables of interest and the relationship between them. The potential relationships between the variables are (Saunders *et al.*, 2003):

- Dependent variables: change in response to changes in other variables
- Independent: cause changes in dependent variables

- Extraneous: may also cause changes in dependent variables and so providing an alternative explanation to independent variables

When designing questions for questionnaires, three methods of questions are common (Clark, 1994);

- Adopt questions used in other questionnaires
- Adapt questions used in other questionnaires
- Develop own questions

For the two questionnaires all three of the above were used. There is a mix of open, closed and forced choice questions. Open questions allow respondents to answer the questions in their own way (Dillman, 2000), using their own language. Alternatively with closed or forced choice questions the researcher provides a range of options as possible answers to the question (deVaus, 2002). This is considered to be a quicker and easier method to obtain the desired answers where the answers from the respondents can be easily compared (Saunders *et al.,* 2003). Youngman (1986) identifies six types of closed questions:

- List: the respondent is offered a list of answers, any of which can be selected
- Category: one response from an offered list can be selected
- Ranking: the respondent is asked to place options in order
- Scale or rating: the rating devise is used to record answers
- Quantity: the response is a number to giving the amount
- Grid: Responses to two or more questions can be recorded using the same matrix

Open-ended questions are featured also in the questionnaire. Many of the questions offer a list or category style answers, and the last option was to select ‘other’ where the respondents could indicate their answer if it did not feature in the list.

Stage 2.1: FM case study

The main outcome of the research is to be descriptive, it is to design the frame of opinions held within the organisation and to gain an understanding of the position of

sustainable development. The main section of the questionnaire was focused upon understanding the opinion on the position of sustainability within the organisation. The following generic questions, which feature in most questionnaires, were adopted to collect nominal data;

- Sex: Through initial observational research it appeared that the female section of the workforce could be argued to be more interested in environmental issues.
- Educational level: to see the effect this had on the answers
- Geographical operation of the organisation: to see whether geographical spread had an effect on the organisations involvement with SP
- Employee size: to give a measureable indicator for the size of the organisation as a whole and the size of the organisational team based at the case study organisation
- Position within the organisation: this may have an effect on the opinion, for example a compliance or Health and Safety and Environment Manager is likely to have a more favourable opinion towards environmental regulation

Part of the survey involved completing a mini exercise in ranking business indicators according to various categories (from a list of 62); these indicators were taken from previous research carried out by Shaw and Haynes (2004) and Hinks and McNay (1999). The quantitative research has been displayed in simple graphical form to prevent the destruction of the original meaning of the data through over coding (Amaratunga and Baldry, 2001). Firstly, respondents were asked to rank how successfully they believed sustainable business practise was incorporated into contract areas and then how critical they believed it was for sustainable business practice to be incorporated. The contract areas are as follows:

- Catering
- Help desk
- Cleaning
- Mechanical & Electrical (M&E)
- Purchasing
- Reprographics

- Off site scanner
- Nursery
- End users activities
- Equipment monitoring
- Reception
- Mail
- Document production and destruction
- Accommodation reconfiguration
- Asset management
- Parking management
- Corporate TV

The second exercise was to rank each item (with a scale from 1-4) in terms of the success of the current level of sustainable business practice employed in each of the areas above. A third exercise began from a different viewpoint. The respondents were asked to rank from 1-5, how important they considered each of the factors in the table below to be. The respondents were then asked to indicate which were statutory requirements and which they considered the most important for the contract. Indicators of sustainable business practice were included in the table below and it was of interest to see if any of these were considered statutory requirements or important to the contract.

Key indicator		**Key indicator**	
Daily office cleaning		Quality of service provided by staff	
Window/carpet cleaning		Supervision of changes	
Others responsibility for maintenance clearly defines		Quality of end product	
Accessibility for day to day advice		Quality of change procedures	
Communication of briefing		Implementation of changes	
Administration of contracts		Flexibility to special requirements	
Technical competence of staff		Achievement of completion of deadlines	
Provision of a safe environment		Contribution to society	
Energy conservation		Reason for changes made apparent	
Level/controllability of lighting		Allocation of FM resources	
Level/controllability of ventilation		Business management time spent on FM	
Area per employee		Provision of good physical environment	
Good water management		People satisfaction	
Statutory compliance		Cost of equipment	
Action on hazards		Services reflect business objectives	
Attitude of staff		Removal costs	
Scheduling of premises/resources		Cost of disruption to movement of goods	
Training of staff to understand role		Management of maintenance	
Completion of projects on time		Management of time input	
Level of politeness		Maintenance well planned	
Level of faults		Applicability of systems used	
Responsiveness to problems		Timelessness	
Staff communication		Precision	
Number of equipment/plant failures		Communication of space requirements	
Maintenance induced interruptions		Health and safety	
Utility supply interruptions		Comfort	
Standard of cleaning throughout the building		Aesthetics	
Correction of faults		Environmental performance	
Space flexibility to meet changing business requirements		Energy cost per m2	
Effective allocation of space		Energy awareness	
Space meeting business needs		Reduction of emissions	

14 Indicators of business performance (Shaw and Haynes, 2004; Hinks and McNay, 1999).

Stage 3: Recycling behaviour

Previous research has helped to shape the survey questions for this research. A key factor for this questionnaire was to ensure that the questions were easily understood, as there was no opportunity for clarification at any stage with the researcher. The questions were a mix of category (7), scale (18) and list (2) questions. It was necessary firstly to know what type of recycler the building occupants considered themselves to be; the categories for this were adapted from Scott (1999). In addition it was of interest to understand what items occupants recycle in the office environment. However, due to the limited nature of office waste only a simplistic measure was taken, which was adapted from a more in depth question asked by Ojala (2008). The variables chosen as potential factors to prevent or promote recycling were adapted from previous research (Coggins, 1994; Vining and Enreo, 1990; Kalinowski *et al.*, 2006; Ewing, 2001). Previous studies have also highlighted the effect of information on recycling behaviour and so this was incorporated in the questionnaire (Lansana, 1993; Simmons and Widmar, 1990; Vining and Ebreo, 1990). From these studies ten questions were adapted to understand the level of (environmental) knowledge linked to the type of recycler. Respondents were given a two-page questionnaire about their experience of the recycling facilities provided in the institution in which they work.

There was a total of twenty-nine questions on the survey, which can be broken down into five groups; level of participation in recycling schemes (3 items), materials recycled (3 items), factors motivating recycling (11 items), barriers to participating in recycling (8 items), knowledge of location (3 items), and information wanted (6 items). The relationships between the knowledge areas were included in the analysis. The majority of the category style questions were yes/no answers, with one question giving three possible answers to indicate the type of recycler. Category answers are useful in this questionnaire as they are useful for collecting data about behaviour types (Saunders *et al.*, 2003). As the participant will not be answering the questionnaire in the presence of the researcher it is recommended to avoid having too many answers available for choice. It is advised for self-administered questionnaires to have no more than five options (Fink, 1995). There are two list

style questions in the questionnaire; the participant is offered six options for one question referring to information demanded and the other question offers seven options for materials the participant recycles. It is important for the options to be clear to the participant (Saunders *et al.*, 2003).

Scale questions were used to collect opinion data, and the most common approach to this is using a Likert scale. A four point Likert scale was used with the following scale being given; 'very strong', 'strong', 'weak' and 'very weak' allowing respondents to indicate how strongly they agreed or disagreed with the statement offered. Most often with Likert questions the scale is 1-5 or 1-7 including a middle options such as 'indifferent' or 'neither weak nor strong'. It was decided to not include the middle option to dissuade indecision; however it does also have the affect of not allowing neutrality. When giving the respondent a list of statements the response scale should kept in the same order to avoid confusion (Saunders *et al.*, 2003). The statements offered included both positive and negative statements, which is advised to ensure the respondent reads each statement carefully and thinks about which box to tick (Dillman, 2000).

Initial questions set to establish what items respondents recycled, if any, through a simple selection of key office recyclables (paper/cardboard/cans/plastic/newspapers/glass). A second standard selection question asked respondents to self analyse their scale of recycling behaviour (frequent/infrequent/occasional). The majority of the remaining questions used the Likert scale to gauge the level of agreement to items in the questionnaire. Variables relating to environmental behaviour and facility condition were present in the Likert scale questions. Respondents were firstly asked to indicate the level of influence a number of variables had on their recycling behaviour (including both options of inherent environmental behaviour and facility provision). For those respondents that indicated early on that they do not recycle, they were asked to indicate their level of influence a number of variables had on dissuading recycling behaviour (again including both options of inherent environmental behaviour and facility provision). Respondents were also asked to give their level of agreement to clear statements about the facilities location, understanding of the intended use and the benefits and gains from recycling.

Much of the previous research on the affect of facility location on recycling has been based on household recycling and community refuse points. In the office environment the variable ‘distance’ has a different meaning; it is linked to convenience, habit and work place practices. Because of this the specific distance of their nearest recycling facilities was not asked, which has occurred in previous research (Ojala, 2008). In this research the question focused on; whether occupants know the location, whether the location is an influence on recycling, whether the distance impacts the behaviour of a non-recycler, and therefore whether the project has delivered the policy targets of increasing the recycling rate.

5.8.2.4 Data Collection, management and validation

For both surveys the method of collection is the same being the completion of the survey. However, as discussed earlier there is a difference between the methods of distribution. For stage 2.1 the survey is distributed face to face, for stage 3 the questions are distributed at selected points and the occupants self-select if they want to participate. Following the completion of the questionnaires, the data will be manually inputted into SPSS. Automating the input of the data through high capacity and high speed scanning equipment and software was not used for either survey due to the cost of this method. Both surveys were completed manually and so each complete questionnaire was required to be numbered and then inputted into the relevant SPSS files. For questionnaire for stage 3 this took substantially longer due to the large volume of questions and participants. However, once the data was inputted into SPSS the data was easy to manage and manipulate.

It was necessary when entering the questionnaires into the system to mark any invalid surveys. This was not a problem for the case study personnel questionnaire as the researcher was present during the completion. However, for the waste management questionnaire it was possible for invalid responses to occur. During cases where the questionnaires were not completed accurately and the answers could not be deemed to be reliable then the question and answer was discounted, and coded as non-complete.

5.8.2.5 Analysing the data

Stage 2.1: FM case study

Mainly due to the small sample size the questions were analysed through a frequency analysis. This was a simple method of analysis but enabled a quick method to understand the information. The data was presenting using bar charts and tables.

Stage 3: Recycling behaviour

The normality of response distributions was tested using Klomogorov- Smirnov. For non-normal distribution of responses a Chi Squared test was used to identify differences between variables. The Chi squared test was first used to test the significance of the association between the influencing variables and the occupant's decision to recycle in work. The Chi squared test was also used to test the association between occupants who do not recycle and the desire for more information. The Kendall's Tau test statistic was used to test associations between variables. A simple analysis of variance was use for parametric data using the Krusal Wallis as the test statistic as it is a non-parametric test (ANOVA). Typically analysis of variance is used for parametric data, however more recently statisticians have argued that the statistical test is robust enough for use on non parametric data if the sample size is greater than 30.

Multivariate analysis (MANOVA) was used to test the variance of groups of dependent variables; this was used to increase the understanding of the effect different behaviour variables or facility variables had on recycling activity. Wilk's Lambada and Roy's Largest Root are the statistical tests used to understand the level of influence the variables relating to facilities and the variables relating to environmental behaviour influence the recycler 'type'. Secondly the test was used to understand the impact of the information variables on the recycler 'type'. Further to this the analysis of covariance (ANCOVA) was carried out to test the level of influence the continuous variables had on the dependent variable. This was used for

testing both the influence of a personal rejection to recycling and an advertising campaign.

5.8.3 Project evaluation data

This stage of the primary research data is stage 2.3 and is designed to test the success of the FM team in delivering environmental policy directives. For this section of the study there is no basis for sampling techniques or population analysis. There are two stages; data collection for the carbon project and data collection for the recycling project. During the two-year observational research stage, a project was initiated to reduce CO_2 emissions by 10% in 12 months. Energy data was collected and compiled in order to show the success of the energy reduction projects and therefore the success of the FM team in complying with the policy mechanisms.

A carbon model was designed which creates a baseline of the energy use prior to the project commencing, modelled the energy use throughout the project and compared the two to monitor the rate of reduction. For this section the energy data was used to calculate the final percentage decrease in CO_2e emissions as a validation of project success or not and for the purposes of this thesis simple graphical representation of the results will be used.

Secondly, during the observational research project the FM team were tasked with delivering a recycling target, complying with head office recycling and waste management policy. This was managed and delivered by the FM team. Extensive data is collected for waste management and recycling; to show the weight of waste, the proportion recycled, the proportion composted and the final weight sent to energy recovery. The trend of this data over the year is used to demonstrate the success or failure of the compliance with the recycling policy. Simple data and graphical representation is used to conclude the success of the FM team in delivery policy targets.

5.9 Qualitative Methods

The following qualitative research methods were carried out in order to achieve the research objectives:

1. Structured interviews with 10 members of the case study organisation (appendix four)
2. A two-year ethnographic study involving participant observation

Qualitative research concentrates on words and situations to express the reality of that person and their situation, making it the method suited to finding definitions of terms particularly suited to the FM context (Amaratunga *et al.*, 2002). The phenomenological device enables the researcher to look at change processes over time, and enables an understanding of new ideas and issues as they emerge (Amaratunga *et al.*, 2002). These features were important when asking participants to define a term, where the human thought process meant that a term could not simply be defined at the first attempt but requires verbal experimentation on the part of the participant.

5.9.1 Interviews

There are three types of interview which feature generally in research (Saunders *et al.*, 2003);

- Structured: use standardised questions with a standardised schedule. This can then be analysed quantitatively. There is likely to be predetermined coding for the answers. Used for mainly descriptive purposes, to determine patterns, or in other cases explanatory purposes.
- Semi Structured: The questions are not standardised. There will be a list of themes to be covered but they may vary from interview to interview. The order of questions may vary, and additional questions may be added. The answers are likely to be recorded. This type can be used for explanatory purposes, to understand relationships between variables,
- Unstructured: This type of interview process is informal, and used to explore areas of interest in depth. There are no predetermined questions, but a clear

idea of the aspects to be explored. This type is common for exploratory research.

Alternatively Healey (1991) suggests an alternative topology consisting of two differentiations, standardised and non-standardised. Semi structured interviews were used to develop the understanding gained from the questionnaires issued to the same personnel.

5.9.1.1 Sampling and response

The sampling and response for the interviews is the same process as undertaken for the quantitative research conducted as part of stage 2.1. The same group of participants from the case study building were selected in the same manor.

5.9.1.2 Data Collection

The data collection method for the interviews is the same process as undertaken for the quantitative research conducted as part of stage 2.1.

5.9.1.3 Interview Design

The interviews carried out were face-to-face interviews, on a one on one basis between the researcher and the participant. The questions were developed from findings through the survey stage research carried out previously to the interviews. The findings from the questionnaires shaped the level at which the questions were set. The questions were also shaped by the information that had been gained to date through the observational research project; themes and streams of thought were beginning to emerge to the researcher through observation. The interviews were semi structured and so prior to the interviews there was a list of questions set to give each participant a similar experience. However, depending on the person and the

answers given additional questions were sometimes asked or additional explanations were sought for some questions. The questions were focused on understanding the opinion on the level of sustainable development on site and forming key definitions of sustainability terms within the context of FM.

5.9.1.4 Data collection, management and analysis

The interviews were recorded using a Dictaphone, which was placed on the table. Participant consent was required for this, and the participants were asked prior to the interview commencing. This enabled the interviews to flow at their natural speed and ensured full accuracy of data collection. If the researcher collected the information through writing or word processing the answers the speed of the interview would be slowed and the flow of conversation may be interrupted by the writing speed. However, this does present disadvantages also. It requires additional time to write up the responses following the interviews. Following the interviews the answers were grouped according to similar or at times near identical answers and coded on paper. Once the codes were known the data was inputted into SPSS as a method to manage the data. Using SPSS the data was then analysed descriptively and presented using simple tables and graphs. In addition there were questions that were centred on forming definitions. The analysis of the answers was again to group the answers; this is where the analysis of such answers ends.

5.9.2 Participant Observation

For the ethnographic stage of the research the researcher will be a complete participant. The FM team were not aware that observations were being recorded to capture the reaction to policy mechanisms and personal interaction with the policy. However, they were aware that research was being conducted, as they were participants in the wider research agenda including the interviews, data capture stages. Being a complete participant involves becoming a complete member of the organisation and group that is being observed. This has the advantage of being able to observe and participate in the normal activities of the organisation that are not

altering the behaviour, beliefs or opinions due to the knowledge that research activity is being carried out (Saunders *et al.*, 2003). Due to the nature of ethnographic research it does have the significant drawback of being a time consuming method of data collection, with time often being a constraint for research projects. For this project two years were spent with the case study organisation to gather the data. The researcher has been fully immersed within the organisation, participating in the projects responding to environmental policy direction.

This stage of the research was focused on observing the reaction, behaviour and motivations of the FM team when presented with an environmental policy directive. The aim was to understand which policy mechanisms where most influential in motivating compliance, and which failed to achieve their aim. There are many mechanisms used within current EU and UK policy that could be utilised within environmental policy to compel organisations and individuals to comply with environmental policy. The following table recaps the findings of the literature review, by focusing singularly on the mechanism type. The mechanisms identified can be divided into two types, motivational and forceful i.e. the resurrection of the carrot or the stick argument, by force or by temptation.

Mechanism	**Source**
Forceful	
Fines	
Tax increase	Sadler and Castrillo (2006)
Permit system	Laffont and Tirole (1993)
Imprisonment	
Misallocation of resources	Gabel and Sinclair (1993)
Contractual performance parameters	
Corporate/ individual liability	Segerson And Tietenberg (1992)
Motivational	
Tax relief	Sadler and Castrillo (2006)
Audit	
Cost of energy	
Achievement of a standard	
Self reporting	
Bonuses/salary increase	Gabel and Sinclair (1993)
Contractual incentives	Gabel and Sinclair (1993)
Competition	Zhang et al (2008)

Table 15 Overview of compliance mechanisms as cited by previous research

The above tables contain mechanisms gathered from all policy sources, not just environmental as a result the mechanisms vary in their approach, or method. Both

the forceful and motivational mechanisms include monetary and reputational approaches to the mechanisms. Fines, tax increases and a permit system are the most obvious and common instances of financial mechanisms used to engender compliance. All three of these are found within environmental policy.

In addition to the above mechanisms there are also a series of points that act as a preventative measure or demotivate towards compliance:

- Ability to evade fines
- Difficulty to measure behaviour or compliance
- Lack of publication of mechanisms/difficult to understand

The aim of this stage of the research is to observe the reaction of the FM team to the pressure from policy mechanisms.

5.9.2.1 Method

The ethnographic study was two years in length where the researcher was submerged into the case study organisation and the group being studied. The researcher was not just an observer but part of the group. The team were faced with an environmental policy directive to reduce CO2 emissions by 10% in one year. The observations of the relationship between mechanism and project success were recorded through a written log. This was intended to contain the information for the end result of the research, to report on the success or failure of the mechanisms in place.

All of the organisations involved in the FM delivery are corporately affected by environmental policy. Four of the five companies, which are involved in the project team to deliver this directive, are large international organisations that have corporate environmental policies managing legislative requirements imposed upon them. It is of interest to study how this contract team complies with environmental policy as it is imposed or acts upon them within this FM setting.

5.9.2.2 Analysis

The analysis will be to formulate and condense the findings into some key tables of information for discuss and testing. This will require unstructured qualitative analysis from the researcher. What the observation hopes to achieve is an understanding of the mechanisms in place for the project and which play a more motivational role. Following on from this the findings will be analysed by conducting further research to show the success of either project and therefore validate the conclusions on the mechanisms and develop a model that will be useful for future analysis and development.

The analysis of the information will be formulaic using Dawson's (1996) model of Organisations as Arenas for the Transformation of Inputs into Outputs. This model treats all organisations as having 'inputs into products and processes', 'transformation processes' and 'outputs of good and services'. This states that all organisations have inputs that are transformed through processes to deliver outputs. In this case the transformation process is the policy mechanism that acts as a process to direct change. Each policy mechanism which is present in the policy directive will be taken and analysed according to its input, transformation process and the output generated.

5.10 Summary

The research takes place following a realist epistemological philosophy, using an inductive approach. It is assumed that that a social world exists that is external to the researcher. The approach focuses on ideas of social forces and processes that act independently of this human thought and beliefs. Ultimately information is gathered to derive a general principle. New truths are formed as an alternative to building upon current truths within the research field. Information is gathered to derive a general principle, a new truth is generated and tested through application to fact.

This research philosophy is based within a mixed research strategy consisting of case study and ethnography. The case study is the overarching strategy used for data collection, within this case study a large proportion of the research data is collected through an ethnographic strategy. Within this a multi methodological approach has been taken consisting of both quantitative and qualitative research methods. The case study is a small FM provider to a large inner city office building. For the ethnographic research the research is a participant observer and is therefore fully submerged as a member of the organisation. The multi methodological approach suits the inductive approach as it allows for theory building and the development of new truths through seeking answers in many forms. The following four chapters detail the findings resulting from this research process.

PART 3: RESEARCH FINDINGS

6 Chapter 6: Current position of Sustainable Facilities Management: an industry benchmark

6.1 Introduction

This chapter is the first of four results chapters and presents the results of the content analysis. The intention of this section is to establish if sustainability is applied to organisational process within the FM organisation, through measuring the organisations against a set of sustainability indicators. This will establish a benchmark for the current position of sustainable business practice within the FM industry currently. Within the wider literature there is a wealth of research existing on measuring the contribution of organisations to CSR, but there is little focus on the FM industry specifically.

The aim of the content analysis is to set a benchmark for the current level of participation of organisational sustainable business practice. There are three sections to this chapter. The first section focuses on the influence sustainability policies have on the uptake of sustainable business practice and the second section focuses on the influence that company size and structure have on the uptake of sustainable business practice. The use and influence of a SP has been the focus of previous research generally in the subject area of organisational sustainability. The third section of the chapter establishes a benchmark for the current position of the FM industry towards sustainable development. Before commencing research with the case study, the organisation is validated against this benchmark to ensure it is reflective of the general industry and not an extreme sample.

The analysis for this section is driven by the following research question:

- *What is the current position of the FM industry towards sustainable development in terms of organisational application and what are the key factors which are influence its implementation?*

6.2 Findings from the Content Analysis: The influence of Sustainability Policies on Sustainable Business Practice

Based on the existing research the argument can be framed both ways, with previous findings dismissing and endorsing the influence a SP has on the implementation of sustainable business practice and CSR. Elmualim *et al.* (2010), Carpenter and Meehan (2002) and Baylis *et al.* (1998) all concluded that having in place a SP does not guarantee the implementation of the content further down within the company structure. However, individual studies have found a link between having a SP and the motivation towards sustainable business practice.

The findings from previous research regarding the link between the establishment of a SP and the implementation of sustainable business practice is not conclusive; this gap in the research for the FM industry was explored. This research found that for FM organisations there is a link between establishing an SP and implementing sustainable business practice. An FM company which has an SP is more likely to report on sustainable issues, set environmental targets and be awarded environmental related awards compared to an FM company which does not have an SP. In addition to the findings in relation to the general industry, the case study organisation has a SP and is found to be more sustainable than the average for the industry set against the chosen measurement indicators.

6.2.1 The impact of a Sustainability Policy on sustainable business practice

The sample size was 65, with no response rate as secondary data was used. Firstly, within the sample 55.4% of the companies have a SP (Price and Pitt, 2011b). It was

of interest to understand whether this had an effect on the variables chosen as indicators of sustainable business practice; the feature of sustainable issues within company literature, the achievement of environmental awards, reporting on sustainability issues and having in place environmental targets. There was a correspondence between having a SP and the feature of sustainable issues within company literature. Out of the sample that had a SP, 80.6% can be classed as mentioning sustainable issues 'occasionally' within their literature (Price and Pitt, 2011b). There was a correlation between companies who have a SP and companies who have gained 'environmental awards' or related accreditation. Out of the companies which have a SP', 52.8% have gained 'awards' or accreditation and 47.2% have not (Price and Pitt, 2011b). For companies which do not have a SP only 24.1% have gained 'environmental awards'. Out of the companies which have a SP 72.2% 'report' on sustainable issues. Whereas out of those companies who do not have a SP only 20.7% report on sustainability issues. Finally, the majority (80%) of all of the companies in the sample did not have any environmental targets. Out of the companies that had a SP 33.3% had set environmental targets, out of the companies that do not have a SP only 3.4% have environmental targets (Price and Pitt, 2011b).

		Prevalence			
SP or not		Highly	**Occasionally**	**Never**	**Total**
Yes Policy	Count	7	29	0	36
	% of Total	10.8%	44.6%	.0%	55.4%
No policy	Count	0	14	15	29
	% of Total	.0%	21.5%	23.1%	44.6%
Total	**Count**	**7**	**43**	**15**	**65**
	% of Total	10.8%	66.2%	23.1%	100.0%

Table 16 Data showing the impact of a SP on the prevalence of sustainability being mentioned in company literature

The Multiple Correspondence Analysis shows the correspondence between the variables (Price and Pitt, 2011b). Looking at the graph showing the correlation between having a SP, 'reporting' and gaining 'awards' the North East quadrant shows the relationship between having SP and 'reporting' on sustainable issues. This relationship is indicated as strong and statistically significant (p=0.000). A second relationship, between having a SP and 'target' setting, is highlighted in the East

quadrants, again this relationship is statistically significant (p=0.003). The relationship between gaining ‘awards’ and a company having a SP is also indicated with a correlation between the two on the graph, both being in the Eastern quadrant (p=0.001). Whereas the Western quadrants on the graph illustrate the correlation between SP, no ‘targets’, no ‘reporting’ and ’awards’.

