WIND POWER SUPPLY TO PHU QUOC ISLAND DISTRICT, KIEN GIANG PROVINCE, VIETNAM

LAHTI UNIVERSITY OF APPLIED SCIENCES
Master Programme in International Business Management
Master's Thesis
Winter 2009
DO THI BICH HANG

Lahti University of Applied Sciences
Master Programme in International Business Management

DO THI BICH HANG: Wind Power Supply to Phu Quoc Island District, Kien Giang Province, Vietnam

Master's Thesis of Degree Programme in International Business Management, 129 pages, 05 appendixes

Winter 2009

ABSTRACT

This thesis presents proposal of a wind power plant project in Phu Quoc island district, Kien Giang province, Vietnam. It aims to propose an effective business model for Finnish companies to invest in wind energy business in Phu Quoc.

The theoretical part explains research method and develops theories including technology transfer, entry mode strategy, stakeholder analysis and legislation. This study uses deductive method and qualitative design. To build the business model, wind energy technology is briefly explained. Different choices of market entry modes are presented. Analysis of stakeholders and legislation were also introduced.

The empirical part consists of the survey conducted in Phu Quoc. The interviewed groups include local authorities (Ministry of Industry and Trade, Phu Quoc Investment and Development Management, Phu Quoc Power branch), local hotels (Sai Gon-Phu Quoc resort, Thien Hai Son resort, Lunar Moon hotel), and local residents. The intent was to investigate the actual situation of electricity shortage, their opinions about using wind energy as a solution. Part of the survey was conducted in Hanoi for interviewing Ministry of Industry and Trade (MOIT - policy maker); Electricity Vietnam (EVN) and Hanoi University of Technology (HUT). This aims to clarify the legal basis for wind energy, EVN's activities and other relevant comments on wind energy development.

The results showed that wind energy is being developed with more and more effective incentives and legal framework to be issued in future. It is feasible to develop a wind power project in Phu Quoc thanks to sufficient wind resource and encouraged investment policies. A business model has been proposed, in which 100% foreign investment entry is suggested. The proposed project location is in Ganh Dau commune - the northern end of Phu Quoc. 25-year BOT contract project is suggested with tentative project implementation plan.

Key words: renewable energy, wind power technology, Phu Quoc island, foreign direct investment, market entry, stakeholders, master plan, legal framework, business model

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ADB	Asean Development Bank
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southerneast Asian Nations
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BOO	Build - Operate - Own
BOT	Build - Operate - Transfer
CDM	Clean Development Mechanism
CEFPF	Clean Energy Financing Partnership Facility
CER	Certified Emission Reduction
DED	German Development Service
EEI	Energy Efficiency Initiative
EVN	Electricity Vietnam
FDI	Foreign Direct Investment
FS	Feasibility Study Report
GTZ	Gesellschaft fur Technische Zusammenarbeit
HAPUA	Heads of Asean Power Utilities and Authorities
HAWT	Horizontal Axis Wind Turbines
HUT	Hanoi University of Technology
IMF	International Monetary Fund
IPPs	Independent Power Providers
JICA	Japan International Cooperation Agency
KfW	Entwicklungsbank
MOF	Ministry of Finance
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resource and Environment
MP	Master Plan
MPI	Ministry of Planning and Investment
NGO	Non-governmental Organization
NPV	Net Present Value

O&M	Operation and Maintenance
ODA	Official Development Assistance
PFS	Pre-feasibility Study Report
PIDM	Phu Quoc Investment and Development Management
PM	Prime Minister
PPA	Power Purchase Agreement
RE	Renewable Energy
VAWT	Vertical Axis Wind Turbines
WB	World Bank
WTO	World Trade Organization

1 INTRODUCTION

1.1 Background

The research topic is wind power supply to Phu Quoc island district, Kien Giang province, Vietnam since the area has potential for developing wind energy and the realization of wind power in Phu Quoc can help to solve the problem of electricity shortage in this tourist attraction island district. The study aims to solve this problem by doing research and proposing solution to provide wind energy as a prospective energy alternative based on the condition of wind abundant resources in Phu Quoc. It also aims to verify the feasibility of this business opportunity for Finnish companies in the target market. A business model will be proposed and verified through field research.

In Vietnam, the traditional power source now cannot meet the domestic demand. According to the first quarter 2008 statistics provided by the Electricity Vietnam (EVN), electricity demand for production activities has increased 18.41% and commercial purposes increased 19.98%. This has affected the overall power production capacity. In order to satisfy this demand, an additional power capacity of 75,697MW and import of 5,131 MW by 2025 will be required. (http://www.ecc-hcm.gov.vn/?menu=89&submenu=89&detail=541&language, viewed 17.01.2009). Coal has long been the major source of power generation. However, it is estimated that the maximum productivity of the coal industry will be 50 million tons and 70 million tons in 2015 and 2025 respectively. To provide sufficient coal for power plants, it will be required to import nearly 80 million tons and more than 120 million tons coal in 2015 and 2025 respectively. (http://www.ecc-hcm.gov.vn/?menu=89&submenu=89&detail=541&language, viewed 17.01.2009). It will also be required to raise exploitation output of oil to serve the demand of power plants.

In Phu Quoc, the current power capacity of 12 MW is not enough to meet the increasing demand, especially when there have been more and more investment

projects in Phu Quoc. If such situation cannot be improved soon, not only people in Phu Quoc will face difficulties but also the investment prospect will be affected. (http://www.baoxaydung.vn/Main.aspx?MNU=1224&Style=1&ChiTiet=3566, viewed 23.4.2009). According to Karagiannidis et all (http://ttpl.chemeng.ntua.gr/wte/Pdfs/Karagiannidis_Vietnam_Anaerobic_Venice2008.pdf, viewed 07.5.2009), the daily peak load in Phu Quoc is about 3.700 kW, and the current production capacity cannot meet the demand while "a connection of the electricity network on Phu Quoc to the national grid is considered as economically infeasible due to the long distance between the island and the mainland".

Wind energy is not a new concept. Wind power is the transformation of wind energy into electricity by means of using wind turbines. By the end of 2006, wind energy has produced additional 74,223 megawatts of power, but this is only 1% of world electricity generated. Wind power can be used in large wind farms for a national grid and grid-isolated locations. Wind energy is a system, which contributes to lowering all types of greenhouse gas emissions as replacement to fossil fuel generated electricity. Wind energy systems offer a clean affordable alternative to fossil fuel generated electricity (http://www.techstore.ie/Renewable-Energy/Wind-Energy/Wind-Energy-Systems.htm, reviewed 18.3.2009).

Of course there are some disadvantages regarding wind energy. Wind is an intermittent source of energy and when it is connected to the electrical grid, it provides an uneven power supply. Many people don't accept wind energy because they think that installation of wind turbines will destroy the local landscape. In addition, the initial cost of a wind turbine can be substantial, especially in countries where there have been no policies or government subsidies, tax breaks and incentives. Even some environmentalists have complained that large utility wind turbines have a detrimental effect to migratory bird flight paths. Noise pollution may also be a factor for consideration. However, people have seen the benefits of using wind energy from thousands of years ago when the Persians and later Romans used windmills to draw water and grind grain. Study and development of wind turbines are on the increase. Wind energy is not as expensive as it has been

thought. In fact, the initial cost depends on the manufacturing, distribution and building of turbines. Wind energy replaces electricity from coal-fired power plants and thus reduces greenhouse gases that cause global warming. Wind turbines can also share space with other interests such as the farming of crops or cattle. Wind energy is available in many remote locations where the electrical grid doesn't reach. Wind energy is creating jobs that are far outpacing other sectors of the economy. (http://www.windturbinesnow.com/advantages-disadvantages-wind-energy.htm, viewed 8.5.2009)

In the world, countries have developed and used renewable energies as effective alternatives. Renewable energies including solar power, wind power, waste to energy, biomass and bio-fuel have been placed in importance and high priority for development in many countries. Since the years of the 1990s, development of renewable energy has been paid much attention to not only because of its economic meaning but also other external advantages it brings about.

Wind energy is the fastest growing source of energy in the world. “The first wind turbines for electricity generation had already been developed at the beginning of the 20th century. The technology was improved step by step since the early 1970s. By the end of the 1990s, wind energy has re-emerged as one of the most important sustainable energy resources.” (Ackermann et all, 2000.)

Europe has been in the lead of using wind energy for power generation thanks to its rich wind resource. According to Dr Mays (1996), the wind energy resource of this continent “could meet as much as 25% of its current electricity demand once technical and environmental constraints have been taken into account”. Germany, Denmark, Netherlands, UK and Spain have been the top countries which have the most wind energy capacity installed. Even in the USA, with the stimulus package, president Barrack Obama wants to promote the study and development of renewable energies as future energy resource. China and India have been emerging as the promising markets for western firms in wind energy business. Thanks to the governments’ policies in these two countries, wind energy industry in these markets has been obtaining remarkable achievements.

Wind energy is the most promising form of renewable energy, and it decreases in cost annually. Over the 1990's its cost was cut in half, and this trend will continue in the future. Wind energy increases in demand every year. In 2004, records were again broken in Canada, the US, Germany and many other countries. In Canada, for example, the industry has grown an average of 27 percent per year over the last five years. (http://www.thesolarguide.com/wind-power/present-future.aspx, viewed 04.5.2009)

In contrast, although statistics show that wind resource in Vietnam is very favorable, this new energy business has not been paid much attention and investment from the Vietnamese government. There are natural and human barriers to the effective exploitation of wind energy; for example, the political and institutional difficulties. In fact, the study and development of wind energy have been raised and implemented more than twenty years ago.

In Vietnam, distribution of wind resource has been studied and calculated by many Vietnamese experts. It can be listed some works such as Distribution of wind energy in Vietnam (Phan My Tien, 1985), Distribution of wind energy in Vietnam at different heights and different territories (Phan My Tien, 2001), Lookup book for solar radiation and wind speed in highly potential areas in Vietnam (Tran Huy Khang, 1988). There are also other studies for evaluating wind energy in some specific areas such as Vung Tau, Bach Long Vy, Ly Son, etc. Nguyen Huu Hung and Duong Thi Thanh Luong (1998) concluded that wind energy in Vietnam can be exploited to generate power in mountainous and coastal areas. They suggested the possibility to develop small wind power turbines in combination with diesel generator in those areas and construction of wind farm for connecting with the national grid, which is economically effective.

According to Ta Van Da (2006), in the north, wind power is stronger in delta and coastal areas, especially in Quang Ninh, Thai Binh and Hai Phong, where the annual average wind speed recorded is above 3m/s. In the central and low areas, wind is weaker; the annual average wind speed is only 2m/s. However, in the border areas with Laos where there are more high mountains, the average wind

speed ranges from 2m/s – 3 or 4m/s. The highland has the most potential wind resource with the average wind speed of above 2.5m/s – 4m/s. Even some in some places like An Khe, the wind speed is about 7 – 8m/s. In coastal areas such as Tuy Hoa, Phan Thiet, Ca Na, Mui Ne, etc. the wind speeds are also high. In the south of Vietnam, potential wind resource concentrates mainly in coastal areas such as Ha Tien, Ca Mau with average wind speed of 4m/s. Statistics shows that offshore areas such as Hon Dau, Hon Me, the wind speed is about 3.5 – 4m/s; Bach Long Vy island, 6.3m/s; Truong Sa, 5.8m/s; Phu Quy, 5.1m/s; Con Dao and Phu Quoc, 2.7m/s. The wind speeds have been recorded and calculated at heights of 10m, 20m, 40m, and 60m for 150 stations in Vietnam.

Renewable energy technology development is very important in Finland. Therefore, Finland has been well known for their effective use and conservation of energy, and development of renewable energies. In his visit to Vietnam in December 2008, Finnish Minister for Foreign Trade and Development Paavo Väyrynen stated that Finland and Vietnam could cooperate in this area because Finland had leading companies in effective energy use and conservation and renewable energy production. (http://vneconomy.vn/61995P0C10/hop-tac-viet-namphan-lan-nhung-linh-vuc-tiem-nang.htm, viewed 12.01.2009). This is seen as a basis to develop cooperation opportunities for Vietnamese and Finnish enterprises in this high technology business. In my talk with Hanna Kokko (Management Consultant, Water and Sanitation programme for small towns in Vietnam) in Vietnam on 12 May 2009, he revealed that an ODA programme has been built and will be launched very soon with a view to bridging the cooperation between the two countries, helping Finnish companies to expand business in new market and supporting Vietnam in absorbing advanced technologies.

Foreign investors have also been trying to look for new international markets in developing countries. As a Vietnamese national, I see this as a good business opportunity for developing wind energy in Vietnam.

It is believed that development of wind energy in Phu Quoc will help to reduce pollution, promote eco-tourism and provide cost-effective, decentralized energy

supply for the residents (Karagiannidis et all, http://ttpl.chemeng.ntua.gr/wte/Pdfs/Karagiannidis_Vietnam_Anaerobic_Venice2008.pdf, viewed 07.5.2009). Will it be possible for wind energy to become a compensation alternative in Phu Quoc? This question will be answered in this study.

1.2 Research objectives and questions

The main objective of the study is:

- To analyze the viability of wind power supply project in Phu Quoc, Vietnam and propose possible business model.

Sub-objectives of the study are:

- To clarify customers of the business
- To propose an appropriate entry mode for foreign investors
- To verify the relevant legal frameworks
- To propose prospective funding solutions

This study will try to answer the following questions:

Main question:

- What is the business model for a wind power project in Phu Quoc?

Sub-questions:

- Who are the customers and main stakeholders in the model?
- How will the company's revenue be generated?
- To what extent, the legal framework for wind energy has been built in Vietnam?
- Is it feasible for wind energy business in Phu Quoc?

1.3 Theoretical framework

New technologies require new business models. “Technology managers must expand their perspectives to find an appropriate business model or “the architecture of the revenue” to capture value from that technology” (Chesbrough 2006, 64). However, Chesbrough (2006) also shows that business model is a double-edged sword for the corporation. He explains that it is because if an effective business model can create internal logic of its own for how value is created and claimed: its target market, market size, margins, value chain, distribution channels, use or neglect of the third parties, etc., a failure to create such model can hinder the innovation and make it difficult to create value for the corporation. It is, therefore, seen that although creating a successful business model is indeed challenging, it is worth doing so in order to obtain more value and expand business for corporation.

How a business model is created and how to develop such business model into real business are also theoretical bases for this study. The theoretical framework provides theories used in this research to build a business model for Finnish companies to be able to carry out wind energy projects in Phu Quoc, Vietnam. These theories include general understanding about wind farm technology, market entry mode, stakeholder analysis, and relevant legal context. In addition, in this theoretical part, the writer also tries to propose possible funding solutions to the business.

The wind turbine technology has been developing very fast in the world due to the need of addition of fuel for current and future use and for the need to use clean energy to reduce global warming, which is now the concern of all countries. A brief introduction of wind farm technology will be presented in more details in Chapter 4 giving readers general concepts about this technology.

In order to build an effective strategy and business model, several issues must be studied. Those are political and social systems, openness, product markets, labor markets, and capital markets. In addition, a thorough analysis of the industry in the

target market should also be carried out and understanding of the country's institutional context be gained in advance because "an attractive industry in your home market may turn out to be unattractive in another country" (Khanna et al, 2005). Therefore, an entry strategy must be carefully studied in order to "match the needs and resources of the MNE (multinational enterprises) with the opportunities and constraints in the local environment" (Meyer, 2008). The questions of "Should we go alone? Should we share with a local partner? Or should we acquire a local firm" have been discussed in his article. Every strategy has its own advantages and disadvantages. However, it depends on the contextual background to select the best one. In Malaysia, for instance, foreign companies should enter into joint ventures only after checking if their potential partners belong to the majority Malay community or the economically dominant Chinese community, so as not to conflict with the government's long-standing policy of transferring some assets from Chinese to Malays. In China, fact has shown that every foreign investor has its own way to entry the market. They can open their offices in China like Vesta, Gamesa, etc. or acquire a local firm or make joint venture with local partners.

In Vietnam, both opening a 100% foreign invested company and making joint venture with a local company are possible depending on specific circumstances. Coca Cola, for example, made its first appearance in Vietnam in 1995 by making joint venture with Vinafimex, a local firm because at that time there was no law allowing 100% foreign invested companies in Vietnam. However, in 1998, Coca Cola became a 100% foreign company in Vietnam thank to the Law on Foreign Investment issued by the government of Vietnam.

In building business model, identifying the stakeholders is very important in a way that it helps to map out the best entry mode and approach to customers. The identified stakeholders are Finnish wind power company (the investor), Vietnam Electricity (EVN), end users, the Vietnamese government and Phu Quoc authority. Business model is the focus of this research with special emphasis on (1) technology transfer, (2) entry mode strategy, (3) stakeholder analysis, and (4) legislation. Scope of this research is Phu Quoc island district, Kien Giang province, Vietnam.

1.4 Research approach

This study uses qualitative research design and deductive research approach. In the theoretical part, information is collected from primary resources including journals, authorized websites, articles and secondary sources such as studies carried out by other people, books, and articles written about international business development, international project development, etc. and World Bank reports, publications, national-level research works of recognized institutes in Vietnam such as Institute for Meteorology and Hydrology, Institute for Energy, Ho Chi Minh Center for Sciences and Technology, etc. about development of wind energy in Vietnam and statistics of wind energy in potential areas and in Phu Quoc. Information and data used for the empirical part are collected from survey through in-depth interview of target groups. Focus groups for interview include:

(1) Authorities including policy maker (Ministry of Industry and Trade), and relevant authorities (Investment and Development Management of Phu Quoc island, Phu Quoc Power Management)

(2) Center for Renewable Energy (Hanoi University of Technology - HUT)

(3) Electricity of Vietnam (EVN)

(4) Local hotels

(5) Local residents

In-depth interview was conducted to obtain different opinions/ viewpoints of different target interviewees in the light of the research's objectives.
"One-on-one interviews uncover the best thinking of each and every participant without the drawbacks of group dynamics" (http://www.csr-bos.com/approach/focusgroups.html, viewed 12.2.2009). It means that the quality of the research will be higher. In addition, with in-depth interview, more information will be obtained from the interviewees. Besides, the interviewees can also freely express their thoughts and ideas about the researched subject. "In-depth interviews capture all the relevance and salience of qualitative information of focus groups. Every word the participant speaks can be taped, transcribed, and used in multiple ways". (http://www.csr-bos.com/approach/focusgroups.html, viewed 12.2.2009.)

1.5 Limitations

In this study, the possible impacts of wind turbine installation/ operation on the environment have not been discussed. In addition, we cannot do the survey for the whole population in Phu Quoc and all people of the target groups for interview, we only choose representatives from those groups. However, these representatives are key persons, so the gained information is still reliable. Another limitation is that companies who are investing in wind energy have not been interviewed since they are not quite open to share information when contacted. Moreover, we have not calculated the economic and financial indicators for business model. Revenue has been calculated only in theory with an assumed electricity selling price and estimated total power production capacity. The actual revenue will be based on Power Purchase Agreement (PPA) signed with EVN in practice and actual power productivity. The thesis has merely proposed a business model in general for foreign investors, not yet detailed plans for sales activities, marketing strategy or logistics, etc. This study does not discuss existing wind companies in Finland and their available technologies either.

1.6 Thesis structure

The thesis is divided into three parts: introduction part, theoretical part and empirical part. The introduction part includes chapter 1 and chapter 2. Chapter 1 briefly presents the background, objectives, theoretical framework of the study. Methodologies and methods are also shortly introduced. After that, limitations and research structures are presented. Finally, the business case – Phu Quoc island is introduced. Chapter 1 gives readers a general setting of the thesis, answering the questions of why, how and where this research was conducted. In addition, an introduction about Phu Quoc island and its current power consumption condition will be presented. Chapter 2 presents the literature review. In this chapter, a review on wind farm development in the world will be briefly mentioned. This chapter mainly focuses on evaluation of potentiality of wind farm development in Vietnam, potential areas pointed out in national level research works carried out by professionals from recognized scientific institutes in Vietnam and reliable wind

speed statistics in Vietnam recorded over a ten year period. In addition, some studies on wind energy development in Phu Quoc will also be mentioned.

The theoretical part of the thesis consists of three chapters. Chapter 3 explains in details the methods and techniques that are used in this thesis. This chapter describes the research approach, research strategy, methods of data collection, and how the collected data will be analyzed and evaluated. It also mentions the validity and reliability of this research. Chapter 4 provides the theoretical background on technology transfer, entry mode strategy, stakeholder analysis, legislation and the business model. Together with a business model introduced in this chapter, the writer intends to propose a tentative company model with organization structure and estimated cost and revenue of the business. In addition, the writer tries to present possible funding solutions for the company in the last section of this chapter.

The empirical part of the thesis is explained in Chapter 5. In this chapter, the collected data and information through applied methods, which have been introduced in Chapter 4, will be analyzed and evaluated to test the hypothesis of a business opportunity in this market. Recommendation will be made in this chapter. Finally, possible future challenges will be put into consideration.

Chapter 6 summarizes the achieved results, and further research in future.

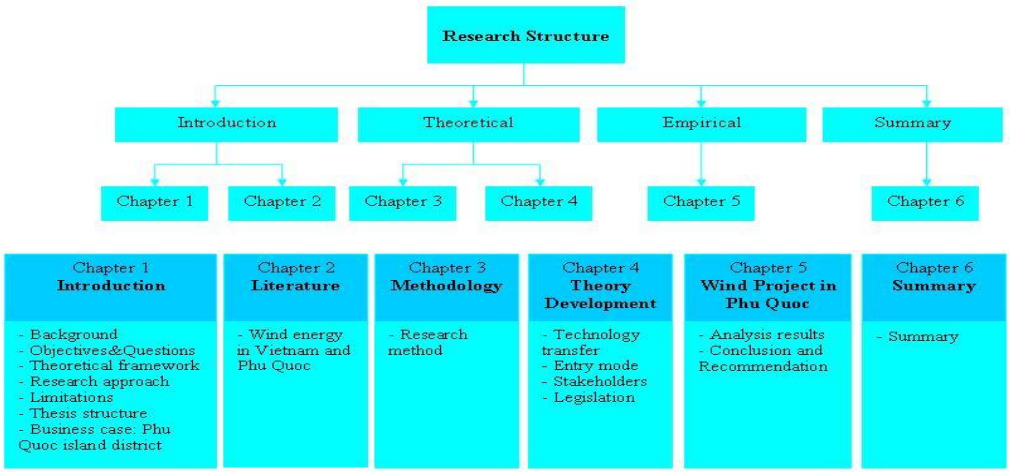

Figure 1 - Research Structure

1.7 Business case: Phu Quoc island district

1.7.1 General information

Phu Quoc island or also called the emerald island is the biggest island in Vietnam. Located in the Gulf of Thailand, the ear-shaped island lies just 62 sea miles from Rach Gia and nearly 290 sea miles from Laem Chabang (Thailand). It covers an area of 567 sq. km (about 62 km long and 3-28 km wide) and is situated at 10o01'-10o27' north latitude and 103o51'-104o50' east longitude. Its population is approximately 85,000 (2001). (http://www.phuquoc.info/general.htm, viewed 18.4.2009). At present, Phu Quoc's population is estimated more than 100,000.

Figure 2 - Phu Quoc island
(Image search from Internet)

During 2001 - 2005, its annual GDP growth was 12.6%. Phu Quoc has developed a diversified economic structure, in which tourism is the main industry. (http://www.tapchicongsan.org.vn/details.asp?Object=14331554&News_ID=30154397, viewed 18.4.2009). GDP increased 16.33%, 20.55% and 26.29% in 2006, 2007, and first half of 2008 respectively. (http://www.daongoc.com/diendan/lofiversion/index.php?t2460.html, viewed 18.4.2009)

Phu Quoc has long been well known to both domestic and international tourists for its natural beauty. In 2000, there was a booming number of 30,715 tourists to Phu Quoc, 143,995 tourists, 300,000 tourists, and 480,000 tourists in the years 2001, 2002, and 2003 respectively. The number of tourists to Phu Quoc has been increasing every year. According to Phu Quoc information website, it is targeted to receive 600,000 visitors in 2010, 1,110,000 visitors in 2015 and 1,900,000 visitors in 2020.

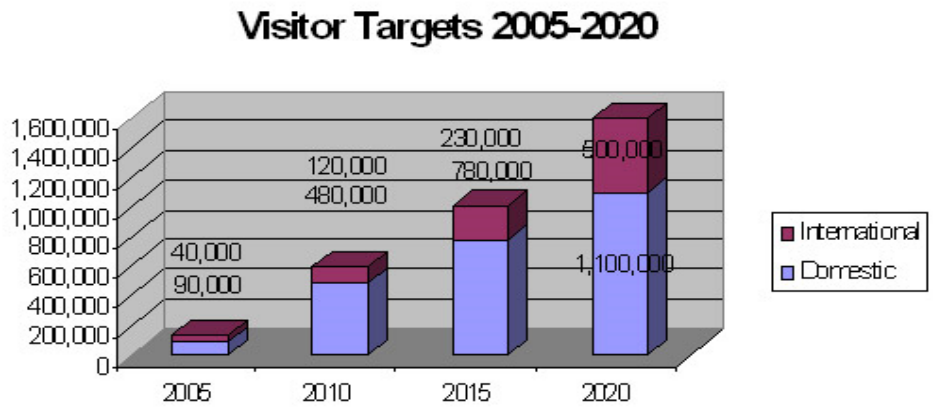

Figure 3 - Visitors target 2005 - 2020 in Phu Quoc (http://www.phuquoc.info/business.htm, viewed 18.4.2009)

Business investment has been increased in Phu Quoc. In 2007 there was total 60,000 billion VND (2.6 billion EUR) registered capital in Phu Quoc by more than 100 international and domestic investors. As examples, Rockingham group (USA) with investment capital of one billion USD, Trustee Suisse (Switzerland) in cooperation with Vinaconex with an investment capital of two billion euro for building a centre for hotel and finance in Phu Quoc, etc. (http://dulich.sky.vn/archives/64, viewed 23.4.2009). It is planned to develop tourism in Phu Quoc and turn the island into an international and regional tourist centre.

