

GREEN BUSINESS DEVELOPMENT IN THE FIELD OF
GREEN ENERGY IN CHINA

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Abstract

After the experience of a worldwide economy crisis in 2008, the world is seeking a sustainable development in order to come over the depression. Pointed out by National five-year plan regarding green economy, China, with a population of over 1.4 billion people, and being the largest production countries in the world, is facing the environmental issue, industrial transformation, and energy shortage and security problem. It is about the time when Chinese enterprises step into green business.

The paper went through with the theoretical concept of sustainable development, global view of green economy, the essential aspects and the stage of development of green business both in the world and in China, finally concentrated on the progressing of green energy in China.

In light of exploring green business development in the enterprise root, this paper also presented a comprehensive analysis through detailed questionnaires and interviews with general managers from resources-based, green energy and its related enterprises or banks to acquire how is the national five-year plan policies regarding green economy implemented, what is the main driving force, impacts, difficulties and challenges for green business in China.

Key words: Sustainable Development; Green Business; Green Energy; Corporate Social Responsibility

JEL Classification System: M14, Q56

Resumo

Após a experiencição de uma crise económica global em 2008, o mundo está à procura de desenvolvimento sustentável de forma a ultrapassar a depressão. Apontada pelo Plano Nacional de 5 Anos de Economia Verde, a China, com uma população de cerca de 1.4 mil milhões de pessoas, e sendo um dos maiores produtores no mundo, enfrenta problemas ambientais, transformações na indústria, falhas de energia e problemas de segurança. Considerando isto, é altura das empresas chinesas entrarem nos negócios verdes.

Este *paper* debruçou-se sobre os conceitos teóricos de desenvolvimento sustentável, dando uma vista global sobre a economia verde, desde os seus aspectos essenciais às principais fases de desenvolvimento de negócios verdes, tanto na China como no resto do mundo, focando-se finalmente na progressão da energia verde na China.

Com o objectivo de explorar o desenvolvimento verde nas empresas, este *paper* apresenta também uma análise compreensiva através de questionários e entrevistas detalhadas com gestores de empresas e bancos baseados em recursos, energia verde e empresas relacionadas, com o intuito de perceber de que forma as políticas do Plano Nacional de 5 Anos de Economia Verde são implementadas e quais são as maiores forças impulsionadoras, impactos, dificuldades e desafios para os negócios verdes na China.

Palavras chave: Desenvolvimento Sustentável; Negócios Verdes; Energia Verde; Responsabilidade Social Empresarial

Classificações do JEL: M14, Q56

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II. List of Acronyms

CSR – Corporate Social Responsibility

EIA – Environmental Impact Assessment

FYP – Five-Year Plan

GDP – Gross Domestic Product

GE – Green Economy

GHG – Greenhouse Gas

GMEPA – Guangzhou Machine Electron Produce Association

GRI – Global Reporting Initiative

HR – Human Resources

HVDC – High Voltage Direct Current

IISD – International Institute for Sustainable Development

IMF – International Monetary Fund

MTCE – Million Tons of Coal Equivalent

NBS – National Bureau of Statistics of China

NDRC – National Development and Reform Commission of China

NEA – National Energy Administrations

NGO – Non-Governmental Organization

R&D – Research and Development

SIA – Strategic Impact Assessment

SME – Small and Medium-sized Enterprises

UHV AC – Ultrahigh Voltage Alternating Current

UNEP – United Nations Environment Programme

WCED – World Commission on Environment and Development

1. Introduction

From 2008, the world was faced with multiple crises, which include climate changes, financial, and the shortage of fuel. These crises lead to the global economic recession since the 1930's Great Depression. Although there are signs that the situation of this economic crisis is improving, some of its effects are continuing to reverberate through the whole world economy. According to the International Monetary Fund, it stresses that for developed economies, the recovery will be really weak while for the developing economies, there will still have lots of activities even though the improvements are very fragile (IMF, 2012).

Regarding the recovery of the world economy, the common objectives are leading the economy back to grow again, assuring the stability of finance and creating the opportunities of jobs. Nevertheless, both consumers and organizations also concern some big world economies such as China about other global challenges like developing green business, which should rely on the well understanding of sustainability.

When compared with European Union countries, the history of doing green business in China is really short just about 30 years. It began with confirming the protection of the environment as one of the basic state policies of Chinese government in 1983 and signing The Rio Declaration on Environment and Development in 1992.

After the implementation of reforming and opening policies in China, China has achieved great successes in the economy. From 1978 to 2011, the GDP increased from 364.5 billion RMB to 47288.1 billion RMB with the growth rate of 15% in average. However, this great success in the economy cannot be regarded as sustainable development, due to it mainly depends on the energy and other resources, which may lead to the damage to the environment.

According to the national bureau of statistics in 2011, the intensity rate of use resources for GDP is 90% higher than the average in the world, while the efficiency rate of using energies is 10% lower than the developed countries. In 2005, the total energy consumption was 2.36 billion tons of coal equivalents (tce) with 55% increasing compared to 2000, and in 2010, the energy consumption even went up to 3.25 billion

tons of coal equivalents (tce) with 123.28% increasing compared to 2000. This huge increasing in demand of energy led to significant pressure on the energy supplies side.

Also this non-sustainable development is caused by the energy structure in China, when compared with the energy consumption structure of the world, China has more than 60% of the energy consumption is from coal, which led to the emissions of pollution like CO₂. Moreover, China is one of those countries that have the biggest greenhouse gas emissions countries in the world.

From this it can be seen that the gap between domestic supply and demand provides a good opportunity to develop green energy like solar power, wind, biofuel and hydro energy. Furthermore, China has limited environmental controls on polluted energy, so it will be a need and opportunity for China to develop policies to limit the emission of Carbon dioxide (CO₂) and Sulfur dioxide (SO₂), which come from the combustion of coal.

After 20 years of high-speed economic growth, which is based on the soaring of energy demand, China has raised the attention of reducing energy intensity and carbon intensity. The year of 2010 became a vital transition point for China in its path for sustainable development as the end of the 11th FYP period and the beginning of the 12th FYP period.

Over the five-year period between 2006 and 2010, China set out to reduce the energy intensity, which is defined as energy consumption per unit of GDP by 20% through energy efficiency policies and programs. Based on this, the government put forward the 12th FYP, “ *the construction of resource saving and environment friendly society is an important focal point to accelerate the transformation of economic development.* (The People’s Republic of China National Report on Sustainable Development, 2012)” The policy includes 6 main parts: conserve the energy, reduce greenhouse gas emissions, develop sustainable economy, use advanced technologies to low the carbon, react to climate changes, and promote social sustainable development. In March 2011, China also announced three key targets for the 12th FYP period including energy and carbon intensity reduction goals of 16% and 17%, respectively.

The concept of green economy in China is still relatively new; this paper seeks to discuss the green business development under the national policy of 12th Five-Year Plan from 2010 to 2015. Meanwhile, the development of the green energy business in becoming a visible trend worldwide. To present an evolution of this topic, this thesis firstly discussed what is national five-year plan, what is the major policy effect green business development in China. Then the paper elaborates on the development of green business, which mainly focuses on green energy, green building, green transportation and green finance issue in China.

The development of green business in China is the core issue of this study, this paper uses a combination of content analysis and substantial interviews to analyse how is the national five-year policy effect the green business development in China, what is the stage of green business development, and expand to how is it carried out in enterprises especially the resourced-base one regarding the green energy field. To be specifically, the brief analysis includes the identification of the main historically milestones, the current situation, existing guidelines to support green businesses, indicators, achievements. In doing so, the thesis would contextualize the difficulties and problems happen in China and give the suggestion and a definite forecast-for scholar and policymakers who wish to understand the rapidly growing development of green business in China. By extension, this analysis will also help shed light on China's evolving role in anthropogenic green business development especially in the field of green energy.

2. Literature Review

This chapter will begin by defining the notions of sustainable development, green economy, green business, and corporate social responsibility. Based on the evolution of the concepts, it will explore in what extend the previous concepts of sustainable development, green economy may be related to macroeconomic policies, economic development and enterprises business development and how can they influence each other. The concepts of green business and corporate social responsibility (CSR) will also be explained and analysed, together with the national five-year plan policies in China. Next, under this national plan background, the focus will be the green business

activities developed in the enterprises especially resources-based one regarding the field of green energy, on its roots and its evolution, as well as the development of green business in China. Finally, a brief summary will be presented.

2.1 Sustainable Development

Sustainable development is a noble and necessary aspiration. It is a visionary development paradigm; and over the past 20 years governments, businesses, and civil society have committed to sustainable development goals. Maurice Strong, former Secretary-General of the Rio Summit, remarked in 1998 that sustainable development.

The first well-known work about the limitations of the environmental resources of the planet was published in 1972, being commissioned by the NGO called Club of Rome.

“If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years.”

“The two missing ingredients are a realistic, long-term goal that can guide mankind to the equilibrium society and the human will to achieve that goal. (Meadows et al, 1972)”

In 1987, world commission on environment and development has raised up a concept, which is sustainable development from the report Our Common Future, and it has become wide-known in the world. It is also known as the Brundtland report, and this report has defined the sustainable development as: *“development which meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

The Brundtland Report has the statement that the serious issues of global environment today came from 2 main parts: the South’s poverty and the North’s consumption and production without sustainable path.

This report highlighted the three fundamental components of sustainable development: the environment, the economy, and society, and it led to a strategy that included both development and the environment.



Figure 1 – Three fundamental components from Brundtland Report

Source: Brundtland Commission, 1987

In 1992, the principles of sustainable development were carried out at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil.

“To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.” Rio Declaration, Principle 8 (The United Nations, 1992).

Generally, when talking about sustainable development, there are three perspectives need to be discussed: economic development, social equity and also environmental protection (John et al., 2010). After two decades, the concept of sustainable development has been rooted in the governments, business organizations and society’s development, it has been regards as a guiding principle, and it led to more and more business or NGO participation in its process.

Even tough, sustainable development is already discussed over twenty years, and it should be included into three pillars as mentioned in the above, this concept is still taken as an environmental issue. Moreover, there are also some other people take the

development mainly as economic growth. Based on this pattern, it may cause the problems like overuse resources or low efficiency of using resources.

This is happened frequently in developing countries with the reason that most of these countries follow the previous path from developed countries, and this path is developing economy based on the resource overuse. Therefore, it requires the changes and action from developed countries to emphasize the importance of sustainable development. Also developing countries should take actions to use its own pathways to participate in sustainable development instead of waiting to learn the experience from developed countries. Between developed and developing countries, it is required to have a certain level of cooperation and dialogue.

Summing it up, sustainable development is progressing in the world but remains on the level of policies requirement instead of deeply real actions in the structural changes of countries economy development within consideration of social and environmental factor. Furthermore, there is significantly different level of sustainable development in developed countries and developing ones, which may create gap of each other for the cooperation and dialogue.

2.2 Green Economy

There are many attempted definitions regarding green economy. In 1989, Pearce firstly stated the term “green economy” from the book *Blueprint for a Green Economy* (Pearce *et al*, 1989), which is an important report that is concentrated on sustainable development in the economies. After 3 years, Pearce discussed again about the green economics. In the below is the figure from Pearce to have more detailed look into the generation of the thoughts within green economics.

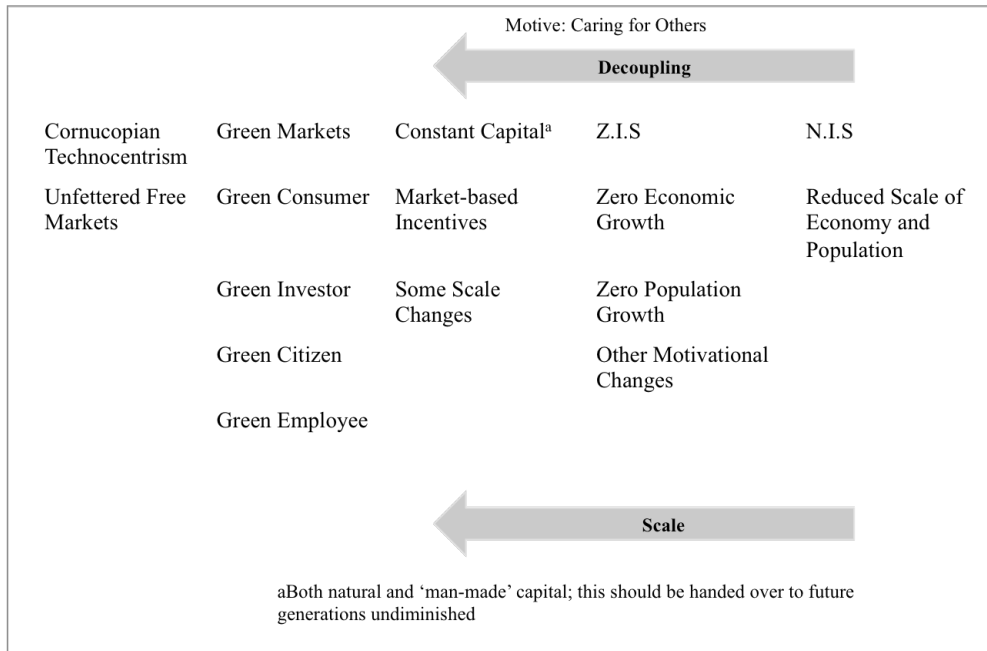


Figure 2 – Schools with thought within green economics

Source: Pearce, David, 1992

In 1992, in Rio de Janeiro, Brazil, the principles of sustainable development were announced at the United Nations Conference on Environment and Development.