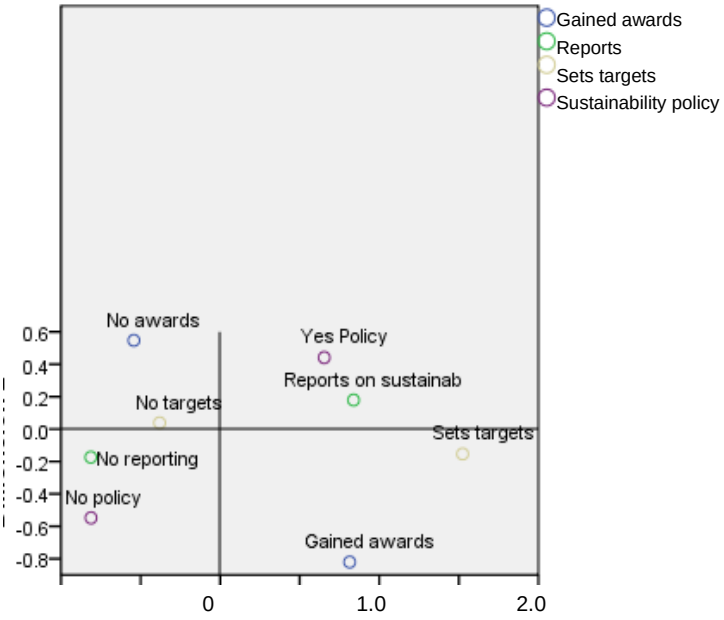


Figure 13 Graph to show correspondence between awards, reporting structure and SP

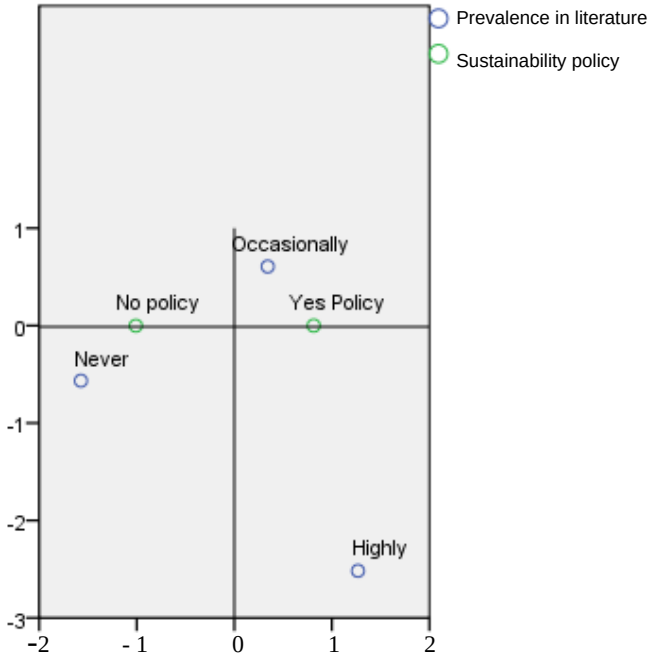


Figure 14 Graph to show correspondence between SP and occurrence of sustainability

A Pearson Chi-Square x^2 test for the correlation between SP and 'awards' was statistically significant at $p<0.05$, with p values of 5.489 ($p=0.019$). It can be said with confidence that companies with a SP are more likely to have gained environmental 'awards' or accreditation (Price and Pitt, 2011b). The highest count is for no SP and not gaining 'awards' at 33.8%, with the second highest count being companies with a SP and gaining 'awards' at 29.2%. A Pearson Chi-Square x^2 test for the correlation between SP and 'reporting' structure was statistically significant at $p<0.05$, with p values of 17.065 ($p=0.000$). It can be said with confidence that companies with a SP are more likely to report on sustainable issues (Price and Pitt, 2011b). A Pearson Chi-Square x^2 test for the correlation between SP and setting 'targets' was also statistically significant at $p<0.05$, with p values of 8.966 ($p=0.003$). It can be said with confidence that companies with a SP are more likely to have set environmental 'targets' (Price and Pitt, 2011b).

However, setting 'targets' is still the least likely business application of sustainable practice. The correspondence between not setting 'targets' and not having a SP is the highest correlation. Out of companies that do set 'targets' only one did not have a SP, showing that 92.3% of companies that set 'targets' have a SP (Price and Pitt, 2011b).

Cross tab	**x^2**	**df**	**Asymp. Sig.**	**Comments**
SP* Awards	5.489	1	0.019	The highest count is for no SP and No awards.
SP*Reporting structure	17.065	1	0.000	Highest count is for companies with an SP to Report on Sustainable issues.
SP* setting targets	8.966	1	0.003	The highest count is for companies with No SP to Not set targets.

Figure 15 Influence of the SP- Pearson Chi-Squared test

When answering the question, does the implementation of sustainable business practice stem from the introduction of a SP, the answer is yes. However, this is not

in isolation. Those who have a SP are more likely to report on sustainable issues, set targets and gain an environmental awards.

6.2.2 The impact of company size and structure on the implementation of sustainable business practice

Size and company structure were two of the factors considered likely to have an impact upon the level of sustainable business practice undertaken by a company and the likelihood that the FM company would have a SP in place. The frequency distribution analysis demonstrated this. The majority of FM companies tested did have a SP in place, 55.4% of companies in the sample had a SP in place with the remaining 44.6% not having a SP in place (Price and Pitt, 2011b). The size of the company was found to be an important organisational factor that is likely to affect the position of a SP. Out of the companies that have a SP, 73% were large, 54% were medium and 27% were small organisations (Price and Pitt, 2011b).

		SP or not		
		Yes Policy	**No policy**	Total
Size (by number of employees)	Large	19	7	26
	medium	13	11	24
	small	4	11	15
Total		**36**	**29**	**65**

Table 17 SP frequency by size

Out of the sample a proportion of the companies were 'stand alone FM companies' and the remainder were subsidiary groups or an FM department within a wider company, for the purpose of this write up titled 'FM+' [4]. It was thought that the nature of the structure of the company affected the link between the type of company that create and implement a SP. In linking the nature of the provision of the service provided by the companies it can be seen that the company structure has a greater affect on whether an organisation had a SP in place than size. 38.8% of

[4] Meaning FM+: either a FM department or subsidiary within a larger company or a FM company which provided other services. In each case the data was collected for the FM arm only but the affect of the existence of the other services can be judged.

large FM only organisations had a SP compared to 13.8% of FM+ organisations (Price and Pitt, 2011b).

However, size had a limited impact on FM+ organisations with 13.8% of both large and medium organisations had a SP in place (Price and Pitt, 2011b). Large companies providing FM only were more likely to provide a SP than if they were part of a wider company, however, they were still more likely than not to provide a SP. 75% of small companies who have a SP are 'FM only' (Price and Pitt, 2011b).

	SP or not		
	Yes Policy	**No policy**	Total
FM only	25	19	44
FM+	11	10	21
Total	**36**	**29**	**65**

Table 18 SP frequency by company structure

When looking at size as a variable, the sample shows that size does have an impact on the level of sustainable business practice implemented by the company. Firstly, out of the 40% of the companies that had gained 'environmental awards' or accreditation, 65.4% were large companies, 31% were medium and, 3.8% were small companies (Price and Pitt, 2011b). Out of the 53.8% of companies that 'report' on sustainable issues, 53.1% are large companies, 34.3% are medium sized companies and 12.5% are small companies (Price and Pitt, 2011b). Finally, out of the 20% of companies that set 'environmental targets'; 53.8% are large companies, 31% are medium sized and 15.4% are small companies (Price and Pitt, 2011b).

Subsidiary or not			SP or not		
			Yes Policy	No policy	Total
FM only	Size (number of employees)	Large	14	5	19
		Medium	8	7	15
		Small	3	7	10
	Total		25	19	44
FM+	Size (number of employees)	Large	5	2	7
		Medium	5	4	9
		Small	1	4	5
	Total		11	10	21

Table 19 Frequency for company structure * SP

The multiple correspondence analysis indicates the relationship between size of company, company structure and the occurrence of a SP or not. The North East quadrant shows that there is a correspondence between SP, large companies and companies which are FM only. The North West quadrant shows a correspondence between small companies and no policy.

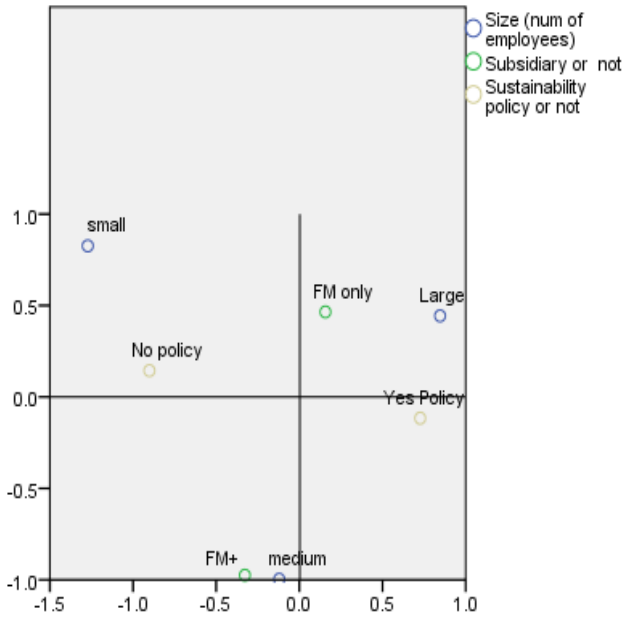


Figure 16 Graph to show correspondence between company size, structure and SP (Price and Pitt, 2011b)

The two graphs below show a stronger correspondence between ‘size’ of company and a SP, with the North East quadrant showing a clear correspondence between

large companies and having a SP, whereas the North West Quadrant shows a correspondence between small companies and no SP. The second Multiple Correspondence Analysis shows there is a correspondence between being FM only and having a SP and being FM+ and no policy. However, the correspondence is not as strong as with previous relationships.

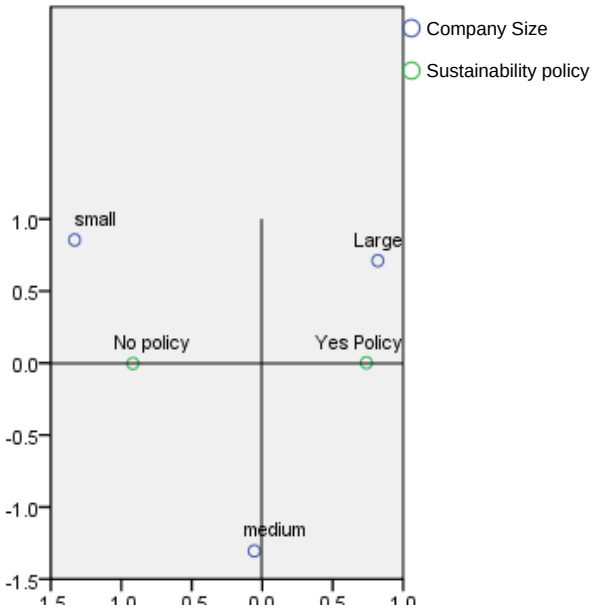


Figure 17 Graph to show correspondence between size and SP (Price and Pitt, 2011b)

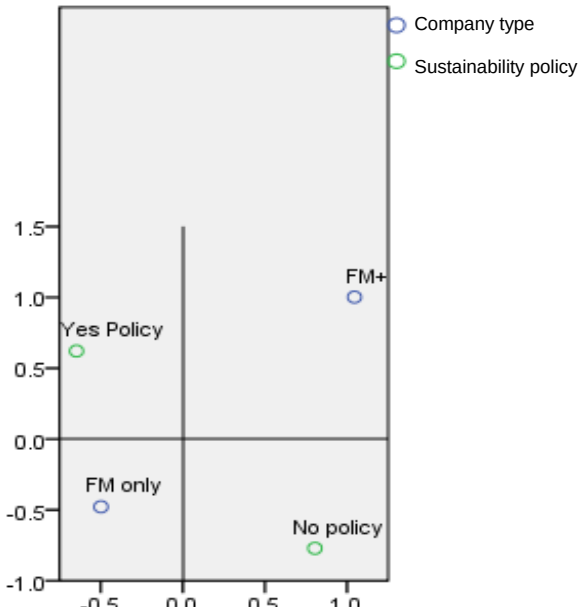


Figure 18 Graph to show correspondence between structure and SP (Price and Pitt, 2011b)

The graph below illustrates the correspondence between large companies 'sets targets', 'reports' on sustainable issues and gained 'awards'; which are all in the North Eastern Quadrant. The North Western quadrant illustrates the correspondence between 'small' companies, no 'awards', no 'reporting' and no 'targets'. Medium Sized companies are less influential on the measurement parameters.

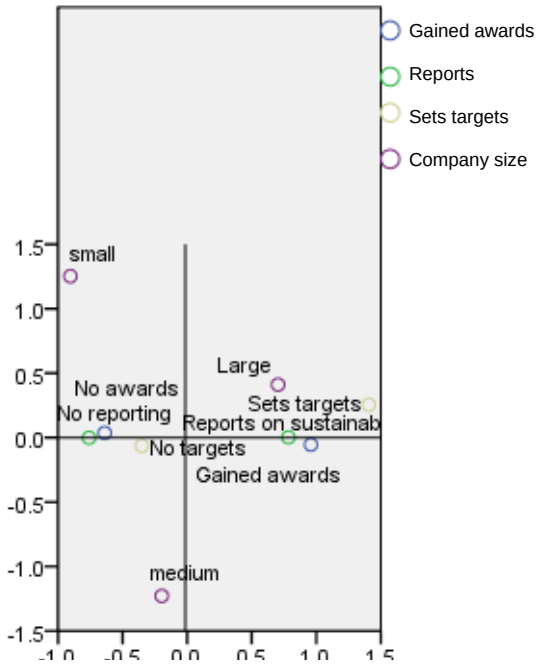


Figure 19 Graph to show correspondence between awards, reporting structure, targets and size (Price and Pitt, 2011b)

A Pearson Chi-Square x^2 test for the correlation between 'size' of company and 'SP' was statistically significant at $p<0.05$, with p values of 8.314 ($p=0.016$) (Price and Pitt, 2011b). It can be said with confidence that large companies are more likely to have a SP. The results for the cross tab of 'size' by 'SP' shows that the largest frequency is at 22.9% of the total with large companies having a SP in place (Price and Pitt, 2011b). The lowest count is for small companies having a SP.

The correlation between 'size' of company and 'awards' was statistically significant at $p<0.05$, with p values of 17.370 ($p=0.001$) (Price and Pitt, 2011b). It can be said with confidence that large companies are more likely to have gained environmental

‘awards’ or accreditation. When a cross tab of ‘size’ of company by ‘awards’ is carried out the highest count is for large companies and gaining ‘awards’ at 26.2% (Price and Pitt, 2011b). There is also a high count for small companies and not gaining ‘awards’ at 21.5% (Price and Pitt, 2011b).

Finally, the Pearson Chi-Square x^2 test for the correlation between ‘size’ of company and ‘reporting’ was statistically significant at $p<0.05$, with p values of 5.881 ($p=0.053$) (Price and Pitt, 2011b). It can be said with confidence that large companies are more likely to report on sustainable issues. Large companies have the highest count of reporting on sustainable issues at 26.2%. The smallest count again is for small companies and reporting on sustainable issues at 6.2% (Price and Pitt, 2011b).

Cross tab	**X^2**	**df**	**Asymp. Sig.**	**Trend**
Size*SP	8.314	2	0.016	The size of a company has an effect on the likelihood of having a SP. Large companies are more likely.
Size*gained awards	14.370	2	0.001	Large companies are statistically more likely to gain environmental awards.
Size* reporting structure	5.881	2	0.053	Large companies are statistically more likely to report on sustainable issues.

Table 20 Influence of size (Pearson chi-squared test) (Price and Pitt, 2011b)

6.3 Establishing an industry benchmark

Taking aside the differing influences of size, company structure and the influence of a SP, it is possible to use the sample to propose an industry benchmark using the variables pre chosen as a measurement method. The findings show that currently an average FM organisation is likely to have a SP or environmental policy and report on sustainable issues. However the average does not yet include setting environmental targets and the average company has not yet gained an environmental award.

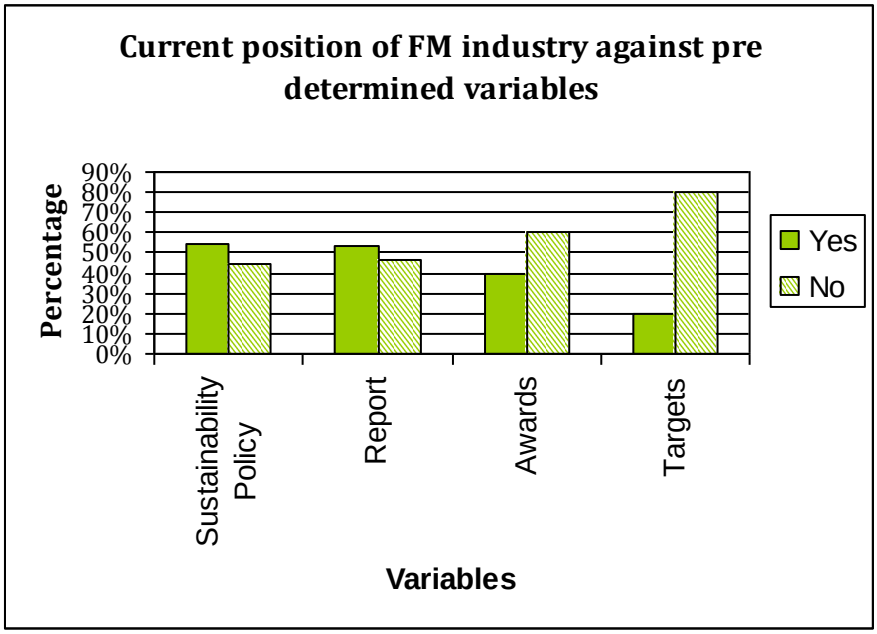


Figure 20 Graph to represent the industry benchmark

6.3.1 Validation of the Case Study

Following the execution of the content analysis it was possible to validate the case study against an industry standard consisting of SFM variables. The case study is a small organisation with less than 50 employees and so the case study has been compared to the both industry average and the average position for a small company.

Indicator	**Industry**	**Average small company**	**Case Study**
SP	√	**X**	√
Report	√	**X**	√
Awards	**X**	**X**	**X**
Targets	**X**	**X**	√

Table 21 Validation of the case study against the established FM industry benchmark

Table 21 compares the case study against the industry average generated out of the content analysis using the variables that have been shown to indicate sustainable business practice. This comparison shows that the case study can be considered to be above the industry average in terms of the commitment to sustainable business practice. The case study can be seen to be in the same position as the industry in all areas except target setting. The case study organisation has targets for CO_2 reduction, waste reduction, recycling ratios and water reduction. The case study organisation is a government organisation and the targets do stem from government regulation, so this is to be expected. When comparing the case study to the average position for small companies the case study is again found to be more committed to sustainable business practice.

Although the case study has been found to not match the current standard of the industry or particularly small companies within the industry, this does not mean that the case study is invalid. For the case study to be valid as a means of gathering data it is necessary for the case study to be practicing at least a minimal level of sustainable business practice in order for there to be activity to measure and observe. The intention for this thesis is to demonstrate the potential of the FM industry to deliver environmental policy, therefore the case study needs to demonstrate sustainable activity in order for new truths to be established. Therefore it is a positive that the case study can be considered to practice a slightly greater level of sustainable business practice than the industry average. Although, the case study cannot be considered to be representative of small organisations within the industry, and so in that sense it is not valid.

6.4 Conclusion

The intention of this section of the research was to understand the current position of the FM industry towards sustainability and sustainable business practice. It is important to understand the current standard of operating within the industry before beginning to try to answer the bigger questions, mainly whether the motivation for

FM organisations to promote sustainable development is financial or moral. The average FM organisation is likely to have a SP in place and to report on sustainability issues. However, the average FM organisation is not yet likely to have set environmental targets or to have gained an environmental award or accreditation for environmental work. The likelihood of any of these aspects being in place is affected by company size and structure. Large companies are much more likely to have a SP, set targets, report on sustainable issues and gain environmental awards. This is also the case for companies that are FM focused organisations.

When a SP is in place there is a much greater chance of further sustainable initiatives being embedded into the company. This shows that the SP does have an influence on sustainable business practice; however, it could be limited as the relationship is not exclusive, not all companies which have awards, report on sustainable practice and set targets have a SP. Having a SP does seem to be a requirement for achieving the standard to gain an environmental award or accreditation. Large organisations are more likely to gain awards and report on sustainable issues. The findings from the sample show that over half of FM organisations have a SP, most of which are medium to large organisations. Large companies are more likely to implement sustainable business practice across the board. Large FM departments serving large organisations are more likely to be linked to the core operations of client businesses.

It was found that size had a greater influence on whether an FM organisation had a SP compared to whether it was an FM only firm or FM+. However, there was still a greater correlation between FM only and having a SP and FM+ and not having a SP. FM organisations deal with wide reaching environmental issues in their daily operations. The sustainability policies of FM companies are likely to have come about due to operational issues that affect the environment such as methods of cooling the building, or the use of generators for example. Due to increasing legislative pressures on large companies, FM only companies would be in the position to develop a SP to cover the wider environmental agenda. FM+

organisations will have varied operational activities that may not lead to a concentrated awareness of environmental issues.

The research conducted within the FM industry has already established the link between an FM company having a SP in place and the development of a SP. FM organisations which have a SP in place are more likely to practice sustainable business practice, according to the variables developed within this study. Carrying on with this theme on SPs, it was of interest to understand the reasons behind the development of a SP as another means of understanding the current position of the FM industry towards sustainability. This was explored through the case study. It was found that the reasons to have a SP were believed to range from legislation and reducing costs to creating a better environment. Out of the eight reasons which were considered the strongest reasons for developing a SP only one was financially motivated; to reduce costs. The other seven reasons that were considered strong were more aligned with moral reasons.

7 Chapter 7: Sustainability in the context of Facilities Management and its relationship with value

7.1 Introduction

The previous chapter described the current position of the FM industry and the current variables available to identify and measure sustainable business practice. This chapter builds upon these findings to develop the understanding and interpretation of sustainability in the FM context. The ultimate aim is to understand how to operationalise SFM and so it is crucial to understand sustainability in the context of FM.

There are two main sections to this chapter, with the research for both based in the case study organisation. The first section is focused defining sustainability within the FM context. This begins with framing a definition for sustainability specifically within the context of FM followed by exploring the opinion of the FM managers of the current position of sustainability at operational level. The next section explores the reasons for establishing a SP for FM organisations and the policy drivers behind this. The contract is an important consideration for FM strategy and the link between sustainability achievements and contractual requirements is investigated. Finally the use of sustainability as an indicator of business performance is explored. The second section of this chapter focuses on the relationship between sustainability and value. The two terms added value and sustainable added value are defined within the context of FM.

This chapter seeks to answer the following research question:

- *What is the understanding and interpretation of sustainability within the FM context?*

7.2 Sustainability and Facilities Management

The first section of this chapter focuses on exploring the understanding of sustainability within the context of FM; looking at defining sustainability within the FM context, the policy driers, contractual influences and opinion of current performance level set against this. The research is gathered through using interviews with the case study organisation. The data was gathered through a combination of interviews and a survey with a sample size of 10, consisting of 10 members of the FM organisation. The 10 were chosen due to their position with the organisation and therefore the knowledge and expertise which they held.

7.2.1 Defining sustainability in the context of Facilities Management

There are a plethora of definitions of sustainability, which cut across many different industries. However, a focused definition of what sustainability means within the FM industry is not yet defined within common literature. The first four stages of this chapter are aimed at understanding the definition of sustainability from within an FM organisation, and to answer the following question:

What is sustainability				
Category A	Category B	Category C	Category D	Category E
Delivering requirements with the minimal impact on resources	Looking long term, with considering wider impacts on the environment	Recycling	Thinking before using resources and not being wasteful	Sustaining human life within environmental limits
45.5%	9.09%	9.09%	18.2%	18.2%

Table 22 Answers for the question ‘what is sustainability in the FM context’?

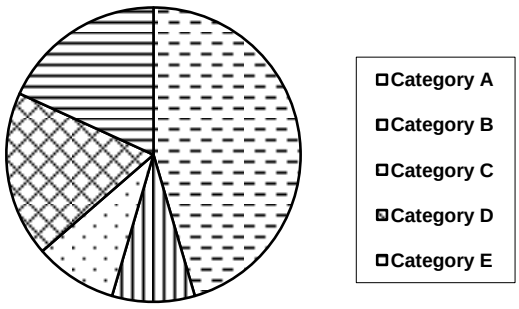


Figure 21 Pie chart to show breakdown of categories.

The case study related sustainability to operating with the minimal impact on the natural environment; the definition that can be constructed from the research is 'delivering requirements with minimal impact on resources'. Other answers such as category B also included references to resources 'thinking before using resources and not being wasteful'; which is similar to the themed answer for category A. The main theme that came out of the answers was to deliver the service requirements within the building by using minimal resources. Category E answer was a more focused definition, possible too focused and missing the wider impact of sustainability.

7.2.2 The opinion of the Facilities Management organisation

The FM organisation believe that sustainability in FM is delivering requirements with minimum impacts upon resources. However, what is the opinion of the case study on how well this is being achieved throughout their daily operations. The case study was asked to discuss four different themes; level of awareness of sustainability issues, level of sustainability issues are managed and implemented, areas considered critical for sustainable development and finally the opinion on the level of success for current level of sustainable development.

From validating the case study against the industry benchmark it is known that the sustainable business practice is more of a feature within the case study than the

wider industry. However, what is the opinion of the case study on their performance of sustainability and ability to integrate it operationally.

7.2.2.1 Understanding of sustainability and its implications for daily operations

Firstly, how aware do the case study managers consider themselves to be of sustainability and its implications for daily operations. On a level of not aware/unsure/aware/very well/perfectly for their level of understanding, all the participants considered themselves to be at least 'aware' of sustainability and its implications for daily operations. The majority of the case study participants indicted that they understood sustainability and its implications for daily operates 'very well', and the second highest frequency of participants indicated that they were 'aware' of the issues. In light of the somewhat voluntary actions to implement sustainable development, it could be argued that the case study felt there was a requirement to improve the sustainability development of the FM operations.