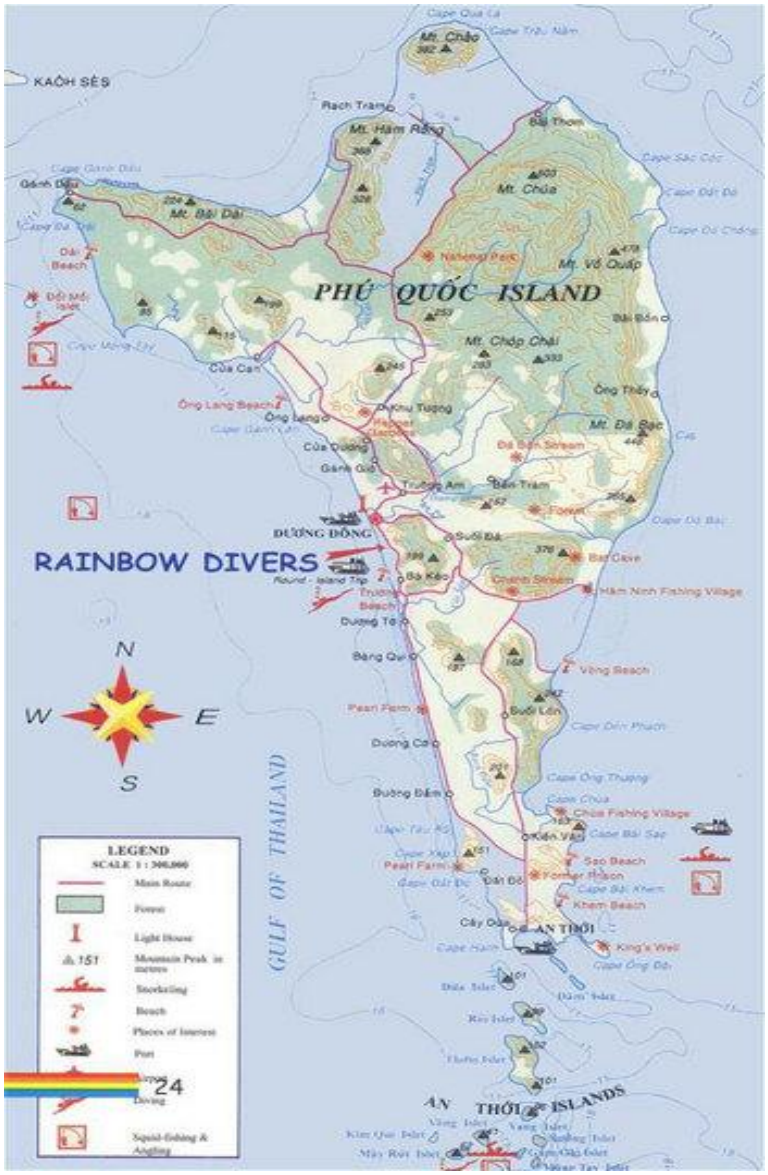

Figure 4 - Phu Quoc map
(Image search on Internet)

Facts show that more and more investors want to invest in Phu Quoc. However, it is estimated that it will suffer a serious electricity shortage in 2009, which will be a hindrance to attract business investment in the area. Even though two more electric generators have been invested in by the local budget to ensure power for domestic and commercial uses; the capacity is not enough for such high demand. Subsidies from local budget will not be enough. (http://www.laodong.com.vn/Home/Phu-Quoc-Nhieu-kha-nang-se-thieu-dien-nghiem-trong-vao-nam-2008/200612/15964.laodong, viewed 23.4.2009).

High electricity prices are also obstacles to investors who want to set up business here. Dang Van Thoi, manager of the Ngan Sao hotel said that the power prices are too high for doing business, thus making the business development in Phu Quoc slower and pushing new investors away.

Every year, Phu Quoc province has to subsidize a large amount of money for electricity, and this amount is still increasing. For example, in three years from 2002-2005, the total subsidized money from provincial budget for power usage in Phu Quoc was 45.92 billion VND (nearly 2 billion EUR) over the three years, but after that the 2006 alone, the amount was more than 30 billion VND (1.3 billion EUR (http://inside.vtv.vn/VN/TrangChu/TinTuc/CKX/2006/2/8/18032/, viewed 20.4.2009).

Compared to the normal prices in the mainland, electricity tariff in Phu Quoc is much higher (http://vietbao.vn/Xa-hoi/Gia-dien-sinh-hoat-o-dao-Phu-Quoc-1.500-dong-kWh/40114715/157/, viewed 20.4.2009).

Table 1 - Comparison of power tariff between mainland and Phu Quoc island

Mainland			**Phu Quoc**		
Consumption/ per household/ per month	**Unit Price (VND per 01 kWh)**	**Unit Price (EUR cent per 01 kWh)**	**Consumption/ per month**	**Unit Price (VND per 01 kWh)**	**Unit Price (EUR cent per 01 kWh)**
First 50 kWh	600	2.61	**For households**		
From 51 – 100 kWh	865	3.75	First 100 kWh	1,500	6.51
From 101 – 150 kWh	1,135	4.93	From above 101 kWh	2,500	10.86
From 151 – 200 kWh	1,495	6.5	**For administrative, governmental organizations and public lighting**	2,750	11.95
From 201 – 300 kWh	1,620	7.03	**For production activities**	3,250	14.12
From 301 – 400 kWh	1,740	7.56	**For commercial and services**		
From above 401 kWh	1,790	7.77	Normal hours Rush hour Low hour	3,000 4,500 2,750	13.03 19.55 11.94

(Exchange Rate on 18.3.2009: 1EUR = 23,024 VND)

Note: Normal hour: From Monday to Saturday: from 4.00 – 9.30, from 11.30 – 17.00, from 20.00 – 22.00; on Sunday: from 4.00 – 22.00. Rush hour: From Monday to Saturday: from 9.30 – 11.30 and from 17.00 – 20.00; and on Sunday: no rush hour. Low hour: Every day from 22.00 – 4.00 of the following day. (http://vnexpress.net/GL/Kinh-doanh/2009/02/3BA0BCC9/, viewed 07.5.2009)

The reasons for such expensive charges are that at present, the electricity network in Phu Quoc has not been connected to the national grid due to the long distance between the island and the mainland. Meanwhile, the current power supply capacity is very limited and is provided by several old and new internal combustion diesel engines. Although the purpose of the high charge is to reduce the use of electricity, it is impossible to reduce the consumption demand because Phu Quoc is a tourism island and its economy is developing very fast. Therefore, the power demand for both domestic and commercial use will be increasing more and more.

In accordance to Vietnam's national planning, the development in Phu Quoc island has to focus on objectives such as:

- Sustainable development of agricultural land to produce clean, high-quality products suitable for eco-tourism.
- Development of clean industries to create jobs and produce goods, by establishing some small industrial zones (2-5 ha each) near the residential areas.
- Development of public networks (i.e. roads, power grid, and connection to the mainland).

(http://ttpl.chemeng.ntua.gr/wte/Pdfs/Karagiannidis_Vietnam_Anaerobic_Venice2008.pdf, viewed 07.5.2009).

The prevailing relatively high electricity price compared to those applied on the mainland as shown in the above table is expected to provide attractive returns for the renewable energy projects, which are economically feasible and environmentally friendly.

1.7.2 Wind data in Phu Quoc and potentiality for wind farm development

According to Ta Van Da (2006), the recorded wind speeds in Phu Quoc are as follows:

Table 2 - Wind speeds recorded in Phu Quoc

Unit: m/s

Height (m)	Annual	Hot season	Cold season
10	2.7	3.2	2.1
20	3.0	3.7	2.4
40	3.4	4.1	2.7
60	3.6	4.4	2.9

(Ta Van Da, 2006)

Beside recording the wind speeds over months and years to determine wind energy, the wind energy is said to be dependent on the K factor. The value of this K factor depends on wind speed: the weaker the wind blow, the larger the K factor is. The correlation relationship is shown in the table below:

Table 3 - K factor table

Average wind speed V(m/s)	K Factor (average)
< 10	9 – 22
1.0 - 1.5	4 – 9
1.6 - 2.0	3.5 – 7
2.1 - 2.5	3 – 5
2.6 - 3.0	2.5 – 4
2.0 - 3.5	2 - 3.5
>3.5	1.8 - 2.5

(Ta Van Da, 2006)

The K factor also depends on the types of territories. It means that even with the same wind speed calculated, the wind energy can vary in different locations.

Table 4 - Wind energy depending on K factor

$\overline{V}$ = 1.8 m/s			$\overline{V}$ = 2.7 m/s		
Trạm	K	W(Kwh/m^2)	Trạm	K	W(Kwh/m^2)
Hà Nội	2.0	61	Bacl Liêu	2.2	228
Yên Bái	2.3	71	Plây Ku	2.5	261
Châu Đốc	3.0	93	Cam Ranh	2.6	269
Hà Nam	3.3	102	Thái Bình	2.8	292
Phước Long	5.1	157	Côn Đảo	2.9	302
Đắc Nông	7.9	244	Đà Lạt	3.8	400
Ba Tri	8.5	260	Phú Quốc	4.2	440

(Ta Van Da, 2006)

For example, Con Dao and Phu Quoc have the same calculated wind speed of 2.7m/s, the K factor in Con Dao is 2.9 and Phu Quoc is 4.2. This means that the wind energy potentiality in Phu Quoc is higher than in Con Dao. At present, in Con Dao, a wind farm project has been implemented by the Aerogie Plus group (Switzerland). This wind farm project is a BOT contract over 25 years with 7.5 MW capacity and will be constructed on a 50ha land area, and initial investment cost is about 20 million euros. (http://vietbao.vn/Xa-hoi/Dien-gio-cho-Con-dao/40195595/157/, viewed 22.4.2009). Currently, the design works are being carried out. This wind farm is expected to be put into use in 2010. (http://vst.vista.gov.vn/home/database/an_pham_dien_tu/MagazineName.2004-06-01.4343/2008/2008_00023/MItem.2008-12-30.3037/MArticle.2008-12-30.3232/marticle_view, viewed 22.4.2009).

In Ta Van Da's research (2006), the average energy (E) in Phu Quoc in a year and in hot and cold seasons for different heights has been calculated.

Table 5 - Average energy in a year in Phu Quoc

Unit W/m2

Height (m)	Annual	Hot season	Cold season
10	50.3	74.0	26.5
20	76.9	113.1	40.6
40	111.5	164.1	58.9
60	135.9	200.1	71.8

(Ta Van Da, 2006)

"If the total energy W < 200Kwh/m2, it is not practical to develop wind energy because the value is too little while investment for equipment is too expensive. However, it will be feasible with total annual energy of more than 300Kwh/m2 or the average wind speed of above 2.5m/s". (Ta Van Da 2006, 86.) It can be seen that with the calculated wind speed and wind energy from Table 2 and Table 5, installing wind turbines in Phu Quoc is possible.

Total wind energy in Phu Quoc has been calculated as shown in the table below:

Table 6 - Total wind energy in Phu Quoc

Unit: KWh/m2

Height (m)	Annually average	Hot season	Cold season
10	440.2	326.7	115.3
20	673.2	499.6	176.2
40	976.7	724.7	255.8
60	1190.6	883.4	311.8

(Ta Van Da, 2006)

Besides, it is also necessary to calculate the wind speed range for optimum exploitation by choosing adequate wind turbines. Technically, there are three levels: V_i, V_c and V_0. V_i is the cut-in speed – the speed that a wind turbine starts to operate and produce electricity; V_c is the speed that beyond this speed, the electricity output is unchanged, and V_0 is the cut-out speed at which the turbine shuts down to protect the blades. According to Ta Van Da (2006), to get optimum exploitation of wind turbines, it is necessary to meet two requirements:

- Optimum exploitation of wind resource at the installed area, and
- Minimum equipment investment.

As it has been explained about the operation range of a wind turbine within speed range (Vi, V_0), the satisfactory wind turbines are the ones that meet this specific range. In addition, it is also essential to consider the V_0 value so that the energy loss caused during machine operation can be minimized, thus reducing the investment cost and maintaining the machine longevity. It is possible to calculate these values of wind energy in Phu Quoc with the help of technical experts using applied calculation software.

In conclusion, statistics show that wind energy is a possible alternative to compensate the current power shortage in Phu Quoc under a circumstance that the demand in this tourist island is more and more increasing for not only household use but more for businesses. This energy alternative will help to improve the living of local people, boost economic development while ensuring clean environment for a tourist attraction island.

In the next chapter, a review of wind energy development in Vietnam and Phu Quoc will be explained. This presentation will help readers to partly answer the research questions of the business feasibility of a wind farm in Phu Quoc by explaining the situation in Vietnam and studied statistics in Phu Quoc in those available studies.

2 WIND ENERGY DEVELOPMENT IN VIETNAM AND PHU QUOC ISLAND DISTRICT

2.1 Wind energy development in Vietnam

In order to define the potential areas for wind energy exploitation in Vietnam, national level research works and studies have been done by experts and scientists from recognized institutes and organizations such as Institute for Meteorology and Hydrology, Ho Chi Minh Center for Sciences and Technology, World Bank, etc.

According to Pham Anh Tuan (2008), the survey result made by World Bank shows that 8.6% of the land area in Vietnam has the most potential for wind energy development, especially in high land, mountainous and remote areas, and islands. The traditional power resources including coal, oil and gas will only be enough for about 30 – 40 years, coal in more than 60 years. After that, those resources will become exhausted and Vietnam's energy will become dependent on the external resources. For those reasons, Pham asserts that development of wind energy is the right choice.

The two maps below show the wind potentiality by areas in Vietnam. The wind data is recorded at height of 65m and 30m. As can be seen from the maps, wind resource is distributed in the coastal and island areas. Phu Quoc island in the Gulf of Thailand has promising wind resource to develop wind energy.

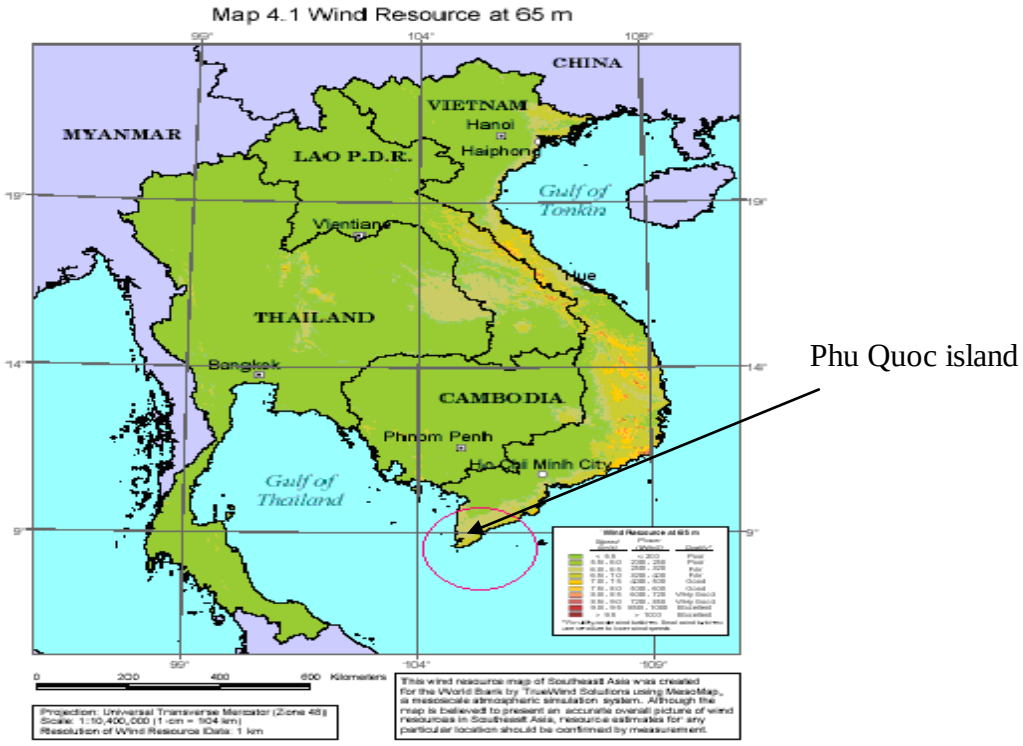

Figure 5 - Vietnam's wind resource at 60m - World Bank data

(http://www.geni.org/globalenergy/library/renewable-energy-resources/world/asia/wind-asia/wind-vietnam.shtml, viewed 15.1.2009)

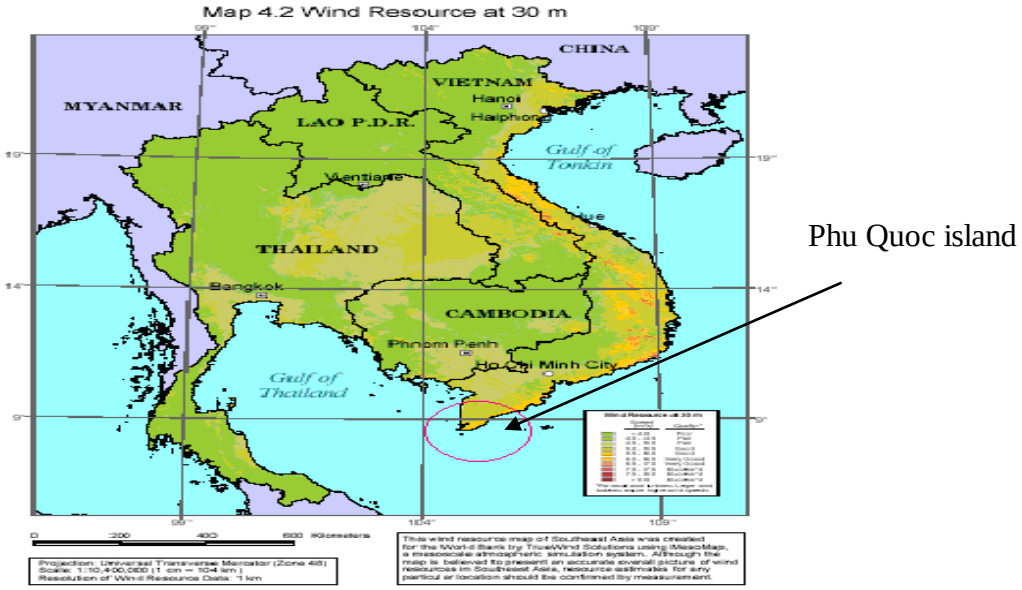

Figure 6 - Vietnam's wind resource at 30m - World Bank

(http://www.geni.org/globalenergy/library/renewable-energy-resources/world/asia/wind-asia/wind-vietnam.shtml, viewed 15.1.2009)

Phan My Tien (1993) summarizes the situation of wind energy and wind resource data in Vietnam. Study on renewable energies has begun from 1981 starting from the fact that the green house effect has resulted in global warming, which has caused climate change and rising of sea water level. Green energy development will help to reduce the CO_2. The 10-year study shows that in Vietnam, wind energy can be exploited in islands, coastal and delta adjacent areas, high land and some special geological areas such as high mountainous areas or valleys. It is also recommended that the size and capacity of the wind turbines being installed should be carefully studied so that the wind resource can be fully made use of by using properly selected wind turbines. In addition, weather conditions such as storm, hard wind, etc. in Vietnam should be taken into consideration when designing turbines to ensure the longevity of the turbines. At present, wind is exploited to generate power mainly for water pumping, rice field works, etc.

Tran Huy Khang & Phan My Tien (1990) used international standard methods and recorded wind speed at different observation stations nationwide. The result shows that offshore wind energy has the most potentiality. For example, total wind energy in offshore islands is about 3,000 – 4,500 kWh/m^2/year. Based on those calculated statistics, a look-up handbook has been done for available wind energy data in 31 locations in Vietnam, mostly delta, coastal areas, island and high land. This wind energy look-up handbook can show eight important characteristics to calculate wind energy monthly, yearly and periods during the year.

Nguyen Huu Hung & Duong Thi Thanh Luong (1998) concluded that wind energy in Vietnam can be exploited to generate power in mountainous and coastal areas. They suggested the possibility to develop small wind power turbines in combination with diesel generator in those areas and construction of wind farm for connecting with the national grid, which is economically effective.

Ta Van Da (2006), in the north, wind power is stronger in delta and coastal areas, especially in Quang Ninh, Thai Binh and Hai Phong, where the annually average wind speed recorded is above 3m/s. In the central and low areas, wind is weaker, the annually average wind speed is only 2m/s; however, in the border areas with

Laos where there are many high mountains, the average wind speed ranges from 2m/s – 3 or 4m/s. The highland has the most potential wind resource with the average wind speed of above 2.5m/s – 4m/s. Even some places like An Khe, the wind speed is about 7 – 8m/s. In coastal areas such as Tuy Hoa, Phan Thiet, Ca Na, Mui Ne, etc. the wind speeds are also high. In the south of Vietnam, potential wind resource concentrates mainly in coastal areas such as Ha Tien, Ca Mau with average wind speed of 4m/s. Statistics show that in offshore areas such as Hon Dau, Hon Me, the wind speed is about 3.5 – 4m/s; Bach Long Vy island, 6.3m/s; Truong Sa, 5.8m/s; Phu Quy, 5.1m/s; Con Dao and Phu Quoc, 2.7m/s. The wind speeds have been recorded and calculated at heights of 10m, 20m, 40m, and 60m for 150 stations in Vietnam.

There have been discussions about the investment cost for wind energy. Phan My Tien (1993) evaluates that huge required investment for wind energy and low technology has made it impossible to exploit wind energy in Vietnam. However, if it is made in practice, remote, mountainous areas and islands, where the national grid cannot reach, can be provided with power. In addition, using wind energy contributes to making the environment clean and ecological balance. It is believed that with more and more advance technologies, the investment cost will be reduced. The study of Phan's was done more than a decade ago. At that time, to install a wind turbine was only a dream. However, nowadays, it is not a dream anymore because wind turbines to generate power have been installed in several potential areas in Vietnam such as Bach Long Vi (Hai Phong), Binh Thuan, etc.

A recent study carried out by Dam Quang Minh & Vu Tu Anh (http://dam.minh.googlepages.com/NLG_cho_Vietnam.doc, viewed 15.3.2009) shows that price/ investment is not as high as people often think if considering both internal and external costs. The external cost refers to the cost for environment protection, residential resettlement, etc. Besides, there are valuable benefits. Those benefits hold both social and environmental values. Surely, the cost will be reduced over time thanks to advanced technology.

In the 1980s, wind farms have been designed and constructed with the original price tenfold the coal generated power. Nowadays, the price has been tremendously reduced to six cent US dollar per kWh. (http://hoithao.viet-studies.info/2008_BuiVanDao.pdf, viewed 15.3.2009). According to his analysis, the COE (cost of energy) = Installed cost/ Annual energy produced.
For example, for the 1.5 MW wind turbines in land-based wind farms,
COE = $1,300 per kW/ 2200 kWh/ year per kW = US$ 0.59. The energy price = energy cost + operation and maintenance costs + bank interest. Suppose the remaining costs are 10% of COE, we have the charge price/ kWh is six cents, which can be accepted by the users. In theory, the COE can be reduced by decreasing the installed cost and increasing the annual energy produced.

According to Herrmann Scheer (http://www.caodangdienhoc.org/TuSachDienHoc/NKNhan/PhongVanGsScheer.pdf, viewed 20.4.2009), it is not reasonable to compare only the costs between construction of a wind power plant and a coal generated thermal power plant. It should not compare the equipment cost, but the total cost from construction, installation, etc. until the power is supplied. With such consideration, we will have:

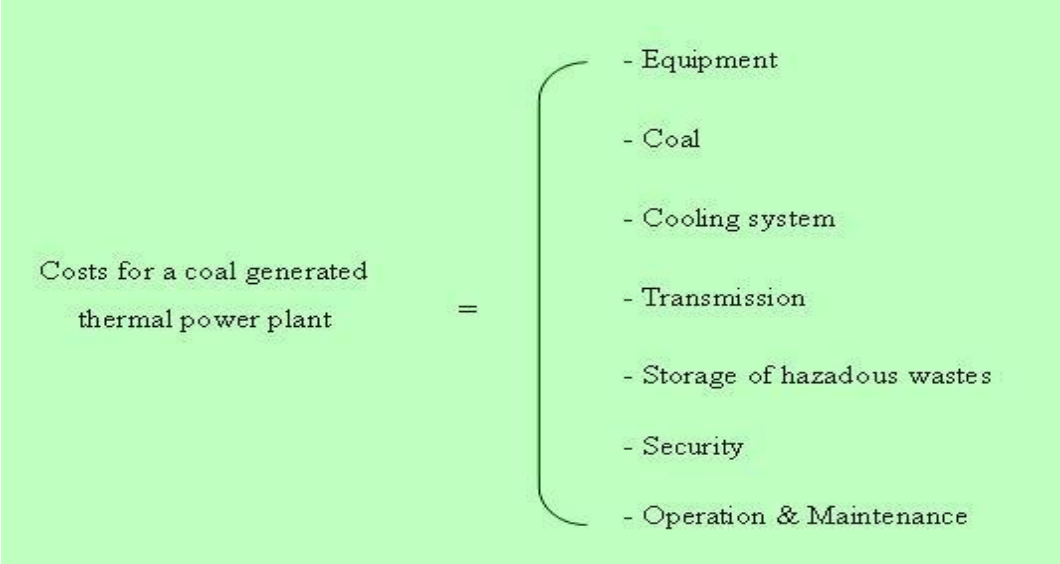

Figure 7 - Cost for a coal generated thermal power plant

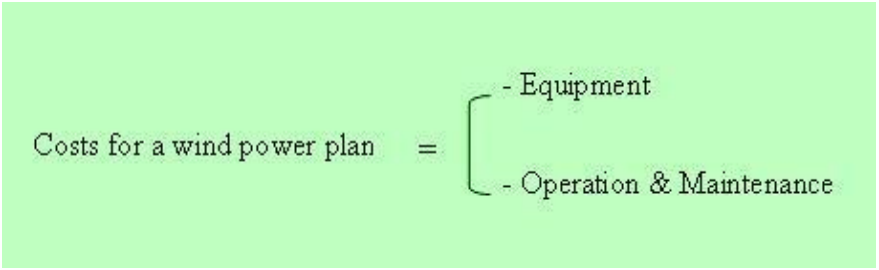

Figure 8 - Cost for a wind power plant

Herrmann Scheer had a meeting with the Vietnamese government and relevant agencies and authorities. According to his suggestion, it is not so urgent to build nuclear power plant. Instead, Vietnam should take most advantage of renewable energy.