The most widely used and authoritative definition comes from UNEP. “*Green economy can be defined as one that results in improved human well being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2011)*” Which can be understood in a simple way that green economy should be low-carbon, efficiency of resource and also include the social factor. In another way, green economy has the character that within the increasing of investments in economics, it should strengthen the capital in the nature, or reduce ecological scarcities and environmental risks.

The World Resources Institute provides an introduction to green economy: “*in a way the green economy is a continuation of work towards sustainable development. The main characters are sustainable economy, environment and social welfare (World Resources Institute, 2011)*”

Building green economy has different meaning to different category, people, societies, and countries. However, the basic meaning of it is to encourage the development in

economics with sustainability as the priority. Therefore, it stresses that from human being to whole society should work with nature while still meet the need from people not only concerning about economic growth without consideration of environment.

The phrase “building a green economy” means different things to different people, but in general it refers to encouraging economic development that prioritizes sustainability—that is, working with nature and not against it in the quest to meet peoples’ needs and rights—instead of disregarding environmental concerns in the process of growing the economy (Migiro,?). The following are the opinions or definitions from Chinese authors or researchers based on varying perspectives.

Ji Tao, a Chinese scholar defines green economy as a new economic structure, growth path and social form, which should use efficiency, harmony and sustainable development as objectives, and ecological agriculture, the recycling industry and sustained service industry as essential necessities.

Zou Jintai and Xiong Weiming regards green economy as a country or region that develops green industry, green products or services and green enterprise into primary or leading industry, and should has competitive advantage and market share increase.

There are also some authors think green economy is synonymous with sustainable development. Liu Sihua defines green economy as an implementation and manifestation of sustainable development, which is base on ecological economy and taking knowledge economy as dominance.

From all these thoughts, it can be seen that the relation between green economy and sustainable development is the later one is the expanded concept of the former one, which is part of it but cannot replace it. Therefore, GE provides a bridge to sustainable development.

The development of green economy has different path in different countries. However, no matter in developed or developing countries, it must be equitable and sustainable. As mentioned by Brundtland report, it should meet our needs today without harm the needs of our future generations. This basic character can be implied from the green energy

uses, green innovation developments, green products and services to the entire context, which concerning about environment.

Regarding the field of green economy, there are many industries cannot be without discussions: electricity, energy, transportation, constructions, and etc. the related topics are green energy, green innovation, green business, environmental impact assessment (EIA), strategic impact assessment (SIC), governance, and CSR.

2.3 Green Business

In 20th century, the term of “green business” raised in response to the soaring concerns about sustainable development. Later on, with the increasing awareness of environmental topics, for example, the over use of natural resources is growing faster and faster.

The foundation of “green movements” was from the middle of the 1960s, however, it took more than two decades for business to adapt to the trend of “greening” and implement this on its strategy and real activates. (Čekanavičius et al, 2014).

In an industrial and business perspective, natural capitalism is defined as a future, which both business and environment have the interests intersect, and it can help enterprises to strength their bottom lines, or to solve environmental problems while they do their business. It helps influencing business people that actions can be taken regarding ecological crises in a way that is also compatible with economic realities.

Taken as an example, “Brown and Ratledge (2011) provide a fine definition of green business: *an establishment that produces green output*”. While there are some authors think green business is the path include more sustainable actions, contribute to environment and can human well being at the same time making profit within the economic growth.”

It is obviously that those definitions shown above try to have a larger impact range of business activities instead of the narrowing idea of “green” practices. It can help ensure the sustainable development of business while also contribute to people and next generations. From this, it is clear that the difference between “green business” and

“sustainable business” is the later one stresses on the business should be sustainable in the aspect of economy, society and also environment.

Nevertheless, there are some authors have narrow views of green business. For example, some paper regarded green business as the business can improve the quality of environment, and Cooney (2008) defined the green business should be able to commit to the principles of environment during the business operations or, even narrower, green business is the business that does not have any negative influence on the environment.

To be concluded, it is generally recognized that green businesses can be identified as organizations, which are dedicated to the values of sustainable development from their strategies to their operations everyday, attempt to develop or use green energy, green innovation, and in the same time be able to reduce the threats to the environment. From this view, green business should be taken into a part of organizations’ long-term strategy. For instance, developing business chores that will not create any hazard, no matter in the aspect of economy, society or environment, and it must be able for current and next generations.

Moreover, until now, the element of green business notion is still quite differently verified by lots of definitions, which may base on different period, different society background (cultural, political, economic) and different development stage. Furthermore, the practices of green business mostly are required by countries’ or organizations’ policies, however, it is not deeply accepted and implement by the whole business entities even in developed countries, which are advanced in ‘green’ concepts, not to mention developing countries. The analyses of the interviews from China enterprises or companies in chapter 6, it shows the similar problem. Last but not least, from countries to countries, the development of green business has gap between each other, one of the reason is, most of time, green business is regarded as environment issue with extra cost for green products, green services, green technologies, and so on.

2.4 Corporate Social Responsibility

Within the development of sustainability, nowadays, the current business is required to satisfy the ethical demands' progression and the updated standards of environment, legislation and also business behaviours. CSR has hence turned into a vital and serious topic for managers from small companies to big enterprises, also for studying or researching in the area of business administration.

“CSR is concerned with treating the stakeholders of the firm ethically or in a responsible manner.

Stakeholders exist both within the firm and outside.

The wider aim of social responsibility is to create higher and higher standards of living, while preserving the profitability of the corporation, for peoples both within and outside the corporation (Hopkins, 2003)”

From World Bank, the concept has been defined as *“Corporate social responsibility is the commitment of business to contribute to sustainable economic development – working with employees, their families, the local community and society at large to improve the quality of life, in ways that are both good for business and good for development.”*

Based on these ideas, CSR talks about not only what are the activities of companies in the perspective of profit but also how they should make it. It concerns how they deal with the impacts, which are mainly focusing on economy, society and environment, also their relations in all the main impacting domains: the firm, the marketplace, the communities, and the policy area. Below are some thoughts that can be considered during the management operations regarding environmental issues:

Decision Area	Environmental Issues
Product/service design	Recyclability of materials; energy consumption; waste material generation
Network design	Environmental impact of location; development of suppliers; environmental practice; reducing transport-related energy
Layout of facilities	Energy efficiency
Process technology	Waste and product disposal; noise pollution; fume and emission pollution; energy efficiency
Job design	Transportation of staff to or from work; development in environmental education
Planning and control	Environmental impact of project management; transport of pollution of frequent Just-in-time supply
Capacity planning and control	Over-production waste of poor planning; local impact of extended operating hours
Supply chain planning and control	Minimizing energy consumption in distribution; recyclability of transportation consumables
Quality planning and control	Scrap and wastage of materials; waste in energy consumption
Failure prevention and recovery	Environmental impact of process failures; recovery to minimize impact of failures
Decision Area	Environmental Issues

Table 1 – Some environmental considerations of operations management

Source: Bortolin, 2011

Despite the fact that management of operations is perceived as concentrated mostly with the day-to-day activities of business, it is a key part of plenty of today's challenges to business practices. Due to it relies on if there are new innovations, advanced methods to organize resources, shifting the situations of marketplace and environment, updating

regulatory panoramas, or alterations in how community views business practices affect the company, and the operations need understand these changes' influence and answer back to them.

Organizations must be in charge not only to maximize the fortune of their shareholder but also to attain future environmental safety and creation of equal living standards among all populations, then it can ready for future generations. Nevertheless, it is not always easy for any business to just implement strategies or operations with consideration of CSR without taking any economic consequences in account, i.e., there are some economic results to CSR decisions. Some of these can be positive, as for example waste control in job design. Despite this, many consequences, especially in the short term, it can be negative, considering that there is a high cost for socially responsible decisions, for instance, creating or using new technologies to reduce waste.

The widely held term “corporate social responsibility” is often used together with ethics, sustainability, sustainable development, and corporate behaviours. Although all these concepts are quite different amongst each other, they all lead to an equal future, which is no matter in developed countries or developing countries like china, where has a big growth in the corporation of social roles are expected to realize.

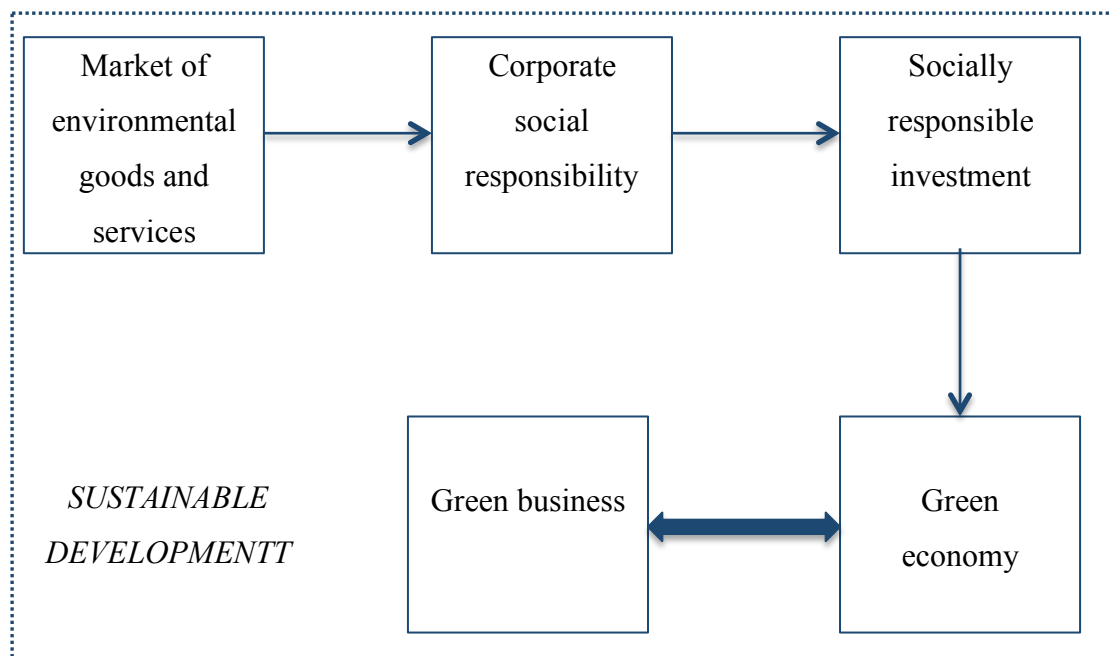
2.5 Summary

This chapter is aim to present theoretical concepts and reviews centered on green business. With the background of requiring sustainable development in the world, the world focuses more and more on finding a new economic growth path to satisfy economic progressing while decreasing the environmental risks, and also be able to improve human well-being, and it leads to generating the concepts of green economy.

When considering in the view of entrepreneurial activities, green business is a quite new form of activities in the economic field. It is in a fast growing way of developing and getting more and more involved into real operations of enterprises. And green business is a way of doing business with green innovation, to produce green products or services to customers and apply this concept into all the process of companies business, and also should be applied in the relations with the stakeholders. Therefore, green business is not only to have ecological development but also has impact on the perspective of ecology,

economy and society with varies characters. In order to implement the green business in the enterprises, many managers will use the framework of corporate social responsibility to assure the stakeholders to have responsible manner.

2. Literature Review's Conceptual Framework



Stages of formation of green economy and green business concepts.

3. Methodology and Method

There are 4 major types of doing master dissertation, which includes: case study, business plan, company project and also the thesis. This paper is following the thesis format, which starts with comprehensive literature reviews, and then focuses on a specific theme with details. In the case of this paper, the theme considered is green business development especially in the field of green energy in China, and concentrated on the situation of green business development, how the green business is developed in the resource-based or related enterprises, and if the green business is important or not. In order to be able answer these questions, it is vital to have appropriate methodology and method to analyse the result and get reliable conclusions. According to Guo Fengning, methodology is the fundamental method to recognize and transform the world, while method is the means and path to realize some specific objectives. Methodology guides the fundamental direction and choice of method and method is made based on the guiding from methodology and the recognition of the objective things.

3.1 Methodology

As it mentioned previously, methodology should be the framework, which can guide the whole process of the research. Generally, there are two types of methodology, which are inductive and deductive approach. Induction is usually described as moving the specific to the general, while deduction starts with the general and ends with the specific. To be more specifically, inductive approach is the approach that reasoning works from specific observations to broader generalizations and theories. Is an approach from bottom to up, conclusion is likely based on premises, and it may involve a degree of uncertainty. And deductive approach is reasoning works from the more general to the more specific. Is an approach can be called top to down, and normally the conclusion follows logically from premises with available facts (Burney, 2008).

This paper is based on the comprehensive study of interviews, move from this particular to general concepts and theories. Therefore, this paper uses the inductive approach as the methodology.

3.2 Method

According to the statements above, the method is the means and path to realize some specific objectives. There are also two major researches of method, quantitative research and qualitative research. Generally, quantitative methods are focusing on obtaining market data by means of numbers and statistics while qualitative research methods are focusing on providing an answer to why things are how they are, thus emphasizing market understanding.

The overall central research question presented by this paper is:

How is the green business development in China especially for the resources-based or related enterprises and companies?