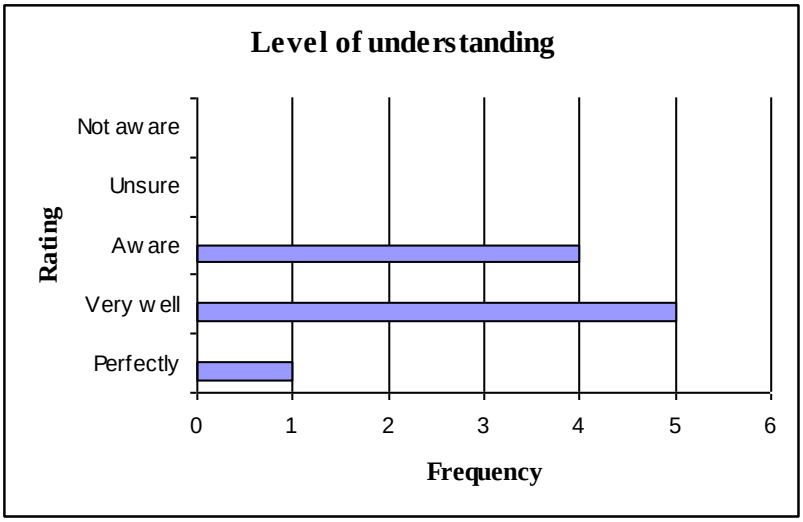


Figure 22 Figure to show the opinion on the level of understanding of sustainability and its implications for daily operations

7.2.2.2 Opinion on success of current level of management and implementation of sustainable business practice

The FM team were asked how well they thought sustainability was managed and implemented. The majority of participants felt that sustainability is managed and implemented to an 'average' standard, with the second majority believing the level was 'good'. The overall opinion of 'average' could reflect the fact that there are minimal areas where the organisations are contractually required to implement sustainable business practice. However, drive is coming from the building occupiers. If the opinion is currently that the standard is 'average' then it could indicate acceptance for improvement. This theory is tested by looking at the opinion on criticality for the development of sustainable methods.

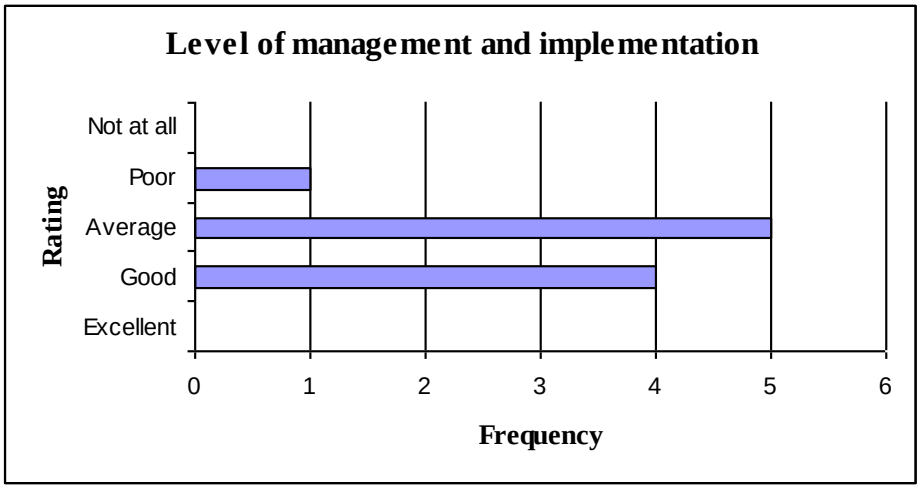


Figure 23 The opinion on the level of management and implementation of sustainable issues

7.2.2.3 Level of criticality for sustainable development implementation

Opinions vary considerably when rating the level of criticality for sustainable development in each area of the contract. The opinions are very split and for most areas there is no overall opinion. The lack of consensus may stem from the lack of a mutual SP or statement to direct sustainable practice to chosen areas. It could also indicate a lack of understanding on where sustainable practice could be

implemented, as the areas where no overall opinion can be made are on areas where sustainable practice may not be immediately obvious.

Although the participant's opinion is that they understand sustainable issues 'very well' or are 'aware' of the implications of sustainable practice for daily operations there are eight areas where the opinion on the need for sustainable development had either a 'very high' or 'high' level of criticality, compared to one area where the majority decision is a 'very low' or 'low' level of criticality. This indicates that the participants felt there is room for development. This understanding of where the FM team believes sustainable development should be targeted aids the understanding of the general meaning of SFM. In addition to recycling, energy management and water management which the FM team believe should be a focus of a SP, it can been seen that catering, cleaning, purchasing, reprographics, end user activities, document production, M&E and asset management are areas which are considered in need of the application of sustainable development. The areas are not immediately obvious as areas that would benefit from targeted development along sustainable lines. However, end user activity certainly is an area that will yield high results if targeted for sustainable development. In addition the areas highlighted here are areas which would not necessarily be linked to cost reduction through sustainable development.

High/very high	**Neither**	**Low/very low**	**No overall decision**
Catering	Off site scanner	Accommodation reconfiguration	Help desk
Cleaning	Nursery		Equipment monitoring
Purchasing	Reception		Corporate TV
Reprographics	Mail		Parking
End user activities			
Document production M&E Asset management			

Table 23 Summary of opinions on level of criticality

7.2.2.4 Opinion on current level of sustainable development implementation

The case study did not believe that the current attempt at sustainable development was successful. The majority of opinions for the success level for each area were 'neither [high nor low]', or in 'no answer'. This could indicate that there was not enough available knowledge to form judgment, a lack of willingness to commit to an answer due to the nature of the question or a lack of boundaries as to what constitutes low or high levels of success. When asked to rank their overall level of satisfaction with the level of sustainable practice on the contract the majority (8) of participants were unwilling to commit, selecting that they were currently 'neither [satisfied nor unsatisfied]'. An equal number of participants were 'satisfied' as they were 'unsatisfied'.

Sustainability in the FM context at this stage can be taken to be delivering existing and normal operational requirements in a new way, with an aim to reduce the impact upon the world's natural resources. The sustainable development that is delivered is above and beyond contractual requirements, showing that the meaning and understanding of SFM in this case is not designed or driven by contractual themes. Key areas for sustainable development within FM operations are still considered to be energy and waste management (and recycling). These are highly operational areas for FM organisations to able to be involved in closely. The case study understands sustainability and its implications for daily operations very well. However, with this understanding the current standard of managing sustainable development is considered average. Possibly the management would be considered a higher standard if there were clear contractual or policy drivers? There are areas that are considered critical for sustainable development, even though the standard still exceeds contractual requirements, showing the importance of sustainability to modern FM model.

7.2.3 The reason for a Sustainability Policy within Facilities Management

If having an SP does lead to the implementation of sustainable business practice, then an important understanding is what are the reasons for an organisation to decide to implement a SP in the first place. The topic of the SP at the level of the firm requires greater investigation. The FM case study participants were presented with a list of possible reasons for motivating an organisation to create a SP. The participants then ranked each as a weak reason, not a reason or a strong reason according to their opinion.

Level of agreement	**Legal compliance**	**Reduce costs**	**Gain award/good publicity**	**Reduce carbon emissions**	**Create a better environment**	**Be responsible**	**Reduce strain on world resources**	**To be innovative**	**Community relations**
Weak	2	1	0	0	1	0	0	1	0
Not a reason	2	2	6	0	2	0	3	2	7
Strong	6	7	4	10	7	10	7	7	3

Table 24 Opinions on the reason to have a SP

Out of the options presented the case study felt that legal compliance, reduction of costs, reduction in carbon emissions, creating a better environment, being responsible, reducing strain on resources, and being innovative as strong reasons to have a SP. These areas all have a high majority strong opinion. Gaining an award or creating community relations was not seen as a reason to have a SP.

This is an important area to understand as it reflects the personal opinions of the FM team towards sustainable development. Developing the research in this direction has created a deeper understanding of the FM motivations. Not all of the variables here are money related. Legal compliance, reduction in emissions, creating a better

environment, being responsible, reducing the strain on the worlds resources are not financially motivated reasons for implementing a SP. The two strongest factors considered as motivating reasons to have an SP is reducing carbon emissions and being responsible. This develops the idea found within the wider industry. Reporting on sustainable issues was the most common indicator of sustainable business practice, this again is a behaviour not financially motivated, at least not directly, but rather about improving image in a sector which seems to be moving towards being more environmentally focused.

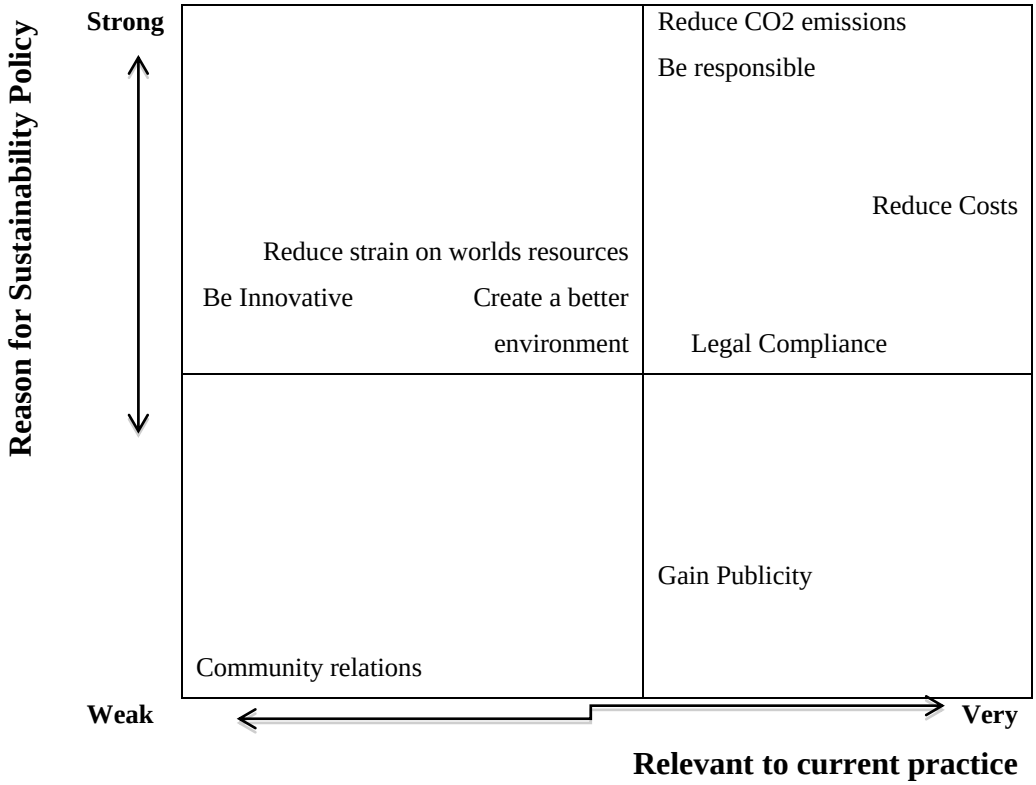


Figure 24 Model to show the relation between the reasons cited for having a SP and the relation to current practice of SFM.

Combining this research question and the earlier research findings it is possible to formulate a relation between the reasons considered to be strong for implementing a SP and the current industry practice with regards to important aspects of sustainability. The reasons that are considered the strongest reasons to have a SP according to the case study organisation are:

- Reduce CO2 emissions, and

- Be responsible

Current literature also makes reference to these two topics when discussing CS or sustainable development. The other reasons that are also considered strong reasons to develop a SP are;

- Reducing costs
- Creating a better environment
- Reducing the strain on the worlds resources, and
- Being innovative

Reducing costs is certainly a common theme in discussions surrounding SFM and it is also considered a strong reason here for implementing a SP. The other factors listed above are not as strong an issue in current discussion for SFM.

All of the organisations involved within the case study setting have a corporate SP, however there is no joined up SP for reference for all of the organisations involved. In order to answer the overarching question of what is the understanding of sustainability in the FM industry, it is of interest to know what the FM case study organisation considers key policy areas to be included in the SP.

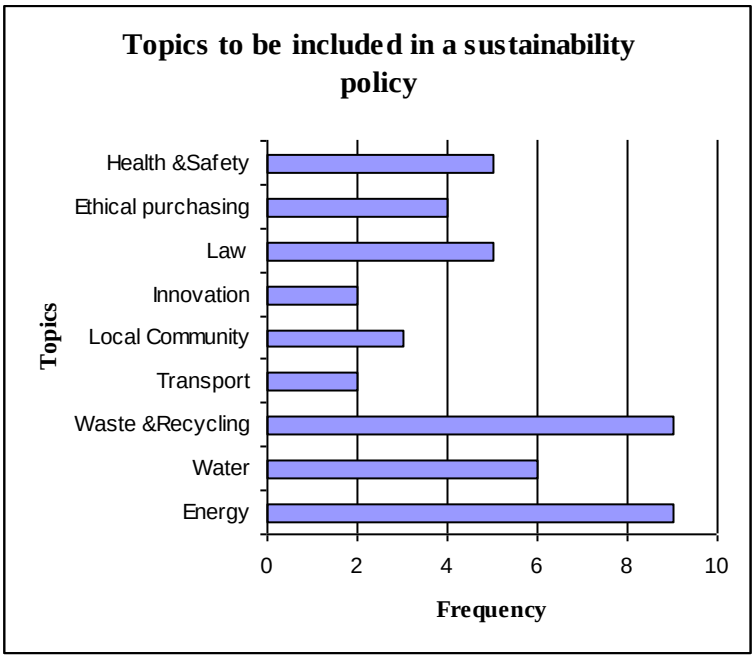


Figure 25 Opinions on which topics should be included in a SP

Two topics are particularly popular, 'waste and Recycling' and 'energy'. The link between these two topics and sustainability is clear. They both have an operational implication and a practical application. This is both a positive and negative connotation. It is positive that the clear elements where sustainable development can be applied to gain direct results are being considered by the FM case study. However it is unfortunate that the other areas such as transport and law are not seen yet to be areas where sustainable development can be applied. When considering what this thesis found as the primary focus of SFM; to reduce the negative impact the built environment has upon the natural environment, the two areas of recycling and energy, and also water, are the key areas where the FM organisation can make a direct, positive and somewhat immediate impact.

7.2.4 The influence of the contract

A key area for consideration is contractual requirements. It could be assumed that an FM organisation is only driven by the contract, therefore if the contract contains sustainability indicators then the FM organisation will be sustainable according to such requirements. Therefore the first stage is to establish the contractual requirements for sustainability within the FM contract for the case study

organisation. Carrying out an audit of the contract showed that there are no contractual requirements for prescriptive sustainability within the contract. Energy management is mentioned broadly and there is an instruction to provide recycling facilities, however, there is no specific clause reinforced with a provision for a fixed performance deduction or an audit schedule.

Conducting a review of the contract answered this sub question, however it was also necessary to confirm the understanding held by the FM team. This sub question was included in the case study interviews. The participants were asked what provision does the contract make for sustainable business practice. The majority of participants indicated that there was no sustainable business practice provided for by the contract apart from a broad statement about recycling. The answers were grouped into similar responses as follows;

- **Category A (5 participants) "None other than a broad statement about recycling**"
- Category B (4 participants): "Nothing provided for in the contract"
- Category C (1 participant): "Nothing other than providing paper from renewable stock"
- Category D (1 participant): "Nothing other than the requirements if the occupiers"

Both the confirmation that there are no provisions in the contract for sustainable development and the confirmation that the participants are aware of this position can support the argument that contractual requirements are not key motivators for sustainable business practice within this FM organisation. The new truth could be proposed that FM organisations are driven by a wider force to develop the FM industry than the contract requirements, or secondly in a broader sense that FM delivery is moving away from being contract focused.

Two things have been established here, that the case study has minimal requirements for sustainability and that the case study is above average in terms of delivering sustainable business practice against the chosen indicators. Therefore, the base

position that can be assumed is that the contract is this case does not positively influence the sustainable business practice of the organisation. However, since the FM team are not being directed by contractual requirements it is likely that the sustainable practice being delivered is in accordance with their opinion of what SFM means.

The case study was asked to indicate which areas of the contract they believed there were no elements contracted for and none achieved, which elements were contracted for and were being achieved and finally any areas where they could form no opinion. Although there were no areas in the contract where there was specific deliverables for sustainable business practice, there was thought to be reference to a general provision surrounding recycling.

None contracted for and none achieved	**Elements contracted for and achieved**	**No overall opinion**
Help desk	Catering	M&E
Off site scanner	Cleaning	Purchasing
Nursery	Reprographics	End user activity
Reception	Document production	Equipment monitoring
Mail		Accommodation reconfiguration
		Asset Management
		Parking management
		Corporate TV

Table 25 Table to summarise majority opinions: contracted levels of sustainability for each area

Clearly within the case study sustainable business practice is implemented above contractual levels, as contractually there is not much provision for SFM. The following areas are considered to be the main areas of sustainable development that are delivered which are outside of contractual requirements:

- Waste and recycling beyond the level described in the contract including reporting
- Looking at solutions and ideas for sustainable methods

- Using green suppliers for the cleaning products
- Reducing deliveries of cleaning products
- Looking at energy management and efficient monitoring
- Sourcing locally produced food supplies along with clear labelling of its origin

This development could be due to the drive for sustainable development initiatives being driven from the head office of the contractors involved in the project. There is a drive for improvements in corporate sustainability especially from within the main contractors, which are construction companies. Each contract is expected to adopt and implement such strategies regardless of individual contracts. The development into sustainable business practice beyond what the contract prescribes for can go some way to explain the variable opinions.

7.2.5 The use of Sustainability as a variable to measure business performance

When benchmarking the FM industry in terms of sustainable business practice during the content analysis the variables used to measure were crude indicators developed from similar non-industry specific studies. It was important to develop this theme within the case study, to gain an understanding of what the FM case study considered to be indicators of sustainable business practice. Whilst working with the case study organisation the aim was to observe rather than lead the research in a specific direction. For this aim the FM case study was asked to indicate what is considered to be indicators of business performance, within which there was the scope for selection of indicators of sustainable business practice. A list of performance indicators were adapted from non-industry specific research conducted by Shaw and Haynes (2004) and Hinks and McNay (1999).

The indicators of business performance fell into the following key themes:

1. Business benefit
2. Change

3. Equipment
4. Maintenance/service
5. Health and Safety
6. Resources
7. **Environment**
8. General

A questionnaire was used to propose the theme of sustainable business practice to the FM case study. The above eight themes contained forty-one indicators that were presented to the participants as potential indicators of sustainable business practice. The indicators were not presented in their themes but as a long list of no particular order or sense. The intention was to see, if any, the amount of indicators for environment and sustainability that were selected as key indicators of general business performance. It is proposed that if a sustainability or environmental indicator was chosen as a key indicator used to measure business performance then that element of sustainability can be considered as a important core business objective.

Table 24. shows the most chosen business indicators. The variable *environmental performance* was one of the most commonly chosen variables by the FM team, indicating their opinion that sustainability is a key factor in measuring the success of business performance.

Indicator	**Frequency**
Statutory compliance	8
Responsiveness to problems	7
Environmental performance	***7***
Quality of end product	6
Provision of a safe environment	6
Health and Safety	6
Correction of faults	5
Quality of service provided by staff	5
Technical competence of staff	4

Table 26 Most commonly selected indicators

The above shows the most commonly selected indicators. However, overall there were four other indicators that were chosen by the participants from the area of sustainability and environment. These were the following:

- Energy conservation (3 participants)
- Reduction in emissions (3 participants)
- Energy awareness (2 participants)
- Good water management (1 participant)

All of these factors can be used as variables to indicate the place of sustainable business practice. The overwhelming focus of the chosen indicators is the subject of energy. Energy reduction is commonly the main focus due to its close links to immediate reduction in costs and its close relation to the FM operations. This can also often be said for water reduction initially, where simple measures can be implemented to give a rapid reduction in water use. Regardless of the subject specifics all of these areas are effective methods of indicating sustainable business practice. The FM case study believes that these areas, along with the other more business-focused indicators, are part of an effective performance measurement. In turn the sustainable indicators can be used in isolation to measure the performance of sustainable business practice in a more detailed manor than simply measuring the presence of reporting, target setting and award achievement. These performance measurement areas would feed into the more generic measurement areas of target setting and reporting.

The fact that the FM team highly recommended the indicator *Environmental Performance* as well as four other sustainability related indicators of performance shows that this FM team include sustainability and environmental measurement within their normal business consideration. It is not treated as a separate area for consideration. However, as discussed the areas mentioned are all areas that could have strong links to cost reduction, which may suggest that the focus is upon that element rather than the moral dilemma of environmental protection. At this stage a conclusion cannot yet be drawn.

Variable from content analysis	Indicators from case study research
SP	Energy conservation
Large organisation (250+ employees)	Reduction in emissions
Reporting system	Energy awareness
Environmental awards	Good water management
	Environmental performance

Table 27 Variables from content analysis and case study research.

The above table brings together the variables that through the content analysis and the initial research conducted with the case study organisation have been found to be independent variables, indicating sustainable business practice. The variables can be used to measure the commitment to sustainable business practice in the FM industry.

7.3 The development of a Framework for Sustainable Facilities Management

The understanding gained from the literature review and the research conducted so far with the wider industry and the case study organisation has allowed for the development of a framework for SFM. The FM is continually developing by nature and the current model of FM is increasingly incorporating the principles of sustainability.

The following diagram shows a proposed model for SFM, including the three pillars of sustainability; environmental, social and economic. It has been broken down into two areas, corporate or organisational sustainability, including such areas that the FM organisations corporately implements and operational level sustainability, elements that are incorporated into the FM systems to deliver a sustainable FM service.

Figure 26 A proposed model for Sustainable Facilities Management

7.4 The relationship between value and Sustainable Facilities Management

The second section of this chapter focuses on the relationship between sustainability and value. There are a number of reasons why it is necessary to develop an understanding of added value specifically for the FM context. Firstly, understanding this term allows an understanding of how the case study in particular place value and understand cost. It then allows for the development of the term *sustainable added value* that is not available within current literature. The initial research showed that current understanding of the term *value* and *added value* varies, especially between

industry sectors. Gallup (iFM, 2005) suggests that the FM industry is very focused on core deliverables, whereas the wider industry is focused on wider support services.

7.4.1 The term Added Value in the Facilities Management context

To the case study the meaning of added value was considered to be when the service provided goes above and beyond what was prescribed or expected (category A). There were some sub groups within category A; 'going over and above even if it involves an extra cost' and 'going over and above without passing on costs to anyone else'.

What is added value?				
Category A	Category B	Category C	Category D	Category E
Going over and above	Delivering a service at an appropriate cost	Delivering added benefits	Use better methods to improve the running of a service	Providing something different that meets requirements
45.5	9.09	18.2	18.2	9.09

Table 28 Participant definition of added value.

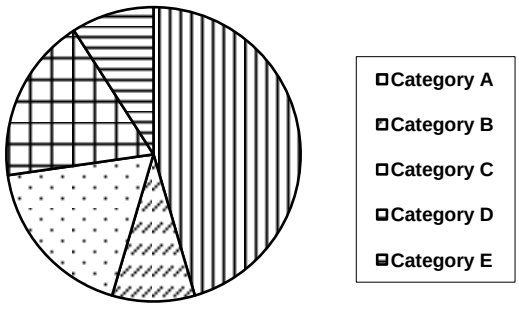


Figure 27 Pie chart to show the breakdown of participant opinion.

Initial research suggested that the FM industry is very focused on core deliverables, whereas other industries are found to be focused on a wider range of support services. It was highlighted that the idea of value is dependent on expectations.

Category A certainly follows the same line of though as the literature review provided, looking at the definition as ‘additional value provided on top of the value provided though delivering the core business deliverables’ (Gronroos, 1997).

7.4.2 Sustainable added value in the Facilities Management context

Using the literature review it was possible to construct a theory for the meaning of sustainable added value. However, this definition had no basis within established research. It was of interest to test whether this definition has basis in reality of the research conducted within the case study. The variety of opinions from the participants indicate that sustainable added value is a less understood term in the FM industry, which supports findings from the initial research. When participants were asked to define sustainable added value the most common answer was ‘an improvement to a service or providing the service involving sustainable methods’.

The most common theme for the definition was category B through ‘providing a sustainable solution as a method to improve an initial service’; this had a strong level of agreement with over half the participants describing this as their personal definition. Category C looks at the idea of sustaining a level of value, rather than adding value through sustainable actions. Category D and E are more of a continuation of the previous questions and appear more to look at the topic of sustainability.

What is sustainable added value				
Category A	Category B	Category C	Category D	Category E
Paying more to provide a service with environmental benefits	An improvement to a service or providing the service involving sustainable methods	Being able to ensure the continuation of a service at the same standard	Recycling and being aware of resources and the environment	To add value to make the future brighter
9.09%	54.5%	9.09%	18.2%	9.09%

Table 29 Participant definitions of sustainable added value.

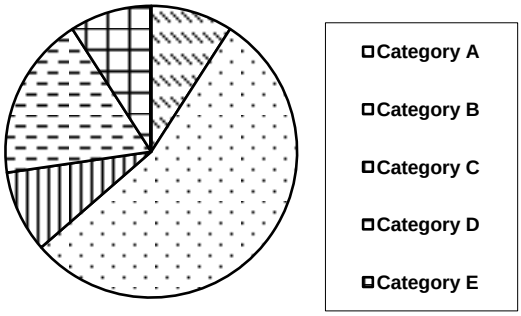


Figure 28 Graphs to show breakdown of definitions.

When looking at the opinions it is clear that sustainable added value is a less understood term in the industry. Indeed this supports the literature review. The most common theme for the definition was category B through providing a sustainable solution as a method to improve an initial service. Category C looks at the idea of sustaining a level of value, rather than adding value through sustainable actions. Category D and E are more of a continuation of the previous questions and appear more to look at the topic of sustainability. However there is a majority theme running through the definitions and this should be able to assist in developing a mutually understood definition throughout the wider industry.

7.4.3 Sustainable solutions; adding value or cost

The previous chapter, chapter 6, established that the case study organisation does practice sustainable business practice. However, a greater understanding of the relationship between sustainability and its link to added value is needed. The case study was consulted to explore the relationship between value, cost and sustainability.

Does sustainability add to the cost, the value or lower the cost					
Category A	Category B	Category C	Category D	Category E	Category F
All three depending on the service	Add value, add to initial cost but long term saving with operational savings	Initial cost but long term cost saving	Adds value, but either cost neutral or adds to the cost	Lowers the cost	There is a cost but needs to be balanced against environmental impacts.
18.2	27.3	27.3	9.09	9.09	9.09

Table 30 Participant opinion on cost, value and sustainability

The most common opinion when exploring the relationship between cost, value and sustainability was that sustainability 'adds to the initial cost but has long term savings' which was included in the category A and category B answers. Category A responses also included reference to adding value, which prevented the common answers under A and B being grouped. Looking at category A and D, another common theme is that sustainable solutions also add value to a service, however this would be a total of four participants holding this opinion.