At present, almost all investment in wind energy in Vietnam is supported by foreign investors. There have been several foreign investment big wind power projects which have been constructed and being constructed in Vietnam. The first wind turbine in Vietnam was installed in Bach Long Vi island (Hai Phong city) with capacity of 800 kW. The project came into operation from 31 October 2004 after more than three years of construction and installation. Implementation companies include Made company (equipment supplier), Tucme company (the consultant) and Technologias Renovables S.A (construction); all are from Spain. (http://vst.vista.gov.vn/home/database/an_pham_dien_tu/MagazineName.2004-06-01.4343/2004/2004_00021/MItem.2004-11-15.1110/MArticle.2004-11-15.2000/marticle_view, viewed 29.4.2009). However, the first wind farm in Vietnam is in Con Dao island. On 09 December 2008, in Vung Tau, AEROGIE.Plus Renewable Energy Co., Ltd. has obtained construction license for a wind power plant in Con Dao with total capacity of 7.5MW, and total investment capital of twenty million euro; and AEROGIE (Switzerland) is the project employer. Operation of the wind power plant is expected from mid 2010 (http://www.baovietnam.vn/cong-nghe/152366/18/Nang-luong-gio-ngoai-khoi-Viet-Nam, viewed 29.4.2009). There are also other completed and on-going wind energy projects in other areas in Vietnam. In Quang Ngai province, there is a wind project in Ly Son island with capacity of 7MW built by Ly Son wind energy Joint

Stock. Binh Dinh province has the largest number of wind projects in the country. These projects are contracted by Tomen (Japan) in 1999, Vietnam Energy Investment and Development in 2000, European Provider Network Gimbh (Germany) in 2006, Power Installation Consultants Company No.3 (Ho Chi Minh city) in 2007, 30MW wind project in Khanh Hoa (Germany) in 1997, Grabowski (Germany) in 2004, Central Wind Energy Joint Stock in 2007, Phuong Mai wind farm No.1, 2 and 3 with capacity of 50MW, 200MW and 50.4MW respectively. There are also many wind projects in Binh Thuan province. At the moment, there are nine investors (domestic and international) having registered wind energy projects with total capacity of more than 1,000MW. In Ninh Thuan, there are ten projects which have been granted investment licenses or project in-principle approval. The investors are domestic (Asia Clean Energy, REVN) and foreign from Germany (EATTRA), Canada (Greta), and Switzerland (Aerogie Plus).

Present situation and future wind energy development in Vietnam are as follows: (http://www.ec-asean-greenippnetwork.net/dsp_page.cfm?view=page&select=207, viewed 29.4.2009)

- 2 MW wind power installation in Ly Son island. The feasibility study has been completed by the Institute of Energy. EVN is the main project investor.
- 15 MW wind farm in Binh Dinh Province. The feasibility study was prepared by Phuong Mai company.
- Wind Power Project in Ninh Thuan Province funded by the Indian Government and Electricity of Vietnam. IE completed the feasibility study.
- 84 MW Wind Power Project in Phuong Mai. The main investor is Grabowski Renewable Energy Company No. 1 Ltd.
- 2.5 MW wind project in Phu Quoc island.
- 15 MW wind farm in Phu Yen Province. The project is owned by VINACONEX. Institute for Energy (IE) prepared the feasibility study.

As evaluated by Ing. Peter L.A Henigin, Managing Director of Altus RE, Germany, Vietnam is a potential market for wind energy. He revealed that a wind park is being designed by his company for the centre of Vietnam, and it is expected

to put the wind park into operation in a few years (http://vneco.vn/index.php?option=com_content&task=view&id=320&Itemid=1, viewed 25.4.2009)

Wind energy is seen as the most effective energy alternative. Pham Anh Tuan (2008) concludes that not investing in wind energy in Vietnam is a way of wasting energy while the country always has to face power shortages. This will affect both development of the national economy and energy.

At the moment, Electricity Vietnam (EVN) is only concentrating on thermal, hydro, and gas generated power. A nuclear power plant will be realized in future. Renewable energies such as wind, solar energies have not been paid much attention. Prof. PhD Nguyen, senior expert of Research Center for Energy and Environment said that the potential exploitation of wind energy in Vietnam by 2030 is 400 MW. (http://vietnamnews.vnagency.com.vn/showarticle.php?num=03SUN071007, viewed 24.4.2009)

However, according to Nguyen Khac Nhan, Vietnamese Professor at Grenoble University, France (http://tailieu.tapchithoidai.org/NKNhan_NLTT_TBKTSG.htm, viewed 25.4.2009), it should be encouraged to develop renewable energy (wind energy) instead of building a nuclear power plant in Vietnam because renewable energy can help to:

+ Decrease global warming
+ Enhance sustainable socio-economic development
+ Save fossil energy resources
+ Overcome fuel crisis
+ Reduce radioactive agents and need for nuclear power

According to Prof.Nguyen, wind energy is the most potential among renewable energy resources.

When discussing renewable energy in Vietnam, a German economist, Herrmann Scheer expressed that (http://www.caodangdienhoc.org/TuSachDienHoc/NKNhan/PhongVanGsScheer.pdf, viewed 24.4.2009) the renewable energy resources are limitless while the traditional resources are limited. The world will end when coal, gas, uranium sources have become exhausted and renewable energy will be our savior.

2.2 Wind energy development in Phu Quoc

The high electricity tariff in Phu Quoc (24.3€ cent/ kWh compared to 5.1€ cent / kWh on the mainland) is a good sign for a viable wind farm project in Phu Quoc. (http://ttpl.chemeng.ntua.gr/wte/Pdfs/Karagiannidis_Vietnam_Anaerobic_Venice2008.pdf, viewed 24.4.2009).

At present, there are some projects investing in renewable energy, especially wind energy. According to Tran Minh Tan (PIDM, expert, 3.7.2009), at present in Phu Quoc a project combining wind and solar technology implemented by Vietnam Services and Investment Joint Stock will be completed by the end of this year in Hon Thom islet, which is about 20 minute-boat trip from An Thoi port. The design capacity is 600 KVA.

Figure 9 - Hon Thom islet, photograph taken on 05.7.2009

Another project carried out by Si Cat company in cooperation with an American group using French technology with a design installation capacity of 90MW is under appraisal. On the day I had interview with Tran, this company was also having a working session with PIDM on their wind energy project. Tran said that there is very good potential for developing wind energy in Phu Quoc and Phu Quoc authority always gives the most favorable conditions to both national and international investors. According to reports made by Si Cat company for their wind project in Phu Quoc, the climate in Phu Quoc has two separate seasons: rainy season and dry season. The dry season lasts six months from October to March and rainy season starts from April until September. In dry season, there is North Eastern monsoon and strong wind with average speed of 5m/s, and it can reach 20m/s - 24m/s if there is very strong wind. In dry season there is South West - West monsoon and average wind speed of 5.7m/s.

Electricity alternatives have been studied by Kien Giang Power company in order to look for additional power sources to meet the ever increasing demand in Phu Quoc. Following Decision No. 32/2007/QD-BCN of July 26, 2007 approving the Planning on the electricity supply system for Phu Quoc island district up to 2010 with a vision to 2020, the currently studied alternatives are:

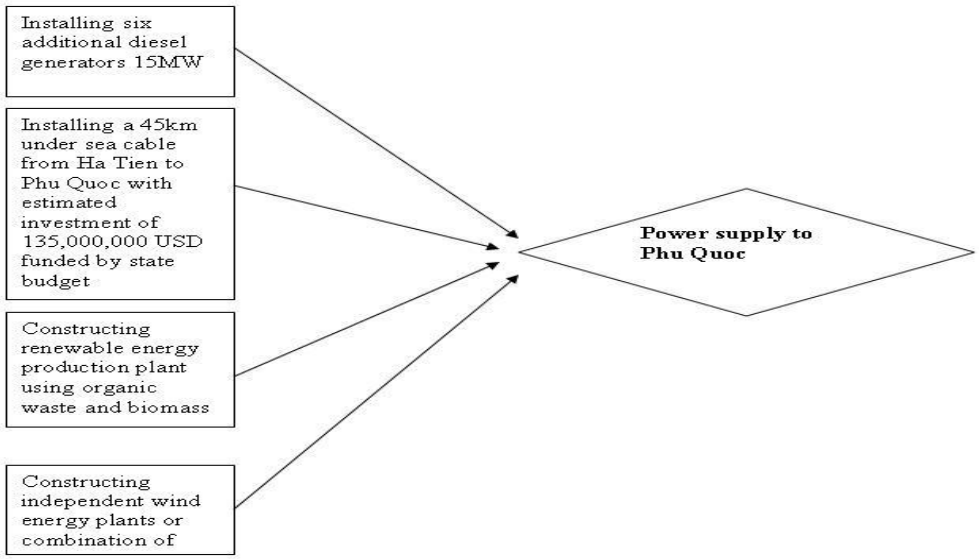

Figure 10 - Energy alternatives in Phu Quoc

It can be seen that development of wind energy in Phu Quoc has been paid attention by local authorities. It has been included in the development strategy of Kien Giang province in order to supplement power for the high demand in Phu Quoc and ending an annual big compensation amount from the state budget.

In order to verify this assumption, a field survey will be made in Phu Quoc. In the next chapter, research method will be explained.

3 RESEARCH METHOD

The research topic is wind energy supply to Phu Quoc island. Deductive approach and qualitative design are used. Besides, survey method is the tool to get data and information in the field for analysis. The analyzed information is interpreted in the light of research questions and objectives. The gained information is valid and reliable since key people representing each target group have been selected for interview, interviewees are not prepared for the questions, they are asked and answer interview questions freely.

The following Figure 11 illustrates how method is combined in this research.

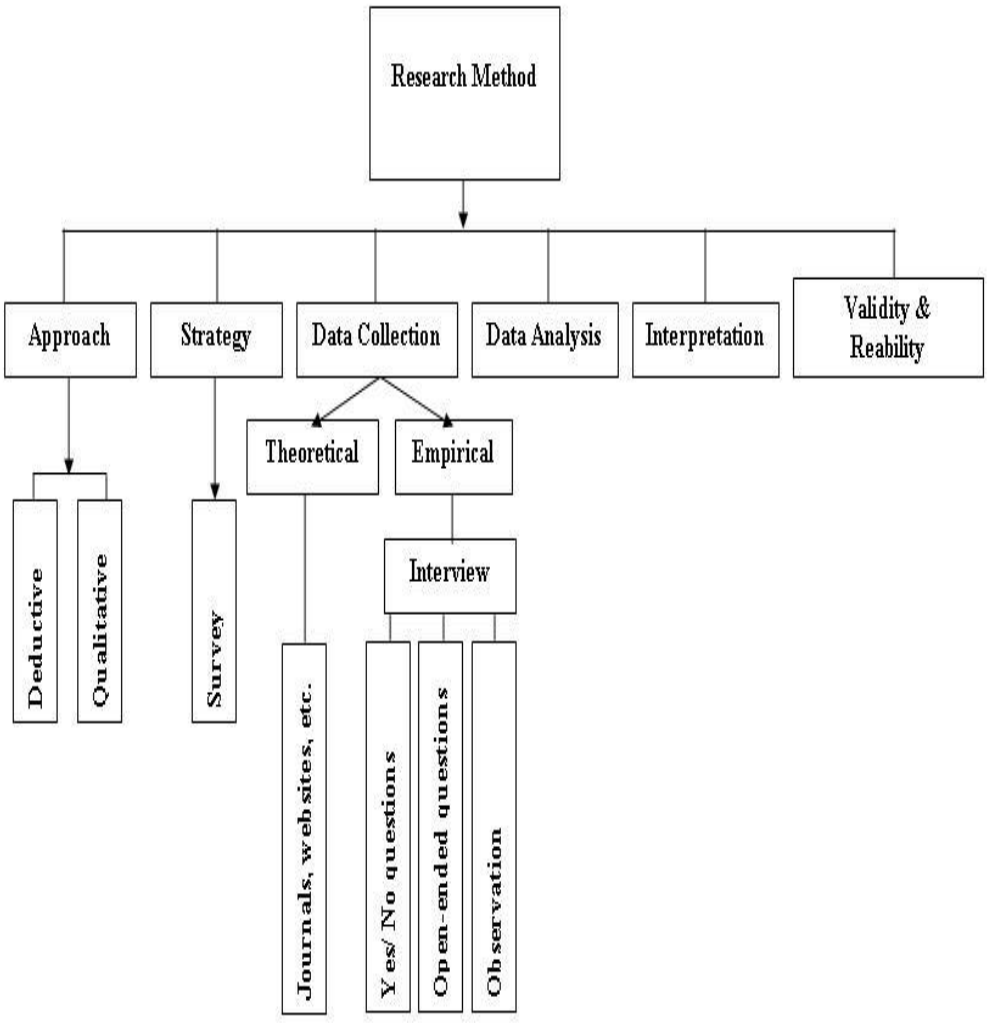

Figure 11 - Research method

3.1 Research approach

"There are no right or wrong methods. There are only methods that are appropriate to your research topic and the model with which you are working". (Silverman 2005, 112.)

The two research approaches being popularly used are inductive and deductive. "The precise purpose of your reading of the literature will depend on the approach you are intending to use in your research. For some research projects you will use the literature to help you to identify theories and ideas that you will test using data. This is known as deductive approach, in which you develop a theoretical or conceptual framework, which you subsequently test using data. For other research projects, you will be planning to explore your data and to develop theories from them that you will subsequently relate to the literature. This is known as inductive approach…". (Saunders et al 2003, 44.) The purpose of this study is to build a theory, and then analyze collected data to verify the theory. Therefore, deductive approach is chosen for the research.

The deductive method is very popularly applied for business research. For example, when research is designed to test some specific hypothesis that wind power is a good solution to electricity shortage in Phu Quoc, the following steps will be taken: We hypothesize that wind power is an effective energy alternative. The hypothesis is then generated that if wind power is exploited, the problem of electricity shortage will be solved. Based on this, a research project is designed to test the hypothesis. The results of the study help the researcher to deduce or conclude that wind power should be an energy alternative under the current conditions of power shortage and sufficient wind resource. We can see that the deductive method starts with a theoretical framework, formulating hypothesis. After that, a conclusion will be deducted based on data analysis. (http://pgdba.blogspot.com/2008/02/deductive-and-inductive-research.html, viewed 12.01.2009).

For the selected deductive research approach, qualitative research design will be used. A qualitative design is “to discover how people understand the situation or issue you are investigating, and how that understanding guides their actions” (Miles and Huberman 1994, 6). “Qualitative research is dynamic and interactive” (Davies 2007, 142). It means that your approaches differ from one target group to another. And also the way you plan to ask people is different from the actual approach that you use in order to get their ideas about the issues in different ways. “With qualitative research, your aim is not to emerge with findings that are statistically representative of a given population but rather to explore subjective patterns of personal, group or organizational experience, to gauge the meaning they have for the people involved, to contrast this with the views that other have of them, and to take proper account of situational context” (Davies 2007, 148). Interviewing is the most common means of qualitative research. “In qualitative research, the range of data collection methods stretches from interviewing and observation to the use of artefacts, documents and records from the past; from visual and sensory data analysis to ethnographic methods” (Davies 2007, 151).

3.2 Research strategy

The research strategy used for this study is survey method. “They allow the collection of a large amount of data from a sizeable population in a highly economical way” (Saunders et al 2003, 92). Jankowicz (1995, 172) explains that “The survey, in which you direct your questions at relatively large group of people, in order to explore issues largely in the present”. In addition, “It’s perfectly feasible to carry out a business and management project, at any level, by using survey method alone, without combining it with other methods” (Jankowicz 1995, 183).

“Survey methods using a random or representative sample enable you to test ideas and arrive at conclusions that are based on evidence that you can reasonably claim reflects the position of the population from which the sample was drawn-albeit interpreted through a perspective that you, the researcher, have imposed upon it.” While “Small sample interviewing enables you to arrive at conclusions that are specific to the sample, but which give a reflective or explanatory depth to the

subject being explored, and which in the wake of detailed analysis – can include complex interpretations of how each person's perspective relates to that person's psychological context". (Davies 2007, 152.)

3.3 Data collection

Fully structured techniques are used "The structured questionnaire, and the structured face-to-face interview, together with material on postal and the telephone variants" (Jankowicz 1995, 173). In this research, the face-to-face interview is used.

Main theoretical resources are from journals, authorized websites, and research works done by other people, reports and publication of recognized institutes in Vietnam such as Institute for Energy, Research Centre for Energy and Environment, etc. about the issues of wind energy, urban wind farm development, international business development, international project development, business model in the new innovation landscape.

For the empirical part, because the survey strategy is chosen for this research, the data will be collected by going to the field, "talking to people, either face-to-face, by means of the telephones, or by written questionnaire" (Jankowicz 1995, 184). The research instrument is in-depth interview. Observation will also be used as a tool for getting information. Interview questions will be prepared in light of the research objectives. Since the objectives of this research are to find the most feasible business model for Finnish companies, to verify the legal framework, and install a wind farm in Phu Quoc island, the following groups will be interviewed:

(1) Related authorities (MOIT, local authorities)
(2) EVN
(3) Academic institutions
(4) Local hotels
(5) Local private households

In-depth interview will be designed for selected people from these five groups with number of people involved in the interview as follows:

Table 7 - List of interviewees

Agency	**Interviewee**	**Position**	**Contact**
Energy Department of Ministry of Industry and Trade	Le Tuan Phong	Deputy Head of the Department	PhongLT@moit.gov.vn
Phu Quoc Development and Investment Management	Tran Minh Tan	Expert	minhtanpq@gmail.com 093 927 6939
Phu Quoc Power Company	Nguyen Van Tuoi	Director	tuoinguyenvan83@yahoo.com
Nuclear Power & Renewable Energy Projects Pre-investment Board, EVN	Phan Minh Tuan	Director	tuanpm.nrpb@evn.com.vn 096 2001 911
Center for Renewable Energy Study, Hanoi University of Technology	Le Danh Lien	Lecturer	ledanhlien@vnn.vn 091 2102 306
Sai Gon-Phu Quoc Hotel	James Doan Anh Phuc	Chief Marketing Officer	phuquocsales@hcm.vnn.vn 091 399 3606

Agency	Interviewee	Position	Contact
Thien Hai Son Resort	Du Hiep Hoa	Planning Dept. Manager	091 621 7053
Lunar Moon Hotel	Mr. Quoc	Owner	Duong Dong town, Phu Quoc, Kien Giang
Household	Tran Huy Duc	Resident	No.47 - Hung Vuong street - Duong Dong town - Phu Quoc, Kien Giang
Household	Nguyen Bui Hien	Resident	No.76 - Duong Dong town - Phu Quoc, Kien Giang

Totally, there are ten interviewees. “Interviews are particularly useful for getting the story behind a participant's experiences. The interviewer can pursue in-depth information around a topic. Interviews may be useful as follow-up to certain respondents to questionnaires, e.g., to further investigate their responses.” (http://www.casanet.org/program-management/personnel/intervie.htm, viewed 16.2.2009.)

Open-ended questions will be used for this qualitative purpose. “An obvious advantage is that the variety of responses should be wider and more truly reflect the opinions of the respondents. This increases the likelihood of you receiving unexpected and insightful suggestions, for it is impossible to predict the full range of opinion.” (http://www.cc.gatech.edu/classes/cs6751_97_winter/Topics/quest-design/, viewed 16.2.2009.) After the questions have been prepared, they will be tested to review if any improvement is needed before sending to the actual takers. The testing may be taken with the supervisor or an expert. Interview questions are presented in the appendice. However, throughout the data collection process, interview schedule might be modified; method might be adapted and changed if required. For example, questions might be added or dropped by learning experience from the previous interview for the next interviews.

Right after the interview has been completed, an interview summary will be prepared. This summary sheet includes all details including time and place, participants, duration of the interview, content, and emerging issues. This summary form will be completed and attached to the transcripts of the interview.

Table 8 - Interview summary form

Interview Summary Form	
Name of Interviewee	
Address	
Occupation	
Contact	
Date and time of the interview	
Issues discussed	
Emerging issues	
Conclusion	

Interview questions were designed for target groups regarding the wind energy development and policy for wind energy development in Vietnam in general and Phu Quoc in particular. The questions mostly focus on their opinions about wind energy, potentiality for wind energy development in Phu Quoc, plan for wind energy development, legal framework for wind energy in Vietnam and favorable conditions for foreign investors to take part in wind energy business in Vietnam. In addition, their difficulties in their business activities are also investigated. The interviews were conducted with key people of the organizations. Each interview lasted about from 15 to 45 minutes.

3.4 Data analysis

"Method of data analysis can include strategies for analyzing talk and text, structured techniques for the interpretation of observed behavior and the use of computer software programs to reduce some of the repetitive tasks that qualitative methods can require" (Davies 2007, 151).

"When analyzing data (whether from questionnaires, interviews, focus groups, or whatever), always start from review of your research goals, i.e., the reason you undertook the research in the first place. This will help you organize your data and focus your analysis."
(http://www.managementhelp.org/research/analyze.htm#anchor718511, viewed 16.2.2009.)

When interpreting information, the information will be put in perspective. Conclusions and recommendations will be recorded in report. During research, all the information and activities will be also recorded.

Davies (2007) says that analysis of qualitative data is the most exciting research task. He also suggests taking into account three factors, namely overlapping stages, different qualitative research for different target interviewee, and time management. For open ended questions, first it is needed to group the answers, interpret the answers while always come back to the research questions. Also analyze what you have observed during the interviewing; for example, expression of feelings of the participants; taking notes during interview.

Miles and Huberman (1984, 21) suggest that data analysis consists of three concurrence flows of activities: data reduction, data display and conclusion drawing/ verification. Data reduction involves making decisions about which data chunks will provide your initial focus. Data display means assembling data into display such as matrices, graphs, networks and charts which clarify the main direction of analysis. Conclusion drawing refers to explanations, possible

configurations, causal flows and propositions. Verification means testing the provisional conclusions for confirmation.

3.5 Interpretation

Interpreting the collected data, interview can be conducted following the steps as below: (http://www.managementhelp.org/research/analyze.htm#anchor718511, viewed 16.2.2009)

- Put the information in perspective; for example, compare results to the expectation;
- Consider recommendations, conclusions about the issues, etc.
- Record conclusions and recommendations in a report, and associate interpretations to justify conclusions or recommendations.

3.6 Validity and reliability

Regarding the quality issue, according to Silverman "how record data is very important because it is directly linked to the quality of data analysis. In this sense, field notes and contact sheets are, of course, only a means to an end – developing the analysis." (2005, 177.)

"Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure" (http://writing.colostate.edu/guides/research/relval/pop2b.cfm, viewed 10.3.2009). For example, the purpose of this study is to find the most feasible business model for Finnish companies in the field of wind energy in Phu Quoc. This study will be valid if after studying and doing the survey, it will prove that the conditions in the target market are favorable for setting up the business. However, the research study might be invalid if we will find that there is no legislation for renewable energy or the Vietnamese government does not want to encourage foreign investors to do the business.

Silverman (2005, 224) says that “Validity is another word for truth. We cannot say that the claims of a research study are valid when:

- Only a few exemplary instances are reported,
- The criteria or ground for including certain instances and not others are not provided.
- The original form of the materials is unavailable.”

Silverman (2005, 224) also explains “Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions”. While reliability is concerned with the accuracy of the actual measuring instrument or procedure, validity is concerned with the study's success at measuring what the researchers set out to measure.

4 BUSINESS MODEL DEVELOPMENT THEORIES

In this part, theories for developing a business model will be presented. The used theories include technology transfer, entry mode strategy, stakeholder analysis and legislation. Technology transfer means brift introduction of wind power technology; for example, how and when it works. It is one of the core elements for a business model. Entry mode is also an important factor for foreign investors when they first entry a new market. Besides, stakeholder analysis is necessarily suggested to understand the factual situations in the market and make necessary connections for the business. Legislation is also of great importance. It is a must and it can decide the success of the business.