To develop a better understanding of the research problem and also to provide a problem centred, attitudes and impacts oriented view, this paper will use the qualitative research to clarify the situation, impacts and also be able to talk about the future trend of the research.

Normally, qualitative data is difficult to measure and quantify, however, it can be able to valuable the attitudes and perspectives, which can hardly be accessed by using quantitative approach, such as a survey. Within qualitative approach, it is able to gather the new information of specific topics of research, and it is often used through an intensive dialogue between the interviewer and respondent (Broda, 2006; Naderer & Balzer, 2007).

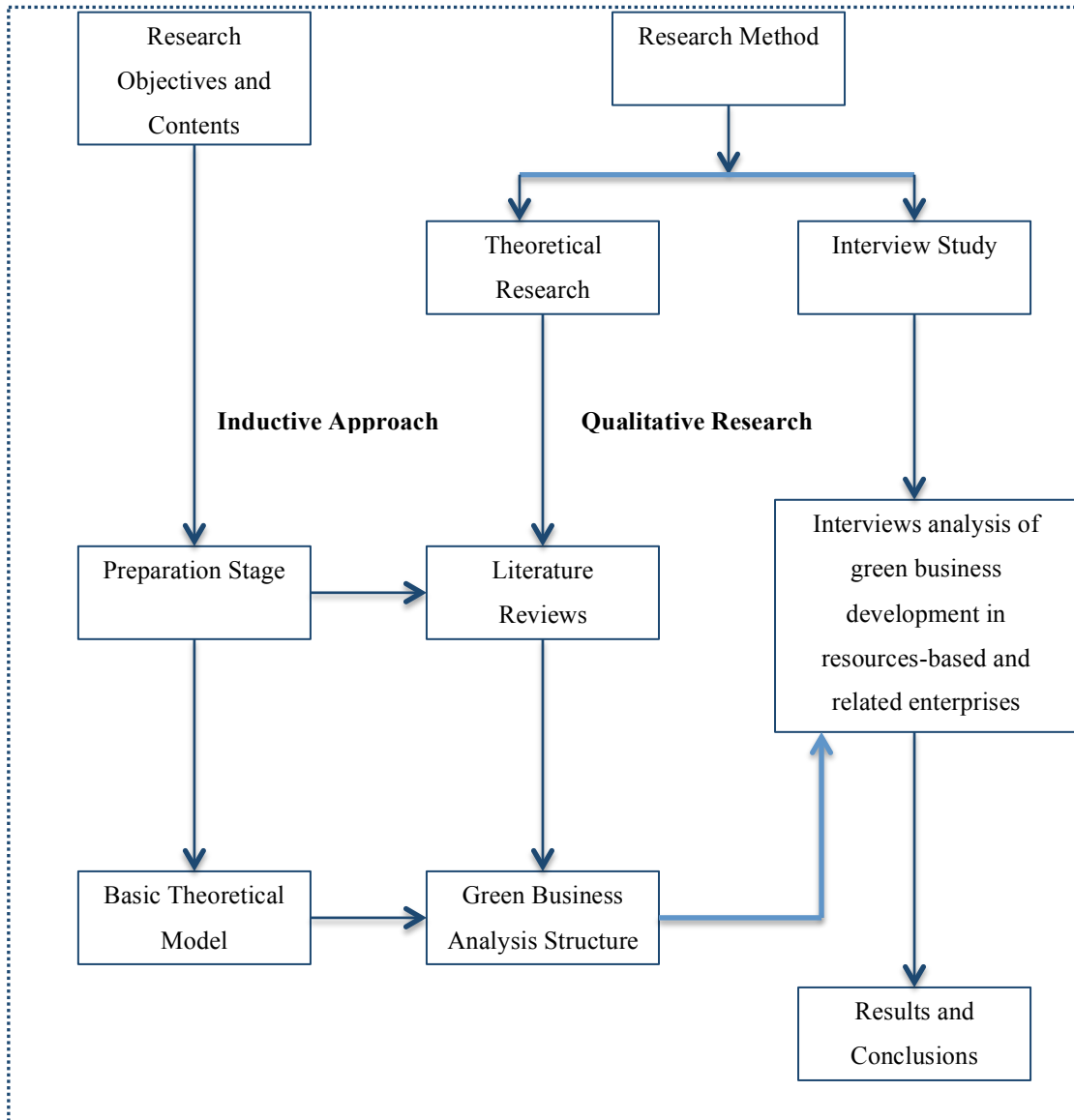
The major advantage of qualitative research is to provide depth and details regarding the research problem, and the aim is not to measure or quantify something, but to improve the understanding of the phenomenon by obtaining information from experts on personal experiences and critical incidents.

To be more specifically, this paper uses semi-structured of the interview guide as the main qualitative approach. This approach requires the interview to provide topics or subject areas in advance, within an outline form. With the framework of guide, the interviewer is free to explore, probe, and ask questions, however, it should focus on a particular predetermined subject (Patton, 2002).

The details of interview objectives, design, procedure, respondents, and results analysis will be discussed separately in the Chapter 7.

To sum up, in this paper, the introduction part sets up the question that is going to analysis is that the green business development in the field of green energy in China. Then the thesis separates the content of the question to narrate into five parts: introduction of overall green business development, presents related concepts and theories of green business, overall green business development in the world, green business development in China, green energy development in China, interviews with resources-based or related enterprises or companies to discuss how is the green business developing in their companies, finally comes with analysis of results, impacts, challenges and difficulties.

3. Method Framework



4. Globally Green Business in the Field of Green Energy

Nowadays, environmental and energy conserving issue has become the serious topic in the world. It is due to the consequence of soaring energy cost and the rising impact on the international affairs already has raising the community's awareness of both aspect of society and economy (Walke et al, 2010). Therefore, in the recent time, the communities of business are in searching for an ecological business especially focusing on the shift to green energy. This chapter would go through the development, highlights the concepts, characteristics of green business especially on green energy in the current global world.

4.1 Developments

If it said that the assured core concept of United Nations Conference on Environment and Development (UNCED) in twenties years ago was sustainable development, then in 2012, the "Rio+20" described a new concept about sustainable development was green economy. Dated back to the 20 century 70s, when the western countries were full of the satisfactory of material goods, they also faced with the decrement of earth's resources, severity of social pollution and the destroy of human survival environment gradually. Then it leaded to an environmental movement which aimed at protecting environment and earth, set off a green revolution, and finally formatted the concept and theory of green business in 20 century 90s.

Meanwhile, one of the reasons to use renewable energy is it can meet the needs of nowadays without harm to the future generations, and is able to meet those needs also. And renewable energy is one of the parts of green energy; the second major part is energy efficiency (Osterkorn; Lemaire, 2004). For the renewable resources part, it generally includes solar power, wind, hydro energy, geothermal and etc. Moreover, the technology of renewable energy is to convert the resources (heat, power or mechanical energy) to electricity or other motive power. While for the efficiency of energy, it requires the to reduce the using amount of energy but remain to satisfy the products or services, also to change how energy is supplied. Moreover, in the point of demanding, to improve the energy equation as verified resource can have great influence on the economy (InterAcademy Council, 2007). Due to energy takes a big part of business and consumption, thus it also needs the transformation into green one which needs to fully

reflect the consciousness of environment protection, resource conservation and social responsibility to meet the customers' green need in order to achieve the enterprise's business goals and sustainability of development.

Moreover, according to Bohdana Stepanenko-Lypovyk (2012), green business has a more specific definition: *“it is a transition from the extensive type of economic development to sustainable which should provide the minimization of the non-renewable natural resources use and effective use of renewable ones, improvement of environmental quality and increase of the state's ecological security and lead to stable economy growth.”*

Therefore, it is supposed that green business is a new form of economic activities, which can satisfy the business need without producing negative effect on environment. In the field of green energy, it should be able to reduce the use of non-renewable resources and be much more effective on developing and using the renewable ones. For example, the increasing of greenhouse gases, which mostly generated from traditional energy such as fossil fuels, and this increasing is the major reasons of global warming. So the objective of green energy is to produce as much as power with less waste and pollution as possible. Even though, all the forms of energy production will have a certain degree of waste and pollution, but the green one will result less. As a consequence, green energy is the one can preserve earth for longer time.

4.2 Importance

Recently, there are some successful cases of developing green business thanks to the market need and also the market development. The scarcities of lack of energy, and the competition in the energy industry also help the market have the eyes on green products like green energy. In the below are listed some vital drive-force for green business in the field of green energy.

First of all, the public has grown the clear awareness of environmental issues. During the past few years, people raised up the public concern about global environment changes such as the climate change and the pollution, which come from inappropriate using of energy. If the entities still use the old or traditional ways doing business, they would be harmful to the whole environment, reduce the market shares and also pay

much more money on the inefficient ways of using resources. Therefore, it becomes important for companies to be cognizant of following closely those changes in the light of the public attitudes.

Moreover, the fundamental factor for the companies to reduce the negative impact on environment is it can also bring the benefit and new opportunities. According to an authoritative survey by AMR Research in 2007 that reducing energy consumption is seen as the prior concern for corporate environmental issue. It is clearly that developing green energy and reducing greenhouse gas become more and more important for the companies especially for the energy ones.

Secondly, the world's major public and private entities have a certain degree of understanding the market demand for green products. For example, government can make its own green business development policies according the national real situation (social, economic and environmental) to guide and support the companies or other organizations to produce green products, services or apply green technologies. For a country, energy is a vital resource so that every government would pay most attention on importing and producing it. Therefore the government provides their preference of green energy to lead the enterprise to improving the technology and process to produce it. Due to the government already set a strong example for normal consumers that those green products especially the green energy is good for community, it is important for companies to invest in the green business, which reduces human impacts on the environment. At the same time, they can use this green trend to provide an opportunity to establish their business brand and create a large market demand for those green products.

Thirdly, investment on green business can provide extra financial backing to those companies. For instance, under the policies that using the tool of tax or green debit, those companies can have significant benefit in the aspect of economic. And the green debit is part of green finance. As the strong control tool, adjustment of taxes can have direct effect on green business development. Except green finance, tool of taxes, green energy obligation support also can be a good way to support green business, referred to the legislation: *promotion of the renewable sources and amending and subsequently repealing*, which was created by European Union in 2009. Regarding other non-direct

ways to help with financial support is to get public investment or loans. If the companies are focused on the green business, it would be quite accessible for them to gain public investment to support their very first stage development of green produces, particularly in the field of green energy. It would be benefit for the growth of SMEs' innovation.

Hence, green business especially in the field of green energy is not only important for the consumers with ecologically sound products and services but also provide a competitive niche and improvement for the companies. In order to have ecological, developing green business is one of the effective and also efficient way to have business growth in the same time with reduction of waste and non-renewable resources.

4.3 Essential Characteristics

For the green business especially in the field of green energy, it basically require about: high technology and innovation, collaboration, and sustainability reporting. The main characteristics would contain high capital costs with low fuel costs in highly site-specific. Because of the limitation of technology and resources, the output of green energy is of high uncertainty.

4.3.1 Innovation & Technology with High Costs

Due to the business of green energy is a high-tech industry; it has a high requirement of technology and knowledge. Therefore, the investment in the research and development department is quite high. Therefore, this way of developing green business is mainly concentrated on companies' own ability to develop green technologies, transfer or improve the products and services to "green" one. It needs the ability to achieve the innovation to keep continuous renewable energy products with low fuel costs and services and gain the efficiency of the producing process to reduction in waste.

4.3.2 Collaboration with Highly Site-Specific

Even though this field is a highly site-specific, for example, one company maybe just focus on green energy like wind, they still need strong connection like networks and communications with other site entities to gain the knowledge sharing and propels innovation. Meanwhile, the technical challenges are increasing, it is important and must

for them to learn from each other and share the experiences and achievement of technology.

4.3.3 Uncertainty of Output

Not all the green energy like wind has a highly variable output, for example, solar has no output for at least 50% of the year with extremely high capital cost. Even the geothermal is inexpensive and reliable but it is really hard to find and access to it and hydropower is of little development expected because of high costs and uncertainty of output.

In addition, companies that do this business are required about periodic sustainability reporting. The reports would depict that performance of companies is in relation to the companies' goals, which is frequently corporating with the corporate mission.

4.4 Summary

In summary, this chapter focuses on the general introduction of green business especially in the field of green energy. Therefore, it depicts the development of it from 20 century 70s to nowadays, illustrates some important concepts about green business and green energy, and then it demonstrates the importance of it in the three aspects: awareness of environmental issues, market and customers demand, and financial backing. Finally, it shows the three main characteristics: technology with high cost, collaboration with high-site specific and uncertainty of output of the green business in the field of green energy.

5. Green Business Development in the Field of Green Energy in China

Within highly speed economic growth for over 30 years, the energy demand has a huge increasing in the same time. This put forward the issue for Chinese government: to lower the carbon emissions, and to relieve from the serious depending on the energy resources to have the economic growth. In this chapter, it will go though from 11th FYP to 13th FYP, which just started in 2016. According to 11th FYP, it is targeted to reduce economic energy intensity by 20% until 2010, and improve the energy efficiency across all sectors by guiding polices and financial side support. In 2009, China announced that by 2020, the mission of China is to decrease the carbon intensity to 45%, which is lower

than 2005. To be able face with the issue of climate changes, security and shortage of energy, economic growth, the strategy of developing low-carbon economy is taken as one of the core strategy in the country.