To develop the idea of sustainable added value, it was necessary to understand the reality of the meaning, and whether sustainable solutions are used as a method to add value currently. Firstly, the majority of participants did 'agree' that sustainable solutions are a method to add value to the client's requirements or the services provided. This shows a link between sustainable added value and organisational performance; with the parties to the contract holding the opinion that sustainable solutions can add value. This reflects the discussion earlier over whether people believe that sustainable solutions add to the cost, the value or lower the cost. The majority of the focus was on the cost element of the question but in addition a large proportion also agreed that value added could be created.

Revisiting the question surrounding the meaning of sustainable added value within the context of the FM industry, it is possible to draw together the previous two case

study investigations. Sustainable added value can be understood to mean providing a sustainable solution as a method to improve an initial service. In addition sustainability is thought to add value to a solution, but also to add to the cost of implementation, only before providing long-term operational cost savings.

7.5 Summary

The first section of this chapter followed on from the previous chapter in looking at sustainability within the context of FM. This section focuses on the understanding within the case study specifically. The participants defined sustainability as 'delivering the requirements with minimal impact on resources'. This differs from the most commonly accepted definition of sustainability as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UN, 1987). However, it reflects the role on the contract, and the FM context of the participant's position. Within the case study organisation the FM managers believe that they understand sustainability and its implications for daily operations very well. However, they believe their success in implementing its aims are only executed to an average standard. In line with this the FM team believe there are a number of areas that are critical for sustainable development. This is the case even though against the chosen variables the case study is found to be implementing sustainable business practice to a greater extent that the wider industry. The FM team overall are neither satisfied or dissatisfied with the current level of sustainable development.

The main reasons the FM team consider important for having a SP is to reduce CO_2 emissions and be responsible. The first of these two reasons has a clear grounding in FM operations due to the ability of FM managers to monitor building systems to manage energy use. The second however has a greater grounding in social responsibility that would traditionally not be associated with FM operations. This is an area where the FM industry can be seen to be developing into SFM. When the FM case study were asked to indicate the key topic areas for inclusion in a SP, the common areas were waste and recycling and energy management. Again these do

have a traditional link with FM operations however recycling is more of a modern development and not necessarily traditionally associated with FM contracts.

When considered contractual drivers, it must firstly be stated that for the case study organisation SFM is not driven by contractual requirements. The majority of participants indicated that there are very few areas prescribing sustainable practice in the contract, apart from broad statements about recycling. When each area of the contract was reviewed, it was clear that sustainable practice is being developed above the contracted levels. The opinion is that the contract was created before the focus on sustainability was developed. The lack of contracted levels may be responsible for the occasions of non-committal answers, due to there being a lack of base line. One could assume that because the overall level of satisfaction with the current level of sustainable practice on the contract is 'neither [unsatisfied nor satisfied] that there is a willingness to develop further.

Taking a step back from the details of SFM the case study were asked to look broadly at indicators of business performance. Out of the list of possible factors to be used to measure business performance Environmental performance was chosen as a key indicator to use; showing that to the case study at least environmental performance is considered a key part of business strategy and therefore can be used to measure performance. In addition to this out of the list the following indicators that are related to sustainability were chosen; reduction in emissions, energy awareness, good water management and energy conservation. It can be argued that using environmental performance as a measuring tool for business performance can be used as an indicator of sustainable business practice.

The second section of the chapter focuses on developing the link between sustainability and value using the case study as a research source. The FM team believed added value in the context of FM operations to be going above and beyond general requirements. The term sustainable added value is generally understood but is not necessarily clearly defined. The participants defined sustainable added value as 'an improvement to a service, or providing the service involving sustainable methods'. The initial research gave a variety of ideas defining sustainable added value including 'the extra value created when environmental and social impacts are

kept constant' (Figge and Hahn, 2004). Which does relate to the participants definition, but it is missing the improvement factor. The FM team believe that sustainable solutions add value and add to the initial cost but also deliver long term cost savings.

Overall the FM case study can be said to be operating sustainability, with a high understanding of the advantages and long-term benefits of SFM. It can also be said that SFM is beginning to be operationalised within the team due to the high level of focus on it as part of the FM business model.

8 Chapter 8: Identification and analysis of compliance mechanisms: observational context

8.1 Introduction

The previous two chapters have involved the write up of targeted research techniques that have involved seeking the answers to the first two research questions to begin to build an understanding of SFM. This has identified the variables available to indicate sustainable business practice in the FM industry. However the variables, situations and factors that motivate and prevent FM organisations to comply with environmental policy are still not known. This idea is especially significant after the previous results showed that contractual requirements are not reason enough to motivate towards the implementation of sustainable business practice.

This chapter has three main sections, the first of which provides an extended explanation of the setting for the observational research, building on the detail provided in chapter 5. The second section discusses the main results of the observational research using the framework designed following the adaption of the model outlined by Dawson (1996). The data was gathered through observing the case study organisation over a period of two years as they managed projects to deliver against environmental policy. The third section looks at the outcome of the policy directives using data gathered from the case study building. The data used was energy consumption data from meter readings and waste weight data that the case study organisation collected as standard.

Ultimately, this chapter is designed to answer the following research question:

- *The built environment is a central part to delivering UK carbon reduction targets; is the FM industry able to deliver environmental policy directives specifically for the current built estate and what are the factors which impact this?*

8.2 Description of the setting

The first section of this chapter focuses on describing the setting and the context for the observational research stage specifically. This involves a more detailed description of case study factors, an explanation of the compliance mechanisms being considered and an explanation of the framework that is being adapted to structure the analysis of the compliance mechanisms.

It is unlikely that a team of managers from across a number of organisations will subconsciously, without guide or motivation, be drawn to create and manage a carbon reduction project. It is proposed that there are specific factors that act upon organisations and managers to drive and motivate towards managing and delivering a carbon management project. The previous chapter showed that the FM team have been motivated by something other than contractual requirements to implement SFM. With the differing opinions present it is likely that something was established to drive the team towards a common direction for sustainability and carbon management.

8.2.1 Organisational setting

The specifics of the case study have been described in chapter 5, however the setting for the observational research requires an additional description. The focus of this section of research is going on observations of behaviour, process, reactions and results of the FM team responding to one specific policy directive. This directive is Project 10; a directive to reduce carbon emissions resulting from electricity, gas and heat use within the contract buildings by 10% within one year from May 13th- May 13th. This Directive was a requirement across all Government departments with a specific focus upon Head Office locations. This was a high level project issued from Number 10. However, the observational research began one year before this project began, this allowed a greater understanding of the situation and cultural factors of the FM team to be observed and understood. The focus of the observational research is specifically on the FM project team that manage the delivery of the services.

However, it is acknowledged that the other organisations involved in the delivery of FM operations have an impact upon the results and behaviour of the FM provider.

There are four main organisations involved in the FM contract and also the project team. The four organisations, although all working towards a common goal of delivering the FM services to the client, all have a different focus, purpose and organisational culture. It is worth mentioning a recent experiment that was carried out for the wider FM team. The FM provider initiated a programme of co-location, where by all four organisations mentioned above are located in the same open plan office. This was part of a wider project called 'branding' where all organisations involved in FM service provision in the building were all rebranded collectively under the same name, with individual organisational names coming secondary. It was observed that this had had an impact on the way that the different organisations work together on joint projects, the improvement in successful team working was noticeable. It was also noted that co-location enabled a greater flow of communication, a greater flow of work sharing and a more collaborative culture.

8.2.2 An Introduction to the idea of Compliance Mechanisms

Project 10 was the project name given to the Government Directive issued to the client organisation that are representatives of the building occupants, the bill player and the energy and resource consumer. However, the client is a standard administrative organisation with no control over building operations and without the knowledge required to manage an energy reduction project. This resulted in the responsibility for project delivery to be passed to the FM provider. The FM provider managed the delivery of the building services that are provided by the two main contractors and a number of subcontractors. A number of subcontractors were involved in delivering the initiatives required for Project 10 delivery.

As expected the directive was issued with mechanisms designed to ensure compliance. Although the directive was generated alongside the CRC Energy Efficiency scheme, it was an entirely separate scheme. With Project 10 initiated by the Prime Minister to focus the energy reduction on Head Office buildings, it was a

politically motivated move. The benefits of both Project 10 and the CRC are not mutually exclusive and feed in to each other eventually. The mechanisms used in this directive were less severe and less fiscal orientated however than for the CRC. The following mechanisms were evident in the policy to generate compliance:

- Reporting (live reporting from energy meters)
- Competition
- Audit
- Individual accountability

In addition to the above measures there were a number of situational factors that motivated the team as well as a number of self-created mechanisms. There were two sides to the reporting requirements, firstly progress reporting via personnel and secondly live energy reporting automatically fed to the internet. Live energy use is taken from the electricity, gas and heat meters and fed onto a website which is available for the public to see. The website updates every half an hour throughout the day and also stores historic data. This requirement was mandated and all buildings involved in the directive had to comply. This data was used to form the basis of the competitions.

A monthly competition was based on the change in energy use from one month to the next, and the results announced each month on the website. There was no reward or incentive for this competition. The audit was a bit more of a tangible mechanism. After the project year ends all the building representatives have to submit all their historic energy use for the past year and the previous baseline year. This is collated and then weather corrected, meaning the energy use will be corrected for any extremes in weather. These mechanisms ensure participation in the project but not necessarily compliance by delivering a 10% reduction in CO_2 emissions. The mechanisms do not make the same connection to financial results as the CRC Energy Reduction Commitment does, nor does it introduce a limit on possible emissions by reducing the amount of allowances available to purchase.

The final compliance mechanism is individual accountability. An employee of the client organisation is nominated as the individual ultimately responsible for the

delivery of the policy aim. However, this does not come with individual liability as is common with other policy, notably recent developments in Health and Safety policy. The individual's reputation is the key motivation behind the mechanism, but even this is questionable. The current climate is making environmental policy a less influential topic, due to the Spending Review, redundancies and cuts to public spending, the success of an energy management project is unfortunately unlikely to be a key issue to organisational strategy holders.

Due to the complex project relationships discussed above the person held accountable for the project is not the person who is actually delivering the project. This creates a breakdown in the link between mechanism and delivery, which could reduce the likelihood of compliance. After the directive was announced there was a period of time when the organisations involved tried to understand how to deliver this directive and who was accountable. The client organisation, although officially responsible for the project, was not actually in the position to deliver the project as this was in the capabilities of the FM provider. The responsibility for project delivery was passed down the hierarchy, however the mechanisms that were put in place to drive compliance cannot similarly be passed to the FM provider. The individual held accountable for project delivery from the client organisation remains in that position of responsibility.

The result was the client and the FM provider 'self mechanised'. A number of processes were put in place by the team themselves to ensure accountability was up help and success was measured. One such self-created motivation mechanism was a Gainshare model; whereby the FM provider plans, funds and delivers a number of projects to deliver the directive objectives and the capital repayment is funded through the financial reduction in energy costs. The initial reason this was created was due to capital funding constraints; the client organisation was not in a position to fund large capital intensive projects and so the Gainshare model enabled the FM provider to carry out the works and gain payment through a reduction in the energy bill. Due to the large quarterly energy bill (in excess of £1 million) the client organisation accrues a sum of money to pay for this.

8.2.3 Framework for Analysis

An understanding of the available compliance mechanisms was gained from the initial literature review contained in chapter 4. However, the impact of standard policy compliance mechanisms on an FM organisation has not been tested before in a structured way. For this reason the model discussed in Chapter 4, Dawson's (1996) model of 'Organisations as Arenas for the transformation of Inputs into Outputs', originally developed for organisational research, has been adapted and used as a framework to shape and present the analysis for this chapter.

The following table shows the model adapted for use under this context, and therefore the content of the table has been changed from that presented in Chapter 4. The headings, 'inputs into products and processes', 'transformation processes' and 'outputs of good and services' are from the original model developed by Dawson (1996). The items under the 'Inputs into Products and process' and 'Outputs of Good and Services' also remain the same, as they are the generic titles for organisational inputs and outputs. Ultimately what is being analysed are the results and impacts of the following model:

Figure 29 Where the policy mechanisms fit into the model by Dawson (1996)

Inputs into Products and processes	**Transformation Processes *(Policy Mechanisms)***	**Outputs of Goods and Services**
Raw Materials	Audit	Finished Products
Energy	Individual Accountability	
Manufacturing Components	Processes	Components
Data/information	Reporting	Information
Cash	Gainshare	Services
Services	Competition	Skills
Skills	People	Knowledge
Knowledge	Culture	Experience

Table 31 Organisations as arenas for the transformation of Inputs into Outputs (Dawson, 1996)

The transformation processes include the fixed policy mechanisms that are designed into the policy directive. However, in this case it also incudes some organisational aspects which have acted in this case as a transformation process; namely Gainshare (financial system), people, culture and processes as these were aspects which acted to transform the inputs into outputs. For example the Gainshare model transformed cash as an input into environmental initiatives as an output.

8.3 Effect of Mechanisms: Observed Results

This section will present the results of the observational research. Each mechanism that was present will be discussed in relation to its intended meaning, effect and outcome in motivating towards compliance with the policy directive, or not. The framework for discussing this comes from Dawson (1996) as discussed in section 8.2.3. The framework comes from the field of organisational theory, and so is being used in a different context here to discuss the impact of inputs being processed by the policy mechanisms to deliver desired outcomes.

8.3.1 Reporting

Transformation process

There were two layers of reporting required; live energy data over the internet and progress reporting upwards within the client organisation to senior level staff and policy heads. It was mandatory to provide the live energy feed via the internet. The intention of this firstly was to motivate the project team to deliver the project and secondly to motivate the building users to participate with the project. The energy feed also provided a link to the public. The intention of upward reporting was to ensure that the relevant stakeholders were aware of project progress.

Output

The two strands of reporting did have a positive effect upon the behaviour of the project team.

REPORTING	
Positive	**Negative**
Demanded immediate development of a carbon model which can be used to collate, measure and monitor data trends.	There was no central methodology to be applied to all buildings as part of the policy directive; therefore a direct comparison between the achievements of all the policy participants was not possible.
Encouraged the fixing of faulty or non-commissioned meters throughout the building.	It was often not possible to access the other buildings statistics, this limited the usefulness of the reporting process.
Allowed the project team to easily and accurately monitor progress.	Subcontractors were responsible to provide meters throughout the building but they were slow to provide remedial action to fix faulty meters.

Table 32 Positive and negative impacts of the reporting mechanism.

The project team embraced the reporting mechanism immediately. Prior to the project the utility use of the building was recorded and monitored, but the data was not held all together in one location, as it was not instantly accessible. Electricity data was recorded by a Hard FM subcontractor, and then passed to the FM provider by email. This process was not reliable, and occurred often after an email reminder

request was sent. The heat data was recorded by a client subcontractor, and then passed to the FM provider when specifically requested. The gas data was recorded by the FM provider following the physical reading of the meters. As a result the data was not collaborated in one database. There was a greater awareness of the overall energy cost of the building only, rather than a knowledge of the carbon footprint. The project team embraced the push to gather the data into one location, it was seen as a positive action to be taken and a carbon model was created. This carbon model held all the data for electricity, gas and heat use. It included these areas only for two reasons; they were the only three areas that were required for inclusion in the project, and the FM team had no connection with occupant related greenhouse gas emissions such as employee travel. The FM team has extensive waste and recycling data, as this was an earlier policy directive, however, this was kept separate to the Project 10 carbon model, as it is not included in this directive at this stage.

Prior to the directive being issued the carbon footprint was not calculated. The consumption data in terms of kWh was known and collected, and so the FM team were aware of the buildings energy use. When warning of the Directive was issued, the FM team created a carbon model applying the conversion factors to the current energy and utilities consumption data. There was a previous desire to produce a carbon model, but the final push to develop this came from the transformation process in terms of the mechanism. There was a growing focus upon sustainability within the team in the run up to this project. The growing focus could be seen through informal discussions between the team within the office, the introduction of sustainable solutions in areas that were additional to the contract and within the growing focus upon innovation.

The pressure of reporting was a motivating force upon the FM team. Key stakeholders continually monitored the progress of the project, and there was a desire to ensure that progress was continually made. A weekly report was produced throughout the project that meant progress towards carbon reduction had to be continual and permanent. If there was a slowdown in the rate of reduction or a temporary increase in energy use the weekly report would clearly display this clearly through graphical representation.

8.3.2 Competition

Transformation Process

Every Head Office Government Building was subject to the policy directive. In addition every building within each department was also included in the overall departmental reduction target. There were two elements to this competition; the main formal competition was between the head office estate but there was also internal competition between different buildings of the same department. A number of specific competitions were operated during the yearlong project e.g. a competition to see who reduced energy consumption the greatest over a four week Christmas period. The intention for this was to generate a formal sense of competition between different teams at each Head Office Estate building. For each competition the FM team collated and then submitted the data to a central office. A league table was then produced showing the achievement of all the Head Office Departments.

Output

Following the introduction of the formal competitions, the general level of competition between the different buildings included within the directive increased dramatically. The personal competitive spirit of the team evolved, driving decision making and pushing projects to completion. There was a strong interest in what the other FM teams in the Head Office buildings were doing. Communication between the teams increased, leading to ideas sharing that did not exist before. As a result the organising department officially sought out information from each team and published a formal report containing what projects or measures each team had taken, which were successful and which were not.

Competition	
Positive	**Negative**
Encouraged the competitive spirit	Led to the introduction of short term decision making
Drove the team towards pushing for change	Raised tension amongst the team due to the increased level of information present in the public arena
Led the team to investigate what the other teams were doing, encouraging ideas sharing and communication	

Table 33 Positive and negative impacts of the competition mechanism.

As part of the measure to increase communication between the teams and to spread the information regarding successful projects a project specific conference was organised. This however did not include the FM teams. A representative from the client team was sent in their official capacity as a civil servant. This meant that the FM team was not heavily involved in the process. The FM team in this case hold the technical, operational and project knowledge and so this was missing at the conference event. To improve the effectiveness as a motivational tool the FM teams where applicable should have been invited to the event to fully discuss project details.

The league table published after each competition was listed up on a project website. This added to the motivation for competition. The results were eagerly anticipated and there was a strong sense of impetus for a project that at times was able to become monotonous. Table 34 shows the league table for one of the competitions.

Rank	Department	CO_2e reduction/ increase
1	MOD	-46%
2	DCMS	-41%
3	BIS	-38%
4	CLG	-38%
5	DWP	-37%
6	DECC	-37%
7	MoJ	-36%
8	DEFRA	-36%
9	CO	-32%
10	DfT	-31%
11	DfID	-30%
12	HMT	-29%
13	HMRC	-20%
14	FCO	-19%
15	HO	-16%
16	No.10	-10%
17	DH	-7%
18	DfE	10%

Table 34League table for departmental competition.

The element of competition certainly motivated the FM team. A drawback to this method however was the strong competitive element within the team resulted in short term projects being implemented which were not necessarily able to be maintained long term due to their impact upon the building occupants. However, the element of competition did also mean that effective projects that under normal circumstances would not have been implemented were able to in fact be so.

8.3.3 Audit

Transformation Process

At the end of the project the figures and statistics that were gathered and used to measure project progress were submitted to a central body as a conclusion of the final achievement. The statistics were then independently audited and validated. The intention for this element was to ensure that clear measurement was used throughout the project to enable clear validation of the final result. However, there were no direct instructions issued, or any standard provided, for how the measurement was to be conducted. It is most likely that every site would have conducted this using a slightly different method. At the end of the project the statistics are forwarded to the Government department responsible for coordinating the competition and also independently audited by the National Audit Office.

Output

It is difficult to assess the nature of the impact for this element. The FM team and the nature of the organisation would be intent on effective measurement and reporting regardless of the final hurdle of an independent audit. The team designed their own report to measure the energy use of the three buildings weekly.

Audit	
Positive	**Negative**
Focus on correct information	No clear instructions therefore a lack of belief in the method being used to validate
Collate all the information across all of the teams involved	

Table 35 Positive and negative impacts of the audit mechanism.

There was a solid desire for the project to have strong and reliable measurement system in place to monitor the progress of the project. The audit element at the end of the project also caused a strong focus on accuracy and methodology. Where assumptions had to be made due to erroneous meter readings a logical methodology was chosen, recorded and was committed to. This step had the final auditors in

mind. This in itself though did not directly motivate the team to reduce emissions and succeed in the project, but more motivated the team towards ensuring accurate information was attained. The knowledge that all departments would be audited prior to the project result being announced motivated to a greater extent to reduce emissions. However, this is really more linked to the competition element discussed above.

The audit process did not produce a clear process to follow; it simply involved independent checks on the final results. This allowed for scepticism to arise within the team over the real benefit of the audit process and the validity of the final result. Again, this did not affect the motivation to success rather gave an element of doubt to the validation process. However, this was not a direct motivator.

8.3.4 Individual Accountability

Transformation Process

An individual within the client representative team was held to be the individual accountable for the project. This person was not in the FM team. The intention was to have a single point of contact throughout the chain of departments and individuals involved in the project. As the project is ultimately a Government target for the civil servant departments to achieve, an individual within the client representative team was chosen as the accountable individual.

Output

This certainly had a motivational affect. With one person being clearly chosen as the single point of accountability, it focused that person on driving for success. This person was responsible for reporting upwards of progress on a weekly basis, being accountable for project impacts upon the operational function of the building and ultimately for the success or failure to achieve the target.

Individual Accountability	
Positive	**Negative**
Created a clear direction for motivation.	Due to the person named accountable there was a distance between them and the FM team delivering the project.
Created a constant flow of communication and information sharing.	Credit was not linked to the FM team but to the person held accountable.
Created a sense of constant pressure.	

Table 36 Positive and negative impacts of the individual accountability mechanism.

As the individual was nominated within the client representative team, it resulted in the drive and motivation flowing from there downwards through the hierarchy to the FM team. However, this did provide a distance between the accountable individual and the team actually charged with delivering the target. This did have a demotivating affect in that the credit for the achievement was not given to the team who delivered the project objectives. However, there was a drawback to the accountability remaining in the client representative team. The credit for project delivery also remained with the accountable individual, which is demotivating to the FM delivery team. It also meant that the knowledge of the project details was with the FM delivery team and not the accountable individual. This required a constant flow of information upwards, which was time consuming and at times frustrated the team.

The individual who was held accountable was motivated by this position. There was drive coming from the individual towards the delivering team (the FM team) during project team meetings and throughout the life of the project during operational hours. The result of not delivering the project for the individual accountable was a possible demotion, as the target was considered key to strategic delivery for the Central Government and therefore any department that did not deliver the project were considered to have failed to achieve a Government strategic demand. There was constant pressure upon the FM team from the client delivery team to succeed in achieving the target. This pressure was effective in motivating the team.

Overall, having a clear person accountable was a highly effective motivating factor in this situation. It removed the element of doubt, leaving a clear line of

responsibility. Without this, failure may not seem as daunting, as effectively no one would be held accountable for a lack of action.

8.4 Non mechanism motivators

The previous section detailed the chosen mechanisms that were designed into the policy directive. They were deliberate mechanisms applied to all organisations involved in the project. However there were more factors involved than the above-mentioned mechanisms in motivating the team towards compliance. These were situational factors specific to the case study team at this location. This includes cultural implications, organisational implications and even management implications. These will vary from site to site, and a different combination of factors will be present in each location. The impacts of such a situation will be discussed next. What would be of interest to this study is for this action to be repeated within a number of FM case study situations in order to gain an understanding of the affect that variations in situations have upon motivating compliance with environmental policy.

8.4.1 Gainshare

Transformation Process

Gainshare was created to mitigate against the present issue of a lack of capital funding. Gainshare is a mechanism that enables the capital funding of an initiative to be to repaid through the savings made in the reduction of energy costs. The Gainshare is closely linked to the carbon model used to measure changes in energy use. The intention was to provide a financial motivating force in addition to providing a method to repay the capital outlay when there was no budgetary allowance for the project. The Gainshare model inputs the financial payback for each initiative through modelling the cost, lifecycle and energy reductions resulting from each initiative. The payback resulting from the reduction in energy cost is then channelled to return capital funding provided in advance by the FM provider. Once the capital value is repaid a proportion of the remaining continual reduction in

energy cost is calculated as a return in profit over the next 20 years. The profit value coming from sharing the resultant energy reduction between the client and the FM team at a ratio of 65/35%. Without this method of generating funding there would have been a lengthy and bureaucratic process to apply for capital funding, even then this method was not guaranteed.

Output

The affect of the Gainshare arrangement was profound. This mechanism was ultimately crucial to the development and success of the project.

Gainshare	
Positive	**Negative**
Provided a funding arrangement upfront for the initiatives	It was challenging to design and implement
It provided a quick funding mechanism without the requirement to go through any additional channels of bureaucracy	It was highly political
It provided an incentive in terms of additional returns after the capital costs is repaid	
It provides a long term revenue stream	
It provided a financial record of all incentives in one document.	

Table 37 Positive and negative impacts of the Gainshare mechanism.

Firstly the gain share solved the problem of a lack of funding, however, it was not a funding method itself. The Gainshare database provided the data required to evidence the value of the capital repayment that the FM team was entitled. This was crucial in giving the FM team confidence to invest and the client confidence to agree to initiatives going ahead. This also provided a quick method of funding which was again crucial to the progress and success of the project. Other potential sources of funding were not guaranteed and involved lengthy processes. Government funding was available for certain types of environmental projects conducted within the Government estate, however this was not guaranteed and the process was lengthy, believed likely to take longer than a year to secure the funding, which for this project was too long.

The Gainshare also provided an additional incentive for the FM team. The cost of all the implemented incentives were inputted into the model, the value of the subsequent reduction in energy costs of the incentives went to the FM team to repay the capital outlay. After the capital outlay was repaid the remaining value of the continuous reduction in the energy costs was split 65/35%. This guaranteed a revenue stream for the FM team for the remainder of the project, which was around 20 years. This was intended to provide the incentive to continually invest in and progress the sustainability agenda as the return was expected to be funding for further innovation in SFM. One of the corporate aims of the FM company was to be an exemplar project, and to lead the field in SFM was one of the chosen ways to deliver this aim.

Finally the Gainshare did also force a certain order upon the financial side of the project. Through the Gainshare model it was a requirement to calculate the expected financial return each incentive brought separately as a prediction rather than relying on the final energy bill. It allowed financial predictions to be calculated, and therefore brought a desired formal monitoring to the financial side of the project.