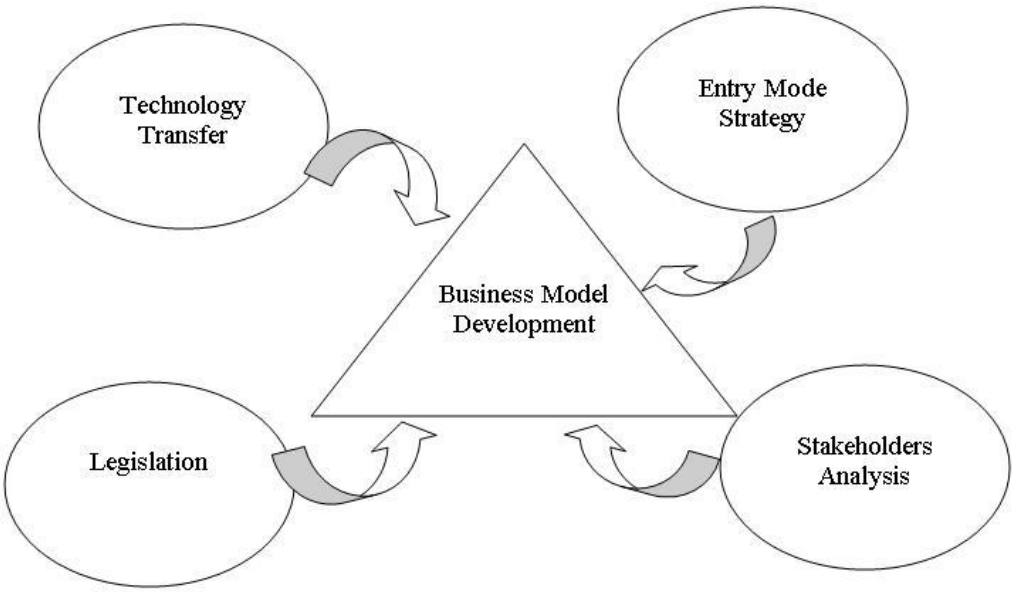

Figure 12 - Theories for Business Model

4.1 Technology transfer

Wind energy can be harnessed by building a tall tower on top of which sits a large propeller. The wind causes the propeller to move which in turn powers a generator. This produces electricity. When many of these towers are built together it is called a wind farm. The amount of energy that can be produced depends on the

size of the propellers, the number of towers and the amount of wind available. Wind farms are ideally suited to places along the coast, at the summit of rounded hills, open plains and gaps in mountainous regions. Propellers need to be big so that bigger volumes of air can be harnessed. Propeller blades can be angled to either a "fine" or "coarse" pitch. This means that they can deal with different wind speeds. The generator and propeller have the ability to turn into the direction the wind is coming from. There are wind farms that use vertical turbines to harness wind energy. In this case they don't have to turn and face into the wind. Towers for harnessing wind energy are very tall. This helps them reach to the area of the atmosphere where the wind is the strongest. It also makes it possible to free up as much land as possible for farming activities in low-lying areas. (http://www.pier55.com/Technology/wind-energy.shtml, viewed 19.4.2009)

Wind turbines are divided into vertical axis wind turbine (VAWT) and horizontal axis wind turbine (HAWT). Compared with VAWTs, HAWTs account the majority. For wind farm construction to generate electricity, the HAWTs are used (http://www.windpower.org/en/tour/design/horver.htm, http://www.windturbinesnow.com/vertical-axis-wind-turbines.htm, and http://www.home-wind-turbines.com/selecting-a-turbine.html, viewed 8.5.2009). Gradually, the VAWTs have replaced the HAWTs in wind farm application thank to its more effective performance in all wind directions, simple structure for transportation, installation, high durability and easy maintenance.

Currently, there are three types of wind turbines: large, small and micro wind turbines. Dutton et all (2005) states that "Large wind" refers to the turbines rated above 100kW, "Small wind" refers to turbines less than 100kW, and "Micro Wind" refers to turbines less than 10kW.

Generating electricity from wind can be explained and illustrated as below: First, (1) wind turbine will be installed at a studied height. The wind makes the blades turn. Second, (2) the shaft inside the nacelle will be turned accordingly. This shaft (3) goes into a gearbox which increases the rotation speed enough for the generator. The generator (4) uses magnetic fields to convert the rotational energy

into electrical energy. After that, the power output (5) goes to a transformer, which converts the electricity coming out of the generator. Finally (6) the national grid transmits the power to the residential areas.

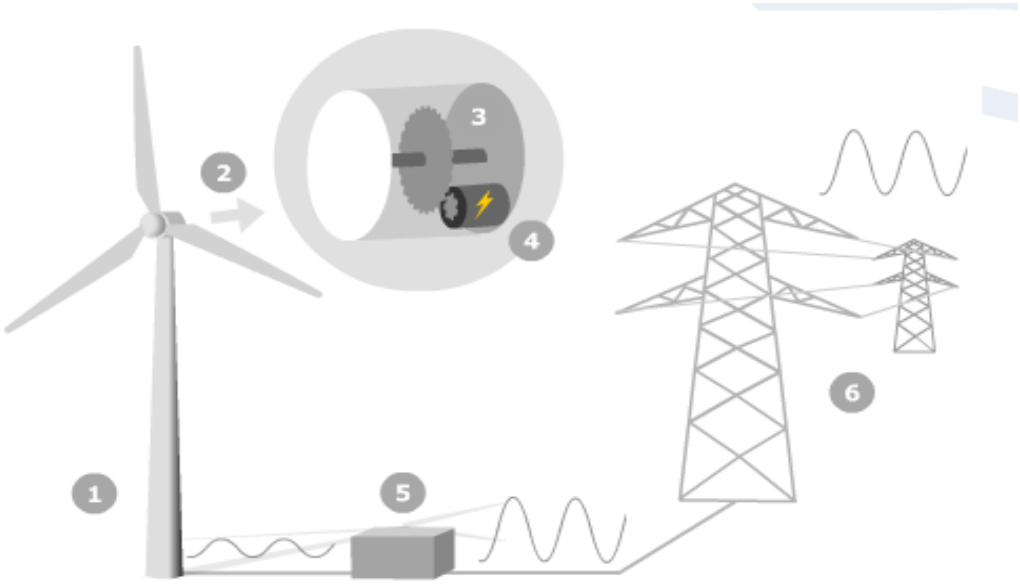

Figure 13 - Operating principle of wind turbines
(http://www.bwea.com/energy/how.html, viewed 19.4.2009)

Normally, a wind turbine has cut-in and cut-out speeds. “The cut-in wind speed is the wind speed at which a turbine starts to operate and produce electricity. Usually, wind turbines are designed to start running at wind speed of 3 to 5 metres per second but some can cut in at lower wind speed and particularly small wind turbines usually have lower cut-in speeds” and “Cut-out wind speed is the wind speed at which the turbine shuts down. At a high enough wind speed, the turbines shut down to protect the rotor blades, the generator and other components from failure. No power is generated above the cut-out wind speed.” (http://www.urbanwind.net/pdf/technological_analysis.pdf, reviewed 19.3.2009.) This is why it is very important to have the wind statistics recorded over certain years and at different heights to see if the wind resources of the area are adequate to establish wind turbines and develop a wind farm. It also relates to the wind turbine design work in order to make best use of the wind availability. In addition, knowing the wind speed range in the location is very important to select the proper

wind turbines for installation so that most advantage of the wind turbines will be made in such concrete territory in order to save the investment cost. Nowadays, wind turbines can start at 2.5m/s of wind speed (10km/h) and automatically stop when wind speed exceeds 25m/s (90km/h) and the efficient wind speed range is normally from 10m/s - 17m/s depending on specific installed turbines.

Wind energy systems are among the most technologically advanced and cost-effective renewable sources currently available. Modern wind turbines are likely to be producing useful power for up to 85% of the year, and have a design lifespan at least 20 years. The power produced by onshore wind farms is one of the cheapest forms of renewable energy available today, with the real potential for continuing technological advances to bring the costs down still further. (http://www.techstore.ie/Renewable-Energy/Wind-Energy/Wind-Energy-Systems.htm, reviewed 18.3.2009). According to calculation by EN-TECH (http://www.techstore.ie/Renewable-Energy/Wind-Energy/Wind-Turbines.html, reviewed 18.3.2009), wind energy solution is the best cost saving alternative.

Although the initial cost for wind farm investment is quite big, it cannot be denied the benefits that it brings about to the environment and society. In the article "Wind energy resource in Vietnam – Potentiality and Opportunities" (Dam Quang Minh and Vu Thanh Tu Anh, http://dam.minh.googlepages.com/NLG_cho_Vietnam.doc, viewed 15.3.2009), the advantages of wind energy to environment and society are presented in relative comparison with other power sources. According to these researchers, the wind farm construction does not have many risks or require residential resettlement like hydropower plant construction. In addition, the available land for hydropower plants is very limited. It has been planned to construct a nuclear power plant in Vietnam as an alternative to the current power shortage. However, this is seen as a very risky option because of its negative effects that it will bring about to the surrounding residents. Lessons about nuclear power leakage in the world and the requirement of huge investment cost have made it a less desirable choice for future energy. Meanwhile, the fossil generated power plants always cause pollution and negative effects to environment and people. Moreover, these traditional resources

have been becoming very limited with higher and higher prices. Wind energy is a clean energy and can be installed close to residential areas, which can save power transmission cost. This requires highly skilled operators so it helps to increase skilful jobs. It also helps to solve the current global warming condition and enhance the global and national energy security. All these conditions have made it possible for renewable energy to become the energy alternative in future. In conclusion, regardless of the high investment cost for wind energy, which will be reduced over time, the external benefits of wind energy show that this power source is the right choice.

Actually, it has been preliminarily studied and pointed out that investment cost for wind energy is much lower than that for hydro power. For example, a 4,800kW capacity wind farm costs about 3,000,000 euro. It means that with such 500 wind farms, the total capacity will be 2.4 million kW, equivalent to capacity of the Son La hydro power plant, and the total investment cost is 500 x 3,000,000 = 1.50 billion EUR = 1.875 billion USD, which is still lower than the estimated cost for the Son La hydro power plant with 2.4 billion USD. (http://ecc-hcm.gov.vn/?detail=41&language=&menu=89&submenu=95, viewed 20.4.2009).

Of course it is not easy to construct a wind farm when you have already had the target areas. The American Wind Energy Association (2000) has summarized concrete steps to construct a wind farm. These are things to be considered to calculate investment costs. Those steps are as follows:

- ✓ Understand wind resource
- ✓ Determine proximity to existing transmission lines
- ✓ Secure access to land
- ✓ Establish access to capital
- ✓ Identify reliable power purchaser or market
- ✓ Understand wind energy economics
- ✓ Obtain zoning and permitting expertise
- ✓ Establish dialogue with wind turbine manufacturers and project developer
- ✓ Secure agreement to meet O&M meets

In Vietnam, because of the fact that EVN is still the single buyer in the electricity market, independent suppliers are suggested to follow these modified steps below:

- ✓ Understand wind resource
- ✓ Understand wind energy economics
- ✓ Identify reliable power purchaser or market
- ✓ Determine proximity to existing transmission lines
- ✓ Secure access to land
- ✓ Establish access to capital
- ✓ Obtain zoning and permitting expertise
- ✓ Establish dialogue with wind turbine manufacturers and project developer
- ✓ Secure agreement to meet O&M meets

For cases where there is not a national grid available or the suppliers can construct their own transmission system and other necessary infrastructure to end users, it is not needed to sign PPA (Power Purchase Agreement) with EVN, but with local authorities.

Identifying the power purchaser/ market is very important after the energy economics have been determined. It is the very first thing to negotiate with the customers. Decision No.2014/2007/QD-BCT of 13 June 2007 issued by the Ministry of Finance (MOF) has provisionally promulgated investment finance economic analysis and power pricing frame for power production projects.

4.2 Entry mode strategy

Coade (1997) points out the key factor for success in international business as follows;

Figure 14 - Key factors for success in international business

So it can be seen that the market entry strategy is one important factor to bring success to international business. Coade (1997, 31) emphasizes the importance of market entry strategy that "The market entry strategy is crucial to the success of every international business; if you get it wrong it may be difficult to recover your market position. The popularity of each market entry strategy seems to vary from one particular market to another." "Executives constantly look at new market entry opportunities as a way of generating rapid growth, diversifying their portfolios, and (occasionally) secretly satisfying their entrepreneurial spirit. New market entry strategies enable companies to improve their revenue base by entering into new geographies, to solidify relationships with existing customers by extending their product offerings, and to diversify their customer base by targeting different customer segments."
(http://www.bridgestrategy.com/topics/new_market_entry, reviewed 10.3.2009.)

There are many choices for market entry. The crucial thing is to make the best choice among those. It is very interesting that in his book, Coade (1997) compares market entry choice in business development with the weapon choice of a military person. He says that "The market entry strategy will be successful only if you choose the right weapon to match your overall strategy". Meyer (2008) also agrees that "The design of an entry strategy is a creative process of integrating many interdependent elements. Various scenarios may be explored to decide over a wide range of issues." The choices of entry strategy are raised in questions in his article.

There are many choices or alternatives or scenarios for market entry. It can be exporting, manufacturing, joint venture, direct investment, strategic alliances, licensing, franchising or consortia (Coade, 1997). In this research, I use the model of entry modes developed by Driscoll (1995), which is more generalized. He categorized entry mode into exporting, contractual, and investment.

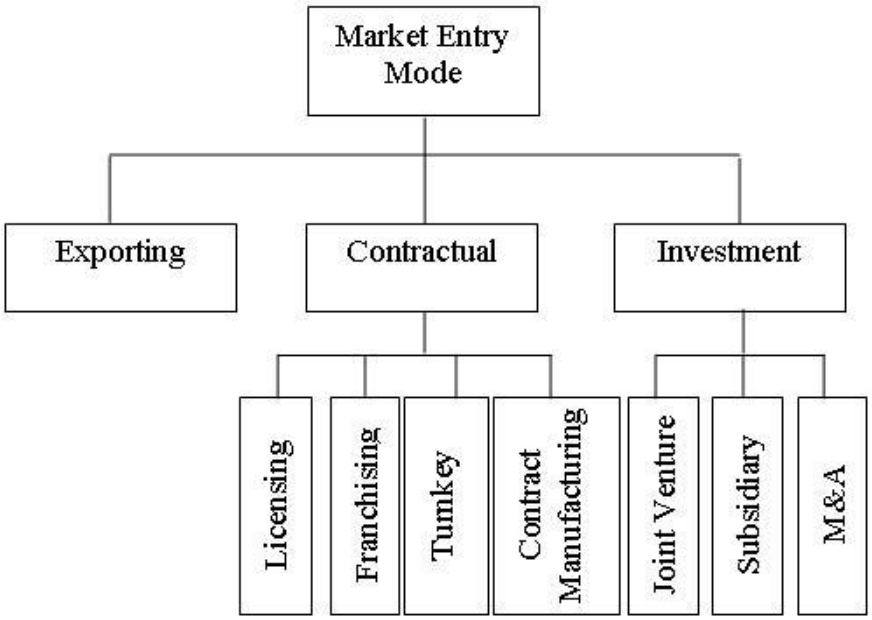

Figure 15 - Market entry mode
(Driscoll, 1995)

Based on these main foreign market entry modes, Driscoll (1995) also analyzed characteristics of these modes following five assessment criteria including control; dissemination risk; resource commitment; flexibility and ownership. Control means the magnitude of the company in managing the production process, performance activities, sales and marketing plan, logistic plan, etc. Dissemination risk is the company's awareness of the expropriation caused by a contractual partner. Resource commitment means the company should make sure that they can bring into the target market sufficient resources including financial, physical and human resources. Flexibility assesses that whether a firm can change the entry modes quickly and with low cost in the face of evolving circumstances. Ownership refers to the equity participation of the company. The characteristics of the defined entry modes are explained in the table below:

Table 9 - Dimensions of entry modes

Entry mode	Control	Dissemination risk	Resource commitment	Flexibility	Owner-ship
Investment	High	Low	High	Low	High
Contracts	Medium	Med-High	Med-high	Medium	Med-high
Exports	Low	Low	Low	High	Low

(Driscoll, 1995)

It can be seen that the export mode has the lowest potentiality among the three, and investment is the highest possible choice for entering a foreign market. The reason is that by choosing this mode, the company has the whole or part control of their business depending on the equity proportion they have. The risk of dissemination is low because they can control their business. The resource commitment is high due to the conditions to set up their subsidiary or make joint venture or apply M&A mode. The ownership is of course high. Only flexibility is low because unlike the exporting mode, they cannot switch their business easily to another market, or customers, they are bound by several constraints in the host market. However, this is the mode that is used mostly nowadays by companies thank to its advantages.

What are the most important factors that a company can rely on to make the best entry mode choice? Driscoll (1995) also built several factors that have the most influence on choosing entry mode.

Table 10 - Influential factors on entry modes

Situational influences	Firm factors	Firm specific advantages
		Experience
		Strategic considerations
	Environmental factors	Demand and competitive conditions
		Political and economic conditions
		Social-cultural conditions
Moderating variables	Government policies and regulations	
	Corporate policies	
	Firm size	

(Driscoll, 1995)

I suggest the investment entry mode for Finnish companies to penetrate to the Vietnamese market. The suggestion then brings us back to the questions raised by Meyer (2008) in Chapter 1: "Should we go alone or should we share with a local partner?"

"Joint ventures may provide your company with an easy way of gaining market access to what may traditionally have been difficult to operate in. This market access may be provided by the fact that you are now part of a joint venture, or it could be that because of the unity of your company competencies you can successfully gain market access to a previously difficult market." (Coade 1997, 39.) In some cases, joint venture mode is a must because "the government of the target market may have legislated to prevent you entering the market unless you have commenced a joint venture agreement with a country home-based company"

(Coade 1997, 39). According to Coade (1997), there are some advantages of joint ventures. Firstly, the combined competencies of the joint venture formed by partners will be stronger and makes it possible to easily access the market. Secondly, your risks will be shared. "The sharing of risks is included in the concern not only for operational or marketing cost but also for the sharing of research and development costs" (Coade, 1997). In addition, joint ventures "increase the awareness of the market place and the company credibility in the market" (Coade, 1997).

"Foreign direct investment (FDI) is the direct ownership of facilities in the target country. It involves the transfer of resources including capital, technology, and personnel. Direct foreign investment may be made through the acquisition of an existing entity or the establishment of a new enterprise. Direct ownership provides a high degree of control in the operations and the ability to better know the consumers and competitive environment. However, it requires a high level of resources and a high degree of commitment." (http://www.quickmba.com/strategy/global/marketentry/, viewed 20.3.2009.)

Back to this entry model developed by Meyer (2008), the term of "subsidiary" or form of "100% foreign invested company" is described as "wholly owned Greenfield" or "Greenfield foreign entry".

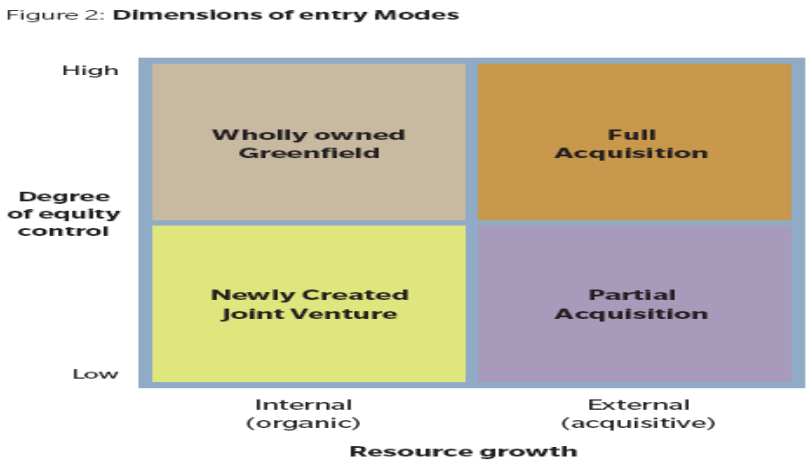

Figure 16 - Dimensions of entry modes

“Businesses usually like to be in control of their operations. Control facilitates the effective management of knowledge, avoids dependencies on external partners, and allows reacting flexibly to new market opportunities. If an entrant has (or has access to) all the resources required for a new operation, and if no legal requirements mandate local ownership, then foreign investors would normally prefer to establish a wholly owned subsidiary to attain full control over the operation.” (Meyer, 2008.)

“The State of the Socialist Republic of Vietnam encourages foreign investors to invest in Vietnam on the basis of respect for the independence and sovereignty of Vietnam, observance of its law, equality and mutual benefit” (Law on Foreign Investment in Vietnam). This will be explained in detail in Section 4.4.1 Entry requirements for foreign directed investment (FDI) in Vietnam. Legally, there are three forms for foreign investment in Vietnam: Business Corporate Contract (BCC), Joint Venture (JV), and 100% foreign invested company.

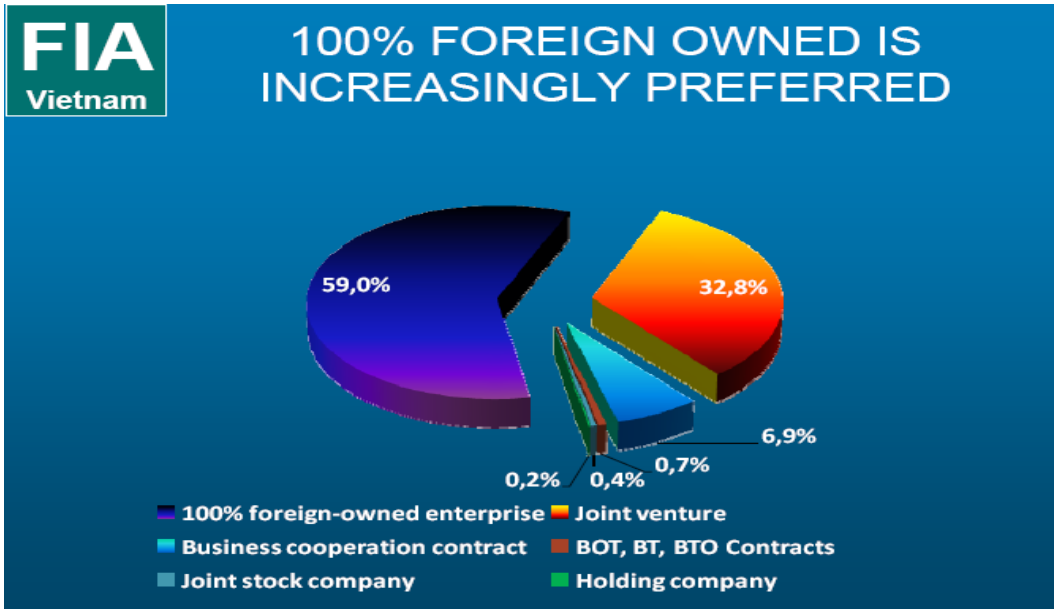

Figure 17 - Percentage of foreign investment in Vietnam (http://www.asean.or.jp/invest/archive/speech/fy07%20vietnam/FIA.pdf, viewed 21.3.2009)

In my business model, the proposed entry mode is to set up 100% foreign owned enterprise in Vietnam. Making joint venture with a local firm is not recommended because investment in wind energy business requires huge capital and local firms do not have strong financial capacity.

4.3 Stakeholder analysis

"The term 'stakeholder' refers to those individuals and groups who depend on the organization to fulfill their own goals and on whom, in turn; the organization depends on for legitimacy (University of Auckland, 2005). Such individuals and groups may have a multitude of interests, expectations, and demands as to what a particular organization must provide to society. In short, stakeholders are those who affect and are affected by the actions of an organization." (http://aceproject.org/ace-en/topics/em/emh/emh01, viewed 19.3.2009.)

For a foreign company, it is very important when starting a business to understand who the stakeholders are. Talking about growing local value for business in the community, Hammel & Denhart (2007) say "By partnering with all the various stakeholders in your business – customers, employees, vendors, fellow businesses, owners/ investors, nonprofit, the environment, and the public sector – you can grow local value". In this context, identification of core stakeholders, stakeholder analysis and management are very important to build a successful business model and run business in the market.

There are also secondary stakeholders; however, in this study, we concentrate on analysis of primary stakeholders who greatly contribute to the formation and success of the business model. Those primary stakeholders are people who have direct influence or are directly impacted by the activities, practices, and changes once the model is established and put in to practical use. Those core stakeholders include the newly established Finnish Wind Mill Company, EVN, end users, interested donors, local authority and the Vietnamese government.

Figure 18 - Stakeholders of Business Model

4.3.1 Wind Mill Co., Ltd.

The Wind Mill Co., Ltd. will be established by proposing to establish a 100% foreign invested company.

A company must know key factors in order to be successful in international business. A company must understand the business environment, global issues that have impact on their business, studying and analyzing the target market to see the development, competitors, suppliers, etc. Besides, a company must know their strength, and competitive advantages. By understanding all the above-mentioned issues, a company can start building the vision, mission, strategy and company's statement. Other important issues for a company are establishing the organization and management, and planning effective market entry mode.

Registration procedures to establish an enterprise in Vietnam can be found in Section 4.4.1 Entry requirements for foreign investment in Vietnam. Depending on the project types, application for investment project approval will be submitted to Ministry of Planning and Investment (MPI) or Provincial Department of Planning and Investments (DPI). In principle, the procedure can be explained as below:

- First, the project plan must be prepared and submitted to MPI/ DPI for approval.
- Application to business license, the approved project plan and other necessary documents as provided in the law will be then submitted to MOIT. In order for the enterprise to produce and sell electricity, it is noted that those product/ service must be clearly stated in the business license as a basis to work with EVN or local authority later.