Regarding the development of low-carbon economy and concerning the economy situation in China, which the economic growth mainly depended on resources, therefore green energy should be taken as the main step to help the industrial transformation. As two parts of green energy, renewable energy and also the efficiency of energy, which must be took into action with national policies, legislation, companies' instruments, and also the consciousness from public of energy savings and the GHG emissions (Jiang et al, 2010).

This chapter would present the situation of green energy in China, depict the guidelines and indicators, illustrate some models and then figure out the main challenge of it. Firstly, it would show the macroeconomic outlook of energy and emissions in China. Then, this part would discuss the guidelines in law and community to direct the green business especially in the field of green energy. Next, the discussion of driving force, technology and trends of green energy will be presented. Following, it indicates the achievement of using green energy and the efficiency in China. Finally, it would focus on the challenges of the situation and the direction of green energy with particular focus on saving energy and reducing emissions.

5.1 Macroeconomic Outlook

In addition to discuss particular drivers and technology trends, elements such as growth rate of GDP and population, and the industrial characters, which has closely relation with energy demanding side and emission of CO₂. All these driving forces may not be the direct ones, however it still has great influence on development of green energy, green business that direct to the green economy in the country.

5.1.1 Major Driving Forces

GDP growth has important impacts on the following aspects: production and trade of industry, and also the domestic income, which can effect the consumption of energy (Fridley et al, 2012). Therefore, GDP growth should be one of the driving forces in this aspect. To be more detailed, China's economic growth is assumed to continue to 2020 with average growth rate of more than 7% while from 2020 to 2030 with a slowing down growth rate of around 6%. As a populous country, the population size, growth rate and urbanization cannot be ignored when considering about energy consumption. Moreover, the urbanization leads to the inflow of people to the cities, also the rural areas become the cities, which requires more construction works that require a large amount of materials consumption.

5.1.2 Findings in the Aspect of Energy

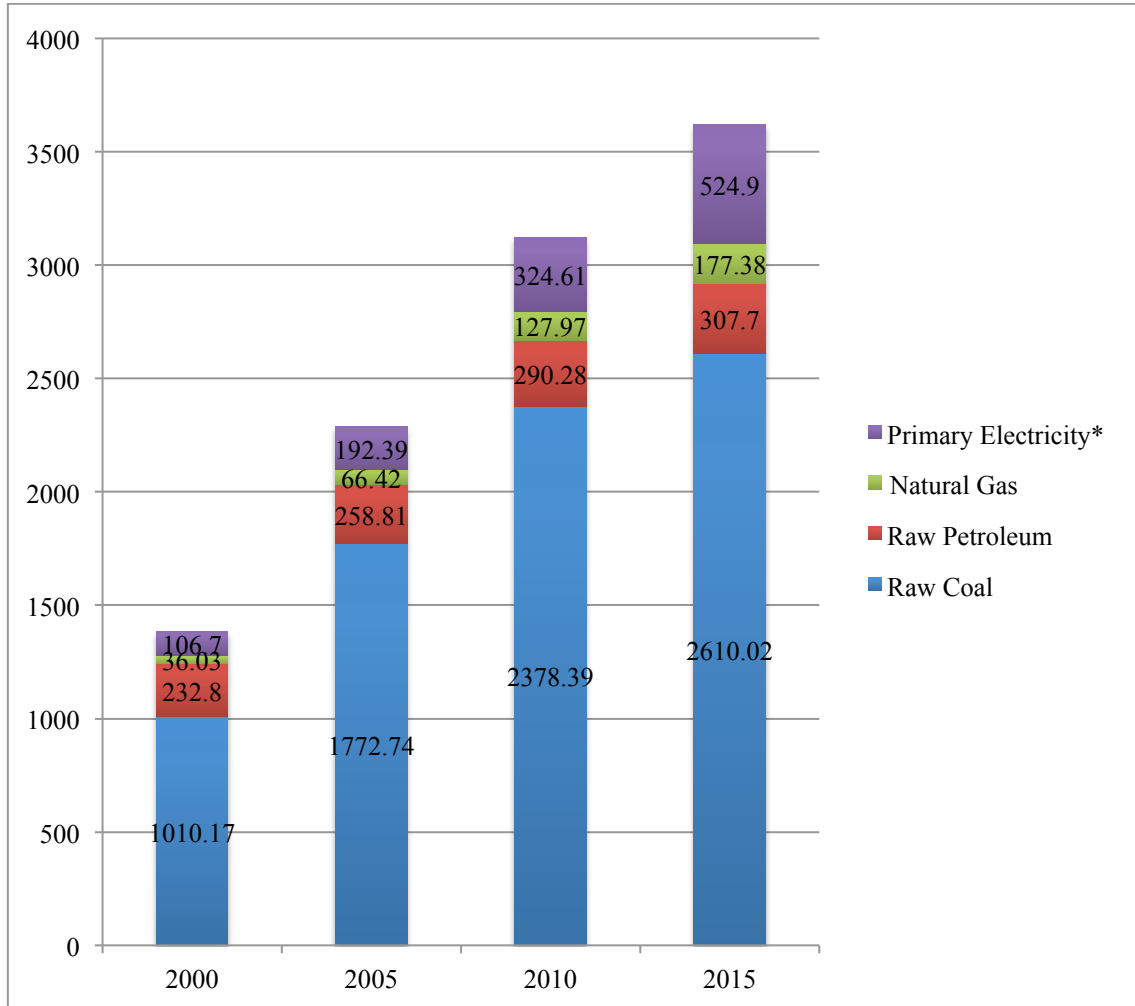
According to the statistics from NBS, which shows in the figure 3 and 4, both primary energy produce and consume has a sharp increasing from 2000 to 2015. However, there is different pace of increasing among different form of energy. Firstly, it is obviously China is the country with rich resources of raw coal, which is 4.34 times of raw petroleum and 28 times of natural gas.

Secondly, under the national policies support of developing green energy, primary electricity rises in absolute value and in shares of total primary energy produce, 1.61 time compare to 2014, and almost 5 times compares to 2000. It shows the same trend in both primary energy producing and consuming.

Nevertheless, the primary electricity, which is regarded as green energy in this figure, is the only resource that with own production can satisfy the consumption. The reason can be green energy is still new in the market, which the market need is not high as the traditional energy, and the rate of transforming the green energy to usage is not high enough. In the point of energy safety, raw petroleum is facing seriously issue.

Moreover, the decrease in coal as a primary energy fuel (in the view of percentage 100%) can be endorsed greatly to the transformation sector, since not much coal is used directly by end-use sectors such as agriculture, industry, commercial and residential sectors.

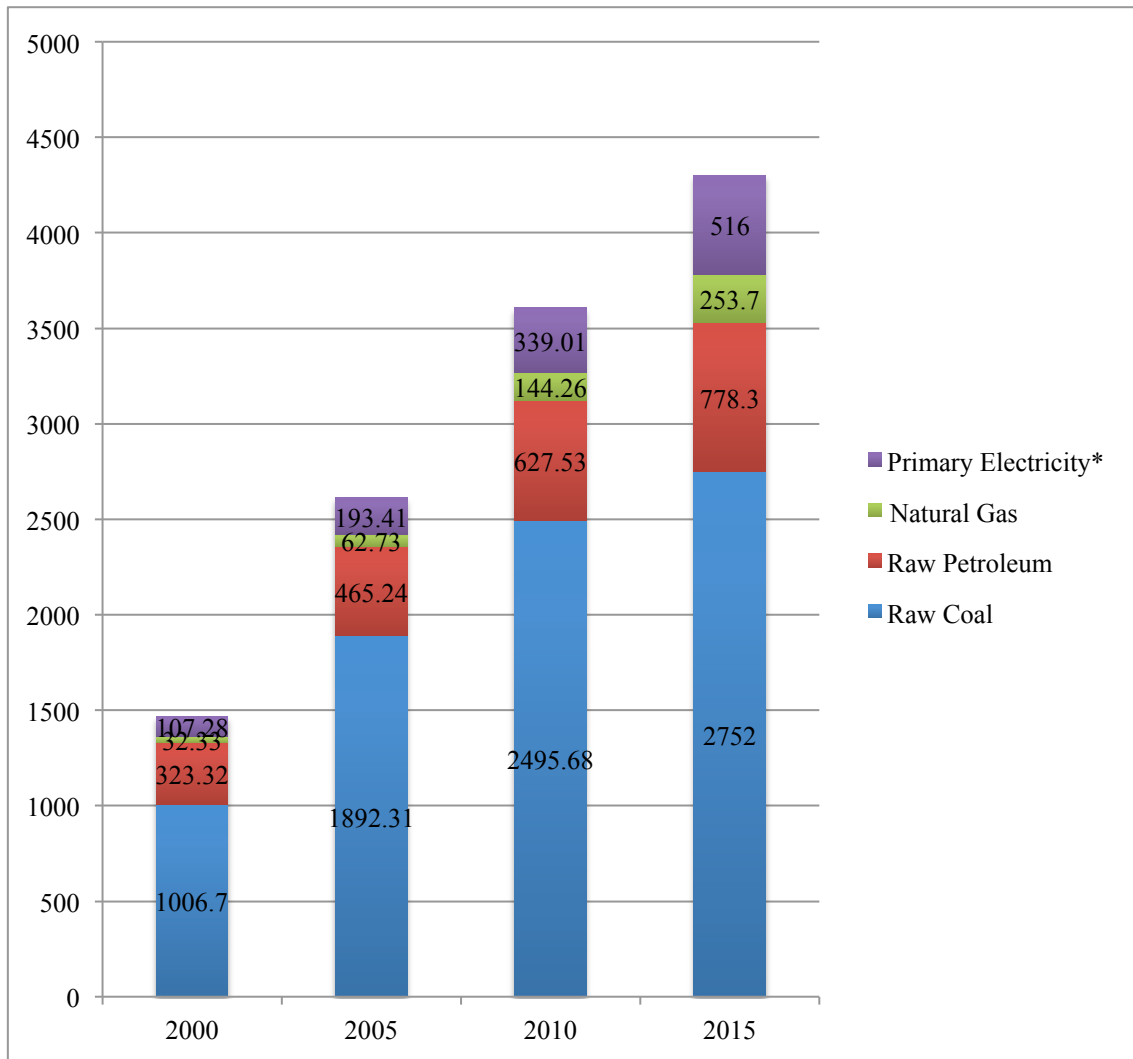
Summing up, China is still a big raw-coal consuming country, however it dedicated to develop green energy like hydropower, wind, or nuclear power to change the economic coal intensity and also solve the issue of safety of energy.



Note: *Primary electricity includes the green energy: hydropower, wind, and nuclear power.

Figure 3-Total primary energy produce outlook by fuel (Mtce) from 2000 to 2015

Source: NBS, 2015



Note: *Primary electricity includes the green energy: hydropower, wind, and nuclear power.

Figure 4-Total primary energy consume outlook by fuel (Mtce) from 2000 to 2015

Source: NBS, 2015

5.1.3 Findings in the Aspect of CO₂ Emissions

According to the collective data from Liu Zhu, in 2012, China CO₂ emissions was in the peak of 8.5 billion tons, it took up 25% of the total CO₂ in the world. The size and the growing speed of this emission make China a country is the center of reducing the emissions and developing low-carbon area.

From figure 6, it shows that in China, manufacturing and thermal power generation are responsible for the CO₂ in 85%, as shown previously, raw coal is the mainly fuel

resource, which took up 70%. Centralized industrial gathering and coal is the core part in the energy structure leads to the high CO₂ emissions situation in China.

To be more specifically, in 2012, manufacturing was up to 47% of the national total CO₂, while thermal power was 32% of it, and the transportation was only 6%. Compared with the developed countries, there is big difference of the CO₂ emissions. For example, in America, 32% of the CO₂ emissions comes from transportation and only 17% comes from manufacturing.

In conclusion, the large amount of CO₂ emissions is because of the energy structure and also the industrial structure in China. Therefore, in order to reduce CO₂, which as is committed to 2020 target, short and mid-long term of energy conservation and emission reduction should be the core implementation. Under this background, it increased the concerning of development of green energy, green business in China.