However, implementing the Gainshare model was not an easy process. It was at time fractious, and remained so even at the end of the project. It was a highly challenging and complex model to build, especially since there was no existing template in the industry. Due to its complicated nature not all parties of the project team understood the workings of the model, including the client. This resulted in at times lengthy meetings to explain changes to the model. It also bred a nature of distrust, as team members were agreeing with the model outcomes without fully understanding the workings of the model. Eventually this led to the Gainshare model still not being ratified and agreed at the end of the project. The Gainshare was agreed in principle at the beginning of the project and so the FM team commenced work and implemented a large number of initiatives in order complete the project and achieve the target. However, the client was unable to gain departmental agreement with the Gainshare model by the end of the project, even though the project was a success. The process of gaining agreement is on going. However, this does not take away the fact that in principle and practice the Gainshare model is a highly effective method

of motivating the FM team and the client to carry out environmental initiatives. In this case the final settlement of payment has not yet been achieved.

8.4.2 People

The impact of people was considerable. There are many layers to this issue, most notably:

- Clear leadership from the Managing Director and the Board who are both committed to the progression of SFM
- The placement of a Knowledge Transfer Associate with the specific aim of innovating a sustainability strategy for the FM provider
- The team included knowledgeable and open-minded technical project managers keen to innovate and test solutions

The managing Director (MD) is personally and corporately committed to SFM and views the subject as part of the process towards creating an exemplar project. The MD was part of the Project Board for the Carbon Project and so the specific project as well as the overarching pursuit of SFM had buy in from the MD. The project also had buy in from the highest level in terms of the FM organisations Board members. This did drive the project forwards. Emphasis was placed upon the project in wider (general) team meetings, presentations on project progress were requested for the wider team, and the MD attended all project board meetings to monitor progress. Ultimately this project was not part of normal business operations and required time away from the normal business demands, this was possible due to the MDs commitment.

A Knowledge Transfer Partnership (KTP) Associate is a recent graduate who is employed by a University and placed to conduct applied research in industry. The KTP was placed within this FM team to design and innovate a sustainability strategy. When the Carbon project was announced the KTP Associate was tasked with commencing the project. Having a focused employee dedicated to advancing SFM was a positive asset to the project. Not every FM team would have a KTP

Associate, however, similar impacts could be assumed from placing an employee focused on sustainability and environmental matters. The KTP Associate ensured that focus remained on finding and implementing sustainable solutions throughout the project through exerting continuous pressure. This worked well within the team, as the technical Project Managers were able to focus their skills and knowledge upon SFM.

The remainder of the team are highly focused, innovative and forward thinking. There is a desire to drive new solutions and deliver innovative ideas. There is not a great resistance to change generally when considering the group as a whole. Only two individuals could be cited as being resistant to change at the individual level but within a group under pressure from a project directive successfully applied their skills to delivering the project requirements.

8.4.3 Culture

Without comparison to other case studies the impact of culture will be hard to gage. Huczynski and Buchanan's (2001) definition of culture can be used to frame the explanation of the results here; the collection of uniform and lasting values, beliefs, customs, traditions and practices that are shared by an organisations members, learned by new employees, and transmitted from one generation of employees to the next. However, it is important to explore the cultural influence within the case study and the affect it may have had. The key aspects of the culture within the FM team is as follows (based on Schein, 1985):

Cultural area	Detail	Case study
Surface manifestations	Furniture	Formal, regulated and conforming. Very little personal artefacts on display.
	Clothes	Formal work-wear suits and ties.
	Ceremonials	A culture of meetings; weekly team meetings, monthly team lunch, regular informal meetings in the coffee shop.
	Norms	No culture of arriving early or staying late, senior member decisions given more weight.
	Physical layout	Open plan, one team branding, and meeting tables throughout the area.
Values	Ownership	Ownership of projects, roles and responsibilities.
	Performance	High performance requirement against key deliverables.
	Preparation	High value placed upon preparation.
	Innovation	Expectation on delivering innovative solutions where possible.
Basic assumptions (staff hold)	Organisation	Best in portfolio, highly skilled, capable.
	Human behaviour	Remains professional and formal, minimum skill level required, self-starters and self-motivators.
	Organisations relationship to environment	Strong links with professional bodies and industry, developing strong links with the building.

Table 38 Details of organisational culture at the case study.

The culture is formal, hard working and relatively regimented through meeting schedules. The senior members of staff in terms of either years of service or hierarchical position are highly respected. There is a culture of meetings and a set standard for meeting etiquette. There is a strong push for developing more formal routes for project development and processes. This allowed for the introduction of sustainability within new organisational processes. The organisational strategic aims of being best in portfolio and being an exemplar project push the team to be successful and innovative in solution finding. The team are expected to be self-starters and self-motivators. All these factors combine to make the able conditions

for not only complying but also exceeding environmental policy directives, especially ones that are short term, with a clear required outcome.

The requirement to be self-starters and high achievers against work requirements meant that the project started quickly through developing the Gainshare, implementing the Sustainability Works Proposal (SWP) process and designing the carbon model to monitor the energy use. The desire to be innovative and successful combined with the MDs desire to lead on sustainability in FM operations meant that the development of new processes to deliver this project were welcomed.

8.4.4 Processes

As part of the project new processes and procedures were created in order to introduce the systems required to deliver this new type of FM structure. In addition to the Gainshare model that was introduced, a process called the SWP process was created, which stood for *Sustainability Works Proposal*. A simple form was created which allowed anybody from the project team, or indeed the contractors to formally suggest an initiative that would deliver improvements in sustainability. The form could only be used to suggest environmental or sustainability led projects. Along with the form was a SWP log, which logged all suggestions, the estimated saving each delivered and the progress through the system to formally recommend each to the client through to completion.

The SWP process created a quick and simple way to progress sustainability initiatives through from the idea stage to completion. It removed the lengthy organisational bureaucracy from the process that is usually required for normal projects outside of contractual requirements. This process created a list of over sixty recommendations. The client was able to swiftly approve or decline each proposal based on the consumption, cost and payback information that was provided in each SWP. The information from the approved and executed SWPs then fed straight into the Gainshare model to calculate the accumulative returns.

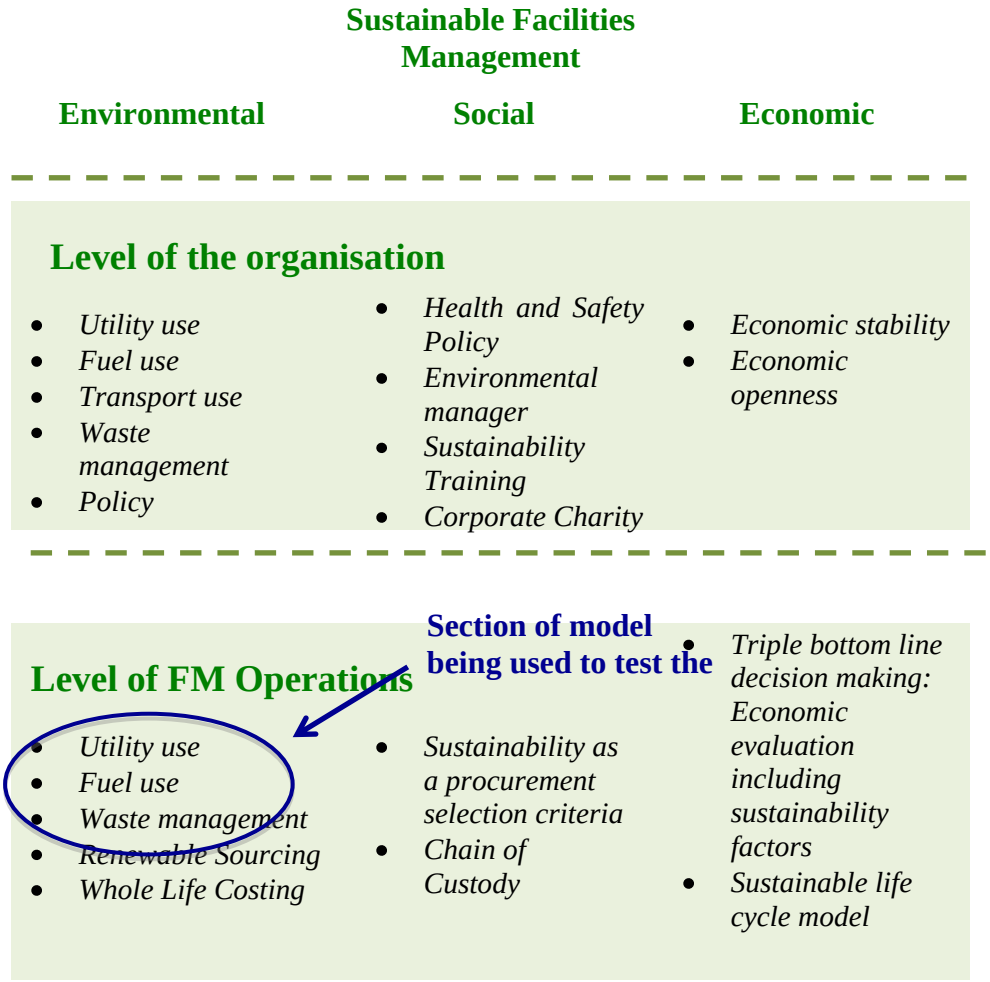
This new process certainly was pivotal in combination with the Gainshare model in providing a quick and simple method to progress the project. The SWP process has not remained in place following the completion of the project. However, this is due to the improvement and development of the organisational systems to include a sustainability assessment as a standard part of all project suggestions and evaluation. The SWP process has evolved into an improved process. The new variations procedure requires the sustainability and environmental impact of all projects to be included in the project assessment. This enables environmental projects as well as standard projects to utilise the same system, at the same time as ensuring all projects are evaluated in terms of their environmental performance.

8.5 Testing the model: The results of the Facilities Management led projects for the Waste and Energy directives

The previous section detailed the method and impact of the designed and situational – or self-created - mechanisms that were in place to motivate the FM team to comply with environmental policy directive through the Carbon Project. Observations were made individually regarding the specific impact of each mechanism, both for the designed and the self-created, and a conclusion was born on whether each one was successful in motivating or not. This section uses data gathered from the case study building to test the overall success of the FM delivered project and the mechanisms used through analysing the results of final carbon reductions and recycling levels. The first section looks at the targets and final results of the carbon project to evaluate the success of the policy and designed mechanisms and the FM team effort. The second section covers the same subject areas for a second policy – recycling and waste management- evaluating the success of the FM team in delivering recycling policy through analysing the changing recycling rate.

The two project areas (Carbon and Recycling) were chosen because of the access to data and the presence of Government directives and targets in place for these area. The case study organisation has data available modelling the use of energy and CO2e emissions and waste data, allowing for the full analysis of project success. However, this is by no means the extent of SFM, they are two areas which make up

the larger model of SFM which are not included in this analysis. The following diagram shows the overall proposed model as shown in section 2.10 and the section which is used for this chapter to analyse the success of the environmental policy delivered by the case study organisation.



8.5.1 Results of the Carbon Directive

The target of the directive was to reduce the CO_2e emissions resulting from electricity, gas and heat use by 10% in one year from May 13th 2010 to May 13th 2011. This translated into a fixed CO_2 figure measured in Kg based on a 10% reduction from the baseline year of 13th May 2009- 13th May 2010. The results were ultimately weather corrected to take into account of extreme hot and cold days that required additional degree heating or cooling days for the building. A third party regulating organisation carried out this correction process.

	Electric kg CO_2 e	Gas kg CO_2 e	Heat kg CO_2 e	**Total kg CO_2 e**
14 May 09 to 13 May 10	12,122,188.03	17,491.23	1,982,044.84	14,121,724.10
10% target equates to:				1,412,173 KgCO_2e

Table 39 A breakdown of the CO_2 target.

Table 39 shows the breakdown of the target across the three emission areas; electricity, heat and gas. The total reduction target is over 1.4 million kgCO_2e for the year. This is quite a significant target to achieve, even more so due to the nature of the building and funding restrictions. The previous chapter described more of the process that was undertaken to achieve the target, however, the first section was to create a carbon model to benchmark the previous year's emissions and to monitor weekly the emissions during the project. This carbon model enabled the results to be shown throughout the project and can also be used to graphically represent the final results.

Initiative	Date implemented	Forecasted savings
Chiller Operation reduction	19/07/2010	548,116.40
Floor plate lighting optimisation- (light level 90%, reduction of zone size and motion detection)	01/09/2010	214,445.68
Park lifts within location 1& 4	06/09/2010	45,664.67
Electric water heating	06/09/2010	
Delay heating season	12/09/2010	58,870.00
Lighting 7&8 – 25% reduction of zone size and motion detection	13/09/2010	20,086.11
Weekend lift modification- 2 lifts in location 2&3	30/09/2010	49,187.17
Secure level 7	01/10/2010	141,603.95
Switch off restaurant lighting when closed	01/10/2010	
PIR in toilets levels G-8	10/10/2010	52,140
Optimisation of meeting room lights- reduce by 10% & and run time to 15 minutes	17/10/2010	5,951.00
Courtyard ventilation	27/10/2010	Not quantified
Chiller operation- seasonal changes	27/10/2010	137,029.35
Reduce humidity control from IT areas	27/10/2010	Not quantified
Switch off ventilation to toilet and 24/7 areas out of hours	27/10/2010	Not quantified
Reduce cooling in restaurant	27/10/2010	Not quantified
Light switch signage	29/10/2010	Not quantified
Time settings for 572 fan coil units	15/11/2010	584,269
Christmas shutdown	24/12/2010	122,000
Loading bay lights- off out of hours	14/01/2011	17,128.00
LED lighting in basement corridor	15/01/2011	137,884.27
Reduce vending provision	12/02/2011	765.41

Table 40 A table to show initiatives implemented in date order.

Over around one hundred initiatives were suggested as part of the project progress. A number of these ideas were generated through two think tank events where industry experts, building engineers and building occupants were invited to brain

storm for possible solutions to deliver the policy target. Table 40 shows a number of the formal projects which were implemented. The majority of the initiatives shown in the table were implemented around September- October 2010. When comparing this table with the graph shown in figure 30 it can be seen that the cumulative impact of the projects began to make an impact on the rate of CO_2 reduction, with a serious change in emissions rate being seen in early November and then again in early December.

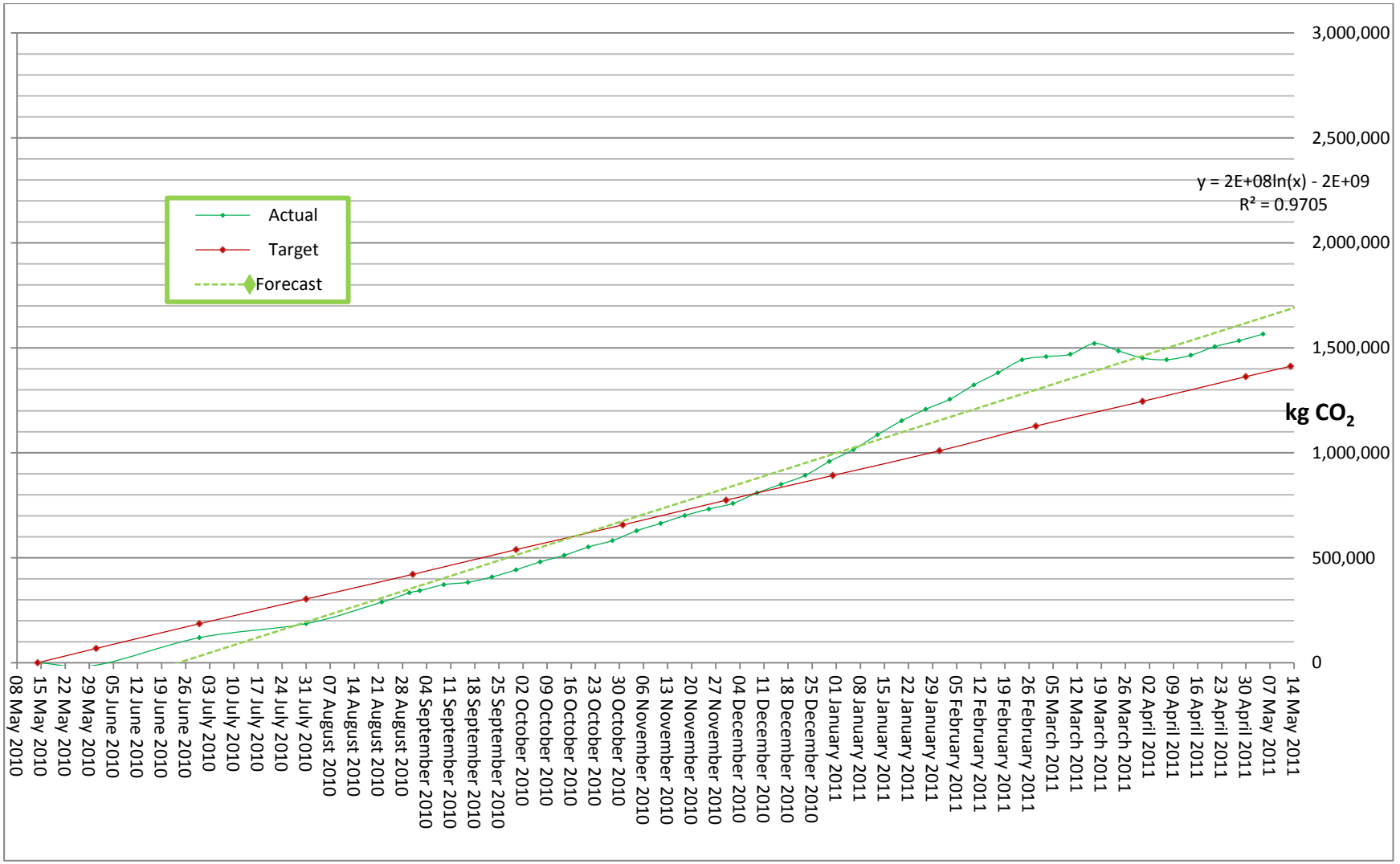


Figure 30 Graph to show energy use over the period of one year from May 13th 2010 – May 13th 2011

The steady green dotted line shows the average line for the reduction rate achieved to date (figure 30), it maps the state likely to be achieved at the end of the project following the current rate of reduction. The red line shows the target line averaged out over the year. The dark green solid line maps the step change in the CO_2e emissions- showing the real time progress of reduction as it is achieved. The graph shows that initially at the beginning of the project the reduction in emissions was not instant and energy use actually increased at the beginning of the project which lowered moral amongst the project team. Real achievement began to be evident the beginning of December. This was after seven months of the project; due to the impact of the initial initiatives beginning to take an impact on the energy use. Subsequently after the rate of energy reduction exceeded the target line, the rate of reduction exelorated raidly following the introduction of the more large scale energy reduction projects.

	Electric kg CO_2 e	Gas kg CO_2 e	Heat kg CO_2 e	Total kg CO_2 e
14 May 10 to 13 May 11	10,565,360	13,175	1,720,007	12,298,542
Reduction achieved:	1,823,182 KgCO_2e (12.9% reduction)			

Table 41 A break down of the final results.

Table 41 shows that the target was not only achieved, but exceeded with the final result a successful 12.9% reduction in CO_2e emissions. The graph (figure 30) gives an indication to the tumulous process that was invovled in setting up some of the processes and mechanisms discussed earlier in this chapter. The graph also reflects operational changes within the client orgnansation which also altered the demand upon energy use within the building. This is particularly noticeable during mid March when a dramatic change in the reduction rate occurred, with the rate of reduction decreasing signifigantly. This was due to world politics meaning that the full operation of the building and provision of services went to twenty-four hour operation, increasing the energy use. Throughout March measures were proposed and implemented to enable the neccessary staff and areas of the building to be supported without the full operation of the building being required, this included solutions such as mobile air conditioning units rather than the full operation of the chilled beam air conditioning system to the whole building. This saw the rate of energy use decrease once again and the rate of reduction in CO_2e emmissions

reduce. This was crucial timing as this fluctaution in the rate of reduction occurred towards the end of the project.

8.5.2 Results of the Waste Directive

The second directive that was tested here was for waste management and recycling. There are numerous requirements for waste management that legislation delivers and there are also a number of directives and policy areas directing environmental improvement. The target for the FM organisation to deliver was a Government directive to increase recycling to 25% of all waste by 2011 and to achieve a zero waste to landfill target.

In order to achieve this directive a number of changes were made to the recycling facilities within the building. Two major changes were carried out; firstly the signage was changed from standard industry signage (figure 31) to bespoke signage (figure 32) specific to the building, this was introduced alongside a communications campaign. The second change was more substantial; it involved changing the recycling system to a co-mingled system– which in turn involved changing the signage again (figure 33)-, removing all desk bins and introducing food and battery recycling. As well as the changes to the facilities, primary research was conducted to investigate the impact of building users behaviour alongside the facility changes; the details of which are discussed in the final section of this chapter.

The following is a summary of the changes that were executed to deliver the policy directives:

- A change in recycling signage from basic industry standard recycling signs to more detailed informative signs giving examples of what items of waste can go in each bin (there was two changes within the project)
- Bin-the-bin project: all the desk bins were removed from the building
- Changes to the recycling system; co-mingled recycling was introduced
- Food composting was introduced
- The battery recycling system was changed

Figure 31 Photographs of the style of the original bin signage- basic standard industry.

Figure 32 Bin signage after the first change- bespoke signage specific to the building.

Figure 33 Photographs of the final signage that was introduced with the system of co-mingled waste.

Looking to the results (figure 34), during the period from October 2010 to July 2011 the recycling facilities throughout the building were following a system of self-separation by the building users. Building users were expected to separate paper, glass, plastic, cardboard and general waste themselves in a series of bins. To improve the recycling rate the bin signage was redesigned to be more bespoke to the building and the common waste materials found. The introduction of the new signs (figure 32) did increase the recycling rate from around 30% typically to around 45% in December 2010 (figure 34). However, the real results for this project were delivered during the second phase of changes, namely the introduction of the co-mingled recycling rate and the execution of the Bin-the-bin scheme, this was delivered in August 2011.

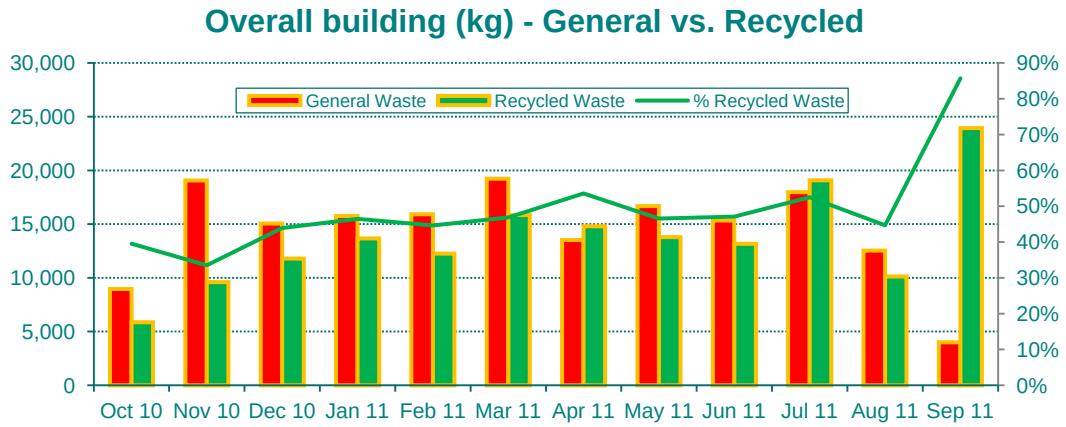


Figure 34 Graph to show changing recycling rate over a year.

The bin-the-bin scheme coupled with the introduction of the co-mingled recycling system was successful and delivered the main progress towards achieving the policy target and improving the recycling facilities. This combination of co-mingled waste, the removal of desk bins and the introduction of food and battery recycling caused the recycling rate jump to 86% in September 2011 (figure 34). This far exceeds the Government targets and also the self-imposed target set by the FM team. The new processes for the recycling system were contested by building users and planners; even though there was top-level endorsement and support from the client organisation. Building occupants were concerned about the distance they would have to travel to get to the nearest recycling point and were dissatisfied with the idea

of transporting food waste to the kitchens. However, regardless of this initial resistance the new system has delivered real results. This is only the result for the first month of the new system where building users are new to the system. This recycling rate is only likely to increase as the understanding of the system and the benefits improves participation throughout the building.

Stage	Item	Result
0	• Self-separation system in place • Signage in place (figure 31).	≈ 30% recycling rate
1	• Redesign of the bin signage (figure 32) • Building wide communication programme	≈15% increase in recycling
2	• Redesign of bin signage (figure 33) • Introduction of co-mingled recycling facilities (two bins provided: 'mixed recyclables' and 'non recyclables') • Removal of desk bins (Bin-the-Bin) • Introduction of food recycling • Introduction of battery recycling • Building wide communication programme	≈ 56% increase in recycling

Table 42 Table to summarise changes to the recycling facilities and the resultant recycling rate.

The Government issued a clear target and directive. However, the FM team ever progressive in their pursuit of SFM aimed to exceed the target and redesign the recycling facilities to deliver industry led facilities. This resulted in the Government target being vastly exceeded, the results being;

- 100% of food waste from the kitchens being recycled
- An increase from an average 45% recycling rate to 86% recycling rate in the first month
- Food waste from the kitchenettes recycled 18,063kg in the past year
- Zero waste to landfill
- 100% used cooking oil recycled to produce bio-diesel

The outcome is a successful project, which exceeded the demands of the government targets. The results show that for the case study, a large-scale office building, a system of co-mingled waste combined with no desk bins and food

recycling delivers exceptionally high recycling rates. This is combined with the previous achievement of zero waste to landfill to deliver a very minimal impact upon the natural environment due to the waste produced throughout the building. It could be argued that this system could be replicated throughout other large office buildings. Another example of where SFM can deliver UK environmental aims.

8.5.2.1 A model for replication

It is accepted that the waste management and recycling project delivered by the FM organisation was a success with the target being vastly exceeded. However, there is a second and possibly more significant finding for this. For the FM team to deliver this target it was necessary for the waste system and facilities to be redesigned, this effectively resulted in a new model for waste management for open plan office buildings being designed and tested in a working situation for a full year. The first stage of the recycling project delivered increased recycling rates of 45%, however it was the second stage that involved the redesign of the system that delivered the most substantial change in recycling rate.