Content of a Project Plan has been clearly defined with five main points:

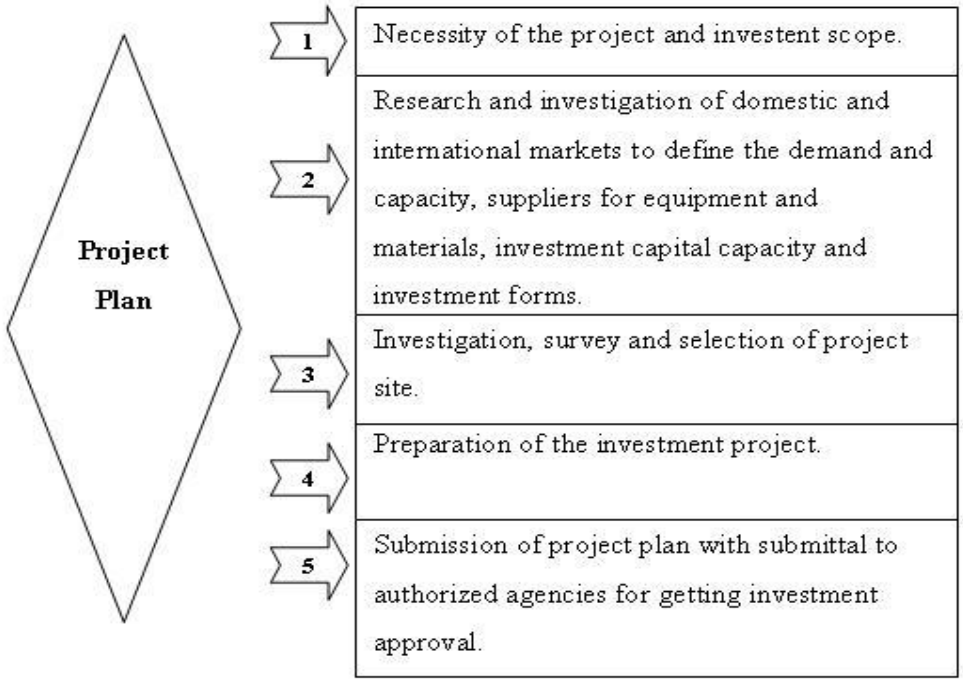

Figure 19 - Contents of Project Plan
(Adapted from
http://www.luatdanhchinh.com.vn/VN/Details.aspx?AppID=205&ContentID=405, viewed 09.9.2009)

After the in-principle approval for project proposal has been obtained, investors have to prepare and submit Pre-feasibility Study Report (PSR) and Feasibility Study Report (FSR) for approval before implementation. Contents of those reports are explained in the figures below.

Figure 20 - PSR report
(Adapted from http://www.luatdanhchinh.com.vn/VN/Details.aspx?AppID=205&ContentID=405, viewed 09.9.2009)

To prepare a PFS report, all these contents must be included. Approval on project proposal by authority will be based on these contents.

Figure 21 - FS report
(Adapted from http://www.luatdanhchinh.com.vn/VN/Details.aspx?AppID=205&ContentID=405, viewed 09.9.2009)

The FS report is prepared after PFS has been approved by authorities. The FS report should be made in detail about the project and all related issues. It is the foundation to start the actual implementation of the project.

Besides, it is essential to know which technology is suitable for the target installation location and meet the existing requirements. Following Correspondent No.278/TB-VP issued by Kien Giang People Committee, we must remember that for installing wind turbines, environmental protection and noise reduction should be ensured. In addition, the introduced technology must be the most advanced and has international standard. According to Le Danh Liem (Hanoi University of Technology, lecturer, 27.7.2009), "before manufacturing and installation, they have to take those conditions into consideration. They have to calculate the suitable height of the hub, the turbine to be able to withstand which wind levels like wind level 12, etc. Or they design the wind turbines in a way that they will automatically shut off when there is strong wind or strong storm in order to protect the wind turbines." In Vietnam, the Beaufort wind scale is used to determine the wind levels.

4.3.2 Vietnam Electricity (EVN)

Vietnam Electricity Group is a big state owned company. The main business of EVN is production, transmission and import of electricity. EVN is responsible for construction of power plants, grid connection to households, controlling the national grid, import and export of electricity, and ensuring sufficient provision of electricity following regulations and requirements of the Vietnamese government.

“EVN dominates the country's electricity market with 74% of production, 100% of transmission, and 95% of distribution. According to analysts, there should be a separate production phase, in which only EVN is allowed to hold 20-30% of electricity production output and manage transmission phase while the distribution should be separated from production. Power plants will have to pay transmission costs and have a right to select consumers. It is necessary to re-consider the current structure of electricity sector in the general development tendency. Factually, up to 33.96% of electricity output comes from hydropower, 33.6% from natural gas power, 17.17% from coal-fed thermo power plants, and 3.73% from oil power.” (http://www.vnbusinessnews.com/2009/02/evns-monopoly-in-electricity-production.html, viewed 23.3.2009.)

Currently, this state corporation has a monopoly in transmission and distribution of electricity in Vietnam and dominates the power production. However, facts have shown that EVN's capacity cannot meet the actual demand. Consequently, the users often suffer from power cut-off in large scale, especially in summer, which has negative influences on lives and works of people living in Vietnam.

Recently, there have been debates and discussion about not letting EVN hold the monopoly position in production of electricity. Programmes to encourage development and production of electricity from new sources, especially renewable energies such as solar, wind, biogas, etc. have been implemented and progress has been made. However, there has not been clear legal framework for renewable energy in Vietnam. A Master Plan for renewable energy development has been completed by Ministry of Trade and Industry and has been submitted to the government for approval.

In 2008, EVN imported approximately 3.5 billion kilowatts hours from China, up 31% from 2007 with the price of 4.5 USD cents/kWh (~ 3.33 EUR cents/ kWh). To satisfy the domestic need in 2009, it is expected that 2.7 billion kilowatt hours of electricity from China will be imported. (http://www.asset.vn/English/kinhte/nangluong/11754.asset, viewed 22.3.2009).

In fact, PPA with EVN is only necessary when the wind farm is constructed in places where the power network is connected to the national grid. For such areas as remote regions, islands, etc. where there is no national grid connection, there is no need to deal with EVN. It is local authority who will be responsible for management of power network, pricing and infrastructure construction. In Phu Quoc, the electricity system is invested by EVN, and under direct control of Phu Quoc Power Authority, Kien Giang Power. In order to supply power for the island power grid, it is necessary to agree with EVN about PPA.

4.3.3 Phu Quoc Insvestment and Development Management (PIDM)

The Prime Minister has issued Statute for Organization and Operation of Phu Quoc Island, Kien Giang province (promulgated under Decision No.38/2006/QD-TTg dated February 14, 2006 of the Governmental Prim Minister).

Following Decision No.42/2007/QĐ-TTg of 29/3/2007, the PIDM was established. According to this Decision, authorities and responsibilities of the management board have been provided. On 22.11.2007 PIDM was officially launched. This management board, on behalf of the Provincial Planning and Investment Department and Natural Resources and Environmental Department to handle all issues relating to investment license granting, business license granting, land use, environment, etc. for enterprises and investors.

According to Tran Minh Tan, PIDM expert, all investment projects in Phu Quoc receive the most favourable incentives and encouraging policies compared to other places in the country. Hoang An 5 star resort project, for example, is registered with total investment of 850 billion VND (equivalent to more than 3 million EUR) on a 20ha land area in 50 years. Incentives and favourable conditions that the project can receive are as follows:

Table 11 - Incentives for Hoang An 5-star resort project in Phu Quoc

a. Corporate income tax	- If investors establish organizations in Phu Quoc: The tax rate is 10% throughout the project duration; income tax is exempted for the first 4 years since income is generated and the tax is also reduced 50% for the following 9 years. - If investors do not establish organizations in Phu Quoc: Tax

	incentives will follow all the prevailing regulations and law.
b. Import and export tax	- Import tax is exempted for import goods in accordance with relevant law and regulations.
c. Employees' income tax	- Employees of the project will be exempted 50% of the income tax, including regular and irregular incomes.
d. Land rent	- Land rent rate can be exempted or decreased in accordance with regulations provided by the provincial people committee (if any) and other relevant legal documents.
e. Investment finance loan assistance	- Financial loan assistance can be considered following the state regulations on development investment.
f. Others	- Other taxes follow the present law.

It can be seen that PIDM is very open to investors who want to invest in Phu Quoc, and they are willing to support those investment projects in Phu Quoc at their best. Investors are ensured interests and responsibilities when investing in Phu Quoc.

4.3.4 End users

End users are all individuals and organizations in Phu Quoc. The Decision No.1802 of 11 December 2008 issued by the Prime Minister (PM) has approved the revised planning of Phu Quoc island district. Accordingly, by 2030 and after 2030, Phu Quoc will become a special administration zone, a center for high-end ecotourism and services. Phu Quoc island district includes Duong Dong and An Thoi towns

and 8 communes including Cua Can, Ganh Dau, Bai Thom, Ham Ninh, Cua Duong, Duong To, Tho Chau and Hon Thom will have a population of 260,000 - 320,000 and 540,000 - 800,000 by 2020 and 2030 respectively. These Phu Quoc's residents are end users of this model. (http://www.kiengiang.gov.vn/index2.jsp?menuId=117&articleId=9071, viewed 22.3.2009)

Besides, in Phu Quoc, there will be thirteen major tourist areas, 4 golf courses, etc. There will be more entertainment centers to be constructed in Phu Quoc as well as urban apartment buildings. An international airport is being built in Phu Quoc, etc. These will require a huge power consumption that the current capacity cannot meet.

Figure 22 - Phu Quoc in future (http://www.kiengiang.gov.vn/index2.jsp?menuId=117&articleId=9071, viewed 10.7.2009).

More information about the development plan in Phu Quoc and its increasing demand for power in the future can be found in Section 1.7 Business Case: Phu Quoc island district.

4.3.5 Vietnamese government

In order for foreign companies to do business in any country, the host governments play a very important role in the way that they promulgate law and regulations for doing business.

Since the adoption of the renovation policy in 1986, Vietnam has gained tremendous achievements in all sectors including economics, social development, culture, etc. Economic reforms, investment law, enterprise law, direct foreign investment law, and many other regulations issued by the Vietnamese government have helped the country to grow quickly and led to substantial foreign investment, rapid economic growth, and expanding private sector.

Nowadays, under the pressure of the electricity shortage, the government has encouraged investment in developing and deploying renewable energies. A master plan is now under review by the PM for approval, expected in 2009. At the moment, government has permitted many foreign investors to invest in wind farm construction in Vietnam. Foreign investors currently doing business and having intention to do business in Vietnam are protected by the law of Vietnamese government. In addition, incentives are also given to foreign investors to encourage them to do business. Collaborating with the government; therefore, plays a very important role in deciding the success of the business.

More details in legislation can be found at Section 4.4 Legislation.

4.3.6 Donors

The idea of involvement of donors in the business model comes from the concerns of many international and domestic organizations about development of renewable energies in the efforts to cope with the issue of energy savings and global warming. These donors such as World Bank (WB), Asean Development Bank (ADB), International Monetary Fund (IMF), Finnish government, other Finnish enterprise funding organizations, etc. not only give loans or financial supports but also

provide technical assistance, or guides on operation of the company or projects in the field of renewable energies.

World Bank; for example, over the last two decades, have been helping partner countries take advantage of opportunities to improve the use of renewable energy and energy efficiency. (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY/0,,contentMDK:20708340~pagePK:210058~piPK:210062~theSitePK:336806,00.html, viewed 23.3.2009).

Table 12 - WBG Commitment for RE and EE in 2008

Table 1: WBG Commitments for Renewable Energy and Energy Efficiency in Fiscal 2008

	Commitments in fiscal 2008 (millions of US$)			
Source of funds	*New RE*	*Hydro > 10 MW*	*EE*	*Total*
World Bank	272	625	719	1,616
IBRD/IDA	117	601	624	1,343
GEF	90	—	55	145
Carbon Finance	65	24	40	128
IFC	115	361	473	949
Own Funds	72	361	473	906
Carbon Finance	39	—	—	39
GEF	4	—	—	4
MIGA	88	21	—	110
Total	476	1,007	1,192	2,675

Note: Some columns may not add up exactly because of rounding.
Source: WBG data.

(http://siteresources.worldbank.org/INTENERGY/Resources/RE_EE_Report_2008.pdf?resourceurlname=RE_EE_Report_2008.pdf, viewed 23.3.2009)

"At the Bonn International Conference on Renewable Energies in 2004, the WBG made a commitment to accelerate its support for new renewable energy and energy efficiency. It pledged to increase its financial commitments for new renewable energy and energy efficiency at a rate of 20 percent per year between fiscal 2005 and 2009, compared to a baseline commitment of US$209 million (equal to the average of the previous three years)."

(http://siteresources.worldbank.org/INTENERGY/Resources/RE_EE_Report_2008.pdf?resourceurlname=RE_EE_Report_2008.pdf, viewed 23.3.2009.)

As the latest news, WB will provide $202 million to help Vietnam promote renewable energy between 2009 and 2013. Speaking at the signing ceremony, WB Director Victoria Kwakwa said “The aim of the project is to increase the supply of electricity to the national grid from renewable energy which is important to help Vietnam expand and diversify its sources of electricity generation and also join Vietnam's efforts to reduce climate change." (http://www.mofa.gov.vn/en/nr040807104143/nr040807105001/ns090618135922/view, viewed 17.6.2009).

ADB is also very committed to support clean energy projects. In her opening remarks at the Regional Workshop on RE and Energy Efficiency held by ADB, Mr. Fernando Garcia Principal Country Programs Specialist Pacific Subregional Office said “The market for renewable energy and energy efficiency in Asia and the Pacific, and particularly in this region, is promising. We need to build upon the existing momentum to develop more of these projects for commercial financing. In this way, we can continue to help bridge the gap that exists today between the region's demand and supply of energy, and expand access to energy for the poor.” (http://www.adb.org/Documents/Speeches/2006/sp2006007.asp, viewed 21.3.2009.)

“The Energy Efficiency Initiative (EEI) was launched in 2005 to encourage greater attention to energy savings. The core objective is to expand ADB’s investments in energy efficiency projects to $1 billion a year. ADB has listed People’s Republic of China (PRC), India, Indonesia, Pakistan, Philippines, and Viet Nam as priority countries for promoting more efficient use of energy. To help finance EEI, the Clean Energy Financing Partnership Facility (CEFPF) was established in April 2007. It is designed to fund small energy efficiency investments that require quick transactions; finance the technology transfer costs of clean technologies in some instances; and provide grant assistance for activities, such as developing the knowledge base on clean energy technologies.”

(http://www.adb.org/Documents/Brochures/InBriefs/ADB-Clean-Energy.pdf, viewed 21.3.2009.)

Besides, Finnish companies can also seek financial support from the Finnish government or Finnish funds for starting new business abroad. Finnpartnership, for example, is a Finnish business partnership programme, which provides advisory services for the business activities of Finnish companies in developing countries as well as financial support in the planning, development and implementation phases of a project. (http://www.finnpartnership.fi/default.asp?docId=12618, viewed 20.1.2009). Being responsible for managing this programme is Finnfund. This is a Finnish development finance company that provides long-term risk capital for profitable projects in developing countries and Russia. They are committed to finance private projects that involve a Finnish interest. (http://www.finnfund.fi/yritys/en_GB/brief/, viewed 21.3.2009).

These donors should be considered when the company is making strategy for business partnership thanks to their interests and supports in the renewable energy development sector. These can also be funding sources, which will be discussed in Section 5.2 External Funding of this thesis.

4.4 Legislation

This legislation part introduces to readers useful knowledge about requirements for foreign investors to enter the Vietnamese market and legal framework status of the renewable energy development in Vietnam.

4.4.1 Entry requirements for foreign investment in Vietnam

The Investment Law dated 29 November 2005 provides that foreign investors can carry out investment in Vietnam. “A foreign investor means any foreign organization or individual using capital in order to carry out an investment activity in Vietnam” - Article 3 (5) and “Enterprises with foreign owned capital include any enterprise established by a foreign investor in order to conduct investment

activities in Vietnam; or a Vietnamese enterprise in which a foreign investor has purchased its shares, merged with or acquired" – Article 3 (6).

The Enterprise Law and relevant legal document provides that foreign investors can establish a 100% foreign invested company in Vietnam - Article 13 (1).

The Law on Foreign Investment passed by Legislature IX of the National Assembly on 12 November 1996, amended on 09th June 2000 has encouraged direct foreign investment in Vietnam, which has great contribution to GDP growth of the country. In accordance with Article 4 of this law, foreign investors may invest in Vietnam in three forms: (1) business cooperation on the basis of a business cooperation contract, (2) joint venture enterprises, and (3) enterprise with 100 percent foreign owned capital.

Decree No.108/2006/ND-CP was promulgated by the PM on 22 September 2006 ("Decree 108") detailing and guiding the implementation of a number of articles of the Investment Law dated 29 November 2005. According to this Decree, "Domestic and foreign investors may invest in the form of 100% of their own capital to establish limited liability companies, joint stock companies, partnerships or private enterprises under the provisions of the Enterprise Law and relevant laws" – Article 7. and "Foreign investors may enter into joint venture with domestic investors to establish limited liability companies with two or more members, joint stock companies or partnerships under the provisions of the Enterprise Law and relevant laws" – Article 8 (1).

"The flow of foreign direct investments (FDI) in Vietnam, a member of the World Trade Organization (WTO) since 2007, has increased steadily over the past few years. In 2008, the amount of actually disbursed capital soared to US$11.5 billion, up 43.2 percent compared with 2007." (http://www.chinapost.com.tw/business/asia/vietnam/2008/12/27/189529/Foreign-direct.htm, viewed 22.3.2009.) By the end of February 2009, "Vietnam has attracted foreign direct investment pledges of 5.3 billion dollars so far this year, down 30 per cent from the same period last year. About 1.5 billion dollars of the

money involved 68 new investment projects. The other 3.8 billion dollars came from increases in the registered capital of 10 already existing projects. Most of the new foreign investment was in industrial production." (http://www.monstersandcritics.com/news/business/news/article_1461603.php#ixzz0AVpJ6kNb, viewed 22.3.2009.)

According to the annual report of Vietnam Holding Ltd. (VNH), an investment company, launched in June 2006, and incorporated in the Cayman Islands. The Company is listed on the AIM market of the London Stock Exchange, "Vietnam has been extremely successful in attracting foreign investment over the past few years" and "Vietnam is an economy on the move, dynamically growing and continually achieving."

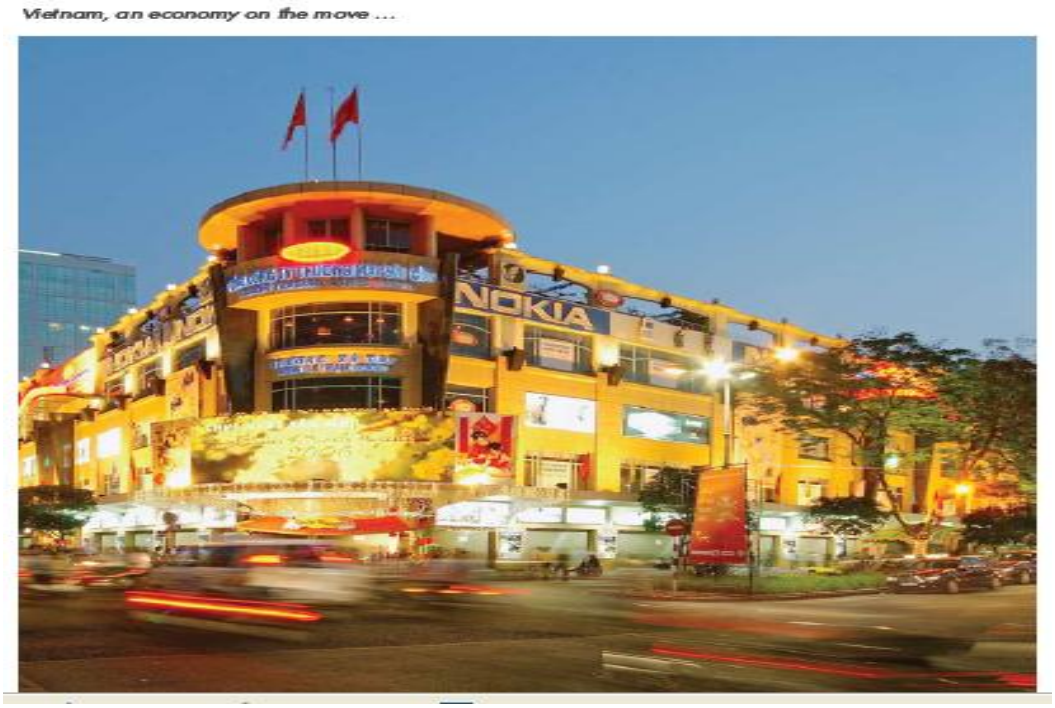

Figure 23 - Vietnam, an economy on the move
(VNH report)

Table 13 - Vietnam's GDP growth 2005 - 2008

	2005	2006	2007	1H2008
GDP (bn VND) – 1994p	392,989	425,135	461,189	n/a
GDP Growth	8.4%	8.18%	8.48%	6.5%
FDI disbursement (bn USD)	3.3	4.1	8.0	6.0*

* Until 22 July 2008

(http://vietnamholding.com/cms/images/filePdf/news/Investor%20Update/vn%20holding%20annual%2008%2013.pdf, viewed 22.3.2009)

Because in this model, the 100% foreign investment is recommended, procedure to establish 100% foreign invested enterprise in Vietnam will be presented in the below.

Formation of a 100% foreign invested company is provided in the Law on Foreign Investment in Vietnam.

(1) "An enterprise with one hundred (100) per cent foreign owned capital shall be established in the form of a limited liability company and shall be a legal entity in accordance with the law of Vietnam." (Article 15).

(2) The legal capital of an enterprise with foreign owned capital must be at least thirty (30) per cent of its invested capital. In special cases and subject to approval of the body in charge of State management of foreign investment, this proportion may be lower than thirty (30) per cent. During the course of its operation, an enterprise with foreign owned capital must not reduce its legal capital. (Article 16).

(3) The duration of an enterprise with foreign owned capital and the duration of a business co-operation contract shall be stated in the investment license for each project in accordance with regulations of the Government, but shall not exceed fifty (50) years. Pursuant to regulations made by the Standing Committee of the National Assembly, the Government may, on a project by project basis, grant a longer duration

but the maximum duration shall not exceed seventy (70) years. (Article 17).

(4) The State of the Socialist Republic of Vietnam shall protect industrial property rights and shall guarantee the legal interests of foreign investors in respect to technology transfers into Vietnam. (Article 21).

These are some basic legislation for a foreign company to do business in Vietnam. Once they want to go to the market, it is very important to study the host law or hire a legal professional in assisting the company's set-up and during operation.

Procedures for licensing and registration of establishment of 100% foreign invested company in Vietnam:

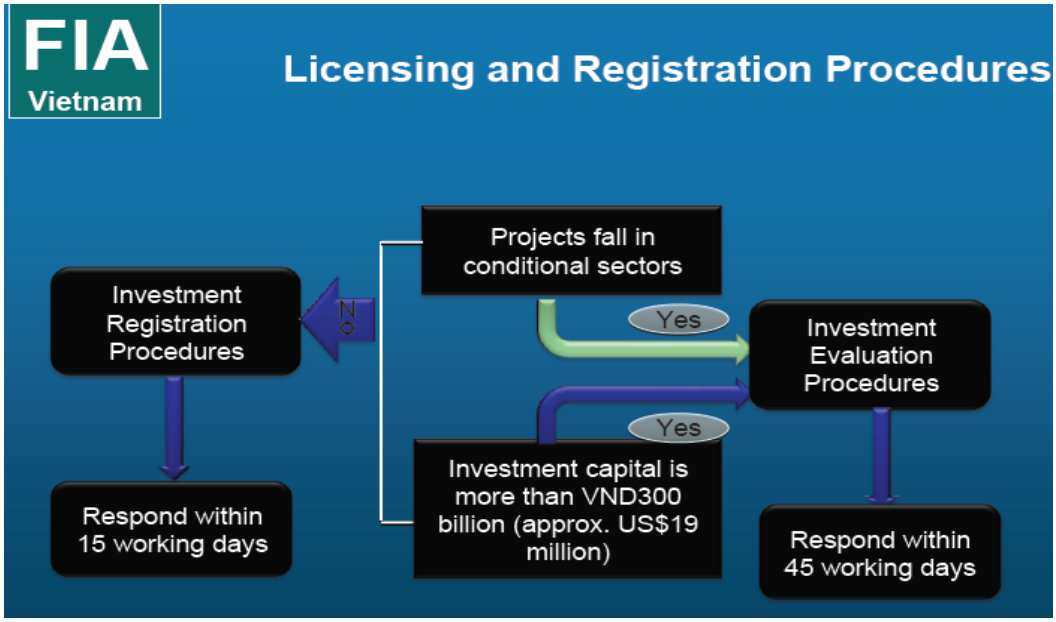

Figure 24 - Licensing and registration procedures (http://www.asean.or.jp/invest/archive/speech/fy07%20vietnam/FIA.pdf, viewed 21.3.2009).

The procedures, required documentation and evaluation process are provided in Article 45, 46, 47, 48, 49 and 50 of the Investment Law.

Table 14 - List of legal documents for foreign investment and enterprises

No.	Legal Documents	Contents
1.	Investment Law	Issued on 29 November 2005
2.	Enterprise Law	
3.	Law on Foreign Investment	Passed by Legislature IX of the National Assembly on 12 November 1996, amended on 09th June 2000
4.	Decree No.108/2006/ND-CP	Promulgated by the PM on 22 September 2006 detailing and guiding the implementation of a number of articles of the Investment Law dated 29 November 2005.

4.4.2 Incentives for investment projects in Phu Quoc

Circular No.10/2007/TT-BTC dated 05/02/2007 issued by MOF guiding financial mechanism and customs procedures in Phu Quoc island and An Thoi, Kien Giang province as follows:

- All investment projects in Phu Quoc will receive all incentives following the existing law and regulations, Law on Corporate income tax and other incentives.
    - ✓ Domestic and foreign investors doing business in Phu Quoc will be given incentive in income tax: For the first four years, 100% income tax will be exempted, for the next nine years, 50% income tax will be exempted and from the 14th year, the income tax rate will be 10% (the currently applied tariff for enterprises is 28%).
    - ✓ High income Vietnamese and foreign people working in Phu Quoc will only have to pay 50% tax of their income.
    - ✓ Domestic and foreign investors are exempted for imported cargos for once such as equipment and plants, accessories and materials for initial investment of the project and other fixed assets for manufacturing in Phu Quoc; the incentive is also applied for cases

of project expansion or technology changes. Especially, the BOT projects will be exempted from import tax for raw materials and materials that are not produced in Viet Nam.