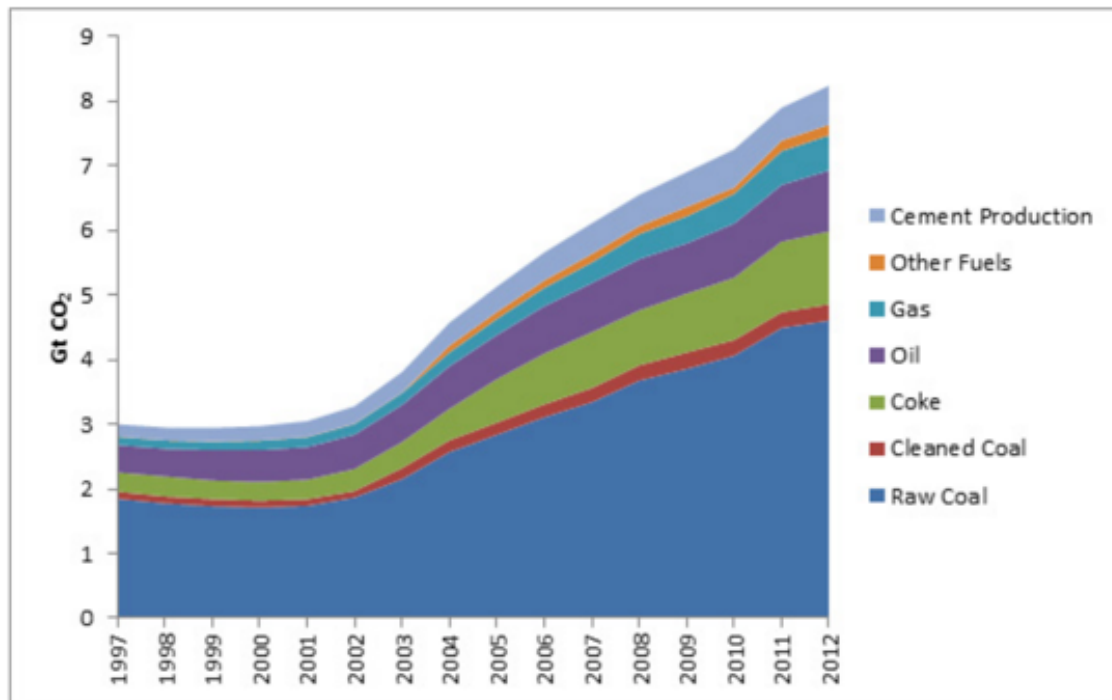


Figure 5-CO₂ emissions outlook by energy sector from 1997 to 2012
Source: Liu Zhu, 2015

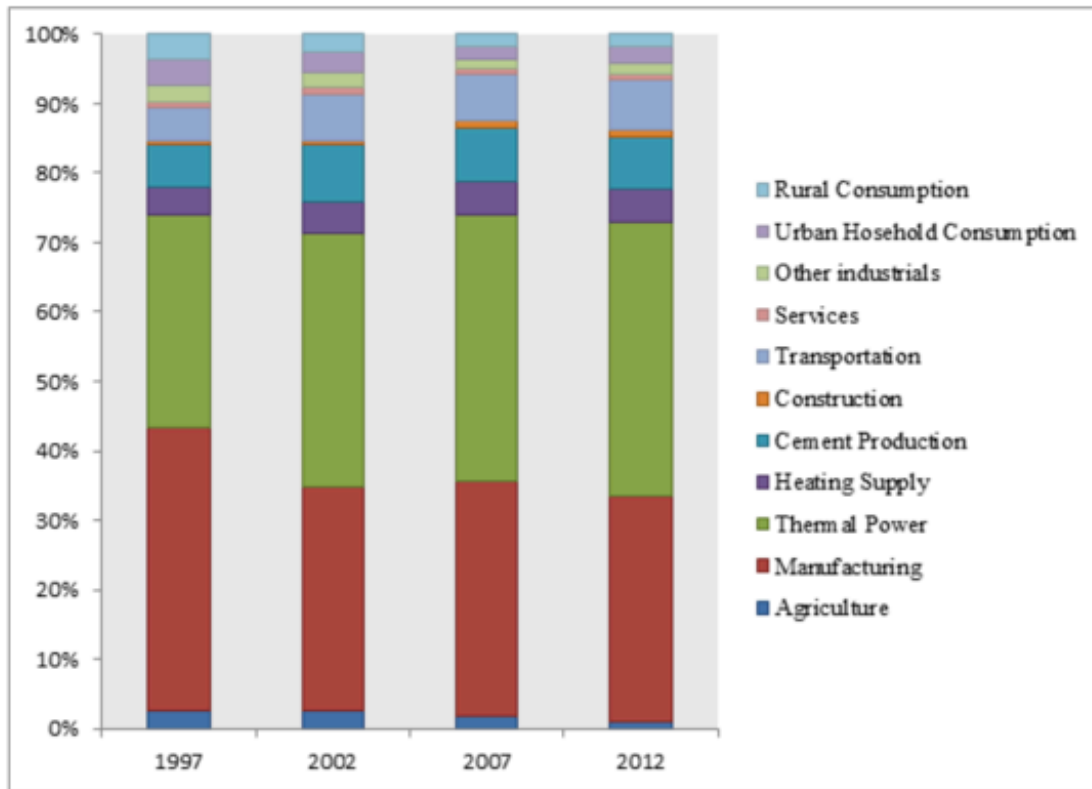


Figure 6 -CO₂ emissions outlook by industrial sector from 1997 to 2012
Source: Liu Zhu, 2015

5.2 Guidelines

Apart from promoting the efficiency of energy in China, there is also concentration on develop other energy form like green energy to reduce the carbon emissions, decrease the negative impact to the environment. In 2009, China was committed to reduce the carbon emissions intensity to 40% - 45% in 2020. In 11th FYP, the government promised to energy consumption intensity decrease to 20% before 2010. For the next 12th FYP, the index of energy consumption intensity has been put forward again; it should decrease to 17%. In 2014, in the announcement from U.S. and China on climate change, China was the first time to promise that China will reduce the total amount of CO₂ in 2030, and also to achieve the consumption of renewable energy takes up of 20% in the total usage of energy in the whole country.

After one decade, China has been able to establish numerous chief renewable energy legislation together with programs to support the development of green energy, which include hydropower, wind, nuclear power, solar, biomass and so on. This part depicts the regulations, which guide the green energy development in China. Like the rest of the

global renewable energy sector, China has also some significant progression in the green energy policies. Here are the latest major developmental and marketable policies, which act as the guidelines.

5.2.1 Renewable Energy Law of China

The 2005 Renewable Energy Law of China marked the beginnings of policy-driven development of China's renewable energy industry once it went into effect on January 1, 2006. The first notable element of the law is the provision for a mandated market share as measured by medium- and long-term targets of the *“total volume for the development and utilization of renewable energy* (National People's Congress, 2005).” The law provided feed-in tariffs for technologies, including biomass power generation, and established grid feed-in requirements and standard procedures. With regards to grid integration, the law stipulates that:

“Grid enterprises shall enter into grid connection agreements with renewable power generation enterprises that have legally obtained administrative license...and buy all the grid-connected power produced with renewable energy within the coverage of their power grid, and provide grid-connection service for the generation of power with renewable energy (National People's Congress, 2005).”

The subsequent implementing guidelines released in January also mandated that government guided prices will be determined by the State Council for grid-connected renewable generation and established a cost-sharing mechanism where the incremental cost will be shared among utility customers. The law further outlined financial support and economic incentives that the government may offer to renewable developers through a newly established renewable energy fund and through preferential loans and tax benefits.

5.2.2 2007 Medium and Long-Term Development Plan for Renewable Energy

After the increase in the government support for green energy development especially focus on renewable energy in the 2005 *Renewable Energy Law*. In order to raise the general share of renewable energy to 10% of total primary energy consumption in 2010 and 15% in 2020, the 2007 medium and long-term development plan was carried out. The first official targets for priority renewable technology sectors including hydropower,

biomass, wind, solar and others such as geothermal, tidal and biofuels were also announced for 2010 and 2020 (Table 2).

		2010 Target	2020 Target
Total Renewable Power		200.8	361.9
Hydropower	GW	190.0	300.0
<i>Pumped Hydro (2011)</i>	GW	2015 target: 41 GW	
Biomass	GW	5.5	30.0
<i>Ag/Forestry Residues</i>	GW	4.0	24.0
<i>Biogas from org effluent</i>	GW	1.0	3.0
<i>Municipal Solid Waste</i>	GW	0.5	3.0
Wind	GW	5.0	30.0
<i>Off-shore</i>	GW	0.2	1.0
<i>On-shore</i>	GW	4.9	29.0
Solar Power	GW	0.3	1.8
<i>PV Total</i>	GW	0.3	1.6
Remote PV	GW	0.2	0.3
Building Integrated PV	GW	0.1	1.0
PV	GW	0.0	0.2
Non-Grid Special Use of PV Tech	GW	0.0	0.1
<i>Solar Thermal</i>	GW	0.1	0.2
Tidal Power	GW	0.0	0.1
Other Renewable Energy Applications			
Solar Water Heater	mil m2	150	300
Geothermal energy	Mtce	4	12
Biomass Pellets	Mt consumption	1	50
Biogas and Biomass Gasification	mil rural households	40	80
Liquid Biofuels	Mt consumption	2.2	12
<i>Bioethanol</i>	Mt	2	10
<i>Biodiesel</i>	Mt	0	2

Table 2 – Renewable energy targets set in 2007 medium and long-term plan

Source: National Development and Reform Commission of China (NDRC), 2007

In addition, the 2007 Plan also set guiding principles, policies and measurements for accelerating the renewable energy industries' development, which included:

- Establishing sustainable and stable market demand through mandatory market share policies, such as setting specific non-hydro renewable generation and installed capacity targets.
- Improving the market environment through designating responsible parties in transmission and grid integration and setting solar integration standards development.
- Setting and improving renewable feed-in tariffs and policies of sharing the costs.
- Increasing the fiscal input to the renewable energy fund and tax incentives.
- Accelerating technology and industry development through continued research and development (R&D) support.

5.2.3 Amendments to 2005 Renewable Energy Law

The unprecedented growth of renewable energy industries, particularly solar PV and turbine manufacturers, from 2005 to 2009 presented unexpected challenges and obstacles to provisions set forth in the *Renewable Energy Law and the Medium and Long-term Plan*. The wind industry, take as an example, has undergone such a rapid pace of growth in production with cumulative capacity doubling each year after 2005 that transmission planning and interconnection have not been able to keep pace.

In 2010, total installed capacity of wind reached 44.7 GW but actual grid connected wind capacity was only 31.1 GW, placing China second behind the U.S. in terms of total grid-connected wind capacity (NEA, 2011). For example, in the wind farms in Gansu, there have been reports of grid-connections for only 20% of installed capacity of wind turbines due to grid connection challenges discussed in the wind section (Ma et al, 2011). At the same time, the revenue for supporting the renewable energy fund set up under the department of Finance Ministry trails total expenditures with insufficient revenue stream from a surcharge of only 0.4 fen/kWh on national electricity sales (Martinot, 2011).

In response to these challenges to continuing the expansion of renewables, in 2009, *the amendments to the 2005 Renewable Energy Law* was carried out and taken into action in 2010. The 2009 amendments mandated the plan and coordination with more details on general renewable and electric power sector development and transmission plan among these organizations: state council, state electricity regulatory council, grid companies, renewable developers and also the local governments.

Additionally, the 2009 amendments also strengthened the requires for electric utilities to buy all renewable energy by obligating them to assure the purchases of a minimum amount of electricity is from renewable energy and mandating the use of economic penalties for non-compliance. However, the amendments did not include any guidelines on how this obligation will be implemented and the mandatory minimum amount of renewable generation for guaranteed purchase (Cheung, 2011). Lastly, the amendments recognized the need to raise the funding level for the renewable energy law by including a provision that allows the Ministry of Finance to supplement and raise the fund with general revenues.

In addition to these amendments to the 2005 Renewable Energy Law, other technology-specific policies were also ushered in over the last two years in response to the dynamic landscape of renewable energy sector in China.

5.2 Framework of China’s Targets in 2020 and 2030 for Climate Change

2020	2030
Carbon intensity: decrease 40% - 45% as in 2005	Carbon intensity: decrease 60% - 65% as in 2005
Non-fossil fuel in primary energy consumption: increase to 15% in 2020	Non-fossil fuel in primary energy consumption: increase to 20% in 2030
Forested area increases 40 million ha Forest stock volume increases 1.3 billion m ³	Forest stock volume increases 4.5 billion m ³

5.3 Situations

As presented and discussed previously, it can be seen that coal is the fuel that has the domination place in the China energy system. And this situation is much more seriously than in other main countries or EU, due to coal takes 70% share of the energy in total (NBS, 2008). Moreover, in the recent time, increasing in energy demanding side is thanks to the fast growing economy in China. Due to the economy size of China is large, it brings out significantly impacts on the world level. For instance, in three years, the new construction of power plants will have a capacity of over 30% of the total capacity that generated by electricity in U.S. Meanwhile, CO₂ emissions, which caused by energy has sharply increasing.

In the view of energy efficiency, from 2005, China shift the eyes on the issue of soaring demanding of energy, therefore it put forward the commitment that in 11th FYP, the goal is reducing 20% of energy intensity, continually with 12th FYP goal is to has another decreasing of 17% in energy intensity. In order to achieve these goals, China implemented measurements in the perspective of legislation, regulation, and reformation from national level to province to make sure the reduction of energy intensity will be applied in all the industries and sectors.

During the period of this paper, in 2015, the result of 12th FYP arrived 20% decreasing of CO₂ emissions, which achieved the targets as promised. And the non-fossil fuel took up 12% of the total energy consumption. In this chapter, it will present the situations and trend of green energy development in China, and it is based on the three important periods reviewing.

Figure 7 presents the energy use and its efficiency in coordinated with economic activates from 1995 to 2008, which covered 10th FYP and also 11th FYP period (2000 – 2008). In the aspect of energy use (blue bar), the general trend is increasing, however, it has sharp decreasing in 1997, 1998, while soaring again in 2003 and 2004 which was due to the urbanization progressing in China. Under the background of 11th FYP, the increasing of energy use became more stable. In the perspective of activity (red bar), which such as manufactured goods, it is stably increasing trend except a small decrease in 1998 and 2008, which is a year of large disasters in China. The rest one is the

efficiency part (purple bar), it is calculated base on how much of the energy used on the unit of activity, which can directly show if the energy usage is efficient or not.