The second model put in place to deliver the target was successful in achieving a 86% recycling rate, along with delivering food composting, battering recycling, generation of biodiesel from cooking oil and maintaining zero waste to landfill. This model as shown in the previous section 8.5.2 can be summarised as follows:

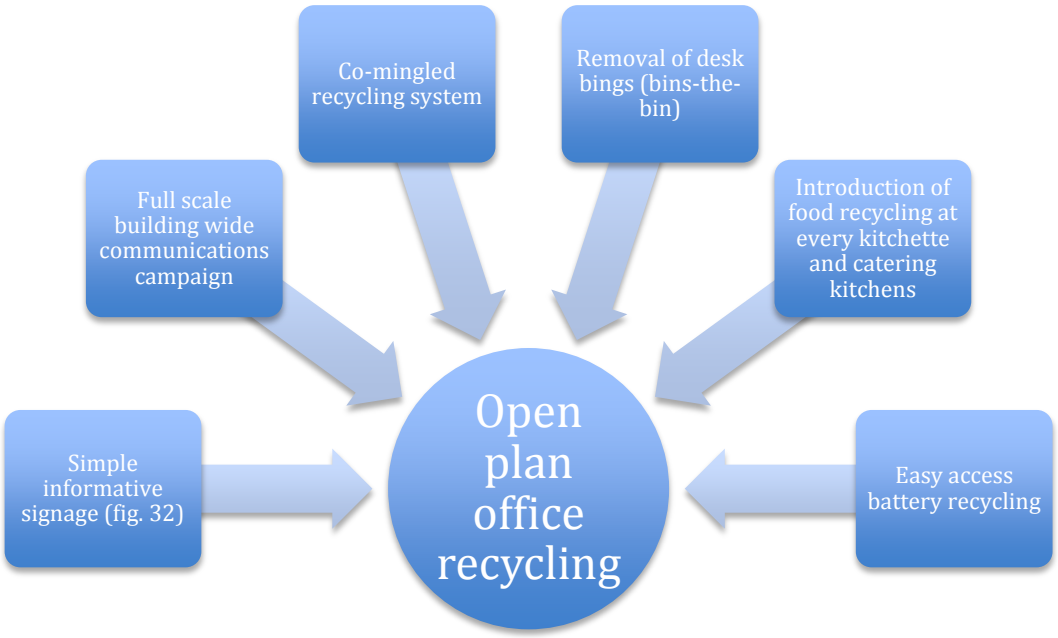


Figure 35 Diagram to show the model system for recycling in a large open plan office

It can be said that this model is able to be replicated in similar office buildings to deliver the target of zero waste to landfill and a recycling rate of over 85%. Due to the nature of this case study building bin-the-bin was a large-scale initiative to implement. This is only likely to be a simpler process in other non public sector offices that are more open to the ideas of a 'paperless office' with central recycling.

8.6 Summary

The Dawson (1996) model worked well as a structure for analysis, providing an effective structure for analysing the inputs and subsequent outputs. The following table concludes the analysis for the outcome against the policy mechanisms.

Variable	Motivational	Comment
REPORTING	Yes	However, it could be argued without it the project would still have had the same success
COMPETITION	Yes	However, it could be argued without it the project would still have had the same success
AUDIT	Yes	However, due to the nature of the organisation an the people involved the threat of audit would not be the reason to comply.
INDIVIDUAL ACCOUNTABILITY	Yes	Highly motivational is ensuring pressure was maintained on success
Non designed mechanisms		
GAINSHARE	Yes	Pivotal in ensuring project success. Without this it could be argued that the project would not have had the same outcome
PEOPLE	Yes	For both it would be a requirement to study other teams to see the affect of people and culture. However, without comparison it can be argued that the situation at this case study has a positive affect.
CULTURE	Yes	
PROCESSES	Yes	Once again pivotal in ensuring progress and success.

Table 43 Summary table of the findings for each mechanism and situational factor.

It can be seen that the designed mechanisms did have a positive effect on the team towards a successful completion of the project. However, the pivotal factors in driving successful compliance can be argued to be the 'non designed' factors i.e. the factors that evolved because of the need for them. If a Gainshare mechanism had been designed and issued as part of the directive it would have motivated all teams towards completion. If the new processes and carbon model had been designed and issued as part of the policy directive it would have again motivated all teams. Due to the cultural and people aspects present within this team, which delivered positive impacts upon the project, the project had been a success. Remove these situational factors and leave the policy directive mechanisms only then the project may not have been such a success.

Both the designed mechanism and the situational mechanisms or factors are interlinked in looking at what motivates the FM team and the reaction of the FM team. Ultimately the FM team were motivated to comply with the policy directives because of the mechanisms or situational mechanisms that motivated them. The FM teams reaction to this policy directive was positive and as discussed earlier led to the development of their own mechanisms in effect.

The outcome of both the carbon project and the recycling project were positive with the policy directives being exceeded. For the carbon project the target of a 10% reduction in CO_2e was exceeded with the final outcome being a 12.9% reduction. This was delivered by a project team consisting of FM professionals, which managed and directed the process. Through observing the project team, it can be said that the client organisation did not have the knowledge or expertise to be able to self deliver this project without the leadership of the FM team. Not only was the project outcome a success but the project process, including management, team and client relationships, and project governance was a success with the case study building being acknowledged by the public sector as delivering real success under difficult circumstances.

The recycling project delivered equal success. This project again was led, managed and implemented by the FM team. The initial target of 25% of all waste to be recycled was vastly exceeded with a final 86% recycling rate being achieved. Considering the environment of a large, public sector building this was beyond the expectations of most industry experts. If it is possible to deliver this recycling rate under this environment it is certainly possible to replicate this success across other business office sites. The system is easily replicable and simple to understand and manage and as such should be used as an example model for wider industry.

Finally, this work towards establishing SFM by the FM team was recognised by an industry award. The FM team were awarded the BIFM Sustainability and Environmental Impact Award for 2011 recognising the FM team's impact in delivering sustainability holistically across the company operations. Although this thesis focuses on two projects for the research data the sustainability agenda of the FM team was a holistic approach as shown by the following diagram.

The Wider Sustainable Development Agenda

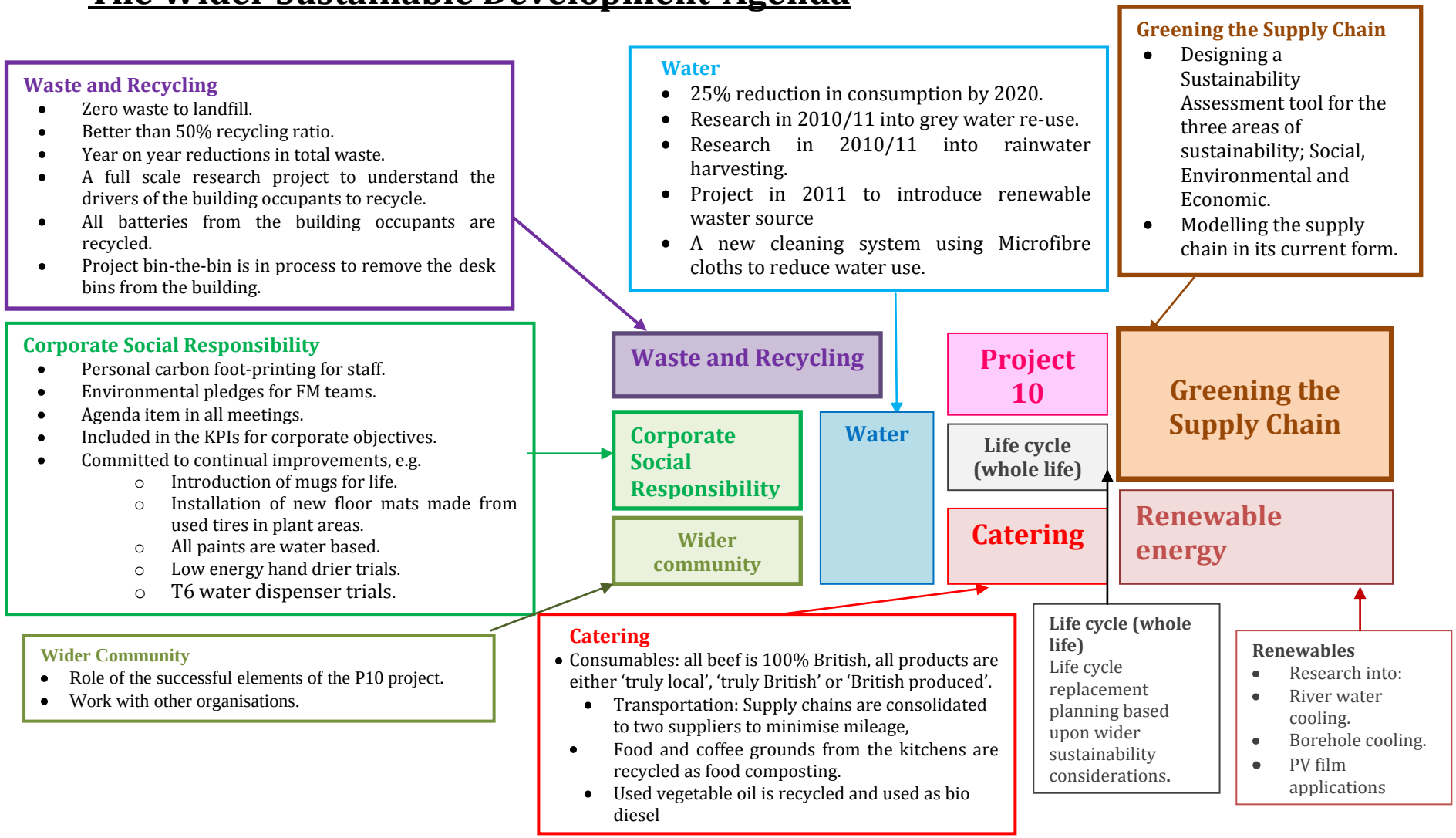


Figure 36 A holistic approach to Sutainable Facilities Management as applied by the case study organisation

As the above diagram shows the FM team pursued nine main areas of sustainability as part of their model of SFM. The main areas were:

- Waste and Recycling
- Wider Community
- Catering
- Life Cycle
- Renewable energy
- Water
- Supply Chain
- Corporate Social Responsibility
- Project 10 (carbon reduction)

The areas included in the above list are a combination of standard sustainability areas and more industry specific areas also. For example managing and delivering life cycle using a sustainable model is specific to FM theory whereas recycling is generic sustainability. Catering is included because it is a large part of the FM contract, and there is a high focus on sustainable sourcing. Ultimately the FM team was awarded industry recognition for their development of a sustainable model of FM that delivered measurable and significant results.

9 Chapter 9: Facilities versus personality in the success debate

9.1 Introduction

The previous section has proved the ability of FM organisations to deliver recycling and carbon reduction policy through their own redesign and management of facilities. However, much of the previous research on this subject focuses on the impact of inherent environmental behaviour within individuals. It is possible to investigate and analyse the success of the FM team in delivering environmental directives, as shown in the previous chapter, however it is not so simple to understand the impact of the building occupants on that success i.e. the impact that environmental behaviour has upon recycling facilities. Here the impact of the facilities, recycler type, behaviour traits and wider information initiatives on the success of recycling within the case study building is investigated. This section seeks to understand the impact of the physical facilities versus the impact of environmental behaviour, to begin to evidence the impact that facilities have on building user behaviour and therefore the success of building wider environmental campaigns.

Previous research, as discussed in section 3.3, has developed an understanding of the impacts that effect environmental behaviour in humans. It has been argued that three factors can be attributed to impacting a person's environmental behaviour (Barr 2002; Barr *et al.* 2003); environmental values (O'Riordan, 1985) ranging from eco-centric to techno-centric (Dunlap and Van Liere, 1978; Dunlap *et al.*, 2000). Barr *et al.* (2003), situational factors such as access to services or gender (Ball and Lawson, 1990; Derksen and Gartell, 1993; Guagnano *et al.*, 1994) and psychological variables that represent personality and perception (Hopper and Nielsen, 1991; De Young, 1986; Chan, 1998; Baldassare and Katz, 1992; Arbutnot, 1977; Tucker, 1992).

For this research is it taken that the facilities as provided to building occupants comes within the situational factors that influence a person's environmental behaviour. Figure 35 illustrates this position. This research will use variables to test

the impact of situational (specifically facilities) and environmental and psychological factors upon the building occupants in the case study setting. The data was gathered through a questionnaire, 500 were distributed to the building occupants with 198 questionnaires returned giving a response rate of 38%.

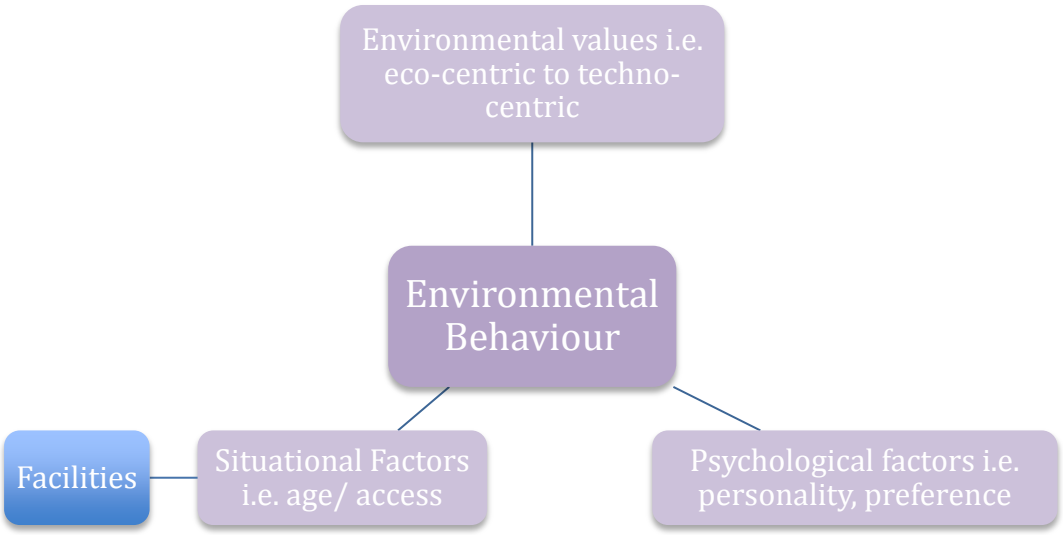


Figure 37 Figure to show impacts upon environmental behaviour (Barr, 2002; Barr, 2003)

Ultimately this chapter seeks to answer the final research question:

- *There is a wealth of research surrounding the impact of environmental behaviour on the success of environmental programmes; however what level of impact does FM have on the success of environmental programmes in large, open plan office environments?*

This chapter discusses the results of one survey, a recycling questionnaire distributed to the case study building. However, the results are broken down into five sections. Firstly developing an understanding of the recycler behaviour type in the building, whether the occupants are frequent recyclers or not. The next two sections answer the main question and look at the impact of the facilities and behaviour traits on environmental behaviour. The next section looks at the issue of

information on environmental behaviour traits and the final section summarises the overall facilities debate.

9.2 Type of Recycler

Firstly it was necessary to build up more of a profile of the building occupants in terms of recycling habits and traits mainly; whether they recycle at home and the impact this might have and what type of materials they typically recycled. It was found that those who recycle at home are more likely to recycle at work ($p = 0.000$) (Price, 2011). The respondents were asked to self analyse the type of recycler they believed they were; the majority of the sample highlighted themselves as a frequent recycler (61%), $p = 0.000$ (Price, 2011). Also a high proportion of respondents described themselves as an occasional recycler (30.3%), with few respondents believing they are infrequent recyclers (3.7%), $p = 0.000$. Respondents who recycle at home are more likely to highlight themselves as a frequent recycler at work ($p = 0.000$) (Price, 2011).

From initial investigations the waste type in offices was judged to be fairly restricted. The modal values indicate that occupants do recycle newspapers, paper and plastic, but do not recycle cardboard, glass and aluminium. This may be linked to facility provision in that paper and plastic bins are available in every kitchen, whereas glass and cardboard bins are not. Glass recycling facilities are only available on floors 1-6 and the waste receptacle is small and not immediately obvious in its purpose. To recycle cardboard the building user is required to telephone the helpdesk and request an operative to remove the materials. These two factors could prevent the building occupants from recycling these two waste streams.

Descriptive statistics			
	Mean	**Mode**	**SD**
Type of recycler 1 if Frequent, 2 if Occasional, 3 if infrequent, 4 if Do not recycle			
Type of recycler	1.51	1	0.763
Motivating Factor 1 if Very strong, 2 if Slightly strong, 3 if Slightly weak, 4 if Very weak, 5 if Not applicable			
• Proximity of facilities	1.61	1	0.672
• Absence of alternative bin	2.46	3	0.899
• Benefits to the environment	1.70	2	0.689
• Personal Benefits	2.43	3	0.879
• Advertising	2.92	3	0.819
• Other	2.31	2	0.855
Reasons for no motivation 1 if Very strong, 2 if Slightly strong, 3 if Slightly weak, 4 if Very weak, 5 if Not applicable			
• Distance of facilities	1.92	1	0.862
• Personal objection	2.92	4	1.188
• Lack of environmental advantages	3.00	4	1.080
• Not clear about materials	2.08	1	0.996
• Lack of information	2.31	3	0.947
• Intended use of bin not clear	1.94	1	0.854
• Not my responsibility	2.62	4	1.325
• Other	1.50	1	0.070
Indicate your level of agreement 1 if Strongly agree, 2 if Slightly agree, 3 if slightly disagree, 4 if strongly disagree			
• Recycling offers a wide range of environmental benefits	1.54	1	0.598
• I feel a personal gain from recycling	2.08	2	0.783
• I understand what items go in which bins	1.67	2	0.673
• I use ‘general waste’ for all by items	3.20	4	1.005
• Bins are located in the best position for my use	2.13	2	0.640

Table 44 Descriptive statistics – recycling behaviour versus facilities design.

9.3 The Impact of Situational Factors – specifically Facilities

This thesis is arguing that facilities are a part of the situational factors that effect environmental behaviour and existing literature is beginning to evidence this. It is beginning to be thought that it is not simply inherent environmental behaviour that determines recycling rates. A descriptive overview shows that the two variables

‘distance of facilities’ (69.3%) and ‘not clear what bins to use’ (68.8%) are strong reasons in motivating against recycling (Price and Pitt, 2011a). The Chi-squared test showed that there is a significant association between those who do not recycle and those who are not clear what bins to use ($p < 0.05$) (Price and Pitt, 2011a). Showing possibly that a lack of information and/or inappropriate receptacles are barriers to participation.

The Kendall’s Tau test ($p < 0.05$, $p = 0.019$) showed an association between occupants who recycle and find the ‘proximity of bins’ a strong influence on their behaviour (Price and Pitt, 2011a). Since the test statistic determined a causal relationship it can be argued that there is a strong relationship between the variable ‘proximity of facilities’ and those who indicate that they recycle. Carrying out the multivariate analysis of variance, Pillai’s Trace and Wilk’s Lambda show that the association between the type of recycler and both the ‘proximity of facilities’ and the ‘distance of facilities’ was statistically significant ($p = 0.016$) (Price and Pitt, 2011a). Frequent recyclers are highly influenced by the ‘proximity of the facilities’ whilst non-recyclers are influenced by the ‘distance of facilities’.

The univariate analysis of variance shows that occupants are more likely to be a frequent recycler if they; agree that the bins are ‘located in the best position’ ($p < 0.05$, $p = 0.09$), understand which ‘items go in which bins’ ($p < 0.05$, $p = 0.011$) and agree with the ‘location’ ($p < 0.05$, $p = 0.031$) (Price and Pitt, 2011a).

This shows that more effective location of the recycling facilities is likely to increase the recycling rate by motivating the current non-recyclers to participate. In particular the perceived distance of the facilities is an important factor, suggesting that when designing recycling facilities within offices the number and location of the facilities are important. In addition the results suggest that the information signs provided on the recycling receptacle are an important motivator to those that recycle.

9.4 The Impact of Psychological and Environmental Values

Alternatively, previous literature is highly focused on the impact behaviour traits have on environmental behaviour and therefore the success of recycling schemes. The association between type of recycler and the two variables 'benefits to the environment' ($p < 0.05$, $p = 0.000$) and recycling offers 'environmental advantages' ($p < 0.05$, $p = 0.000$) is significant (Price and Pitt, 2011a). An analysis of variance, the Kruskal Wallis test showed that the 'environmental benefits' ($p < 0.05$, $p = 0.000$) and the opinion that recycling offers a wide range of 'environmental benefits' ($p < 0.05$, $p = 0.023$) were considered a strong factor in the behaviour of recyclers, i.e. the people who do recycle are affected by their pro environmental attitude (Price and Pitt, 2011a). The factors that proved to have weak associations in motivating the non-recyclers against recycling are 'personal objection', 'lack of environmental benefits', and 'not my responsibility'. For the non-recyclers a lack of belief in 'environmental benefits' was not found to be a significant factor ($p < 0.05$, $p = 0.153$) (Price and Pitt, 2011a). These variables related to environmental behaviour are shown not to be the significant reason in preventing recycling in the non-recycling group. In other words, the non-recyclers are not found to be prevented from recycling due to a lack of environmental beliefs.

A Spearman's correlation test showed that the relationship between the non-recyclers and the variable 'not clear what materials are recyclable' is statistically significant with ($p < 0.05$, $p = 0.040$) (Price and Pitt, 2011a). This strength in relationship could indicate that rather than a lack of environmental belief, the occupants are deterred by confusion over what materials are recyclable. This could be because of inadequate facilities, a lack of signage or a misunderstanding of the information presented. The variables that are related to facilities specifically are stronger factors in causing users to not recycle.

9.5 Wider information initiatives

Finally, it is thought that wider information initiatives could have an impact upon the success of a recycling scheme, and this was certainly a factor that contributed to the success of the recycling project delivered by the FM organisation as discussed in Chapter 8. This was tested here by looking at the type of recycler against their possible desire for more information. The individuals who do recycle indicated that they do not want more information about recycling in the work place. Similarly the individuals who do not recycle also indicated that they do not want more information except for one variable. People who do not recycle in work want more information about the location of the recycling facilities. The Chi-squared test shows this association is significant ($p < 0.05$, $p = 0.010$) (Price and Pitt, 2011a).

The multivariate analysis shows the importance of giving information about the intended use of each bin. The test for Pillai's Trace shows that if building occupants are unsure about the 'intended use of a bin' this has an effect on whether they recycle in work and the type of recycler they are ($p < 0.05$, $p = 0.04$) (Price and Pitt, 2011a). Carrying out an analysis of covariance shows beyond this, a personal objection to recycling influences the type of recycling behaviour, ($p < 0.05$, $p = 0.018$) (Price and Pitt, 2011a).

9.6 Overall the facilities debate

A descriptive overview of the effect of environmental behaviour variables show that the variable 'environmental benefit' is considered to be a slightly strong factor in influencing recycling behaviour. The multivariate test between groups (type of recycler, agreement with 'bin location', 'proximity of facilities' and 'environmental benefit') was statistically significant.

9.7 Summary

The results of this chapter have reinforced what was discovered in the previous results chapter; that the FM team consistently go beyond contractual and Government requirements in the delivery of sustainable development. This chapter presented the results of the carbon project, the formation and delivery of which was presented in the previous chapter. The target of a 1.41 million $KgCO_2e$ reduction was exceeded with the final result being a 1.8 million $KgCO_2e$ reduction from the building. This is a permanent reduction, with the results and the benefits being delivered consistently year on year if the initiatives and building settings developed throughout the project remain in place. The second example of policy delivery was for the recycling and waste management policy. The target for this again was exceeded with 85% recycling rate achieved exceeding the target of 25%. In addition to this the target to deliver zero waste to landfill was achieved early and food composting was introduced. This latter achievement puts the building ahead of a looming nationwide environmental policy update that is to remove food waste from landfill across the UK. Battery recycling was also introduced to a remarkable success. This demonstrates the ability of the FM team to manage the delivery of environmental policy for the built environment.

When looking at the impact of behaviour versus facilities, throughout the analysis the 'bin location' variable consistently appears to be significant. The majority of the building users agree with the location of the recycling facilities, which coincides with the majority indicating they are frequent recyclers (Price and Pitt, 2011a). There is a correlation between the occupants who recycle and the variables 'proximity of facilities' ($p < 0.05$, $p = 0.039$) and agreement that the 'bins are located in the best position' ($p < 0.05$, $p = 0.006$) (Price and Pitt, 2011a). Consistently the results show that location factors are highly influential in both motivating recyclers and preventing the participation of non-recyclers (Price and Pitt, 2011a). This shows the importance of engaging FM organisations in the operation and design of recycling facilities. This result coupled with the results from the first two sections of this chapter -showing the success in FM organisations delivering environmental

policy -pose a strong argument for utilising the skills of the FM industry to deliver environmental policy.

PART 4: DISCUSSION AND CONCLUSION

10 Chapter 10: Discussion

10.1 Introduction

This thesis sought to demonstrate the contribution that the FM industry could add to the progression of environmental policy within the built environment. It sought to present an in depth position of SFM, provide an exploratory understanding of the indicators of sustainable business practice and present what motivates towards SFM. All these areas are a contribution to knowledge in the currently under researched and latest stage of development in the FM model; the area of SFM. Ultimately SFM is the operationalization and application of sustainable business practice and this thesis seeks to demonstrate if, and therefore how, this is executed.

A combination of the knowledge of; the impending environmental damage caused by the release of greenhouse gases, the established knowledge of the built environments' large contribution to this, the literature review of SFM all directed and justified the research path chosen for the thesis. Currently within the literature there is little or no research demonstrating the role that the FM industry can play in specifically delivering targeted environmental policy for the built environment. Current research and policy focuses on the building occupants and the energy consumption attributed with their operations. However, the extent to which there is a desire for FM operations to evolve into SFM is not known; and whether this be due to a moral dilemma or a desire to capitalise on a growing market.

This chapter provides an overview of the discussion of results. It is divided into five sections. The chapter begins with concluding the current position of SFM in practice and a discussion of the indicators of sustainable business practice. Section two develops this to discuss the interaction of sustainability and value, remaining within the context of FM, and concluding with the proposed framework for SFM. Section three moves towards discussing the way that FM organisations react towards environmental policy, developing the knowledge to understand whether FM

organisations are best placed to deliver environmental policy for the built environment. The effects of the mechanisms designed within the policy to motivate FM organisations are discussed as are the results of the project. Section four discusses the impact of facility provision (as a situational factor) versus the building occupants environmental behaviour on the success of the recycling directive. The final section introduces the limitations to this study and future paths for the research to develop the contribution to knowledge.