- ✓ Treatment for domestic and foreign investors will be the same.
- ✓ And many other favorable incentives.

- ➢ Land rent policy:
  - ✓ The unit price per year is only 50% of the unit price provided by the Government for land rent unit price, but limited to at least 0.25% of the land rent according to use purpose following regulations provided by Kien Giang People Committee in 5 years.
  - ✓ Exemption or decrease of 11 years of land rent for projects that are not encouraged to invest, and 15 years for projects that are encouraged to invest.
  - ✓ Exemption from land rent auction.

Other legal documents regarding Phu Quoc and investment regulations in Phu Quoc can be found in this table:

Table 15 - Legislation for investment in Phu Quoc

No.	Legal Documents	Contents
1.	Decision 38/2006/QD-TTg dated 14.2.2006	Promulgation on administration and operation regulations of Phu Quoc issued by PM.
2.	Decision 178/2004/QD-TTg dated 05.10.2004	Approval on Master Plan for Phu Quoc development by 2010 with a vision to 2020.
3.	Decision 2392/QD-UBND dated 06.10.2008	Regulations on investment criteria in Phu Quoc issued by Kien Giang people committee.

4.4.3 Legal framework for renewable energy in Vietnam

Legal framework and policies for RE have been also discussed. Nguyen Khac Nhan (http://tailieu.tapchithoidai.org/NKNhan_NLTT_TBKTSG.htm, viewed 25.4.2009), there are two reasons why renewable energy has not been paid much attention: (i) small volume and (ii) little investment. But this situation has changed. Nowadays, development of renewable energy has caught attention of governments and authorities.

Pham Anh Tuan (2008) points out three main reasons for slow development of wind energy in Vietnam.

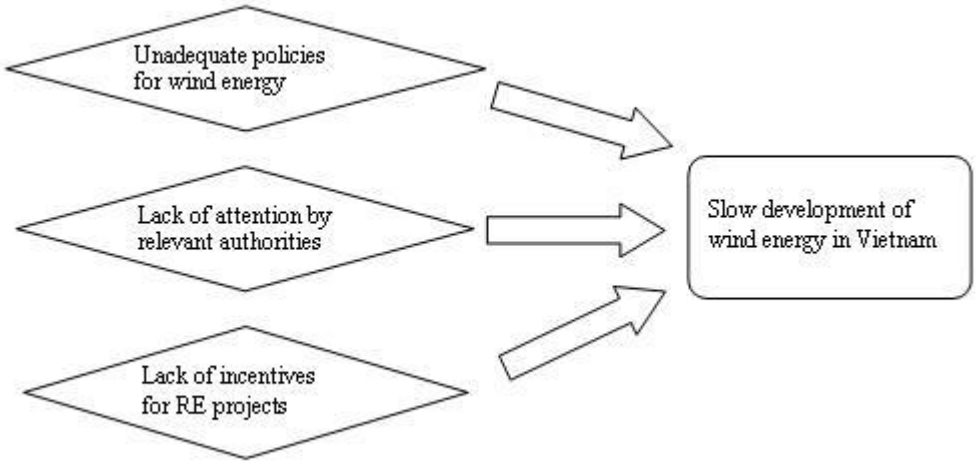

Figure 25 - Reasons for slow development of wind energy in Vietnam

Policies have not been adequate to encourage development of renewable energy in general and wind energy in particular. Besides, investment for study and evaluation of new energy has not been paid attention to by relevant authorities. This has been done sparsely without coordination among related agencies. In addition, investment is huge while there has been no incentive policies developed by the government for interested players.

According to Pham's recommendations, first an overall survey is necessary to establish a wind map for Vietnam, and a master plan for renewable energy should be developed. Second, improving and training technical people should be executed. Third, attractive incentive policy for programs of wind energy survey, trial installation should be formed. Other policies such as reducing tax for equipment and technology import should also be implemented. Fourth, selecting the most suitable technology for Vietnam's conditions is very important. Fifth, legal framework and pricing policy should be established to attract foreign and domestic investors. A clear road map for wind energy development in Vietnam should be adopted as soon as possible.

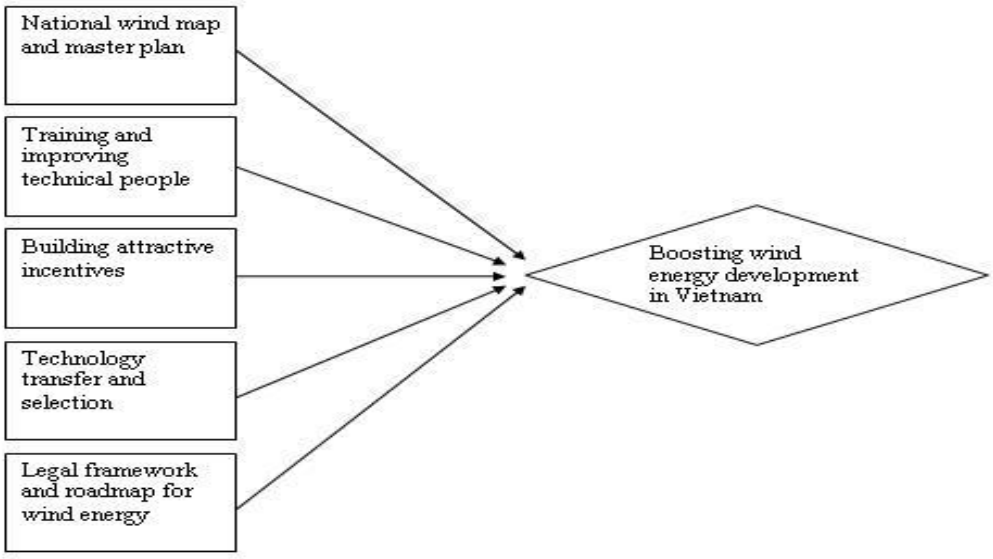

Figure 26 - Recommendations for boosting wind energy in Vietnam

In 1999 the government launched a Renewable Energy Action Plan (REAP). It sets out a 10-year framework to be delivered in two, five-year phases of international assistance to scale-up the development and use of renewable energy for rural electrification and grid supply. (http://www.evn.com.vn/Default.aspx?tabid=60&TopicId=17&ItemId=1633&language=en-US, viewed 22.3.2009). The REAP was adopted in 2001 followed by key elements of the policy and regulatory environment for renewable energy, including development of the ACT and Standardized PPA, financed by the System Efficiency

Improvement, Equitization and Renewables Project (SEIER, Cr. 3680-VN, approved 2003).

In accordance with the results of the primary research done by MBA08 team, Lahti University of Applied Sciences, legislation base for wind energy in Vietnam has been verified. The Article 33 of the Law on Environmental Protection amended by the National Assembly on 12 December 2005, mentions development of clean energy and renewable energy as one effective measure for environmental protection. It also provides that investment and development of clean energy and renewable energy shall be encouraged, and those involved in the process will be granted preferential taxes, funding support, and land for building production facilities. In addition, the programmes for developing and implementing clean and renewable energy have been considered as one that is integrated in programmes for hunger eradication and poverty reduction, as well as the development of islands and rural, mountainous, and coastal areas. The Government of Vietnam has proposed five main policies toward wind energy development:

- ✓ Encourage wind power development
- ✓ Consider application of favorable incentives: CIT holiday, import tax exemption, land-use, etc.
- ✓ Standardize the PPA
- ✓ Encourage pilot projects
- ✓ Welcome international assistances.

Primarily through MOIT and EVN's Institute of Energy, Vietnam has actively co-operated with other organizations in the region such as the ASEAN Energy Cooperation and the APEC Energy Working Group to speed up the process of renewable energy application. Vietnam has also participated in several working groups organized by the HAPUA (Heads of ASEAN Power Utilities and Authorities on transmission, generation, databases, financial, and renewable energy/environment. The Working Group on Renewable Energy/Environment is divided into numerous sub-groups on biomass, MSW, solar, wind, mini-hydro, which are newly set up, in line with the Senior Officials' Meeting on Energy agreement to sponsor an Action Plan to increase the amount of renewable energy

in the region to 10% by 2010. The other ASEAN forums in which Vietnam is active include the ASEAN Forum on Coal and the ASEAN Sub-Sector Networks on Energy Efficiency and Conservation and RE.

The Government has built a plan based on strategic principles as below:

- Renewable electricity will be used when it is the economically least expensive option and economically viable.
- Renewable electricity will be supplied on a commercial basis, by all types of businesses, including by a variety of private and public sector companies, cooperatives, and NGOs. Communities, individual consumers, and investors will actively contribute to and participate in the program. All stakeholders will participate in program design and implementation and invest their own funds in the activities and installations.
- The government will help create the enabling market environment by issuing policies and establishing the legislation and regulation to support commercial development.
- Access to long-term credit will be increased to improve financial viability of businesses and affordability of services. The program facilitates access to credit for individual households to purchase systems or for communities or developers to finance larger-scale plants.
- Limited grant assistance will be provided in recognition of the social and environmental benefits, but will be used carefully. Grant funding is needed to build the capacity for large-scale, renewable electricity development and to defray the costs of pre-investment activities. For off-grid facilities targeted at poorer communities, capital cost subsidies will not be considered.

At present, “investors and scientists claim the current policy and regulatory framework for encouraging the use of renewable energy was inadequate to provide the necessary drivers to accelerate the development of Vietnam’s RE industry”. However, “MOIT's Energy Department general director Ta Van Huong recently said a strategy and master plan for the development of renewable energy in

Vietnam till 2015 would soon be submitted to the prime minister. Huong added that the MOIT was also drawing up a decree with incentives and encouragement policies for renewable projects to be issued in 2009." (http://www.evn.com.vn/Default.aspx?tabid=60&TopicId=17&ItemId=1633&language=en-US, viewed 22.3.2009.)

According to Pham Khanh Toan (2007), the Institute of Energy has planned and encouraged development of renewable energy. According to this plan, the potential sources for power production are small hydropower, geothermal power, biomass power, wind power and solar PV power.

Table 16 - Vietnam's energy development potentiality

Development potential	
Small hydropower	~ 2000 MW
Geothermal power	~ 200 MW
Biomass power	~ 300 – 400 MW
Wind power	~ 400 – 600 MW
Solar PV power	~ 4 – 6 MW

(Pham Khanh Toan, 2007)

In the planned Generation Structure, renewable power will account for 2.8% (1,717MW) and 2.7% (2,267MW) by 2020 and 2025 respectively.

Table 17 - Generation structure by 2020 and 2025

	2020	2025
Electricity production	294 TWh	432 TWh
Pmax whole country	47607 MW	68440 MW
Total installed capacity	60611 MW	85411 MW
- Hydropower	~ 17,195MW (28.4%)	21295 (24.9%)
- Oil and gas TPPs	~ 16,151MW (26.6%)	16901 (19.8%)
- Coal TPPs	~ 18,350MW (30.3%)	35750 (41.9%)
- Renewable power	~ 1,717MW (2.8%)	2267 (2.7%)
- Imported	~5,198MW (8.6%)	5198 (6.1%)
- Nuclear power	~ 2,000MW (3.3%)	4000 (4.7%)
Reserve margin in peak Month	20%	14.4%

(Pham Khanh Toan, 2007)

The general structure of energy by 2020 is as follows. According to this, the major percentages are still for coal, oil and gas, and hydropower. Together with RE, nuclear power will also account for 3%. The remaining 9% will be imported.

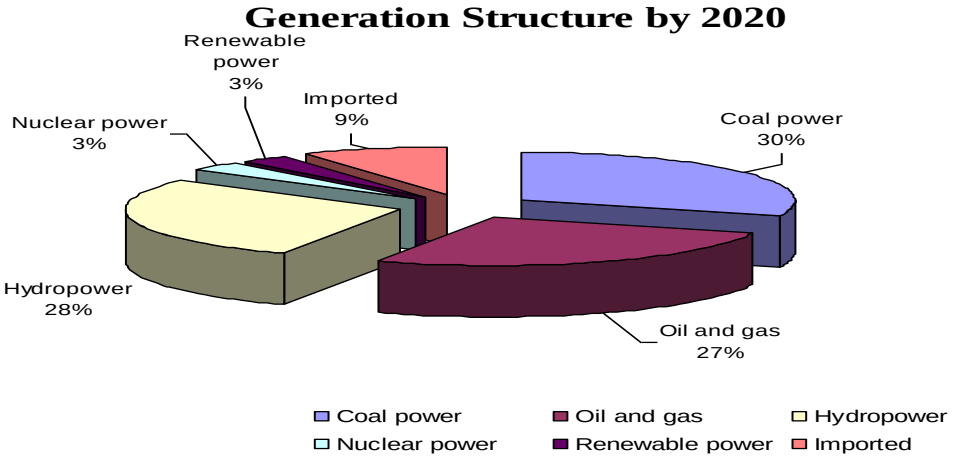

Figure 27 - Generation Structure by 2020

(Pham Khanh Toan, 2007)

In the general structure of energy by 2025, the imported power will be decreased. Instead, nuclear power will be increased. However, this is only a vision because at the moment, a nuclear power plant has not been constructed yet. RE percentage will remain the same at 3%.

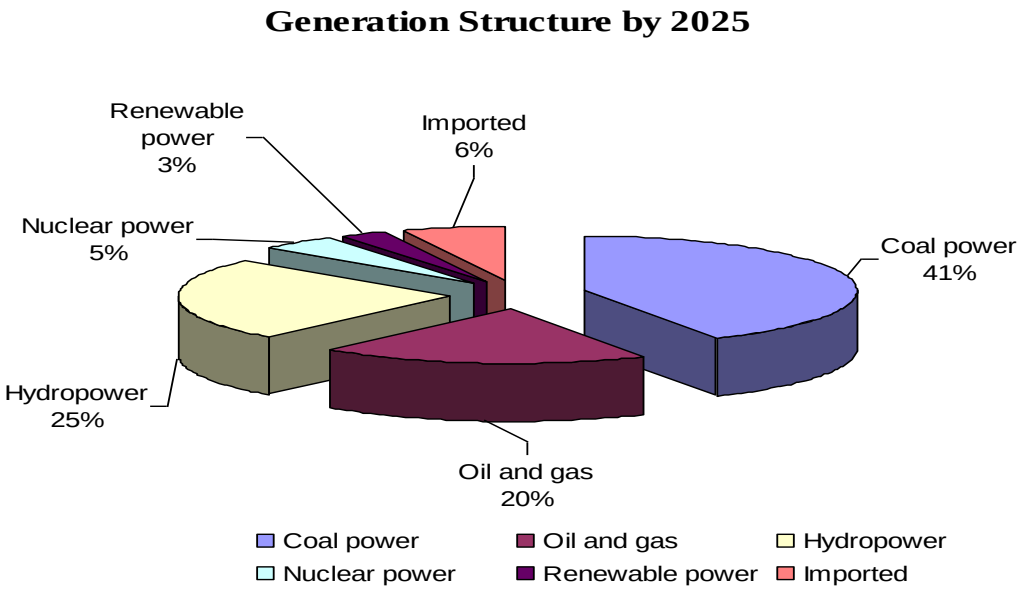

Figure 28 - Generation Structure by 2025
(Pham Khanh Toan, 2007)

According to the memorandum written by Nguyen Quynh Trang (Business Development Manager, DK Engineering Ltd.), a workshop on wind power was organized in Hanoi on 19 February 2009. There were around sixty attendants from donors, governmental agencies and interested companies.

Table 18 - List of attendants at the workshop on wind power on 19.02.2009

Donors	Government agencies	Companies
- Japan International Cooperation Agency (JICA) - KfW Entwicklungsbank (KfW) - German Development Service (DED) - Asean Development Bank (ADB), etc.	- Government's Office - Ministry of Industry and Trade (MOIT) - Electricity of Vietnam (EVN) - Ministry of Natural Resource and Environment (MONRE) - Media, etc.	- Altus AG - Fichtner - KV Venti - Entec - DK Engineering Ltd., etc.

In this workshop, issues relating to development of renewable energy were questioned to the authorities and discussed. According to this, some key issues were concluded.

Table 19 - Summary of the workshop discussion

No.	**Key discussed issues**	**Contents**
1	MP for RE Development in Vietnam up to 2015, with Outlook to 2025 was submitted by MOIT to the Government for approval on 12 December 2008	- From 2010 on, wind energy will be added 100 ÷ 200 MW each year. Targeted share of RE in electricity generation is 4% by 2020. - 8.6% of the total land area of Vietnam is evaluated to have "high" to "very high" potential (Wind velocity > 7 m/s). - Renewable energy is a field of investment incentive; investors can get advantages such as import tax exemption and land fee exemption in a definite period of time.

No.	Key discussed issues	Contents
		- Estimated investment rate: 1,700 USD/KW (2006-2010), 1,615 USD/KW (2011-2015) and 1,500 USD/KW (2016-2025). - MOIT recommends the Government to develop renewable energy with the following priority order: reasonable small-scale hydro power, biomass, geothermal, wind power and photovoltaic (low-cost production first). - Financing for renewable development is expected to be mobilized from the private sector. The State only finance for rural off-grid projects
2	MOIT and GTZ are developing a project funded by BMU named "Establishment of a legal framework and improvement of technical capacities for grid - connected wind power development in Vietnam" (2009 – 2011).	- Focus Area 1: Establishing legal framework conditions for grid-connected wind power (support mechanisms for wind power and wind power planning through various activities) - Focus Area 2: Promoting advanced wind power technologies (maintenance, wind measurements, turbines and capacity training) - Focus Area 3: Consulting services (as an info. broker, support in contractual issues, financing obtainment and contacts…)
3	Other discussions	- Through presentations and discussions, attendants recognized and agreed with the potential of wind power development in Vietnam and pointed out legislative,

No.	Key discussed issues	Contents
		technical and financial barriers that should be removed for the development, especially legislative ones. Attendants recommended that RE Master Plan should be finalized and approved soon, Feed-in tariffs should be high enough to encourage investments and Code/Standards for equipment and grid connection should be issued, etc.

According to Nguyen Duc Cuong (2008) of the Institute for Energy, legal framework has been built for RE: (1) Power Law to support RE generated power, (2) Decision No. 110/2007/QD-TTg issued by the government on plan for installation of 4051 MW RE generated power connected with national grid, and (3) Decision No.1855/QD-TTg issued by the government on target for RE installation percentage (3% - 2010, 5% - 2020). According to his report, the energy situation in 2008 is described as Table 20.

Another important document for developing renewable energy in general and wind energy in particular in Vietnam is the issuance of Decision No.130/2007/QD-TTg on 02 August 2007 on a number of financial mechanism and policies applicable to investment projects under the clean development mechanism. Accordingly, the right and obligations of CDM (Clean Development Mechanism) projects formulating and executing investors have been provided in Article 6 of the Decision. For example, investors are entitled to receive tax incentives, fixed asset depreciation, etc. CER (Certified Emission Reduction) selling time and prices and CER fees are also stated in Article 8 and 9 of the Decision.

Table 20 - Energy situation in Vietnam (2007)

Power Sources	**Capacity (MW)**	**Percentage (%)**
Traditional	11,360	97.65
Coal thermal	1,427	12.28
Oil thermal	573	4.93
Gas turbine	4,450	38.25
Diesel	615	5.29
Large hydro	4,227	36.34
Renewable energy	273.2	2.35
Wind	1.2	0.01
Small hydro	121.0	1.04
Solar	1.0	0.009
Biomass	150	1.29
Total	11,633.2	100.00

Decision No.110 issued by the PM on 18 July 2007 provides that domestic and foreign investors are encouraged to participate in projects for construction and installation of electricity production and distribution under given investment forms.

Figure 29 - Seminar on RE development in Vietnam (http://tinmoi.vn/Phat-trien-nang-luong-tai-tao-o-Viet-Nam-tiem-nang-con-bo-ngo-0413268.html, viewed 24.3.2009)

Decision No.276/2006/QĐ-TTg of 04/12/2006 issued by PM regarding power selling prices states in Article 3(c) that independent power suppliers can sell at the agreed prices but not exceeding ± 25% of the prices given in attachment with this Decision. Decision No.2014/2007/QD-BCT of 13 June 2007 issued by MOF has provisionally promulgated investment finance economic analysis and power pricing frame for power production projects.

Table 21 - List of current regulations on RE development

No.	**Legal document No./ Decision No.**	**Contents**
1.	Decision No. 110/2007/QD-TTg issued by the government dated 18 July 2007	Plan for installation of 4051 MW RE generated power connected with national grid
2.	Decision No.1855/QD-TTg issued by the government	Target for RE installation percentage (3% - 2010, 5% - 2020)
3.	Decision No.130/2007/QD-TTg on 02 August 2007	A number of financial mechanism and policies applicable to investment projects under the clean development mechanism. Investors are entitled to receive tax incentives, fixed asset depreciation, etc. CER selling time and prices and CER fees are stated in Article 8 and 9.
4.	Decision No.276/2006/QĐ-TTg of 04/12/2006 issued by PM	Regulations on power selling prices
5.	Decision No.2014/2007/QD-BCT of 13 June 2007 issued by MOF	Provisional promulgation on investment finance economic analysis and power pricing frame for power production projects.

4.5 Business model

4.5.1 Proposed business model

The proposed business model is created based on (1) wind turbine technology in generating electricity, (2) entry mode, (3) stakeholder analysis, and legislation. Scope of this research is Phu Quoc island, Kien Giang province, Vietnam.

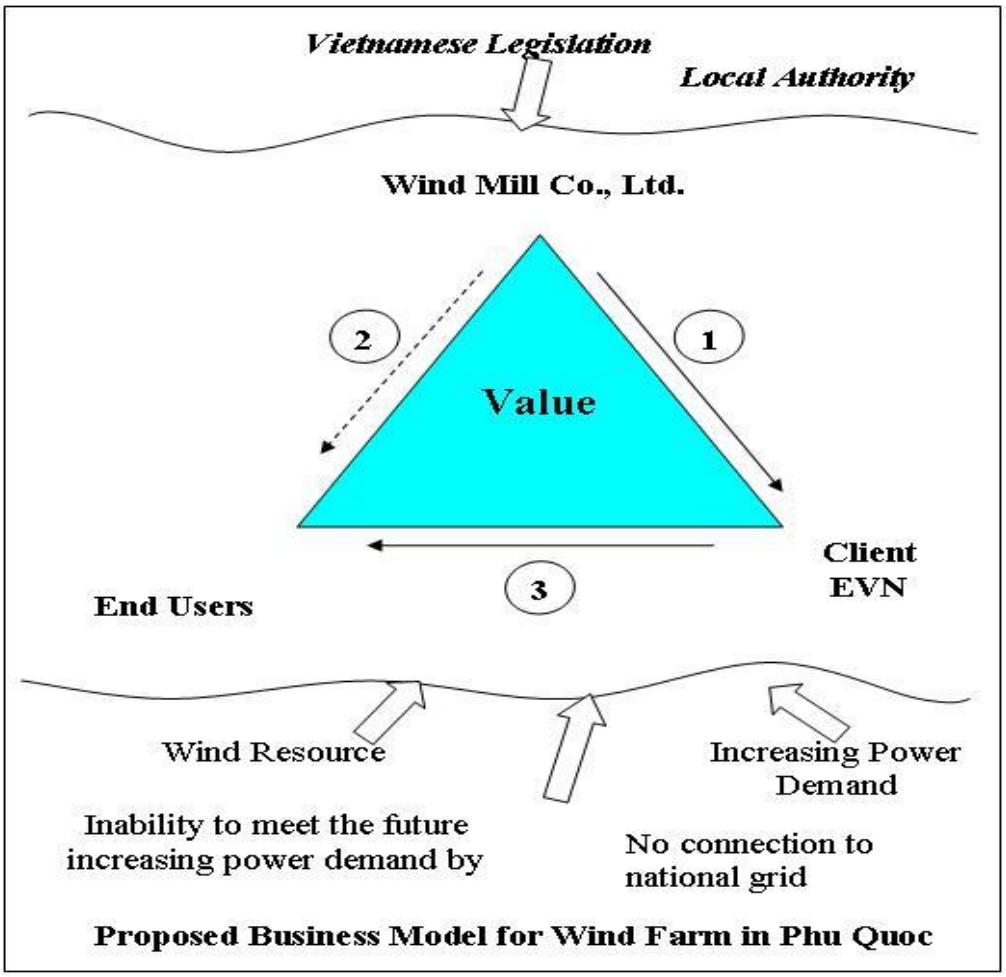

Figure 30 - Proposed Business Model

The process of this model is explained as follows:

(1) Relation 1: Price negotiation and agreement, BOT contract between Wind Mill Co., Ltd. and its client - EVN (represented by Kien Giang Power Authority).

(2) Relation 2: Wind Mill Co., Ltd. builds the wind farm, operates it and transfers it to EVN after 25 years.
(3) Relation 3: From Kien Giang Power Authority (EVN) to end users: Provision of national grid.