In general, this figure presents in the 10th FYP and 11th FYP, the fast increasing of energy use was thanks to the speedy increasing in activity, which has the high peak in 2007. Moreover, the increasing of energy use may also cause by the energy efficiency reduction, when taking 2007 as an example.

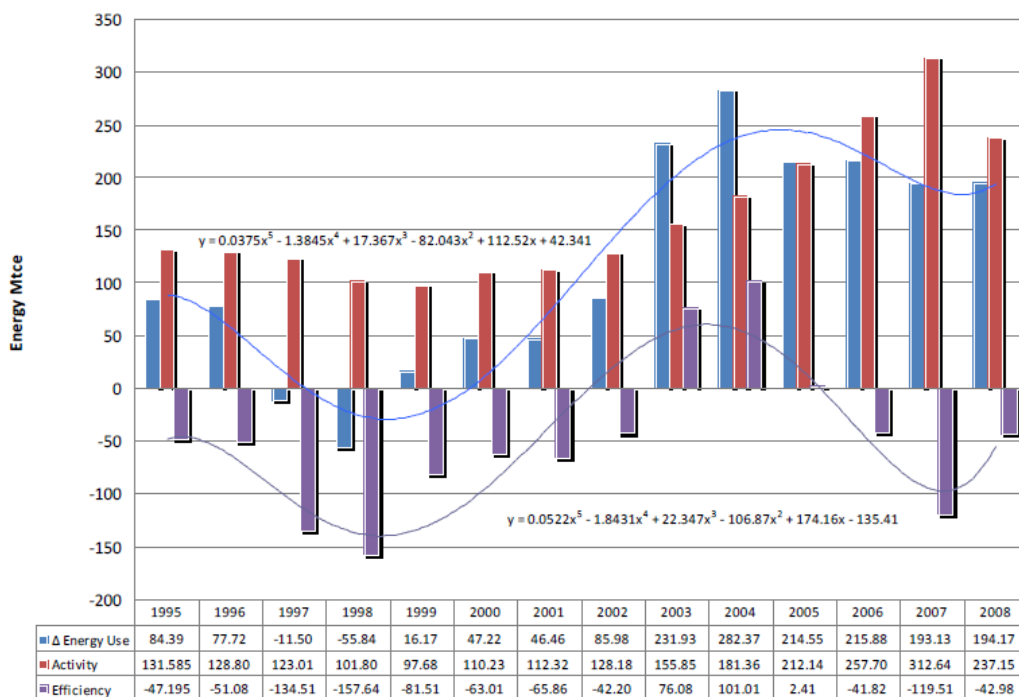


Figure 7– Trends in energy use, activity, and energy efficiency for Chinese economy, 1995-2008

Source: National Development and Reform Commission of China (NDRC), 2010

Regarding this situation, decreasing energy intensity in the secondary sector¹ seems has the significant effect on it. According to the table 3 in the below, from 1990 to 2015, the consumption of coal decreased smoothly, while natural gas and hydropower has a general increasing. It represents that China is committed to increase and develop green energy instead of the traditional one like coal. Moreover, it is still need to continually increase the alternatives of green energy like nuclear power and wind power. As a consequence, China carried out an objective of nuclear power development in the mid-term and also long-term in 2007.

Year	As percentage of total energy consumption			
	Coal	Crude Oil	Natural Gas	Hydropower, nuclear power, wind power
1990	76.2	16.6	2.1	5.1
1995	74.6	17.5	1.8	6.1
2000	68.5	22.0	2.2	7.3
2005	72.4	17.8	2.4	7.4
2010	69.2	17.4	4	9.4
2011	70.2	16.8	4.6	8.4
2012	68.5	17.0	4.8	9.7
2013	67.4	17.1	5.3	10.2
2014	66.03	18.1	5.7	11.21
2015	64	19.7	5.9	12

Table 3 – Total consumption of energy and its composition

Source: NBS, 2015

¹ The secondary sector includes the sectors, which create a finished, usable product: manufacturing and construction.

12 th Five Year Plan Targets and Results				
Indicator	Plan Targets		Results	
	2015	Avg. annual change (cum. change)	2015	Avg. annual change (cum. change)
Economic development				
GDP (trillion, RMB)	-	7%	67.7	7.8%
Resources and environment				
Share of non-fossil fuel in the primary energy consumption (%)	11.4	-	12	-
Decreasing of Energy consumption per unit GDP (%)	-	[16]	-	[18.2]
Decreasing of CO₂ emissions per unit GDP (%)	-	[17]	-	[20]

Note: This figure is the selected one with the data, which concerning of this paper's topic: energy issue. Therefore, only economic and resources index shown in above, which is not the full index as in the original report.

Table 4 – 12th FYP energy related targets and results

Source: NDRC, 2016.

In conclusion, from 1990 to 2015, China has a great change of energy using. Changes includes polluted energy decrease and green energy increase with energy efficiency improved, After a period of energy intensity reductions between 2010 to 2015 under concerted efficiency efforts and programs of the 12th FYP, China is still facing the serious situation regarding the energy intensity, and the challenges of stabilizing total energy demand and emissions in the near future.

All the evidence shown in above suggests that China has put greatly efforts on developing green energy. Following by the results of 12th FYP, it shows that the

achievements mainly came from the increasing efficiency of energy, however, the economic structure of using coal as mainly resources is still need to be overcome in the future.

5.4 Achievements

After two decades of implementing green energy development policies, in 2006, it has the first time of decreasing of 1.7% in energy intensity in China. Following by 3.7% decreasing again in 2007 and 4.6% decreasing in 2008, and with the same result in 2009 (Zhou et al, 2009). Continually, in 2010, under the background of world economic struggling crisis situation, China finally reached the goal of reducing 20% of CO₂ emissions. To be more specific, during the period of 11th FYP, according to the requirements by government in the alternative energy development, it has a significant expanding in the alternative energy industry. In the period of 12th FYP, in 2014, China was the first time to have the creasing in the generation of coal-fire power and its consumption. In 2015, it was the first time for China has the decreasing of 2% in electric power within the generation of non-fossil power increased 150 GWh. In the same time, the generation of power from renewable energy reached to 24.8% (Li, 2016).

As seen in the table 6, 11th FYP has committed to develop of renewable energy like wind, solar power, hydropower and so on. And the results reflected that all of the targets have been met during this five years. For example, the capacity of wind has 800% higher than the goal, which settled in 2010. Solar capacity also has 300% higher and hydropower has more than 100%. All these positive results direct to China's achievement in renewable energy development, which is contributed to the development of green energy in China (Pew Charitable Trusts, 2011).

	2005 Actual	2010 Target	2010 Actual	Target Met
Wind	1.26	5	44.7	√
Solar	0.07	0.3	0.85	√
Biomass	2	5.5	5.5	√
Hydro	115	190	213	√
Nuclear	6.9		10.8	
Geothermal	0.03		0.024	
Solar Hot water (mil m2)	79.3	150	168	√
Ethanol (mil tonnes)	1.02	0.8	1.8	√

Table 5 – China installed capacity for alternative energy generation and sources

Sources: REN21 2006; BP 2010; CEC 2011.

When considering this rapid expanding in renewable energy in China, it leads to a big investment no matter from public or private organizations in this renewable energy sector. From 2005 to 2010, China has become the fifth highest investment in the aspect of growth rate. As shown in figure 6 in the below, the 2010 investment composition closely follows that of the past five years.

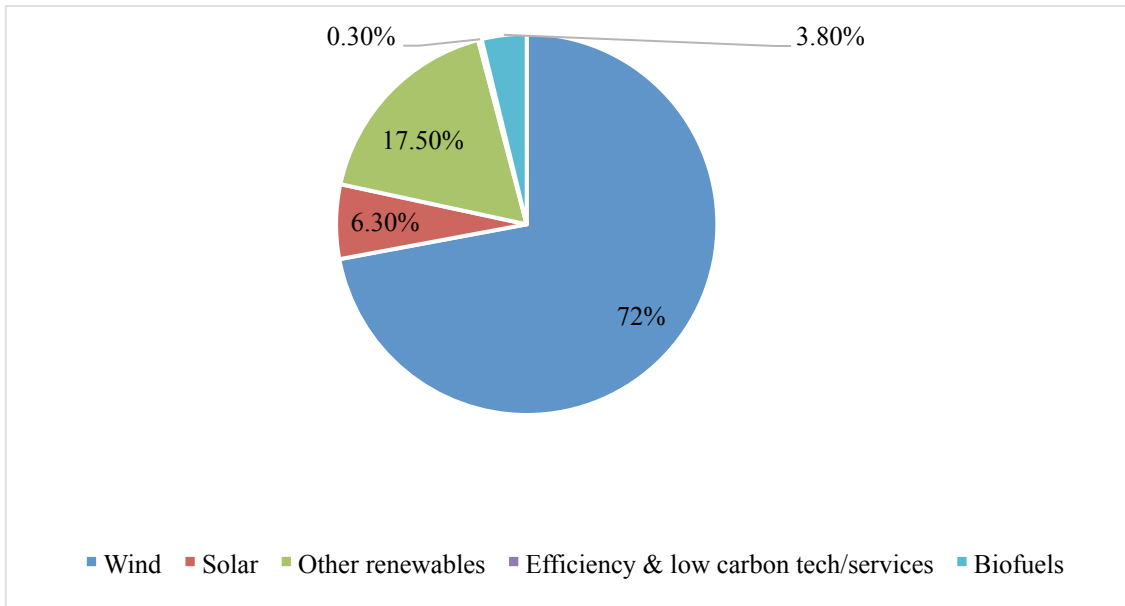


Figure 8– *Distribution of investments by industry, 2005-2010*

Source: Pew Charitable Trusts, 2011

Besides the achievements as mentioned in the above, there is still weakness of electricity grid for penetration of renewable energies, such as solar power. In order to improve this, China has been invested of 3.2 trillion RMB in the development of power sector infrastructure with 295 billion RMB in the grid construction (GMEPA, 2011). To overcome the transmission of energy structure also increase the energy efficiency, China has began to put heave investment in ultrahigh voltage alternating current (UHV AC) and high voltage direct current (HVDC) transmission, which can be able transmit larger quantities of electricity during long distance while reduce the power loss.

To be more specifically, in 2010, grid development was accumulated with a total of 440,000 km of 220V+ high voltage direct current (HVDC) transmission, an increasing of 180,000 km from 2005, and completion of 2078 km of UHV transmission lines (GMEPA, 2011; Cheung, 2011).

Therefore, while China has a success in the expansion of the scale and scope of renewable energy manufacturing, and also the generation capacity, it still facing lots challenges, for example, how to maintain the stability of grid while the increasing demand for renewable energy.

5.5 Challenges

Even though China is able to move forward with developing green energy based on the FYP updated targets, however, the real progression of developing or using green energy should rely on multi factors: development of economy, structure of industry, progression of technology, maintaining legislation, and implementation.

Firstly, after the expansion of investment on the green energy and its construction, the issue of supply side and demand side has been put forward; nevertheless, the problem of energy safety is still the core issue for the country due to China is not a country with rich oil resources, and the increasing demand of consumption is depend on the international market. Secondly, the changes of energy structure cannot be done in five years, ten years or even more time, because the special situation of resources in China, which is coal that has the dominated position in the structure. The overexploitation and overconsumption of coal, leads to increased pressure on the transportation industry and also the inefficiency of usage. Last but not least, China is taken as the world factory; therefore the exporting products normally are with lower price while the consumption and emission of energy per unit product are quite high. There is also big size of invisible carbon emission from these products in China. Therefore while other countries using the low price products from China, China is responsible for its own effect of these products' emissions, which leads to seriously effect on China energy resources and the environmental protection.

To sum up, in order to develop green energy and increase energy efficiency, China still has a long path to go with the challenges of technology promotion, regulations perfection, social consciousness raising and innovation.

5.6 Conclusion

After decades of rapid growth in energy demanding, China has began to concentrate on Developing green energy in order to solve the issue of energy safety and also the problem with CO₂ emissions. Together with the progression on energy efficiency in 11th FYP, the next step is focusing on developing renewable energy to achieve the 2020 carbon intensity reduction goal.

The development of renewable energy has the support from regulatory and financial part, which recognized by legislations passed previously, and it includes the *2005 Renewable Energy Law* and its 2009 amendments, the *2007 Medium and Long-term Development Plan for Renewable Energy*. China has also committed to international agreements, for example, *U.S. – China Joint Announcement on Climate Change*.

As a consequence, China has successfully achieved the targets of 2010 renewable energy development. From the short to medium-term, China targets to have 15% green energy in the total primary energy consumption in 2020. In addition, solar power and advanced coal alternatives are taken as an important role in China's green energy development.

However, in spite of all these achievements from 11th FYP and 12th FYP, China still facing the challenges of green innovation, stability of green energy, the transformation rate of green energy, and the long-term of input and output of it.

6 Questionnaire of Interviews: Content, Design Procedure and Results Analysis

After the discussion of green energy development in China, this chapter provides the micro-level of observation of how the green business is developed in especially for the resources – based or related enterprises or organizations.