10.2 The meaning of Sustainable Facilities Management; an industry benchmark

The literature review revealed although minimal, research is beginning to emerge from this area. The literature review allowed a basic understanding of the topic to allow the first research stage to be developed to answer the following question:

1) What is the current position of the FM industry towards sustainable development in terms of organisational application and what are the key factors which are influence its implementation?

This question involved identifying the main variables that exist within SFM organisations to develop a benchmark position for SFM.

10.2.1 The current position; impact of size and sustainability policies

The research focused on the position of SFM through establishing the position of the industry according to a number of indicators established through the literature review. Generally the indicators were found to be size of company, the position of a SP, gaining environmental awards, reporting on sustainability and setting targets. Both size and the position of a SP were found to impact the development of sustainable business practice. Large companies were found to be more likely to have the indicators of sustainable business practice. The literature review found that small

companies do not recognise environmental issues so readily and this thesis reinforces this finding.

This thesis found that having a SP in place is likely to ensure further sustainable initiatives are embedded into the company, successfully influencing sustainable business practice. However, this disagrees with current research identified in the literature review which suggests that companies with environmental policies are not necessarily motivated to act on them (Elmualim et al, 2010; Carpenter and Meehan, 2002; Baylis et al, 1998). Over half of the companies with a SP have gained awards, over three quarters report on sustainability and nearly a third have established targets.

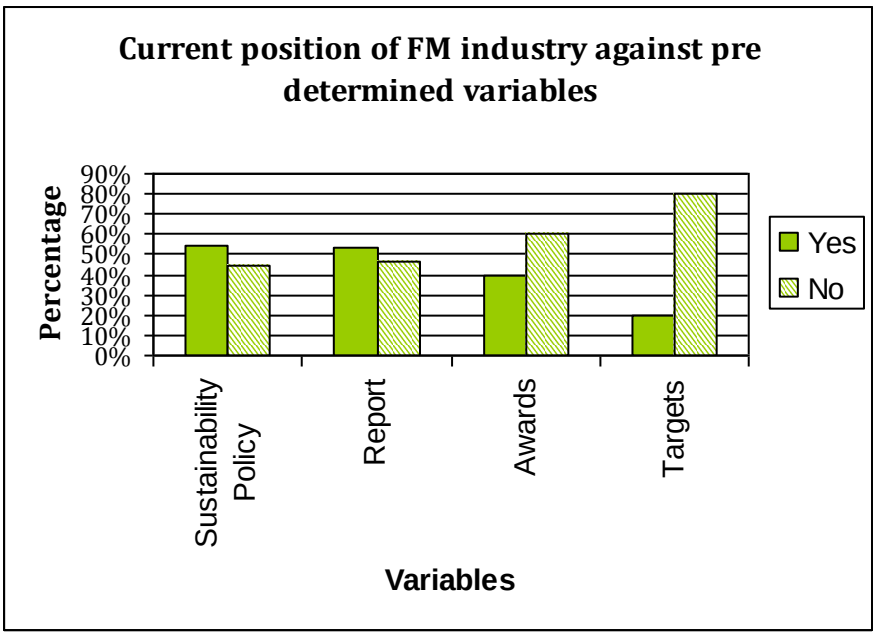
However, not all companies that have awards, report on sustainable practice and set targets have a SP. The relationship is not a definite one. Perhaps this could be due to the nature of the industry, as an FM company can gain an environmental award for one project, due to a specific client request or culture, but the FM company itself does not need to have a standard procedure for all contracts. Large organisations are more likely to gain awards and report on sustainable issues. This is relevant for the future in terms of achieving environmental targets. Current legislation drivers do not seem to be impacting on the behaviour of small FM organisations.

As well as having a SP, size of company was a variable that impacts the uptake of sustainable business practice. Looking at the industry standard it seems that large FM organisations more often display indicators of sustainable business practice. Baylis *et al.* (1998) established a link between size of company and the recognition of company impacts upon the environment within the wider business environment. The findings here extend this theory to the FM environment with large companies more likely to be practicing SFM according to the indicators established here. The case that over half of FM organisations have a SP, most of which are medium to large organisations also reflect findings from research Baylis *et al.* (1998) which concluded that *"Size is a very important factor in explaining why companies make environmental improvements"*. Large companies are more likely to implement

sustainable business practice across the board, being three times more likely to cite environmental policy as a stimulus for environmental improvements (Baylis *et al.*, 1998); thus supporting the findings here that this is still the case.

10.2.2 Establishing a benchmark for Sustainable Facilities Management

An industry benchmark can be established following the first research stage. The following graph is included in chapter 6. It shows that the average FM organisation is likely to have a SP in place and report on sustainable issues. At this stage in the development of the FM model it is possible to argue that the presence of those two factors will indicate a company that is involved in sustainable business practice. It is less likely that an average organisation has gained environmental awards or has set their own internal environmental targets.



In establishing the industry benchmark it is clear that within the FM industry sustainable business practice is not yet embedded. However, it is apparent that sustainability is beginning to play more of an influential role, especially amongst the larger companies.

10.2.3 Validating the case study

Before embarking on detailed research using the case organisation it was necessary to validate the case study against this industry average to ensure if was truly reflective on the wider industry. The case study was required to be practicing sustainable business practice to enable to research data on how this looks to be gathered. However, there current level of implementation cannot be too far from the industry average.

Indicator	**Industry**	**Average small company**	**Case Study**
SP	√	**X**	√
Report	√	**X**	√
Awards	**X**	**X**	**X**
Targets	**X**	**X**	√

Table 45 Table summarising the industry benchmark towards SFM

The above table shows the position of the case study against the established industry average using the same variables to identify behaviour. When validating the case study it is clear that the case study organisation is more active in implementing sustainable business practice than the average FM organisation. This established that the case study was validated and able to be used for the further research.

10.3 Sustainable facilities management and the value added

The first research stage established the current position of the FM industry towards sustainable development through conducting research at the industry level. This established indicators of sustainable practice and developed a benchmark to indicate the current standard against these. However, more detailed research on the topic area

is required to understand the true position and for this the case study was used to answer the second research question:

2) What is the understanding and interpretation of sustainability within the FM context?

For this question there are a number of discussion points that were developed in the research. The case study was used to create a definition of sustainability in the context of FM which provided the grounding for the case study to then go on to explore the wider meaning on this in terms of operational FM. Ultimately a framework is proposed as a model for SFM.

10.3.1 Sustainability in the context of Facilities Management

The literature review illustrated that other researchers have defined sustainability in the context of their field in order to direct a the initial wide subject area into a focus subject for relative discussion. Many researchers have defined sustainability in the context of Construction (Abidin *et al*., 2003; Addis and Talbot, 2001; Department of the Environment, Transport and the Regions, 2000; Raynsford, 2000; Bogenstatter, 2000; Edwards, 1999). Wood (2006) on feeling that the Brudtland statement was too negative developed the following definition of sustainability in the context of Construction, maintenance and management at the commencement of the research; *'Improving quality of life consistent with the capacity of supporting infrastructure'*. Abidin and Pasquire (2005) define sustainability in the context of Construction as a precursor to researching its relationship with value management.

The case study defined sustainability in the context of FM as 'delivering the requirements with minimal impact on resources'. This differs from the most commonly accepted definition of sustainability as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UN, 1987). It is also quiet focused, more focused than Wood's definition above for example. However, it reflects the role and purpose of FM operations. The application of sustainability within FM operations does not need to

follow the broad and political definition of sustainable development; environmental policy for FM operations should target their definition of sustainability, which is likely to deliver real results.

10.3.2 Application of Sustainable Facilities Management

The case study was interviewed and issued with a survey to gather more information between their daily operations and the relationship with SFM. It is known that the industry is moving towards SFM and it is known that the case study organisation practices SFM but the relationship between the professionals and the daily operations and SFM is not widely understood. It was found that the case study do consider themselves to be aware of sustainable development issues, however there is a feeling that there is a desire to do more for which assistance and direction may be required. There is a desire to improve as currently the case study believe the management of sustainable development is only carried out to an average standard. In addition to this there are a number of areas that are considered critical in terms of requiring sustainable development, and overall the case study is not satisfied with the current level of sustainable development implemented.

What the results do show is that the FM model is evolving of its own accord towards SFM rather than reacting to contractual or legislative requirements. The FM team may self-deliver against the broad spectrum of sustainability due to market forces, of which there are many. The issue of security of energy supply will concern the FM industry that, with performance parameters, will have to ensure the provision of services. For resilience purposes it is advantageous for FM organisations to diversify energy sources, and this should hopefully involve renewables. Although the barriers to this often rest with funding restrictions and large capital investment requirements, this could be improved with development of the current weak policy position. Another market force, the rising cost of energy, again is likely to drive the FM industry to reduce energy use at least through efficiency drives if not through extensive retrofitting. The extent to which this is delivered is likely to depend on contractual provisions- depending on whether the FM organisation or the client is the bill payer for energy. These market forces are certainly financially driven.

With the case study, it is certainly not the case that sustainable business practice is driven by contractual provisions; the FM case study has far exceeded their requirements for sustainability according to the contract. A culture of SFM exists, where there is a more moral drive to reduce the use of natural resources across the spectrum of the building services. The FM team has also far exceeded Government environmental policy directives showing that their impact upon the selection, operation and management of properties can be used in conjunction with their knowledge to deliver cutting edge solutions to sustainability requirements beyond what is currently being demanded. This puts strong weight to the argument that the roots of SFM are not purely from a financial background. There is a strong desire to apply knowledge and to innovate.

The FM case study indicated that they believed environmental performance, energy conservation, reduction in emissions, energy awareness and good water management were all key factors for indicators of business performance. This reflects what has been found in the literature review for example the research by Elmualim *et al.* (2010) and Carpenter and Meehan (2002) found that energy and waste and recycling were key policy drivers. The content analysis identified the following as being indicators of sustainable business practice; have a SP, reporting on sustainability and having an environmental award. These are all areas which, when used alongside the holistic list developed by Shaw and Haynes (2004) and Hinks and McNay (1999), are considered variables which can measure business performance. When the case study was asked to select indicators most beneficial to be used to indicate business performance, on of the most commonly selected indicators was 'environmental performance'. This indicates that the case study consider indicators of environmental performance as a key tool to measure general business performance of FM organisations. This can be argued to be another area to show the operationalisation of SFM.

The indicators or variables that have emerged are not financially focused which might have been the original expectation. Hodge (2005) and Elmualim *et al.* (2010) both argued that opinion of SFM was still focused on cost reduction. The findings in this thesis, gained through developing the indicators of sustainable business practice,

could be argued to show that SFM has moved away from a singular focus upon cost reduction. It was found that the reasons to have a SP were believed to range from legislation and reducing costs to creating a better environment. When looking at the reasons to have a SP only one out of eight reasons cited was financially motivated; to reduce costs, with the other reasons more aligned with a moral grounding. This reflects the findings discussed above in reference to indicators of sustainable business practice. The motivation to be responsible reflects what Zhang *et al.* (2008) found; that community pressure has a positive effect on conducting environmental work.

Environmental issues are increasingly being included as part of core business operations for large organisations, due to motivators such as the CRC, and it is likely to mean that the FM department will adopt environmental targets. This supports Edum- Fotwe *et al.* (2003) and Noor and Pitt (2009) who state that the FM industry is moving more towards supporting businesses host operations. However, the case study is a small organisation which strides ahead of the industry average in terms of sustainability delivery. Indicating that there is a combination of factors involved in driving a company towards SFM.

Added value in the FM context can be defined as 'going over and above the prescribed service'. This relates to the idea of added value as distinguished by Gronroos (1997) as the additional service delivered on top of the core solution. This could be a reflection of previous research which states that the FM industries idea of added value differs from other industries, in that it focuses more on cores services as strategic services, which may deter from the idea of looking at expectations. But is the concept of sustainability viewed differently within FM compared to wider industries?

It is useful here to reflect back to the question, considering the argument of sustainable development being the pursuit of a revenue stream or moral advancement. The case study are acknowledging their belief that sustainable development does add to the cost initially but delivers added value and cost savings in the long run. In addition there are no contractual requirements for this case study to practice sustainable development. In addition they actually consider themselves to

be falling below the potential of what could be achieved for sustainable development and there is a clear desire to achieve more. This illustrates that the drive for sustainable development is not purely financial, but a desire to deliver the operational requirements in a sustainable manner.

The FM industry is open to sustainable business practice. There is a welcome feeling to further SP with the impression that it is taken to be an opportunity to innovate, invest in ideas and to develop the industry positively from within. This is demonstrated by the development and introduction of self-designed processes which embedded sustainability within the case study organisation and throughout the supply chain. It is the opportunity for industry recognition and presentation of skill rather than simple payback that is a strong motivating factor.

A framework for SFM was developed following the research to establish the meaning of this subject within the wider industry and the case study organisation. Both the industry and the case study organisation were more developed in terms of applying SFM than first expected. This is especially the case with the case study organisation in which there is evidenced operationalisation of SFM. It is a widely accepted notion that the FM industry is a continually developing model due to external market forces and changing client requirements. It can be argued that SFM is the latest development of this FM model; with the three pillars of sustainability being incorporated into the traditional FM concepts and process.

10.3.3 The relationship between Sustainable Facilities Management and value

Added value here is considered to be going above and beyond the prescribed service, even if it involves additional costs. This follows a similar idea as developed by Gronross (1997). Making the link to sustainability, sustainable added value can be defined here as providing a sustainable solution as a method to improve the initial service. Meaning that the result is the same as the initial request but the method to get there was sustainable, delivering minimal impacts upon the natural environment. This reduction in impact is the added factor to the process. This could be

implemented either with a focus upon financial benefits or moral benefits of the process.

The case study views sustainable practice as having a '*initial cost, but longer term cost savings*'. Remembering that this case study actively implements sustainable business practice. Is it the case that organisations will often only implement sustainable solutions if the value added by the sustainable advantage is greater than the environmental damage caused through not using that solution- an idea proposed by Figge and Hahn (2004). Figge and Hahn (2004) believe that sustainable added value is the extra value created when the overall level of environmental and social impacts remain constant. For the FM model it can be argued that sustainable added value is delivering the same outcome of service provision through reduced use of natural capital. This is evidenced through the case study research; with delivered the same level of output with a 10% reduction in energy use for example.

Perceived or real high costs associated with sustainable activities can act as a barrier to implementation, the initial research and the participants opinion, show that sustainability is still viewed as a factor that will increase costs (Dahle and Neumayer, 2001; Abidin and Pasquire, 2005). However, within the case study there was the opinion that sustainable solutions add to the value of a service. The case study defined sustainable added value as an improvement to the service through providing a sustainable solution. Showing that a change in perception could be occurring, or that in the FM industry there is a realisation of the value of sustainability greater than elsewhere. It is likely that the knowledge and skills of the FM professional in management and maintenance of building systems is likely to lend itself to the development of sustainable operations.

10.4 Analysis of compliance mechanisms; testing the model of Sustainable Facilities Management

The main body of the research was conducted through a two-year observational research strategy. This focused on observing the FM team in the delivery of two environmental directives under the impression of policy mechanisms. Observing

how the FM team reacted to the policy mechanisms and then evaluating the result of the two directives against the initial targets enabled the following research question to be answered:

3) The built environment is a central part to delivering UK carbon reduction targets; is FM able to deliver environmental policy directives specifically for the current built estate and what are the factors which impact this?

This section discussed two main areas of the results; the reaction of the FM to the compliance mechanisms and the project results. This enables the success of FM delivered environmental policy to evaluated.

10.4.1 Environmental policy mechanisms and the impact on the Facilities Management team

DTI (2009) believes that the FM industry has the potential to be at the forefront of delivery for sustainability due to the impact upon the selection, operation and management of properties that is available to the industry. However, firstly it is necessary to highlight that there is little research available to indicate that the FM industry is being involved in environmental policy formation or that policy makers are acknowledging the idea of the potential contribution to be made. This ability combined with a sustainably focused FM company can be an effective tool for advancing environmental policy.

Both financial and non-financial mechanisms have a motivating effect upon FM organisations complying with environmental policy. However, it is known that within the case study there is a predisposition towards operating sustainably, which could be evidenced further through the process of self-mechanising that was witnessed. Chapter 8 concluded by evaluating the success of designed and self-designed mechanisms present during the policy directive (table 46).

Variable	Motivational	Comment
REPORTING	Yes	However, it could be argued without it the project would still have had the same success
COMPETITION	Yes	However, it could be argued without it the project would still have had the same success
AUDIT	Yes	However, due to the nature of the organisation an the people involved the threat of audit would not be the reason to comply.
INDIVIDUAL ACCOUNTABILITY	Yes	Highly motivational is ensuring pressure was maintained on success
Non designed mechanisms		
GAINSHARE	Yes	Pivotal in ensuring project success. Without this it could be argued that the project would not have had the same outcome
PEOPLE	Yes	For both it would be a requirement to study other teams to see the affect of people and culture. However, without comparison it can be argued that the situation at this case study has a positive affect.
CULTURE	Yes	
PROCESSES	Yes	Once again pivotal in ensuring progress and success.

Table 46 Conclusions from chapter 8.

Many existing environmental related policies include reporting as a compliance mechanism for example, the CRC requires self-reporting of energy use to the Environment Agency and the European Clean Water Act. Non-compliance with this mechanism has been found previously in existing research (Harrington, 2003). Even though the reporting function was complied with, the mechanism wasn't found to be a greatly influential motivating factor here. Audit as a mechanism follows a similar pattern and is linked to the idea of reporting. Macho-Stadler and Perez-Castrillo (2006) found that with minor audit pressure exerted companies were found to decrease emissions but continue to not report, and under strong audit pressure companies were found to report more accurately. So if the company reports were

likely to be audited they were more likely to collate reports. Again showing that reporting in itself is not a strong motivator. Macho-Stadler and Perez-Castrillo (2006) concluded that for audit to be used to its full potential as a motivating mechanism it should be followed up with inspection and sanctions. Required audits have more of an influence than voluntary audits, which were found to be treated with suspicion (Campbell and Byington, 1995). The audit function on the FM team did not have a great influence over behaviour, however it was not a condition of strong audit pressure. There was also the knowledge that the end reporting on the results would be minimal therefore distracting from any pressure resulting from the auditing mechanism.

The element of competition was found to motivate the FM team. There was a strong desire to come out on top and demonstrate the abilities of the organisation. This was encouraged through official competitions between the buildings involved in the policy. However, this could have been used more effectively as the element of competition was quite minimal. There was an awareness of a final league table to be published at the end of the project, but this could have been extended to include for example an award ceremony, prize giving or a bonus system to develop the element of competition. This could have been developed into an emissions trading scheme with a financial cost levied on the CO_2e emissions, to develop a sense of financial competition. This type of financial incentive is in use in many environmental policy initiatives and is deemed to be successful (Cooper, 2008). However, this would not be exempt from a traditional cost/benefit analysis whereby it might be cheaper overall to not comply (Stigler, 1970). However, given the nature of the policy the combination of rising costs of energy and a financial reward/penalty system linked to competition is likely to impact upon the bottom line which is something that is likely to generate compliance (Wehrmeyer *et al.*, 2009).

Individual accountability can also be linked to monetary incentives. Accountability was found to be a very strong factor in driving compliance in this case. The accountable person was highly focused on ensuring pressure was maintained to achieve the policy directive. There is a feeling that monetary incentives should become a stronger feature when motivating managers (Gabel and Sinclair-Desgagne, 1993). In this case there was no financial incentive linked to the individual

accountability. There was however other incentives. There was a clear indication that failure could result in demotion. There is an internal prize ceremony each year and a successful project may result in gaining a personal award through this ceremony, and this in fact did happen for the team. The individual accountability may have been such a motivational factor here because of the closeness of that individual to senior members of the organisation. Failure would be attributed to the individual and there was a knowledge that senior members of the organisation would know this.

However what was particularly interesting was that the non-policy mechanisms were seen to be pivotal in motivating compliance. The FM team in effect self-mechanised, creating a number of incentives themselves that motivated towards compliance. The first of these was the Gainshare model. This was highly influential and was really the only financial incentive involved in the policy. If future environmental policy were to include predefined Gainshare mechanisms it could be highly successful. This theory is already seen through such schemes as the FiT which was designed to encourage the take up of solar and PV technology. It is generally acknowledged that this has been successful in encouraging the take up of the technology and as a result of increased competition between providers and in the uptake of the technology has resulted in lowering the cost of the technology itself.

It was also acknowledged that the culture and the people factor were highly influential at this case study. Teams, training, empowerment, rewards and top management support have all been highlighted as factors that affect culture (Balzarova *et al.*, 2006). It can be said that these factors were influential within the case study, however a real analysis of this would only be possible if a comparison to other case studies was available. The importance of cultural change has been highlighted as an important part of the environmental improvement process (notably; Balzarova *et al.,* 2006; Kitazawa and Sarkis, 2000). Alternatively, the inability of organisations to incorporate an EMS into company culture has been cited as a reason for failure to deliver results against environmental progression (Ronnenberg *et al.,* 2010). Cummings and Worley (2008) cite embedding the change in culture as a key feature of implementing environmental improvement. This can be demonstrated by the case study as there was an acceptance of change and an

intention to refocus operations and this was known and understood by all employees of the organisation. Sustainability was linked to company strategic objectives ensuring that the direction for change came from the top. It could be argued that without this culture present the uptake of change in delivering SFM may not have been so successful. There was no evidence of a real resistance to change during the execution of the project and therefore it is not seen as an area requiring expansion in the discussion.

The creation of a number of processes was crucial in embedding the project aim within the wider organisation. Again this was not prescriptive in the policy requirements but rather created by the FM team as a method to drive the project forward. If such processes were required by future policy documents it is likely that compliance, and project outcomes, would improve. However, it might also be seen as being too prescriptive to which resistance could be present. Also one system that works for one organisation may not be so successful for the next.

Although the policy mechanisms worked to motivate the FM team, it can be argued that if the FM team was not predisposed to sustainable business practice the results may not have been the same. This could add more weight to the argument that, in this case at least, the motivation to implement SFM in fact stems from a moral grounding. The self-designed mechanisms were the strongest factor in motivating the team and the organisation towards SFM and policy compliance. It can be argued that this again demonstrates that the current position of FM organisations is forward thinking in terms of sustainable development. It could be seen to demonstrate that there is a welcoming attitude to increased environmental policy, or alternatively the provision of an environment where the FM organisations can more easily pursue environmental progression.

10.4.2 The success of Facilities Management led environmental projects

For the case study example it is simple to evaluate the project success to demonstrate the potential for FM organisations to deliver a sustainable exiting built estate. The second half of Chapter 8 demonstrated the ability of a sustainably

operated FM team to deliver and exceed environmental policy targets in the built environment. The FM team exceeded directive targets for two areas of environmental policy, even with the restrictions of limited funding, grade one listed status and a 24/7 operational building. The Carbon reduction target of 10% was exceeded delivering a 12.9% reduction in emissions that equated to nearly a £500,000 reduction in the energy bill in the first year. Through the Gainshare mechanism this financial benefit generates this level of saving year on year to provide a funding mechanism to deliver further sustainability led projects. The recycling target was also exceeded with a 86% recycling rate delivered alongside the other key achievements such as zero waste to landfill, bin-the-bin and food composting. If this ability was harnessed across the built estate then the reduction of greenhouse gases could be dramatic. However, it can be argued that the policy requirements are currently lacking.

A key secondary finding of the recycling project was a waste management and recycling system which was highly effective in the large scale, open plan, city centre office building which is able to be replicated. It is highly probable that this recycling system implemented in other such similar buildings will deliver the same level of success providing an FM led solution to waste management and recycling. The recycling rate increased dramatically when the following system was introduced: co-mingled recycling, food composting and the removal of desk bins. The previous system was a self-separation recycling system, which still provided desk bins for the occupants. The statistics show that a co-mingled recycling system, treating food separately, is effective at producing a very high recycling rate. Landfill is avoiding by sending the remaining un-recycled waste to energy recovery. There is a lot of research existing focusing on household and educational establishments recycling systems. This research here could be the basis for more extensive research within the office environment.

It is evident here the role that FM organisations can, and should, play in developing the built environment to fulfil environmental policy and operate in a more sustainable manner. The FM team successfully delivered the policy directive to reduce CO_2e emissions and deliver recycling policy, even when the policy itself did

not contain influential compliance mechanisms. This demonstrates the possible positive results that could be generated towards the UKs aim to reduce greenhouse gas emissions if the FM industry is involved to a much greater and more defined level within the built environments environmental initiatives. Currently, clearly the FM industry is involved already but the full potential may not be harnessed.

10.5 Facilities versus the personality debate

Another key area of research that was highlighted in the literature review was the argument that environmental behaviour was constructed of three key areas; situational factors, environmental value and psychological factors. It is argued as part of this thesis that physical facilities come under the remit of situational factors and therefore is likely to impact the environmental behaviour of building occupants. This theory was testing using the recycling project through issuing a questionnaire to the wider building occupants. This answered the final question:

> *4) There is a wealth of research surrounding the impact of environmental behaviour on the success of environmental programmes; however what level of impact does FM have on the success of environmental programmes in a large, open plan office environments.*

Building occupants are a factor which much be acknowledged as they still have an impact upon the success of environmental policy, especially that of recycling and waste management. Much of the initial research on the impact of environmental behaviour on recycling schemes has focused on kerb side recycling schemes or educational establishments. This research broadens the field to the office example.

10.5.1 The impact of facilities as a situational factor

It has been accepted for some time that building occupants do have an impact upon energy use (Levermore, 1985) and the research conducted in this thesis proves that the facilities themselves within an office environment have a significant impact on participation in recycling schemes. If the recycling facilities for example are considered too far away, to be in the wrong location, or to be insufficient, building occupants will be discouraged from recycling. Behavioural impacts should be taken into consideration in facility design. The findings showing that there is a link between the type of recycler and the considered benefits to the environment or the impact of personal responsibility for example. Such personal attributes can be targeted by a communications campaign, for example the FM department can target the link between personal responsibility and recycling through the creation of posters.

It was found here that people who recycle at home are more likely to highlight themselves as a frequent recycler in the work place. It was found that the proximity of facilities was a very strong effect in motivating the type of recycler. It was also found that the distance of facilities, and a misunderstanding of what bins to use, were found to be a very preventative factor in the behaviour of recyclers. Looking towards environmental values, benefits to the environment were found to be a strong factor in motivating the recycler type. There is also a strong relationship between non-recyclers and not being clear what materials are recyclable. This could be due to inadequate facilities, a lack of understanding or inadequate information (signage) for example. The results from this show that FM organisations can play an intrinsic role in engineering building occupants to successfully participate with building wide environmental campaigns through designing the physical facilities with this in mind.