4.5.2 Proposed company organization

- Organizational structure

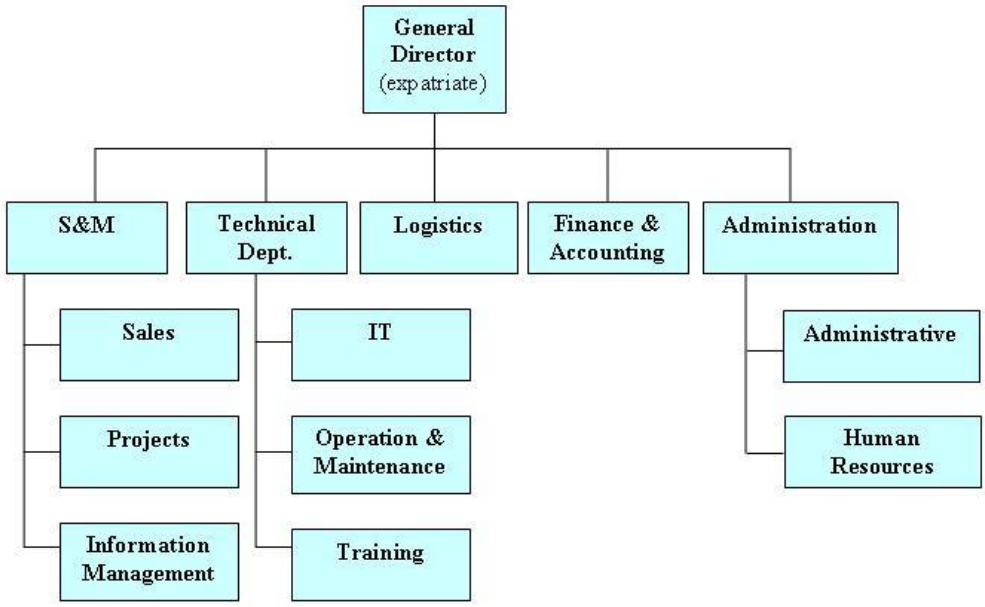

Figure 31 - Organizational structure

General Director (GD) of the company will be an expatriate (Finn, for example). Under the GD, there are five departments.

The S&M Department (sales and marketing) will be divided in three sections that will be in charge of sales of wind turbines to interested organizations and individuals, doing big wind projects in Vietnam in connection with EVN, the government, donors, etc. There will be one Information Management section that is in charge of managing internal and external information of the company.

The Technical Department has three functions: One section will be in charge of IT for the whole company, one major section will be in charge of operation and maintenance, and the last one will be in charge of training for local employees. So this department may need at least one expatriate engineer.

Besides, there will be a Logistics Department to be in charge of import, export activities, storage, warehouse, transportation, etc. Finance and Accounting Department will be in charge of all financial and accounting related issues. Administration Department is in charge of general administrative matters and human resource issues such as employment, contracts, etc.

- Company's statement: Wind Mill Co., Ltd. provides the most effective solution for electricity shortage in coastal areas of Vietnam. Through innovative wind turbine products and services, we are committed to customer satisfaction and environmental friendliness in the energy market.

- Scope of business:
    - Products: Construction of a power production plant using wind energy to supply power to Phu Quoc island.
    - Investment form: BOT project

- Customer: EVN represented by Kien Giang Power Authority

- Cost and revenue:

- Wind Mill Co., Ltd. builds wind farm in Phu Quoc, operates the wind energy systems, and sells electricity to the local authority. In this project, we will build a 7.0MW capacity wind farm in Phu Quoc. The project is a BOT contract.

- Estimated investment costs: The estimated investment for equipment purchase, transportation, construction and installation is 20,000,000 EUR.

- Estimated income: The electricity generated is estimated as:

7,000kW x 24 (hours) x 365 (days) = 61,320,000 kWh/ year.

- Suppose the offer price is 0.05EUR (1,250 VND) per kWh, the expected annual revenue is:

61,320,000 x 0.05 = 3,066,000EUR.

- Suppose that the annual expenditures (maintenance and operation costs) are 15% of the annual revenue (ignore tax):

3,066,000*15% =459,900EUR

- The annual cash inflow will be:

3,066,000 - 459,900 = 2,606,100EUR

- We can estimate the net cash inflow as in the below table:

Table 22 - Cash flow calculation

Year	$ cash inflow	Cumulative	Year	$ cash inflow	Cumulative
0	(20,000,000)		11	2,606,100	28,667,100
1	2,606,100	2,606,100	12	2,606,100	31,273,200
2	2,606,100	5,212,200	13	2,606,100	33,879,300
3	2,606,100	7,818,300	14	2,606,100	36,485,400
4	2,606,100	10,424,400	15	2,606,100	39,091,500
5	2,606,100	13,030,500	16	2,606,100	41,697,600
6	2,606,100	15,636,600	17	2,606,100	44,303,700
7	2,606,100	18,242,700	18	2,606,100	46,909,800
8	2,606,100	20,848,800	19	2,606,100	49,515,900
9	2,606,100	23,454,900	20	2,606,100	52,122,000
10	2,606,100	26,061,000			

It can be seen from the cash flow calculation table that until the first 7 years, net cash flow is negative. From the 8th year, it starts making profit.

Payback period = 7 + (20,000,000-18,242,700)/20,848,800 = 7.084 years

Table 23 - NPV value at different rates over period of 15, 20 and 25 years

Interest rate/ period	NPV = -CF0 + $\sum_{t=0}^{N} \frac{CF_t}{(1+i)^t}$	Project to be accepted (Yes/ No)
12%, 20 years	-533,882.971	No
12%, 25 years	440,004.839	Yes
10.5%, 20 years	1,450,571.717	Yes
8.5%, 15 years	1,641,670.941	Yes
8.5%, 20 years	4,662,401.532	Yes

The cost of capital of 12% is too high for the project in 20 years, NPV<0; therefore, the project is rejected. However, if the period is extended to 25 years, NPV>0, the project can be accepted.

Fact shows that this rate will be lower and lower. For example, 10.5% is the lending rate of Vietnamese commercial banks in 2008, and it is expected to be reduced to 8.5% in 2009. The lending rate of the Vietnam Development Bank is 5.4%, and Bank of Finland is 5.2% in 2009. So, the lower the rate, the higher the NPV value, which promises more chances for the project to get profits.

I suggest a 25 year period for this project for the investor to have enough time to make profit. Also, there might be required replacement of equipment after 20 years of operation. After that, it will need five more years to operate before transferring to EVN. In the EVN's point of view, they don't want to receive an old system.

4.5.3 Funding solution

- 100% investment

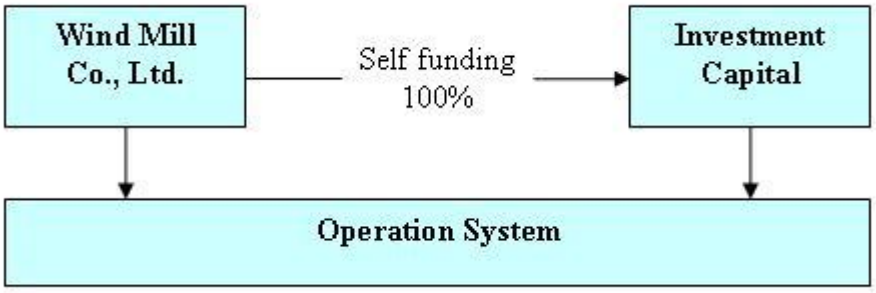

Figure 32 - 100% foreign invested firm

In this funding model, 100% investment capital is from the company's financial resource.

- Cooperating with another foreign partner to establish a 100% foreign company in Vietnam

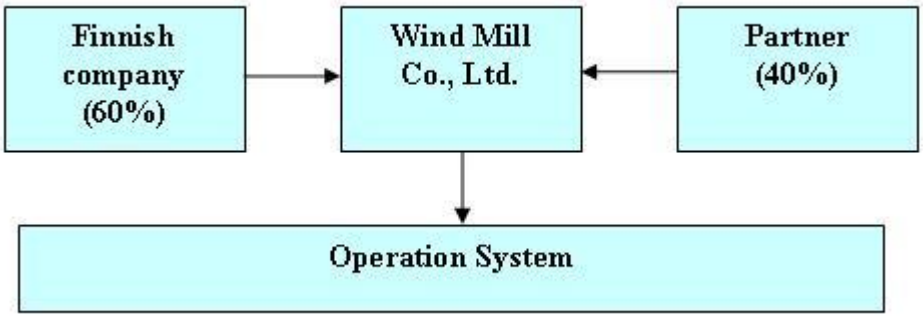

Figure 33 – Cooperating with another foreign partner

Benefits from cooperating with another foreign partner are:

- It helps to ease the finance burden for the mother company because financing for business will be shared as constructing a wind farm often requires huge capital mobilization.
- Risks will be shared, especially when a new investment in a new market is made.

- Opportunities for combining technologies of two companies in one business.
- Sharing of mobilized resources for the new business.

➢ External funding

A business enterprise can raise capital from various sources like issue of securities and loans from different agencies. The lenders of funds include individual investors, institutional investors, banks and special industrial financial institutions. (http://business.gov.in/growing_business/financial_support.php, viewed 24.3.2009).

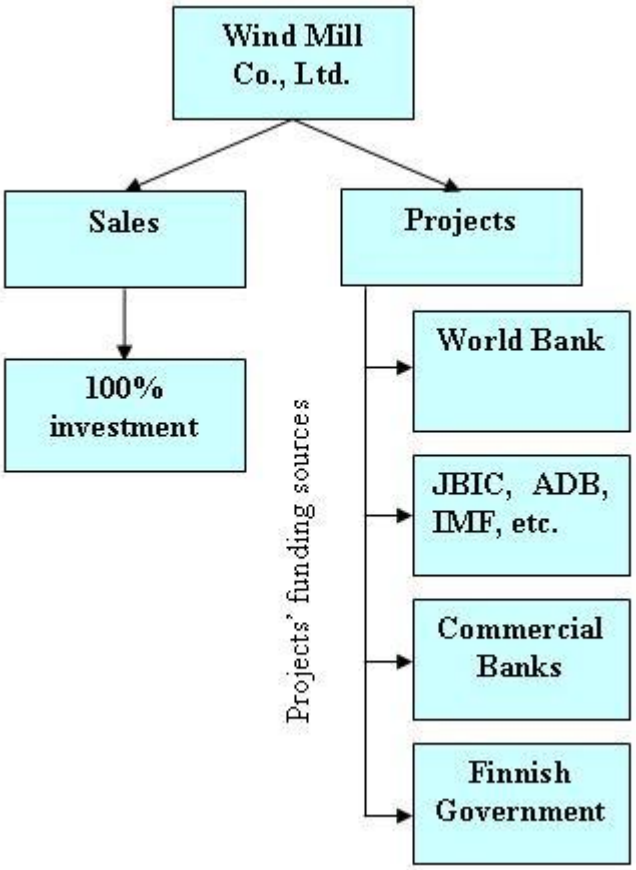

Figure 34 - External funding solution

5 WIND ENERGY PROJECT IN PHU QUOC

5.1 Summary of the interviews

In this study, ten people were interviewed. The questions to interviewees vary depending on interview groups. It can be summarized as follows:
For related authorities, three agencies including MOIT, PIDM, and Phu Quoc Power Branch were selected. The questions intend to clarify:

- ✓ MP for renewable energy development in Vietnam
- ✓ The current legal framework situation for renewable energy
- ✓ Foreign investment policies and procedures in Phu Quoc
- ✓ Wind energy projects in Phu Quoc and its prospect
- ✓ Current conditions of electricity consumption in Phu Quoc and its expected future demand.
- ✓ Plan for solutions to electricity shortage in Phu Quoc and wind energy development potentiality.

For EVN, the intended questions are:

- ✓ EVN's opinion about wind energy development as alternative source of energy.
- ✓ EVN's cooperation with other partners doing wind energy projects and EVN's cooperation intention.
- ✓ Barriers and difficulties for foreign investors when cooperating with EVN.

For the academic institution (Hanoi University of Technology), questions will mainly to investigate:

- ✓ The research activities of the center of renewable energy study in wind energy.
- ✓ Required technical conditions of wind turbines to be suitable in Vietnam weather conditions,
- ✓ Their opinion about future of wind energy development in Vietnam.

For groups of hotel and residents in Phu Quoc, the questions can be summarized as below:

- ✓ Their understanding about wind energy
- ✓ Monthly power consumption of their houses/ hotels
- ✓ Frequency of power cut-off in Phu Quoc and their currently applied solutions.
- ✓ Wish to use wind energy
- ✓ Opinion about power market and EVN's role in power market in Vietnam

The results of the field research bring about real and accurate information about the potentiality to develop wind energy in Phu Quoc island, available legal framework and the current situation of wind energy in Phu Quoc in particular and Vietnam in general. The gained information is valuable to investors to understand the market situation, analyze related stakeholders and business opportunities, and establish a proper business model to enter the target market.

5.2 Analysis of research findings

Based on the information provided by interviewees, it can be explained in more details in light of the research objectives as below:

5.2.1 Present situation of electricity shortage and current wind energy projects in Phu Quoc

All local people when asked complained about the electricity shortage and inconvenience of power cut-offs in Phu Quoc to their lives and businesses. Seven interviewees represent local people, local businessmen and local authorities in Phu Quoc island. They were very open to answer the interview questions and expressed their own opinions. They have also shown their deep concern about solution to the problem.

The electricity shortage is a serious problem in Phu Quoc. It affects the daily life and business of people on this tourist island, which is home to more than 100,000 residents, a hundred hotels and resorts in operation and nearly 174 resort projects taking shape in near future, not withstanding the ongoing-construction of an international airport project. These are signs of increasing demand for power consumption in Phu Quoc in very short time.

During my stay in Phu Quoc, I have seen the very frequent electricity cut-offs every day. Every house and hotel here has their own diesel generator. The capacity depends on specific purposes like domestic or commercial use. For domestic use, the generator's capacity is smaller, about a few KVA. But for commercial use, bigger ones are required. Tran Huy Duc, whom I interviewed, told me that the capacity of the generator he is using is 15KVA, but this is not enough for his business. He said that the actual demand is 25KVA. For other normal families, they need about a 200 - 300 KW capacity generator.

Figure 35 - Duc's electric generator in his house, Phu Quoc

For hotel purposes, of course, much larger capacity is required. Thien Hai Son resort has a generator of 320KVA to serve for full operation of 150 rooms in their hotel, and they plan to buy an additional one.

Figure 36 - Electric generator used at Thien Hai Son resort, Phu Quoc

The current total capacity of 12MW is not sufficient, and power cut-offs are very regular in Phu Quoc. To save the situation, additional five generators are being installed, increasing the total capacity to 20MW according to Tran Minh Tan, PIDM expert. However, he added that this capacity will not be enough. By 2010, the capacity demand will be 50MW.

The alternative of connecting an undersea cable from mainland to Phu Quoc was raised seven years ago, and currently this plan has been approved. However, people doubt about the reality of this project. Diesel generators are being additionally installed. Two coal generated power machine assembles will be constructed in future. However, some projects take years to be completed while Phu Quoc is seriously in need of electricity for its social and economic development.

The interviewed people have some certain understanding about wind energy to produce electricity. One of them has already installed a wind turbine in his house. Though the 1000W wind turbine is too small to provide power, its owner shows positive thought that wind resource is sufficient to produce electricity.

Figure 37 - Wind turbine system in Quoc's hotel

Quoc revealed that the 1KW wind turbine is only used for pumping because the capacity is too small. He bought the China-made system in a conference on wind energy held in Phu Quoc last year with the total investment of 6,000 USD. Being asked that if he was willing to invest in a bigger system, he said the bigger system would be more effective than his existing one; however, it would cost him a lot, and he could not afford that.

At present, wind energy projects in Phu Quoc are under preparation stage. There are two projects as told by Tran, PIDM expert. The project in Hon Thom islet combines wind and solar energies carried out by Vietnam Investment and Manufacturing Services Joint Stock with a design capacity of 600KVA, and a bigger project in Cua Can with design capacity of 90MW contracted by Si Cat company in cooperation with an American group.

5.2.2 Target customers for the business

Currently, EVN is the single buyer in the power market in Vietnam. In Phu Quoc, though the electricity network has not been connected to the national mainland grid, this network is constructed by and under management of EVN. Therefore,

getting PPA with EVN is essential for independent power suppliers. According to Le Tuan Phong, Deputy Head of the Institute for Energy, MOIT, there has been regulations on electricity selling prices following the calculation of strategic expenses and non-negotiational contract format, meaning that independent power suppliers can sign PPA with EVN if they can meet those requirements (following Decision 276/2006/QD-TTg dated 04.12.2006). MOIT also issued a Decision on avoided cost for electricity prices calculated by the Electricity Regulatory Authority of Vietnam, which means the allowed price buying electricity from other sources when traditional sources cannot meet the demand is the avoidance cost, which is about 800 VND (0.03eur) (Phan Minh Tuan, 2009, Nuclear Power & Renewable Energy Projects Pre-investment Board, EVN, Director, 24.7.2009). This price is applied to small electricity projects including small hydro power, wind power, etc. (Decision No.18/2008/QD-BCT dated 18 July 2008 regarding Promulgation of Regulation on Avoided Cost Tariff and Standardized Power Purchase Agreement for Small Renewable Energy Power Plants).

EVN has been said to hold the monopoly in electricity business for too long. At present, EVN accounts for only 70% of electricity production. In future, this ratio will decrease. However, EVN still owns the transmission and distribution system. Any independent power suppliers who can build their own transmission and distribution network can sell directly to their end users without PPA with EVN following their agreed prices with the clients.

EVN has established the Nuclear Power & Renewable Energy Projects Pre-investment Board. At the moment, EVN is not involved in any renewable energy projects. The reason is that doing wind energy requires research, pre-feasibility study and survey of wind data for several continuous years, which consumes huge EVN’s resources such as human, finance, etc. while the exploitation capacity is quite small compared to what they are doing. They are more interested in projects with more than 100 MW capacity. Besides, the investment cost for wind energy is still high while the electricity tariff is quite low, which does not interest EVN either. They hesitate also because there has been no favorable mechanism for them to take part in the current wind energy picture. However, they confessed that

energy resources have been nearly fully exploited. Coal, gas, and oil have been mostly used up. Looking for future energy is essential, and renewable energy will soon become a booming industry in Vietnam like in Europe, USA or China at the moment. EVN will not stand outside the game when the mechanism is beneficial to them.

5.2.3 Legal framework for doing wind energy business

There has been no floating or free power price market in Vietnam yet. The government controls and regulates the electricity prices. The price list is annually prepared by the Electricity Regulatory Authority of MOIT and approved by the government before being publicly announced. Decision No.2014 issued by Ministry of Industry (MOI) on 13.6.2007 provides financial investment and economic analysis and electricity sales prices framework for power production projects. This decision is the basis for power sales contracts and selection of effective investment projects. Investors have to follow provisions in this decision. Otherwise, it will be explained separately. A project proposal shall include calculation results of economic and financial analysis, and shall be shown in three tables: (i) Estimated sales revenue, (ii) Economic accumulative flows and economic effective indicators, (iii) Financial accumulative flows and financial effective indicators. Forms of those tables are available in the decision.

Development of wind energy has been included in the National Energy Development Strategy and Power Development Plan issued by MOIT. Decision No.10/2007/QD-TTg dated 18.7.2007 regarding approval on planning for national electricity development for period 2006 - 2015 in consideration of 2025 states that national and international investors are encouraged to take part in electricity production and distribution projects under investment forms provided by the government. Electricity price calculation shall be market oriented in order to make favorable conditions and attract investors. MOIT shall coordinate with related agencies and ministries to build a financial mechanism to encourage development of renewable energy projects. The Ministry of Planning and Investment (MPI) shall be in charge of preparing policies to attract investment and use of ODA funds.

Electricity prices shall follow Decision No.276/2006/QD-TTg dated 04.12.2006. Accordingly, from 01.01.2007, electricity price is 842 VND/kWh (3.37 cent EUR); from 01.7.2008, it will be 890 VND/kWh (3.56 cent EUR); and from 2010 onward, the price will be market based. Independent power suppliers can sell at prices as provided in a price list attached this decision without being excessive ± 25% of the provided prices in the list.

MP for wind energy development in Vietnam has been completed by MOIT and submitted to the government for approval. The government encourages both national and international investors to take part in renewable energies. At present, there have been laws providing favorable conditions for investors such as tax incentive, land use incentive, etc. MOIT is studying incentives for renewable energies. After being completed, the incentive proposal will be submitted to the government for approval. A competitive electricity market is expected to be established in 2010.

They provide the most favorable conditions for investors who want to do business in Phu Quoc. They call for and encourage electricity production and distribution projects in Phu Quoc because Phu Quoc will be developing in the future and the demand for power will increase too. Tran, expert of the management board expressed his belief in the feasibility of a wind energy project in Phu Quoc, but it will take time to make it reality.

Figure 38 - Phu Quoc Invesment and Development Management (PIDM)

Investors should be aware of the technical requirements of local authorities. For example, in Phu Quoc, the latest technology is required, no effects on the surrounding environment and residents, etc. Phu Quoc authority will also support investors in their negotiation with EVN about PPA. Beside other provided policies issued by MOF, a newly established foreign enterprise in Phu Quoc will receive 100% exemption of corporate income tax for the first four years of income generation, 50% for the following nine years, and from the fourteenth year, the exemption rate is 10% of income. They are now finalizing procedures to grant permit to a wind project of 90MW capacity. This is a positive sign for other investors.

It can be positively seen that conditions are being more favorable for investors who want to develop wind energy in Vietnam in general, and Phu Quoc in particular.

5.2.4 Entry modes and business forms

At present, wind energy business in Vietnam attracts investment from both domestic and international investors. There are Vietnamese companies such as Renewable Energy Vietnam Joint Stock (REVN), Ly Son Wind Energy Joint Stock, Clean Energy Joint Stock, Central Wind Power Joint Stock, Cavico Transport Corporation, Si Cat Real Estate Investment, Trading and Services Joint Stock; and international firms as AEROGIE (Swiss), Grabowski (Germany), EATTRA (Germany), GRETA (Canada), etc. It can be seen that most Vietnamese companies are joint stock, and foreign investors are 100% foreign invested firms. For example, AEROGIE is a subsidiary of Swiss AEROGIE plus company, EATTRA (Europe Asia Financial, Technology Transfer and Trading Group) is an affiliation of the Eattra and Eab group, etc. So for foreign investors, the trend of opening a subsidiary or affiliation or open 100% invested company is more seen. It is not really necessary to found a joint venture with a local firm.

Most of the wind energy projects are BOT or BOO form, mostly BOT. The 7.5MW wind project contracted by AEROGIE in Con Dao island and valued at 20 million euros is a 30-year BOT project. AEROGIE also has another wind project in

Ninh Thuan, which has been granted in-principle approval. All wind projects in Ly Son (Quang Ngai) are BOT form. The 90MW wind project contracted by Si Cat Real Estate Investment, Trading and Service Joint Stock in Phu Quoc island is a BOO project. The Cau Dat 30MW wind power plant in Da Lat city invested by Cavico Transport Corporation, valued at 57 million US dollars is a BOO project.

The BOT or BOO form depends on the company's business strategy and available resources. For domestic companies, they often choose BOO contract because they are competent and have enough resources to construct, operate, maintain the plant, own it and make profit from it forever. But it is not always like that. Some domestic companies like Central Wind Power Joint Stock choose the BOT form, for example. Foreign investors often choose BOT form.

Table 24 - List of main existing wind power projects in Vietnam

No	**Investors - Project Location**	**Area (ha)**	**Investment Form**	**Current Status**
1	Greta Inc Company (Canada) Cong Hai commune, Thuan Bac district, Ninh Thuan	310	BOT	Investment License granted
2	EATTRA Loi Hai commune,Thuan Bac district, Ninh Thuan	300	BOT	In-principle approval granted
3	Greta Inc Company (Canada) Loi Hai commune, Bac Phong commune, Thuan Bac district, Ninh Thuan	900	BOT	In-principle approval granted
4	Asia Clean Energy Trading and Services Company, Ltd. Phuoc Huu commune, Phuoc Nam commune, Phuoc Dan town, Ninh Phuoc, Ninh Thuan	1,274	BOO	In-principle approval granted

No	Investors - Project Location	Area (ha)	Investment Form	Current Status
5	An Vien Group Phuoc Hai commune, An Hai commune, Phuoc Dinh commune, Phuoc Dan town, Ninh Phuoc, Ninh Thuan	2,230	BOO	In-principle approval granted Submitted application for Investment License
6	Vietnam Renewable Energy Joint Stock Company (REVN) Phuoc Nam commune, Ninh Phuoc, Ninh Thuan	607	BOO	Investment License granted
7	Huong Dien Hydroelectric Joint Stock Company Phuoc Dinh commune, Ninh Phuoc, Ninh Thuan	980.3	N/A	In-principle approval granted Submitted application for Investment License
8	Aerogie Plus (Switzerland) Phuoc Dinh commune, Ninh Phuoc, Ninh Thuan	200	BOT	In-principle approval granted
9	REVN Company Phuoc Minh commune, Ninh Phuoc, Ninh Thuan	272	BOO	Investment License granted
10	EATTRA (Germany) Phuoc Thanh commune, Bac Ai, Ninh Thuan	890	N/A	In-principle approval

No	Investors - Project Location	Area (ha)	Investment Form	Current Status
11	EATTRA (Germany) Phuoc Huu commune, Ninh Phuoc, Ninh Thuan	453	BOT	In-principle approval
12	Thuong Tin Energy Joint Stock Company (Sacombank) Phuoc Dan town, Phuoc Hau commune, Phuoc Thuan commune, Phuoc Huu commune, Ninh Phuoc district	965	N/A	Investment License granted
13	AEROGIE plus Con Dao island (7.5MW)		BOT	under construction
14	Ly Son Wind Energy Joint Stock Ly Son Wind Power Plant (7.0MW)		BOT	
15	Cavico Transport Corporation Cau Dat Wind Power Plant, Da Lat city (30MW)		BOO	N/A
16	Si Cat Real Estate Investment, Trading and Services Joint Stock Phu Quoc island wind power plant (90MW)	192.26	BOO	In-principle approval granted
17	REVN Tuy Phong, Binh Thuan (140MW)	-	BOO	N/A

(http://vietnamnews.vnagency.com.vn/showarticle.php?num=03SUN071007,

http://www.worldofrenewables.com/vbnews.php?do=printarticle&artid=3621, http://www.lookatvietnam.com/2009/05/private-firm-weighs-wind-energy-plant-for-con-dao.html, viewed 28.8.2009 and Nguyen Quynh Trang's report)

There are still more and more applications for wind energy projects in Quang Ngai, Ninh Thuan, Binh Thuan, Phu Quoc, etc.