To be more specially, this part is to examine empirically the attitudes of manager-level employees towards the green business and sustainable development in the enterprises, especially the resources-based one. Furthermore, this chapter will present the analyses of the real case of those enterprises to see how they are involved in green activities from the general view of green concepts to their daily work. Another objective of this study is to investigate what is the main driving force for those companies to develop green business, and if those companies adopt green approaches, they will have a competitive advantage in the market and sales or not.

6.2 Content of the Questionnaire

Using questionnaire has been one of the most popular methods of doing management research. Normally, the design of questionnaire should include four main parts: objectives of the questionnaire, framework of questionnaire, measurement of questionnaire, and statements of questionnaire (Wang, 1990). The objectives decide the theoretical conception, structure and main index of the questionnaire. While the statements directly effect the attitude and feedback from the respondents. Therefore, the design of questionnaire should be based on the objectives and with non-ambiguous statements to present the actual information. The whole questionnaire should not be too short or too long to avoid the negative attitude from the respondents.

The questionnaire has been designed according to the core topic of the paper, which is green business development. The objective of this questionnaire is to explore how Chinese resource-based or related enterprises develop, implement and the impacts of green business in real case. By doing this, it is able to discuss the theoretical concepts and national policies regarding green business in the enterprise view, and may figure out some specific solutions, also the practical difficulties and challenges.

The questionnaire include 7 main parts

- Enterprise' basic information: how long it is established, which industry, size of the organization, the ownership, and etc.
- The knowledge about green economy, green business, sustainable development – what they know
- The activities related with green business – how they do
- The major driving force of developing green business – why they do
- The main impacts, results of developing green business – what it brings back
- The measurement of green business – how to control
- The future of green business – what they see

6.3 Design Procedure of the Questionnaire

According to the articles regarding the process and suggestions of designing procedure (Churchill, 1979; Hinkin, 1998; Chen *et al*, 2012), the questionnaire has been designed followed the steps in the below:

- The questionnaire is based on the existing questionnaire for the interviews, which has already been examined and regarded as reliable by the academic world and scholars. On account of this, it combines with the research of this paper, and then the first draft is come out.
- The author has discussed all the questions with 2 experts who are in green energy, green business field for over 10 years to have the suggestions and revisions. Firstly, is to check the logical of the questions, and is the statements, to see if all the questions are clear and non-ambiguous.
- The questionnaire has been tested with 2 general managers from energy enterprises (electricity and green energy), who are familiar with green business to see how the questions work out and to receive the suggestions from them.
- The final questionnaire has been interviewed with seven-selected manager-level employees from resource based enterprises or related one, such as bank. As can be seen in the appendix 2, the respondents are from state-owned or private, most of them has big company size, which has more than 20 000 employees, some of it even more than half million, which generally has mature policies, process and green products of green business development. To a certain extent, this kind of enterprise has representative meaning in the energy field regarding green business development.

6.4 Countermeasure of the Questionnaire Deviation

The questionnaire is used for interview; therefore, it depends on respondents' subjective answers. It will cause the deviation issue, which mainly include 4 aspects: the respondents do not know the answer, cannot be able to remember the related information, do not want to reply the questions, or cannot understand the questions (Fowler, 1988). To avoid these deviation, the study uses the countermeasure as in the below:

- To avoid the respondents do now know the answer, the author choses the manager-level employees who have been in the companies for more than 3 years.

- To avoid the respondents cannot be able to remember the questions-related information, the questions are mainly concentrated on the current situation of the enterprise.
- To avoid the respondents do not want to answer the questions, the author will explain the questionnaire is only using for master thesis research, all the information will be regarded as confidential information.
- To avoid the respondents cannot understand the questions, this questionnaire has been discussed with the experts in the green business field, and also has been tested before the actual interviewing. Moreover, during the interviewing, the author will be able to explain the questions to make it clear.

6.5 Interviewing and Profile of Respondents and the Enterprises

Due to interviewing is already a subjective method to do the research, in order to have a qualified interview, the author uses the phone call, emails, or WeChat to be able have an explanation and introduction of the interview.

Regarding the profile of Enterprises, the author selects the leading resource-based or related enterprises, and banks who have the green project. The enterprises include the industry of electricity, energy, green energy, transportation, construction, and also the bank. All of these enterprises are exactly the main focus from national five-year plan of green business development - green energy, green transportation, green building and green industry.

All the respondents are manager-level or above to be able for the study to compare. And they all have at least 3 years working experience in the enterprise to assure they are familiar with the company policies, strategy, activities related with green business.

This interview questionnaire has not been designed as a questionnaire, but the way the questions has been laid out, it is a form of information and self assessment document for the respondents, for example a daily work question followed by actives of developing green business in the enterprise view. This question is not only to acquire an answer but also make the individual think about the practices from daily work to contribute to sustainable development.

6.6 Results and Analysis

As can be seen in appendix 1, it presents 13 major questions for the interviewing, this part of chapter analyses the results by selected topics in order to have a review of the interview.

- *Do you have your eye on the ball?*

As this paper explained previously in the literature view, enterprises or companies today in China are facing the environment issue, especially the resources-based one, and they are willing to develop green business to be ready for the challenges.

And this is discussed from question 1: *In your opinion, what is green economy?*

Question 2: *In your opinion, is your company engaged with green economy?*

All the interviews agreed that their company is engaged with green economy, nevertheless, while talking about what is green economy; most of the respondents only mentioned the perspective of reducing environmental risks and ecological scarcities, except respondent 5 who works in the bank, talked in the aspect of improving human well being by providing green finance.

For example, respondent 2 from electricity industry:

For us, green business, firstly is future trend in the field, in the industry and in China; secondly, in the point of our industry, we are saving the resources (coal, water, oil, etc.), and reducing the emissions, this is why I said our company is engaged with green economy.

Another example from respondent 4:

In my opinion, the green economy should be considered in 2 main aspects, real economy² and financial sector. For real economy, it means all the issues related with green movements, and for financial sector, it should be green finance.

- *Is business equipped to change, and how?*

² Real economy in a broadly defined concept, it should include all the service industry and industrialized service industry from the primary industry, secondary industry and service industry (Jin Pei, 2012).

After talking about concepts of green economy, the following questions focus on the activities and strategy from whole operation and supply chain to develop green business or manage the sustainability risk in real case. This is the biggest part in the whole interview, with 6 questions included.

The related questions are question 4: *What are the activities of developing green business in your company?* Question 5: *How is sustainability embedded into the company strategy?* Question 7: *How is the company developing green business?* Question 8: *How does your company integrate green business issues in its daily work?* Question 11: *How to measure the impacts/result after building green business in company?* Question 12: *What are the sustainability risks in your company? Are they identified, monitored and actively managed?*

The main activates have been talked are according to the industry. For instance, the resources-based companies, which respondent 1, 2, 4, 6 and 7 from, they all mentioned that the using of renewable energy like solar energy, green products such as new energy vehicle, and also producing autonomous internet operation management system to help the operation process become more transparent and efficient. Moreover, different respondents talked other specific activates.

As an example, respondent 4, who is from new energy vehicle company: *The main business in our company is producing new energy vehicle, which in a certain content, it is contributed to the sustainability while compared with traditional fuel vehicle. Of course, there are some doubts for this product due to it uses electricity, which is not renewable energy. So I will say the activities help us do the green business is that we are not only produce new energy vehicle, but also we create our own platform and also app to provide better services to the client, and we are able to make our operation process more efficient and easy to reduce waste.*

Here is also the example from respondent 5 from state-owned bank: *As a bank, we are in the financial sector, so it is not obviously that we are related to green business development, nevertheless, we have our own way to do this, let me give you an illustration, in our bank, we have the strategy to increase green credit to help supply and improve ecological civilization. In Jan 2015, we have issued the*

first green financial debt in response to climate change. And we became the first green bonds listed on the London stock exchange, which has already attracted nearly 140 investors from Asia and Europe to oversubscribe.

When talking about the strategies, which the author would like to figure out if it is embedded with sustainability, there are no respondents can be able to clarify the sustainability strategy, mostly of them are talking about green products/services/technologies to help sustainability. Except the company 4, which is quite new in the market, all the rest admitted that they have stakeholder strategy, environmental certifications, and CSR report, but sustainability director is in quite a few cases.

Regarding question 8, here is an interesting example:

From respondent 6, who is working in an electricity transmission company: *In our company, we use Ameba management, which means the company is divided into small unites, for example, our department of international business is a unit, and we should be completely responsible for our cost, sales and profit. So all the people from this unit must take the responsibility for the actions, especially for the cost part. By using this, we are more motivated to reduce the waste and develop new green products to meet market need. Every three month, there will be a department come to have assessment for our cost, sales and profit. This is a management way we learnt from Japan, and from my personal opinion, it makes us like the owner of the company instead the employee.*

Next question is about measurement of the impact/result of developing green business also the suitability risks. Generally, there are three main measurement of the green business development, namely, performance indicator, environment indicator and also society indicator. All the respondents take the performance indicator as the most important indicator in the company, even the only indicator for some companies. Regarding the environment indicator, it is mostly related with low-carbon standard. However, there is still some measurement for the non-financial impacts, given an example, from respondent 1:

As you may know, the performance indicator is the prior indicator for us, not only for us, probably for all the enterprises like us, however, we also have measurement for the non-financial impact, for example, we count the times of the complain to the service network, and the general manager need to be responsible for this.

For the sustainability risks part, the general manager from company 7 mentioned that, *when we think about sustainability risks, it could be high cost for the green products or technologies, hard to control the quality, may need more time to do the construction, all of these are the risks, and if we cannot assure these risks to be monitored, we will consist to use the traditional way to finish the project but also reach the lowest environment standard. The most important thing for a construction company, it is to finish the project on time, guarantee the safety and also control the cost.*

- *What does it mean for business?*

Within the raising concern of resource limitation and climate changes, lots of enterprises or companies take the green business as a new opportunity to save the energy, gain competitive advantage in the market, improve the brand image and attract investment.

To discuss this topic, the related questions are question 3: *What is the major driving force for the green business in your company?* Question 6: *What does this mean for business?* Question 9: *What is the competitive advantage of developing green business in company?*

According to the conversations, all the respondents think green business is a new opportunity due to right now under the national five plan guideline, it is the time to develop green business, and government give huge support from allowance to banks provide green debit, all of these policies and moves help to create a positive market for green business. Not only companies from energy sector to develop green energy, but also the energy related companies like company 4, also into the green energy besides producing new energy vehicle. Second important factor is to save energy and low the cost, while the third factor is to have a better brand image that the company is a high – tech one. But there is big difference between the state-

owned enterprises and private companies. For private companies, the new opportunity and market need is the major factor.

From respondent 2: *It is obviously, right now is the time to develop green business, within the government positive policies and support, and we are in the electricity industry, it is our responsible to increase the percentage of green energy like solar power. It will also help us to have a better brand image. For example, we have a green opening day every month to welcome students, media and local government stuff to visit our company, to know we are not a polluted company. Moreover, due to we are listed in Hong Kong Stock Exchange, for the investors, the brand image is quite important, our shareholders need to assure we are the company can have sustainable development. So this is the meaning for our business.*

From respondent 4: *We are a private company, business and market need is our biggest driving force, but also because we believe this industry, new energy vehicle is the sunrise industry at least for 5 years in China.*

- *Total impact drives optimal business decisions.*

When asking about what is the impact or result after building green business in the company, there is big difference among the different industries, for example, for resources-based companies, the major impact is increasing visibility, reputation and lowering the cost, while for the company from transportation sector, the major impact is increasing profit.

The related question is question 10: *What is the impact/result after building green business in company?*

From respondent 3: *To be honest with you, developing green business in our sector is mainly on buying new product, which can reduce more emissions, for fuel, we cannot just change it to green product due to our essential principle is keep the safety during the flight, and right now the green fuel has not been confirmed it is stable and can be controlled. So the major impact for us is increasing the profit by*

using the new, light aircrafts. And for reputation, I do not have direct feedback from our customers for this.

From respondent 1: *We are state owned enterprise, it decides we need to follow and support national policies, to develop green business, and to have sustainable development. Every little step from us will cause a strong influence in the industry, in the market and in the country. So the most important impact after building green business is that we are able to change the national electricity system construction step by step.*

- Sustaining business is the future.

While facing the challenges of finite resources, water pressures, climate changes, all the enterprises or companies are under these huge pressures, and it is the question for them, what is the next, and what is the future. The related question is question 13: *How you see the future of green business in your company, industry, and in China?*

Yes, green business is the future, agreed by all the respondents. This is the global trend, this is what our government leading now, it is vital for all of us, even though it should admit that there are still lots of difficulties to develop it, for instance, the innovative technologies, the legislation, are far away behind this concept.

Here is the example from respondent 7: *Our industry has some own characters; it is construction industry, so the quality of the project, the time to complete the project, and the cost of the project is our prior factors to consider. Of course green business is the trend, and it can have the strong impact in the industry, for example, the eco-friendly materials, renewable materials, it is the requirement from the moderation of the construction industry. However, the situation right now is not that positive, as you may know, it is the industry depends on the resources, and we are the leading company in China, with more than 50 000 employees in the company, so the first thing for us is to survive in the industry and be able to afford our employees. Let's say we are like a big boat, we need use 80% power to move the boat and only 20% power to direct the boat. So it is not easy for us to change to green business directly.*

6.7 Summary

This chapter based on the qualitative method of interviewing, firstly is to clarify the objectives of the interviews are to know how the manager-level employees see the green business development in their companies, how they implement the concept with their strategies, in their operations, and their daily work, and if there is any risks or disadvantage of it, if so, what they do to avoid, monitor and manage it.