10.6 Limitations

This section discusses the possible limitations of this work.

10.6.1 Sample sizes

The study took a mixed method approach using a number of samples and a combination between case study research and external research. Overall this was a successful method however, at stages there were limitations:

- The initial investigative study using a content analysis of secondary data had limitations. In total the number of organisations in the study was 65, which in itself is an acceptable sample size. However, this consisted of 26 large companies, 24 medium companies and 15 small companies. Small companies were under represented within the study, and so the results may not be a true representation. However, there was a reason for this in that when selecting the companies to be included in the sample a large proportion of small companies did not have the required data available. If the data was not available then the results would have been meaningless even if the number of small companies included in the sample was increased.
- The sampling method for the content analysis was a non-probability purposive sampling method, and so the sample will not be representative of the whole population. Using a stratified sampling method would have allowed for a reflection of the number of small/medium/large companies within the sample. Regardless, the statistical tests conducted as part of the analysis ensured that the significance of the results was tested.
- Following on from the above research stage, the industry standard was understood and the case study could be validated against this. The case study was found to generally follow the industry standard but was considered to be more developed along the path of SFM. This was a requirement for the remainder of the study as to test the variables and success of SFM a company that practices SFM was required. The findings being a method to suggest how the remainder of the industry could be targeted for development. However, it has to be remembered that the remainder of the industry might not be ready for this development yet.
- The case study was ultimately a convenience case study. The researcher had the opportunity to work with the organisation for two years so the

opportunity to carry out the research was taken. However, the validation exercise was carried out to ensure that the makeup of the case study was valid for this study.

10.6.2 Ethnographic methodology

For a large section of the research the research method chosen was ethnographic, through participant observation. The researcher was a participant as well as an observer. This has many advantages that have been discussed in chapter 5 however, there are also a number of limitations to this chosen method. The FM team were aware that the employee was also engaged in research activity but they were not aware that observational research was being carried out also. It was felt that the team were completely unaware of the observational research and so the limitations are minimal. If they were aware of the process of observational research then the team may have behaved in a different manor to normal circumstances. This type of research method is also time consuming. For this study it involved the researcher spending full time hours at the place of work to conduct the research. Again, in other circumstances this might be prohibitive towards this type of data collection.

10.7 Future Research

There are themes in the study that have been touched upon but not answered because they are outside the specific scope of this study or because they were not able to be answered with the research data collected here. Further research that would enable the progression of the ideas would ultimately strengthen the discussion and conclusions discussed within this thesis.

The main theme that emerged as a side issue to the main research was the idea of the impact of organisational culture on the delivery of environmental policy requirements and the likelihood of compliance. It was clear that in this study the cultural and people aspect of the case study situation was very influential in the delivery of the environmental directive. Possibly more influential that the policy

mechanisms itself. However, this would not be fully understood without comparative work carried out in other case study organisations.

The reaction of the FM team was observed in detail to one policy directive. It would be interesting to extend this model of research to another policy directive to see if the process and outcome was similar to that found here. True strength would be given to these findings if the process could be replicated to a large number of other FM organisations, all presenting different cultures, contracts and environmental requirements.

Finally, one of the more side issues to the research was the impact of building occupants linked to the recycling facilities provided. It was shown that the building occupants are affected by such factors as distance of facilities, signage and understanding of materials. However, it was also found that the recycling rate dramatically increased when a new system of recycling was introduced. This new system was simpler, requiring less understanding of materials. In addition removing desk bins forced building occupants towards the recycling bins, removing the demotivating factor of distance to some degree. It would be interesting if this research could be extended to a sample of large office buildings to increase the reliability of the results.

11 Chapter 11: Conclusion

11.1 Introduction

The overarching subject of this thesis is SFM; in particular how it is operationalised and how this can be used to ensure the FM industry delivers environmental policy for the existing built estate. This thesis demonstrates how the skill set and knowledge of the current FM industry can be targeted in order to promote the environmental agenda. Sustainability in this context has been established as delivering current and new FM requirements with a reduced impact upon the world's natural resources; it is focused around adopting the FM model to deliver the requirements using new methods. Currently the FM industry is not targeted by the policy makers. This could be because of a lack of understanding of the contribution that the FM industry can make or just the premature stage of the current policy process. Developing environmental policy such as the CRC targets the owners of organisations to reduce emissions resulting from organisational activities. In turn it is likely to be necessary for the organisations to involve the FM team to deliver this.

Ultimately this thesis demonstrates that an FM organisation can manage and deliver environmental policy exceeding existing targets even without large capital funding. It also demonstrates that FM processes can be adopted to introduce triple bottom line accounting to incorporate sustainability into project evaluation. Finally it established research that shows that facilities do influence environmental behaviour of building occupants and therefore should be more considered as factor in delivering environmental policy. As a conclusion this chapter will summarise the key findings from the thesis.

11.2 Current position of the Facilities Management industry towards Sustainable Facilities Management

This section of the research was focused understanding the current position of the FM industry towards sustainable facilities management and establishing a benchmark for this. The aim was to identify a number of variables that could be used to identify and measure the industry in terms of sustainability. The key findings were:

- There is a link between establishing an organisational sustainability policy and the implementation of sustainable business practice. Companies are more likely to report on sustainable issues, set environmental targets and gain environmental awards if they have an organisational SP.
- Regardless, it is still uncommon for FM organisations to have gained an environmental award.
- Organisational size is also a key influence- with large organisations (over 250 employees) more likely to have a SP.
- Large organisations are also more likely to have gained awards, report on sustainability and set environmental targets.
- The benchmark created shows that an average FM organisation is likely to have a SP and report on sustainability but is not likely to have gained environmental awards or set environmental targets.

This research has created an industry benchmark measuring FM organisations against sustainability indicators. This looked at whether a typical FM organisation has a SP, reports on sustainable issues, has gained an environmental award and has environmental targets in place. Developing this initial findings the case study was used to develop a number of other indicators of sustainable business practice that can be used as a measurement tool. It can be said that participating in energy conservation, reduction in emissions, energy awareness, water management and environmental awareness is an indication of SFM. An FM organisation having a SP is more likely to participate in SFM. However, the size of the company is a key factor in the likelihood of effective implementation of SFM. The development of a

SP does not seem to be financially motivated; FM organisations implement SPs for a variety of reasons, most of which appear to stem from the moral spectrum.

11.3 The development of Sustainable Facilities Management

This section focused on developing the understanding of the relationship between FM and sustainability as a route to begin to develop a model for SFM in practice. The previous section created the backbone for the subject to enable identification and measurement, and this section aimed to develop a reasoned understanding of the emerging subject area. The key findings were the following:

- It is possible to define sustainability in the FM context as delivering the existing and new operational requirements in a new way, subsequently reducing the strain on the world's natural resources. A new model for SFM is developing using existing processes in an updated way.
- The reasons for having a SP in FM organisations are to reduce emissions and be responsible. In addition to this the other common reasons are to reduce costs, create a better environment, reduce strain on resources and be innovative.
- Key topics for inclusion and focus in the SP are energy and waste and recycling.
- For the case study SFM is not directed by contractual requirements.
- Sustainable added value can be taken to be an improvement to a service or providing the service involving sustainable methods. There is a link to acknowledging that SFM adds value to operations.
- A new model of FM is developing with sustainability incorporated into FM processes.

It seems that the FM industry is developing into SFM without the push from specific policy makers. It seems there is a moral and financial drive to this change, but it is not a change that appears to be driven by contractual requirements, rather it is above and beyond contractual requirements and delivering sustainable added value. FM

professionals consider sustainability within the FM industry to be delivering requirements with minimal impact on [natural] resources. This is a practical understanding that shows the link between the role of FM and how this can be developed along with the sustainability agenda. There is a clear desire to do more. The FM case study were aware of what sustainability means, but felt that it was carried out to an average standard currently. The actual standard of delivery is far advanced of what the contract requires or in fact what policy makers are requesting. Yet there is still a desire to improve further.

11.4 The reaction of the Facilities Management team to environmental policy and included mechanisms

The third section of research centred on the two-year observational research stage and was focused on observing the reaction of the FM team to environmental policy in terms of behaviour, organisational processes and success in delivery. The key findings for this section are the following:

- Environmental policy can successfully transform inputs (such as managers knowledge, BMS systems) into outputs (reduction in emissions, sustainable sourcing).
- Reporting, competition, audit and individual accountability are all motivational policy mechanisms that can be said to contribute to project success. However, the self-mechanisms of Gainshare, people, cultural aspects and processes were more motivational.
- Gainshare and the SWP process developed a way to operationalise triple bottom line accounting – bringing sustainability factors into standard project analysis.
- FM organisations can successfully lead environmental policy for the existing built environment exceeding policy requirements; the case study delivered a 12.9% reduction in CO2e emissions and delivered a 86% recycling rate (alongside zero waste to landfill and food composting).
- A new model for waste management and recycling was designed and tested establishing a replicable model for other large scale, open plan buildings.

When looking specifically at the FM case study and policy mechanisms it can be argued that all of the mechanisms were motivational but to a varying degrees. This could be because of the above statements that show that the FM industry is open to sustainable development and is developing the agenda internally. The industry is already motivated, therefore the mechanisms designed are going to create participation regardless of their focus and agenda. This can be seen to a greater extent when it was established that the case study organisation designed a number of mechanisms to self-motivate and ensure success. The success of the case study FM team in delivering environmental policy was demonstrated. The hope with this thesis is that the ability of the FM industry to deliver the sustainability agenda for the built environment is demonstrated.

A key finding was establishing that the SWP processes and the Gainshare model is a successful method to introduce triple bottom line accounting into project analysis for daily FM operational decisions. The SWP processes ensured that all sustainability impacts of project proposals and lifecycle decisions were accounted for and analysed and the Gainshare model ensured the financial implications of this was generated. This demonstrated the financial benefits to SFM and the real potential for evidenced added value.

11.5 Facilities versus the personality debate

The final section of the research involved looking at facilities as a situational effecting environmental behaviour. Previous research has evidenced that three factors effect environmental behaviour; situational factors, environmental values and environmental psychology. The questionnaire was designed to test the impact of the facilities compared to environmental values on recycling behaviour in the building. The key findings were:

- There is a relationship between those who recycling at home and those who recycle in work.

- Proximity of facilities as a motivating factor was found to be very strong in implementing the recycler type. Distance of facilities was found to be a very strong as a preventative factor. Alternatively benefits to the environment was also found to be a strong motivating factor.
- There was a strong relationship between building users not being sure what bins to use or not being clear what materials are recyclable and the type of recycler.

Previous research has centred on the impact of environmental values on recycling behaviour predominantly for kerb side recycling schemes and recycling in educational establishment. What this research does is two main things; provides research data set in the office environmental and proves that the facilities have a significant impact on recycling behaviour. It is clear that the building occupants are affected by the location of the bins, with frequent recyclers being linked to acknowledging the location and accepting the location. Alternatively, infrequent recyclers are linked to the variable distance of facilities.

Signage and information campaigns are an important issue. The research found that the variable not clear what bins to use and not sure what materials are recyclable are linked to none or infrequent recyclers. When linking this back to the previous section there is greater evidence for this. During the two stages of the research into the recycling facilities the signage changes twice and during the second stage an awareness campaign was introduced. The recycling rate increased during both stages but a significant increase was seen during the second stage when the signs were simplified and the information campaign was introduced. It is clear that both environmental values and situational values influence recycling behaviour, however to date the facilities provided have not been included as a situational value is any comprehensive research. This thesis establishes that the facilities are a situational value and do impact upon environmental behaviour.

11.6 Closing thoughts

The aim is that the research presented here makes a contribution to the current body of knowledge surrounding SFM and the links to environmental policy. Firstly the research adds to the current industry knowledge of the current position of FM industry towards sustainability. Research has begun to emerge in the area of establishing an understanding of SFM. This study builds upon this adding to the existing knowledge in the area.

The multi method approach taken here is a contribution to the knowledge in this field. An initial theory is tested to establish the basis of the study, from there the case study is tested. Following on from this new theory is established and tested within the specific field of FM. The combination of qualitative, quantitative and ethnographic research methods adds to the depth of the understanding of the subject and creates a well-rounded picture of the topic. The thesis establishes a number of new truths. This is in the form of new definitions that previously didn't exist for this field; such as sustainability and sustainable added value in the context of FM. A new model for SFM delivery was proposed, establishing the continuing development of the FM business model. It has been established that facilities are a situational factor which effects environmental behaviour, and so should be considered with more importance when delivering environmental policy requirements. Finally a new and replicable model for recycling and waste management has been designed and tested delivering significant improvements to the recycling rate of the case study building. This provides research on recycling behaviour from an office environment and therefore enables this model to be delivered in other similar environments. In addition the indicators of sustainable business practice have begun to be established; this could be taken on through further research to develop a deeper understanding of what they mean.

The study conducted exploratory research to begin the conversation of what motivated the FM organisation specifically to comply with environmental policy. This study tests some common policy mechanisms that are present in wider industry

policy to understand their impact upon FM operations in terms of project outcome. New truths were established in the form of sustainability indicators in the FM context and the motivating factors for the FM organisation to comply with environmental policy for example. A firm new truth that was established is that the FM case study is driven internally to develop SFM, and that this pursuit that is being self driven and self-designed is successful in delivering Government and client targets. It was shown that the contractual requirements were not driving sustainable development, it was driven by the organisational leadership, the culture of innovation and the skills set of the FM team.

Finally this study establishes the positive contribution that the FM industry can provide to the environmental cause. FM organisations hold the skill, drive and desire to achieve along with the adaptability in culture that is required to deliver FM within a different performance model. Whether this means that environmental policy will be best targeting the FM industry rather than targeting client organisations is another question. However, it should remove the current situation where FM is separated from the policy targeting the client organisations. Ultimately, FM operations could add to the advancement of reducing the environmental impact of the current built environment. New policy regarding construction is successfully targeting the new built construction industry. The FM industry could fill the gap for the existing built environment that is currently under represented in the policy field.

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13 Chapter 13: APPENDICES

13.1Appendix One: Content Analysis

For the data analysis there was a set of points which were used as questions to gather the information for the content analysis. The questions were the following:

Question	Area
1	Company Name
2	Annual Turnover
3	Employees (small/medium/small)
4	Company purpose (FM only, FM+)
5	SP (yes/no)
6	Frequency of sustainability reporting (feature: highly/occasionally/never)
7	Accreditation/awards (yes/no)
8	Type of measurement
9	Areas of focus (key reporting areas)
10	How is sustainability reported
11	Reported targets (yes/no)

Table 47 Questions for content analysis

13.2 Appendix two: FM and Sustainability Survey

Part one: Understanding of FM

The following survey was conducted with the FM case study and was designed to understand which contract areas were considered key for development and which areas sustainability was successfully incorporated into.

Indicate with the following scale:

1. How successfully is sustainable practice incorporated into the following business areas:

1 for very well to **5 as very bad**

2. How critical is it for sustainable practise to be incorporated into the following business areas?

1 for very critical to **5 not critical at all**

Area	**Level of criticality**	**Level of success**
Catering		
Help desk		
Cleaning		
M&E		
Purchasing		
Reprographics		
Off site scanner		
Nursery		
End users activities		
Equipment monitoring		
Reception		
Mail		
Document production and destruction		
Accommodation reconfiguration		
Asset management		
Parking management		
Corporate TV		
Other (indicate)		

Table 48 Contract areas for ranking level of criticality and success

In order to further develop the understanding of the impact of contractual requirements upon sustainable business practice, the following question was asked in the survey.

3. For each of the following business areas indicate the current level of sustainable practice:

1= Non contracted for and none achieved

2= elements contracted for but none achieved

3= elements contracted for and those elements are achieved

4= none contracted for but sustainable practices implemented

Area	**Level**
Catering	
Help desk	
Cleaning	
M&E	
Purchasing	
Reprographics	
Off site scanner	
Nursery	
End users activities	
Equipment monitoring	
Reception	
Mail	
Document production and destruction	
Accommodation reconfiguration	
Asset management	
Parking management	
Corporate TV	
Other (indicate)	

Table 49 Contractual areas for ranking level of sustainable practice

4. How satisfied on a level of 1-5 are you with the current level of sustainable practice?

1	2	3	4	5
Very satisfied	satisfied	neither	unsatisfied	Very unsatisfied

5. Mark with a scale of 1-5 the importance to business practice:
1 being very important to **5 for not important at all**

6. Then highlight the areas which are statutory to provide provision with an **S.**
7. Then highlight the **10** most important areas for business practice for the FM contract.

Key indicator		**Key indicator**	
Daily office cleaning		Quality of service provided by staff	
Window/carpet cleaning		Supervision of changes	
Others responsibility for maintenance clearly defines		Quality of end product	
Accessibility for day to day advice		Quality of change procedures	
Communication of briefing		Implementation of changes	
Administration of contracts		Flexibility to special requirements	
Technical competence of staff		Achievement of completion of deadlines	
Provision of a safe environment		Contribution to society	
Energy conservation		Reason for changes made apparent	
Level/controllability of lighting		Allocation of FM resources	
Level/controllability of ventilation		Business management time spent on FM	
Area per employee		Provision of good physical environment	
Good water management		People satisfaction	
Statutory compliance		Cost of equipment	
Action on hazards		Services reflect business objectives	
Attitude of staff		Removal costs	
Scheduling of premises/resources		Cost of disruption to movement of goods	
Training of staff to understand role		Management of maintenance	
Completion of projects on time		Management of time input	
Level of politeness		Maintenance well planned	
Level of faults		Applicability of systems used	
Responsiveness to problems		Timelessness	
Staff communication		Precision	
Number of equipment/plant failures		Communication of space requirements	
Maintenance induced interruptions		Health and safety	
Utility supply interruptions		Comfort	
Standard of cleaning throughout the building		Aesthetics	
Correction of faults		Environmental performance	
Space flexibility to meet changing business requirements		Energy cost per m2	
Effective allocation of space		Energy awareness	

Space meeting business needs		Reduction of emissions	

Table 50 Indicators of business performance

Part two: FM and understanding of Sustainable Facilities Management

The following survey was a second survey to be conducted with the case study.

DATE:

1. Are

Male		Female		**you?**

2. What is the highest educational level you have attained?

PhD	
Masters/MPhil	
Degree	
NVQ (indicate level)	
A levels	
GCSEs	
Other (please specify)	

3. Are you?

Employed		Independent consultant	

4. **What are the Facilities provided by the company**?

5. What economic sector do you operate in?

Public		private		Non-profit	

6. Where does the organisation operate (please indicate or if global indicate in the box)?

	OR Global	

7. What is your position/title within the organisation/consultancy?

Managing Director	
Assistant Director	
Manager	
Trainee/assistant manager	
Assistant	
Engineer	
Operative	

Other (Please specify)	

8. Number of employees in the Company?

1-10		20-50		50-100		100-250		250 +	

9. Does the company have a SP?

YES		NO	

If you answer NO what are the main reasons for this? (Then skip to Q12)

10. What are the key areas of focus for the SP?

Energy	
Water	
Waste & recycling	
Mechanical systems	
Transport	
Local community	
Innovative solutions	
Complying with Legal requirements	
Ethical Purchasing	
Health& Safety	
Other (please specify)	

11. What do you/your company consider as the reason to have a SP

(Indicate the level of importance with **0 being non-existent** through to **5 for very important** for **each** category)

To comply with law	
To reduce costs	
To gain an award/good publicity	
To reduce carbon emissions	
To create a better working environment	
To operate as a responsible company	
To reduce the strain on the worlds resources	
To be innovative	
To build community relations	
Other (please specify)	

12. a. Does the company report on Sustainable issues

YES		NO		Not Sure	

If NO skip to Q14

b. If yes- How do you/the company report?

Annual Report	
Monthly Report	
Presentations	
Website	
Email	
Information leaflets	
Other (please specify)	

c. AND who do you/the company report to?

Shareholders	
Customers	
The Board	
End users	
Members within the company	
Wider community	
Suppliers	
Others (please specify)	

13. If you report; how often does sustainability feature in the company reports? (choose one)

Permanent feature	Frequent feature	Often	Occasionally	Never

14. How well do you understand sustainability and its implications for the daily operations?(choose one)

Perfectly	Very well	Aware	Unsure	Not aware

15. How well do you feel sustainability issues are managed and implemented? (choose one)

excellent	Good	Average	Poor	Not at all

16. What factors do you feel act as resistor forces to the development of sustainable practise in your company and the wider industry?

No resistant forces	
Cost	
Lack of knowledge	
Lack of interest at policy level	
Lack of belief in perceived benefits	
Difficulty in bringing a change in attitude	
Interest only statutory legal sustainability requirements	
Other (please specify)	

17. Does the company have environmental targets?

YES		NO	

If no skip to Q18

If yes, in which areas?

Energy	
Water	
Waste & recycling	
Mechanical systems	
Transport	
Local community	
Innovative solutions	
Complying with Legal requirements	
Other (please specify)	

18. How do you agree with the following statements? Using the following scale and indicate with a number (Highlight in bold the correct number or delete as appropriate)

1	2	3	4	5
Strongly Agree	Agree	Unsure	Disagree	Strongly disagree

16.1	I/the company engage with <u>end users</u> to establish a sustainability agenda for the services provided	1	2	3	4	5
16.2	I/the company engage with the <u>client</u> to establish a sustainability agenda for the services provided	1	2	3	4	5
16.3	I/the company use sustainable solutions as a method to add value to the clients requirements and/or services provided	1	2	3	4	5
16.4	I/the company see sustainable solutions as a method	1	2	3	4	5

	to increase organisational performance and productivity					
16.5	I/the company perceive sustainable solutions as a method to improve the internal environment within each building where services are provided.	1	2	3	4	5

19. WOULD YOU BE PREPARED TO PARTICIPATE IN AN INTERVIEW (DOES NOT HAVE TO BE FACE TO FACE) TO GATHER FURTHER INFORMATION ON THE FUTURE OF SUSTAINABLE FACILITIES MANAGEMENT AND TO FURTHER THE FINDINGS OF THIS STUDY?

YES		NO	

If Yes Please give your name and email address where I can contact you directly (the contact details will not be kept on file with your questionnaire)

OR, if you would prefer not to give any details of a personal nature on this form but would like to be available for a short interview then simply tick the box and indicate in an email.

.....

THANK YOU FOR YOUR PARTICIPATION

13.3 Appendix three: Facilities versus environmental behaviour: Survey

The following questionnaire was issued to the building users to understand the impact of environmental behaviour versus facility provision on the success of environmental policy compliance.

Date

1. Are

Male		**Female**		**you?**

2. Do you recycle at home?

YES		NO	

3. Do you recycle in work?
If NO skip to Q7?

YES		NO	

4. What materials do you recycle at work?

Aluminium cans	
Newspapers	
Office paper	
Plastic bottles	
Glass	
Other (please State)	

5. Would you consider yourself (choose one)?

a) **Frequent recycler**: recycle everything that is possible **ALL** of the time (go to Q6)	
b) **Occasional recycler**: recycle major items, most of the time(go to Q6)	
c) **Infrequent recycler**: recycle little (skip to Q 7)	

6. If you answered a) or b) to Q2, on a scale of 1-3 what is your motivating factor (select any which are true)

1= very influential 2=neither influential or not 3= not influential			
Proximity of facilities	1	2	3
Absence of alternative bin	1	2	3
Benefits to the environment	1	2	3

Benefits to yourself	1	2	3
Advertising campaign within the building	1	2	3
Other (Please indicate)	1	2	3

7. **If you answered <u>c) to Q2</u>, or <u>NO to Q3</u>, what are the reasons (select any which are true)**

Distance of facilities	
Moral/personal objection	
Do not believe in the advantages to the environment	
It is not clear what I can recycle/not clear which bins to use	
I do not believe it is my responsibility in work	
Other (Please indicate)	

8. **Do you know that you can use your own mug for the coffee machine**

YES		NO	

9. **Do you use your own mug/glass for drinks out of machines within the building?**

YES		NO	

If No (to Q8) what is the reason?

10. **Do you agree or disagree with the following statements? Using the following scale and indicate with a number**

1	2	4	5
Strongly Agree	Agree	Disagree	Strongly disagree

9.1	Recycling offers wide ranging environmental benefits	1	2	4	5
9.2	I feel a personal gain from recycling	1	2	4	5
9.3	I understand what items go in which bins	1	2	4	5
9.4	I use the waste bin for all my items of rubbish	1	2	4	5
9.5	The bins are located in the best position for my use	1	2	4	5

11. **Do you know the location of the recycle bins?**

YES		NO	

12. **Do you agree with the location of the recycle bins?**

YES		NO	

If No (to Q 6) where would you rather the bins be located (and WHY)?

13. Do you want more information about any of the following to be available at work?

The benefits of recycling	
The materials that can be recycled	
The location of the recycle bins	
Wider policy initiatives	
Other (please indicate)	
No further information required	

14. Do the current recycling facilities suit your method of working?

YES		NO	

If NO (to Q13) please state why

15. Do you have any further comments?

……
……

THANK YOU FOR YOUR PARTICIPATION

13.4 Appendix four: FM and Sustainability- Interviews

Stage two of the research included interviews with the members of the case study organisation. The following questions were asked to understand the FM case studies position towards sustainability. The information gathered is intended to build upon the understanding gained from the content analysis and also begins to generate definitions for the relatively new subject area.

Question	**Area**
1.	Who is your contract with?
2.	Describe your supply chain (with an organisational chart).
3.	What others contractors work is linked to yours? i.e. that you cannot do without the completion of someone else.
4.	List the services that you provide for the contract.
5.	Do you provide services which the client cannot function without?
6.	What services do you provide which are as an addition to the original contract or as a variation?
7.	Define the term added value.
8.	Define sustainability.
9.	What level of sustainability are you contracted to achieve on this contract? And do you deliver this?
10.	What areas of sustainability do you practice as an addition to contracted levels?
11.	What areas of sustainability do you think are important for the future development of the contract?
12.	What working practices do you now deliver with a sustainable solution?
13.	Do you substitute an accepted method of working with a sustainable solution to deliver a core service?
14.	Can sustainable solutions lower the cost of a service, add to the cost, or add to the value of a service?
15.	Define the term sustainable added value.

Table 51 Interview questions for the FM team.