Secondly is the interviews are designed according to the theory and concepts of green business and sustainability, has been tested by experts in the energy field, and given to the similar level of the respondents from state owned enterprise or private company.

Thirdly, the results from the interviews show that generally, the managers already see the green business, and think it is a trend, is important for the business development, and mostly the related activities are buying or developing green products, using green energy, and punish the behaviors, which may cause the non-necessary waste, all of these actions are from energy-saving factor of green business, while only a few mentioned the activities to improve human well being. From this, it can be seen that the level of green business development is in the primary level.

Nevertheless, there are also some companies mentioned that it is not easy to develop green business due to the high cost, instability and unable to control green energy, product and services.

7 Discussions

- *What is the stage of green business development in China?*

When considering about green energy, it includes energy efficiency and renewable energy. However, the concept of sustainability should be more expanded than this. It should be in the core of business strategy and its longevity. It should be applied not only in the CSR department, but also the boards of R&D, HR, finance, procurement, and strategy development department. However, from the analysis of green business development in the energy sector in China under the national policies from five-year plan, and also interviews from resources-based or related enterprises or companies, it shows that we are still in the very first stage of knowing green business, developing

green business, due to most of them are only focusing on using green energy, green materials, developing technologies to have low-carbon products, and the guidelines are national or industrial standard of environment and corporate social report from company. The concept of sustainability and the development of green business are still not applied during whole strategy and operation, and not the prior issue for all the stakeholders in or related to the company.

When talking about green business in the field of green energy, as the results showed in the previous chapter, China is in a positive trend of increasing energy efficiency and developing renewable energies, however, taking these into market side, it is still far away of use green energy in the large-scale of economic development in China. Even though, there are some green energy products like solar heating, is the first place in the world, but not the major heating product in China.

- *What are the main driving forces?*

Recently, due to the global markets' heavily competition of resources, companies nowadays should put concerns on resource scarcities and climate changes, and take it as a transformation opportunity for business. Moreover, there are also some other driving forces to consider, for example, to achieve desired outcomes, increased competitive advantage in the market, to meet the trend of green business, and also improve the company brand image. Nevertheless, in the case of green energy field in China, government policies and support is probably the biggest factor, and this is also the reason that there are lots companies announce that they will develop the green energy, new energy vehicle, and has been found out is only for to have the allowance from the government. Considering from the view of consumer side, most of the consumers who would like to buy new energy vehicle is because they can have the licence plate for their car quickly instead of waiting for long time and using lot to decide if they can have the plate or not. This is the case quite frequently happened in the big size cities like Beijing and Shanghai. Therefore, it can be seen that government governance is still the major driving force, it can be good in the sense of directing green business development quickly and strongly, but in a certain content, the market need should also be the major driving force to lead the enterprises to develop the green business, due to for all the enterprises or companies, market need is the essential factor.

- *How to implement green business development?*

All the people are living in the same world with continually increasing population, and would like to have a better life, however, there many resources cannot be renewable, and will be run out soon. The result is obviously, but are the companies nowadays ready to face with it? If companies only concentrate on the profit with negative impact on environment, this should be considered as sustainable? If not, how to change this situation, what the companies can do for the green business development.

For many companies today, the first step is to understand and behave with sustainability as “doing good”, which make the business with profit but also take CSR into concerns (PWC, 2014). Just as the respondents mentioned that they used green products, punish the behaviours which lead the waste in the daily work. But is this enough? How about consequences and benefits for all the stakeholders, for the society. Therefore, green business cannot be regarded as an afterthought, but it is a path to have foreknow ideas and real actions inside whole organization’s operations.

The first thing to implement green business is to put sustainability as the heart issue for a successful business. Therefore, it should assure to maintain the business with the concerns on risks from developing green business and also the consequences by doing it. From this, it can be seen that green business is not only about developing green products or services, but also about how to operate, and identify and control its risks. So with the eyes only on green energy, green products, green innovation is not enough for green business development.

- *What are the sustainability risks regarding developing green energy, green business?*

As this paper analyse in the essential characters of green energy previously, there are the major risks like high cost of technology and innovation, high requirements for the cooperation, and also uncertainty of the output, these are the major concerns from the enterprises or companies when they decide to develop green business. The other risks can be instability of the green energy, green products, and green materials, especially for the transportation industry, which safety is the prior factor to consider, these risks are the biggest challenge. Also when rising the input to develop green business, it may lead to cash flow problems in the company. To sum it up, the main risks are from

financial view, which is right now still the dominated factor to consider the business in the companies.

- *What is the future of green energy, green business?*

Resource scarcity is becoming a priority on both the political and business with access to raw materials, water, land and energy increasingly a concern. Population growth, the speed of rising consumption in developing economies, and geopolitical and environment factors that impact production and distribution are all intensifying the issue. The result is higher price, market volatility and changing supply landscape. These concerns provide a good opportunity for enterprises or companies to have their eyes on the new trend of using green energy. Especially it should be applied in the developing country, for example, China. In the point of green business, it is already raised up as the main issue for the next five year; therefore, this policy provides a positive background for the green business to develop.

However, as it discussed above, there are many disadvantages of green business, which needs to be identified, monitored and actively managed. Also the legislation regarding it should be produced and carried out during all the process of doing business in the companies instead of treating green business as a far-away “future”, talking about it only in the CSR report, and not be included for financial strategies.

Therefore, the future of green business especially in the green energy is a positive trend within challenges and difficulties, which requires efforts from government, industry, companies and other stakeholders.

8 Conclusions

The influence of developing green energy, especially increasing the energy efficiency, can be realized and recognized in the short to mid-term. However, conducting green energy into green business, it can only be achieved in a longer term. Following are the main notes for concluding.

After decades of implementing FYP plan in China, China has achieved great success in reducing carbon emissions, improving energy efficiency and increasing the share of using renewable energies in the economic energy consumption. However, the economic

energy structure is still need longer time to have the transformation, also the green energy should be applied into more market view.

In the view of green business, no matter state-owned or private companies, it is vital to include serving the society into their operations. Especially for the big size resource-based ones, they should compensate for green business development due to they are the one mainly depend on the resources consumption. In short, inside the green business development, CSR is a wide theme, which normally includes enterprise' promises to the society, its own stakeholders and the environment.

In general, the green business development projects implemented in energy field and its related field illustrates positive trends of sustainable development. However, from a profit view from companies, it illustrates the outcomes of developing green business remains extremely rare. In some specific industry, like transportation industry, green business is not the essential factor to consider about when it is compared with safety issue.

Based on the interviews, often those companies achieve the sustainability based on CSR perspective. For example, CSR report is frequently used to communicate with stakeholders, however, it will be hardly to be considered also in finance department or others. If green business is not integrated into companies' strategy and whole operating process, it is hard to reflect the real value of it. As a consequence, only a few managers will take green business through the whole operating process, most of the people are not able to have the whole view.

No matter organizations or companies, they all should put the eyes on the impact, which comes from their operation on the environment and community. By doing so, it can bring the improvement in their strategies, daily operating process and also the financial performance. Therefore, it can make sustainably as a forethought and also be able to solve the problems that caused by non-ecological business.

They have a clear goal, thinking ahead to understand potential risks, however it is hard to have a clear framework to identify solutions with longevity that better fit today's world. Sometimes, they will prefer to wait until the market has a mature and proven

green products or technologies, and then they are willing to apply it on its business, otherwise, they still prefer the traditional products/technologies to assure the business to continue.

All the stakeholders from the enterprises need more information and education about green business and corporate social responsibility instead waiting for governmental actions. A country green economy do not depend only from government or big size enterprise, but also depends of the population capacity to believe that changes need to and can be happen.

9 Limitations and Further Research

There are three main aspects of limitation in this paper. The first limitation comes from the theory and concepts in the literature reviews part. Regarding the core topic of this paper, which is green business development in China in the field of energy, the literature reviews chapter is only concentrated on the few concepts, for example, it starts with sustainable development, then followed by green economy, green business, and CSR. However, there are still many specific ideas can be also associated with the topic. For instance, the legitimation theory, concept of green supply chain, and green new deal policy can be interested to discuss.

Secondly, green business development in China includes: green energy, green building, green transportation and green industry. However, in this paper, it is only focus on green energy, the other aspects should also be involved in the further research to have a full picture of China green business development.

Thirdly, there might be several limitations while gaining knowledge from the interviews.

- This interview is qualitative approach, which has only 7 respondents, it is lack of quantitative approach to prove and measure.
- The individuals and enterprises have concerns about confidentiality and future interests sensitivity. This is the reason that the author cannot have the recording for all the interviews.
- The choice of enterprises in this case are from state-owned, private, and different industry with different company size, which to a certain content, is

not be able to do the comparison with each other, but for more knowledge about the practices of enterprises in real case, which cannot be referred only from CSR report (in the case of this paper).

- For the interviews, which cannot be recorded, it cannot be completely written down to analyse, and it is mainly depends on the author's notes and supplemental statements from the respondents if they provide.

Regarding the further research, several conclusions regarding green business development in the field of green energy in China has been taken. It can be found that green economy is still a conceptual idea in China; green business is taken as a future trend, however, the main driving force is from governmental policies instead of market need, and how to implement it into whole business structure and adapt to the market need remains to be the major issue; and green energy is strongly developed and promoted under the government support, nevertheless, the green energy is high-cost, lack of stability, and the rate of transforming is not high compare to the traditional energy. All these issues can be discussed in the further research, for instance, a quantitative analysis could be conducted and the hypothesis could be:

- H1: For resources-based companies, there are three main driving forces for the green innovation: governmental policies and support, supply chain's requirements and companies' development. Among these three main driving forces, companies' development is the engine while governmental policies and support has significantly positive impact.
- H2: In order to have a continuously development of green business in China, governmental policies and support should not be the biggest weighted-value of driving force.

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Appendix

Appendix 1 – Questionnaire

Dear Sir or Madam:

This interview is only use for my master thesis' research of enterprise's strategy regarding the green economy development in China; therefore the name and any information of the company will be regarded as confidential information.

Thanks for your time for this interview.

Contact school: ISCTE – IUL

Contact email: happydora@126.com

- Before the interview:
 - Basic information of company who agrees for the interviewing.
 - 1. Where is the company based?
 - 2. What is the ownership of the company?
 - 3. Which industry the company belongs to?
 - 4. How many employees in the company?
 - 5. How long the company established?
 - 6. What is the position of the respondent?

- Questions of the interview:
 - 1. In your opinion, what is Green Economy?
 - 2. In your opinion, is your company engaged with green economy?
 - 3. What is the major driving force for the green business in your company?
 - Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 more relevant driving forces.
 - Possible topics: finite resources, weather, pressures, climate driving disruption, government support or requirement, new profit drive force, influence from the supply chain...
 - 4. What are the activities of developing green business in your company?
 - Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main activities that are implementing on green business.

- Possible topics: green products/services, technology, and strategy...
5. How is sustainability embedded into the company strategy?
- Possible topics: has a sustainability strategy/has a carbon strategy/has a stakeholder strategy/has environmental certifications/has a sustainability report/ has a sustainability director...
6. What does this mean for business?
- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main aspects.
 - Possible topics: new opportunities, adapt to the market need, saving the energy and improving the efficiency, innovation need, brand image, CSR requirements
7. How is the company developing green business?
- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main aspects.
 - Possible topics: doing Market research, data analysis, product/service innovation information management, business intelligence, and developing scenario planning...
8. How does your company integrate green business issues in its daily work?
- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main aspects.
 - Possible topics: knowledge and research, procedures and tools, product innovation, process innovation, marketing innovation, development of new business models...
9. What is the competitive advantage of developing green business in company?
- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main advantages.
 - Possible topics: efficiency, effective, satisfy the clients need, easy to adapt to the market need, growth of the share in the market, decrease the cost, more products/services...
10. What is the impact/result after building green business in company?
- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main impacts.
 - Possible topics: increase intangible asset/increase visibility /increase reputation/ increase in profit ...

11. How to measure the impact/result of developing green business in company?

- Instructional idea: talk with the person and wait for her to speak freely, and at the end ask them to identify the 3 main impacts.
- Possible topics: financial and non-financial impacts: profit/cost/margin/improving of the efficiency...brand image...

12. What are the sustainability risks in your company? Are they identified, monitored and actively managed?

13. How you see the future of green business in your company, industry, and in China?

- Possible topics: trends, advantages/ disadvantages, changes, importance/not relevant/will have more legislation/...

Appendix 2 – Basic Information of Respondents

Respondents	Ownership of the company	Industry	Number of employees	Time of establishment	Position of the respondent
1	State-owned	Electricity	1.72 million	2002	General manager of the branch in Ningbo, Zhejiang Province
2	State-owned	Energy	0.5 million	2001	General manager of green energy, headquarter
3	Private	Transportation	0.2 million	1993	General manager of international office
4	Private	New energy vehicle	300	2014	Chief operating officer
5	State-owned	Bank	0.4 million	1951	Service manager of the branch in Hengyang, Hunan Province
6	Private	Power transmission	26,000	1988	International business manager
7	State-owned	Construction	70,000	2006	Project manager of the branch in Wuhan, Hubei Province