5.2.5 Feasibility of wind energy project in Phu Quoc

First of all, the serious need of additional power supply now and in future for Phu Quoc's socio-economical development has put the task of finding energy solution in priority. The present power capacity has proved insufficient for the actual demand. Alternatives including undersea cable connection and coal generated power have been proposed, but not yet realized. Therefore, mobilization of all available resources is necessary. Meanwhile, wind resource is adequate for developing wind energy. This is also the development policy of Kien Giang province.

PIDM is the authorized body that manages most investment projects in Phu Quoc. At present, there are two wind energy projects in Phu Quoc, which have been granted in-principle approval. They believe that wind energy is a right solution to the power shortage in Phu Quoc and are committed to provide the most favorable conditions for investors.

Although PPA with EVN is the concern of all investors at the present and they are waiting for a mechanism for RE together with more clear incentives from the government for this sector, it has been stated by Le Tuan Phong (MOIT) that they are trying to establish a competitive electricity market in 2010 with incentives for RE, and the master plan for RE will be approved soon by the government.

5.3 Conclusion and Recommendations

This study has presented the feasibility to develop wind energy in Phu Quoc island, Vietnam. The main findings from field work are the actual situation of power shortage and current wind energy projects in Phu Quoc, the target customer for the business in that situation, available legal framework and policies, business forms and entry mode.

5.3.1 Conclusion

The current situation of electricity shortage in Phu Quoc has made it difficult for people's living and businesses. Facts show that Phu Quoc has been attracting more and more business investment in tourism, trade, etc. Completion of the international airport will make it easier for national and international tourists and investors to come to Phu Quoc. Obviously, the current power capacity cannot meet the ever increasing demand. Even in future, if there are no alternatives worked out, there will not be enough power for consumption. Thus, the plan to develop Phu Quoc into a high quality eco-tourism center will surely be affected when energy security is not ensured.

The success of a wind power plant in Phu Quoc will help to improve people's lives. On the other hand, sufficient power supply will boost the socio-economical development of Phu Quoc and lure more and more new business investments. The use of clean energy is also in line with the development strategy of Phu Quoc. One of the most important things is that by mobilizing additional sources of energy for Phu Quoc, it will put an end to the annually chronic big compensation amount from the provincial budget for electricity.

The research proposes a BOT project in Ganh Dau commune over 25 years. PPA will be signed with EVN and the produced electricity will be transmitted directly onto EVN's existing grid to end users. When this project is executed, it will create more jobs for people. Since the wind technology is still new in Vietnam, local employees will get training on the advanced technology thus their knowledge and

skills will be improved. At the same time, their awareness about clean energy and its importance will also be enhanced. Through those people, the knowledge will be widely spread to others. Infrastructure will also be constructed.

The major problem of wind energy projects in Vietnam at present is inadequate incentives and subsidy from the government. However, it is seen that the Vietnamese government is very active in building strategy and plan for RE development. The MP will be approved very soon, and it is likely that a competitive electricity price market will be launched soon in 2010, where the power prices are market-driven. More and more foreign investors are registering their wind investment projects in Vietnam. Besides, there are many international organizations like WB, ADB, JBIC, etc. who have been supporting Vietnam to build legal framework for RE development and support, as well as financing RE projects in Vietnam. These show positive signs to investors.

Using clean energy has much significance. While the fossil fuels are limited and will be exhausted in the time to come, RE is seen as limitless sources and contributes to environmental protection, reduce global warming and ensure energy security. In Vietnam, how we make people aware of this importance and willing to use this energy at high price (if necessary) are not easy tasks. How the cooperation among relevant agencies and authorities is coordinated will require really strong commitment. However, it is believed that “coal, gas and oil will not be the three kings of the energy world forever. It is no longer folly to look up to the sun and wind or down into the sea’s waves”.
(http://www.che.iitm.ac.in/~sjayanti/presentations/wind.ppt, viewed 12.1.2009.)

During the field research, it was found that direct sales of wind turbines to capable and interested individuals can be a good market segment. Further research can be conducted on this. In addition, manufacturing of wind turbines and accessories in Vietnam should also be taken into consideration.

5.3.2 Recommendation for business model development

The business model for wind farm development in Phu Quoc is proposed as follows:

- Entry mode:

- Establishing a 100% foreign invested firm/ subsidiary in Vietnam.

- Information of the project:

- 25-year BOT contract project, total capacity of 7.0MW, producing electricity from wind energy, connecting to national grid, selling electricity to EVN, and transfer the plant to EVN after 25 years of operation.
- Installing about 30 wind turbines, each with capacity of 250KW.
- To ensure electricity supply to customers in case wind is too weak or calm, a back-up diesel generator will be installed. Capacity of the generator will be dependent on the production capacity of wind turbines and actual electricity demand. An automatic transfer system (ATS) will be installed. When wind turbines cannot work, this ATS will start the back-up diesel generator.
- Proposed area: Ganh Dau commune: Ganh Dau is located in the north western coast of Phu Quoc and it is about 32km from Duong Dong town (the center of Phu Quoc).

Figure 39 - Ganh Dau commune

In accordance with Decision 32/2007/QD-BCN dated 26.7.2007 regarding approval of planning on the electricity supply system for Phu Quoc island district up to 2010 with a vision to 2020, until 2010, six additional diesel generators will be installed with total capacity of 15,000 kW. Besides, possibilities will be studied to construct a wind power plant in Ganh Dau with a capacity of 450 kW and other locations with capacity of 1,800 kW.

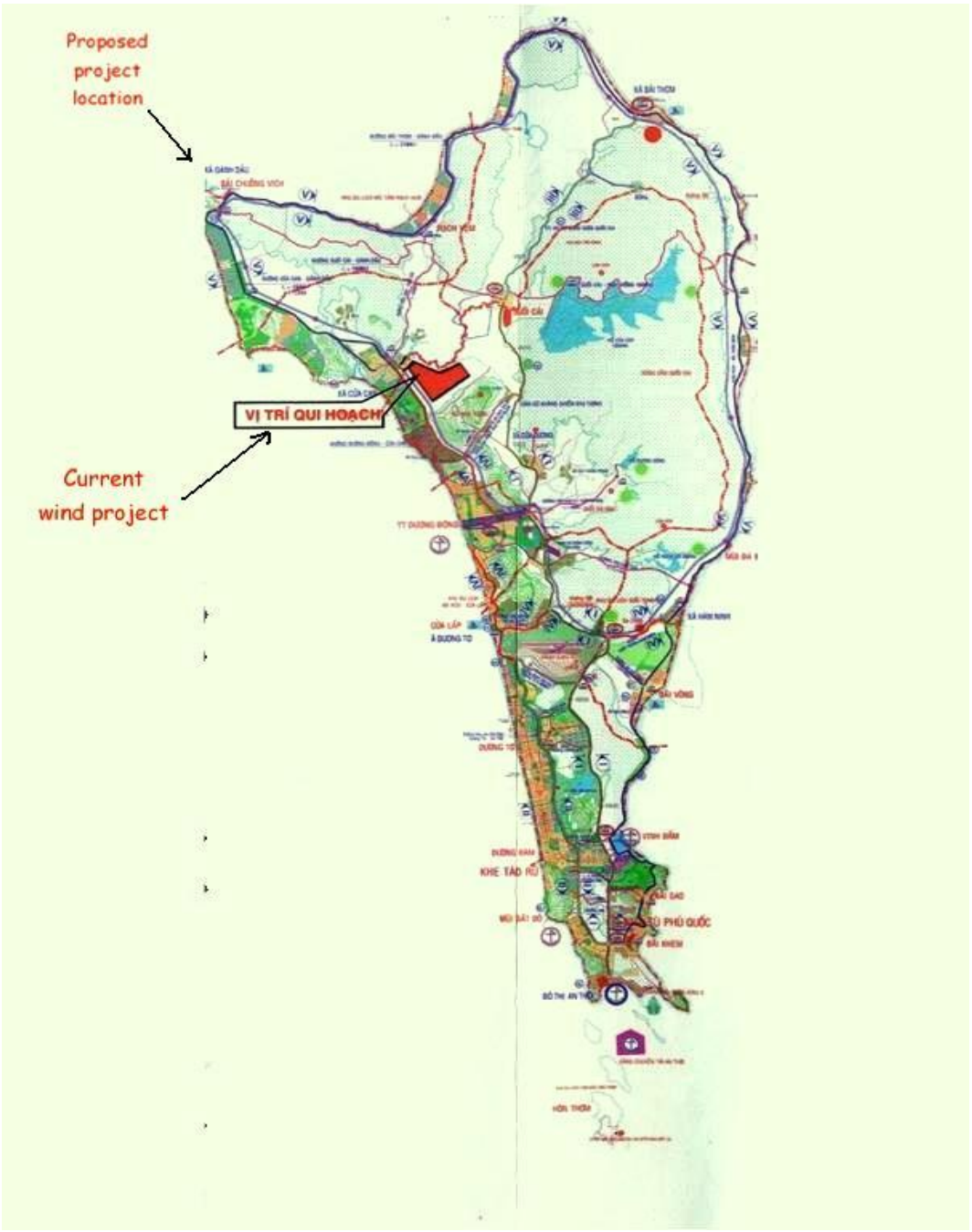

Figure 40 - Proposed project location

➢ Benefit of the project:

- Reduce electricity cost
- Save fossil fuels
- Protect ecological environment
- Improve people's lives on Phu Quoc island.

➢ Specifications of wind turbines to be installed:

-Type: 3 blade rotor, vertical turbine, self starting
- Cut-in wind speed: 2.5m/s - 3.0m/s
- Cut-out wind speed: 25m/s
- Life span of the wind turbine/ generator: 25 years
- Hub height: 60m

➢ Project implementation plan:

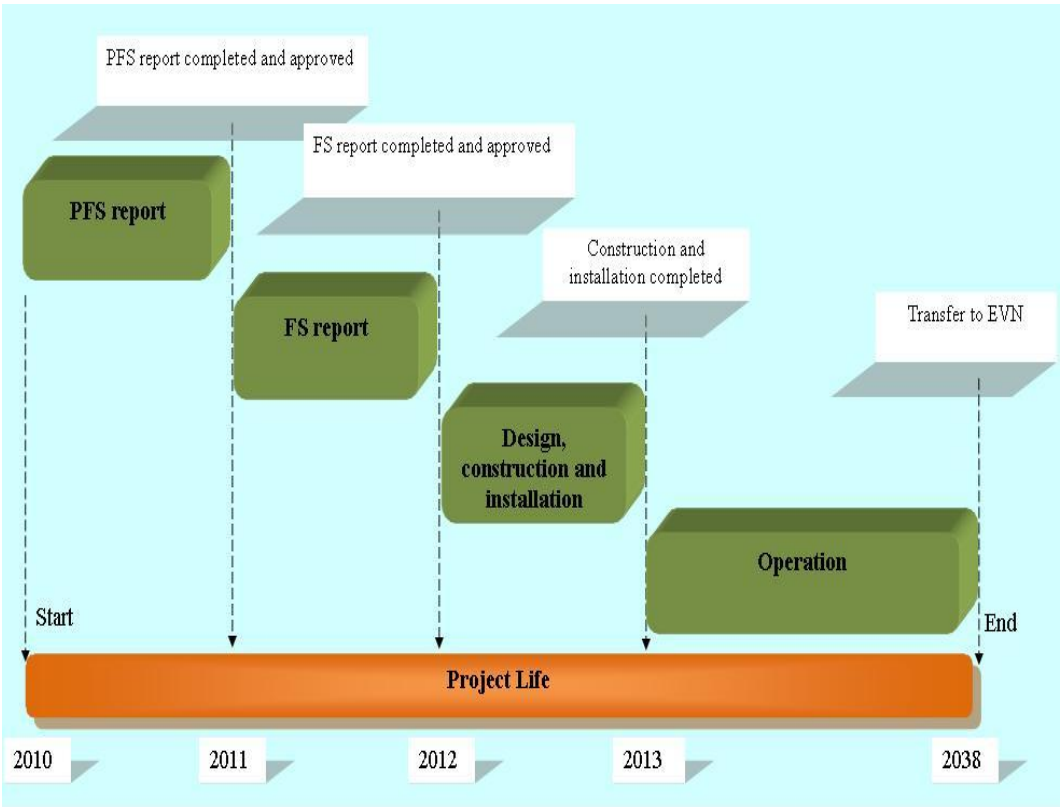

Figure 41 - Tentative Project Implementation Schedule Plan

There are two stages:

Stage 1: Investment period: 3 years (2010 - 2012), including:

- Preparation of PFS report, approval: 2010
- Survey and investigation of wind resource: 2010
- Preparation of FS report, approval: 2011
- Design, construction and installation: 2012

Stage 2: Operation period (25 years)

- Operation: starting from 2013 and ending in 2038.

5.3.3 Recommendation for Vietnamese authorities

Taking China as an example, the Chinese government understands that they need to exploit all available energy resources for the demand of their country, but they don't have clean energy technology. So they built favorable legal framework to call foreign investors to China and develop renewable energy in the first place. They bought the equipment. After that they bought the technology or from a BOT project, they can get the technology transfer. Finally, they produce the wind turbines by themselves from what they have learned from foreign technology. China is now very strong in RE. They even have become a manufacturer and exporter of that equipment back to European countries. We should learn this experience from China. In Vietnam, we also have wind resource, which has been evaluated by WB to be the most abundant area in South East Asia. We also have cheap labor resource. So why can't we develop wind energy and become a place for turbine production when investors are now seeking a way to reduce their investment cost in equipment. In future, when energy resources have become scarce, global warming has caused alarm, RE is the right solution for all countries where it is possible to exploit it. Vietnam will not stand outside this trend of the world. We can both develop wind energy for power production, and produce wind turbines for domestic and overseas demand. There has been actually one company who is manufacturing wind turbines in Vietnam, namely Fuhleander Vietnam Joint Stock. They have a wind powered turbine factory in Tuy Phong district, Binh Thuan to supply turbines for wind projects in Vietnam and overseas.

For using clean energy people will pay an extra fee for electricity in the monthly bill like in European countries. In Finland, every month, people have to pay an extra, for example, 1.5 euro per household. This is not immediately easy in Vietnam because it depends on public awareness of the environmental protection issue. However, if it can be done, this will be an encouragement for RE development and investment. Phan Minh Tuan, director of nuclear power & RE projects pre-investment board (EVN) shared with me his experience that Vietnamese people used to pay extra money in the past for every electricity bill as a public contribution for upgrading the electricity system. We used to do it previously, so why can't we do it now. He also suggested that maybe this extra amount will be paid by urban people, not people living in rural and remote areas. He told me that this experience he had also shared with GTZ, a German group who wants to promote RE in Vietnam. This can be regarded as a solution to reduce the investment cost and enhance people's understanding about the global warming issue.

5.3.4 Future challenges

- Government policy

The general investment environment in Vietnam is very good. However, it is important to carefully consider approval procedures, regulation guidelines, etc.

The MP for renewable energy development has been completed and submitted to PM by MOIT. However, it has not been approved yet. At present, attractive subsidy arrangements and incentives are not yet in place. Regarding these, MOIT is working on and trying to finalize it in 2010. Investors are now waiting for those incentives and more favorable policies from the government to do the business.

- Project implementation and investment efficiency

Compared to fossil fuels, wind energy cannot compete. EVN has long been concentrating on coal, oil and gas generated power because those are big energy projects. Wind energy projects are small for what they do. However, since EVN is

not so keen on RE projects, it is opportunity for independent power providers (IPPs). The challenge/ risk is PPA with EVN. Initial investment costs for wind energy is high, while the provided avoided cost is already very low. These have made it difficult to negotiate PPA with EVN.

All wind energy projects being carried out in Vietnam are pilot projects. In fact, there have been no projects that are operating at the moment. Some of the projects are under construction, some have got in-principle approval or approval for PFS or FS reports (see Figure 20 and 21). For the same reason, possible impacts on the environment have not been proved in practice.

- Technology localization

The first challenge is the limited operating experience of local employees. Initial training will be required so that local people can manage the technology.

Inadequate awareness about the technology and the need to use clean energy by authorities is also a hindrance for investors. The Vietnamese often prefer cheap and short-term solutions. Therefore, it is a challenge to convince the Vietnamese users to think long-term by investing in new, advance technologies at higher cost.

- Global financial crisis

Impact of the global financial crisis is obvious to all nations at different levels. The global crisis, for example, "has hit the Finnish economy with full force" (http://www.ek.fi/www/en/work_employment/Current_situation_graphs_ENG.pdf, viewed 20.9.2009). According to this, export rate will decrease by 4% in 2009, local government economies continue in crisis in 2009, and unemployment will incline steeply, rising to at least 10% in 2010. This is to say that it will surely weaken companies' investment possibilities and formulate the strategy to expand their market internationally. Companies will scale back their spending and delay projects.

6 SUMMARY

The research subject is wind power supply to Phu Quoc island district, Kien Giang province, Vietnam. It means that in this study, a wind energy project in Phu Quoc is recommended for business investment. This business idea was established through an investigation of wind energy development in Vietnam and its potential areas. That Phu Quoc was found to have satisfactory wind resource and its need to have additional source of power have induced the writer to conduct this research.

At present, the electricity tariff in Phu Quoc is much higher than that in the mainland due to the fact that Phu Quoc power system has not been connected to the national grid, but is dependent on operation of diesel oil electric generators with total capacity about 12MW. Compared with the rapid development pace of this tourism island, the power capacity is proved insufficient for actual demand. High electricity price and frequent power cut-off due to the power shortage have affected the living and business development of the island. Even though the under-sea cable project invested in by EVN is being studied to connect Phu Quoc power system to the national power grid, mobilization of possible power resources is encouraged by local authorities. Therefore, the research on a wind power plant project possibility in Phu Quoc is to verify if it is feasible for Finnish investors to invest in this project. It also aims to come up with a recommendation about business model and wind energy project development in Phu Quoc at the end of the study.

The Phu Quoc development planning stresses the importance of development of Phu Quoc into a high profile eco-tourism center in Vietnam. For that purpose, clean energy like wind power is the right choice based on the evaluation that Phu Quoc's wind resource is sufficient. Conferences on wind energy have been held in Phu Quoc in order to introduce this new type of energy, and there is a person who is using the wind turbine to generate power for his personal use. It has been recognized that although there have been no public studies done before on wind energy in Phu Quoc, there are currently two registered wind energy projects in Phu

Quoc. These two projects have been granted investment approval and necessary procedures have been being finalized for actual implementation.

The study is a student's thesis paper. Before going into the field, data for the theoretical part was collected from journals, authorized websites, and research works done by other people, reports and publication of recognized institutes in Vietnam such as the Institute for Energy, Research Centre for Energy and Environment, etc. The theoretical part deals with background knowledge about the researched issue, research method and theories used for business model establishment. The deductive method which is suitable for business research was used together with qualitative design. Accordingly, interview was used for gaining information in the field. The business model was recommended based on explanation about wind technology, modes of entry, involved stakeholders and knowledge of available legal regulations and law for foreign investment in general business and wind energy business.

Its field survey was carried out in Phu Quoc island district, Kien Giang province and Hanoi city, Vietnam, and funded by Lahti University of Applied Sciences during the period from April to July 2009. Interviews were carried out for representative(s) of five target groups. They are local authorities (Ministry of Industry and Trade, Phu Quoc Investment and Development Management, Phu Quoc Power branch), local hotels (Sai Gon-Phu Quoc resort, Thien Hai Son resort, Lunar Moon hotel), and local residents. The intent was to explore the actual situation of electricity shortage in Phu Quoc, the legal basis for wind energy and other relevant comments on wind energy project development.

Before conducting the actual field survey in Vietnam, the writer has foreseen the potentiality of wind projects in Phu Quoc, Vietnam thanks to its present favorable conditions for investors. Major findings show that there are ongoing contracted projects in the area and the feasibility of wind energy projects in Phu Quoc has been proved. It is recommended to establish a 100% foreign investment firm in Vietnam and start an investment in a 25-year BOT wind energy project in Phu Quoc. The proposed project location is in Ganh Dau commune. Although some

research limitations have been pointed out some limitations of this research in the Introduction part, the final recommendation is believed to provide interested investors with practical benefits. A legal framework for wind energy business has also been verified.

Findings of this research can be useful for interested investors to prepare a business plan, PFS and FS reports in order to get an investment permit and approval. Additional calculations will be needed for those steps such as calculation of economical and financial effective indicators following Decision No.2014/QD-BCN regarding provisional regulation on investment economical and financial calculation and analysis and power pricing frame for power production projects.

REFERENCES

Books:

Henry W. Chesbrough, 2003, Open Innovation, Harvard Business School Press

Henry W. Chesbrough, 2006, Open Business Models, Harvard Business School Press

Neil Coade, 1997, Managing international business, International Thomson Business Press, London

Martin Brett Davies, 2007, Doing A Successful Research Project Using Qualitative or Quantitative Methods, Palgrave Macmillan

Laury Hammel and Gun Denhart, 2007, Growing local value, Berrett-Koehler Publishers, Inc

A.D. Jankowicz, 1995, Business Research Project, 2nd edn, Teesside Business School Cleveland, International Thomson Business Press, UK

Rebecca Marschan-Piekkari (Helsinki School of Economics, Finland), and Catherine Welch (University of New South Wales, Australia), 2004, Handbook of Qualitative Research Methods of International Business, Chelteham, UK

Mark Saunders, Phillip Lewis and Andrian Thornhill, 2003, Research Methods for Business Students, 3rd edn, Prentice Hall, UK

David Silverman, 2005, Doing Qualitative Research, 2nd edn, University of Florida, Sage Publications

Articles:

American Wind Energy Association, 2000, 10 Steps in Building a Wind Farm.
Bourillon, Christophe, 1999, Wind energy - clean power for generations, European wind energy association, UK

The British Wind energy association, 2000, Noise from wind turbines.

Dam Quang Minh & Vu Tu Anh, 2008, Wind energy – potentiality and opportunities

David FitzEerbert, Chairman, Landfill Gas Association, 1999, Electricity generating renewables and global warming emissions

Tarun Khanna, Krishna G. Palepu, and Jayant Sinha, 2005, Identify Emerging Market Opportunities, Harvard Business School

Klaus Meyer, 2008, Strategies for Emerging Economy markets

Nguyen Duc Cuong, 2008, Experiences of Energy Institute in preparing Master Plan for Renewable Energy, Energy Institute

Nguyen Huu Hung and Duong Thi Thanh Luong, 1998, Wind energy in Vietnam

Nguyễn Khắc Nhẫn, GS Viện kinh tế, chính sách năng lượng Grenoble, Năng lượng tái tạo thay vì điện hạt nhân, Trường ĐH Bách khoa Grenoble, Thời báo kinh tế Sài Gòn, số 7-10-04 & 14-10-04
Nguyen Khac Nhan, Professor, Renewable energy, not nuclear power, Grenoble Institute for Economy and Energy, Saigon Economics Times, No.7-10-04 & 14-10-04

Phạm Anh Tuấn, 2008, Tiềm năng và cơ hội phát triển năng lượng gió ở Việt Nam, Tạp chí hoạt động khoa học
Pham Anh Tuan, 2008, Potentiality and opportunities for wind energy in Vietnam, Science Journal

Pham Khanh Toan, 2007, Vietnam Energy Review and Power Development Plan Period 2006 – 2015 with Outlook to 2025, Institute of Energy, Beijing

Phan Mỹ Tiên, 1993, Kết qủa nghiên cứu năng lượng bức xạ mặt trời và năng lượng gió ở Việt Nam trong 10 năm qua 1981- 1990, Viện khí tượng thủy văn
Phan My Tien, 1993, Research results of solar radiation and wind energy in Vietnam during 1981 – 1990, Institute for Hydrology and Meteorology

Phan My Tien, 1985, Distribution of wind energy in Vietnam, Institute for Hydrology and Metrology

Tạ Văn Đa, 2006, Tài nguyên năng lượng gió trên lãnh thổ Việt Nam, Viện khoa học khí tượng thuỷ văn và môi trường
Ta Van Da, 2006, Wind energy resource in Vietnam, Institute for Hydrology and Metrology

Trần Huy Khang và Phan Mỹ Tiên, 1990 số 9, Điều tra nghiên cứu tiềm năng bức xạ mặt trời và gió nhằm mục đích khai thác sử dụng các nguồn năng lượng này, Tạp chí hoạt động khoa học
Tran Huy Khang and Phan My Tien, 1990, No.9, Survey and study for solar radiation and wind energy for practical application, Science Journal

Legal documents:

Decision 110/2007/QD-TTg dated 18.7.2007 regarding Approval on planning for national electricity development for period 2006 - 2015 in consideration of 2025

Decision 276/2006/QD-TTg dated 04.12.2006 regarding Regulations on electricity prices

Decision No.130/2007/QD-TTg of August 02 2007 on a number of financial mechanism and policies applicable to investment projects under the clean development mechanism

Decision No.18/2008/QD-BCT dated 18 July 2008 regarding Promulgation of Regulation on Avoided Cost Tariff and Standardized Power Purchase Agreement for Small Renewable Energy Power Plants

Decision No.1802 of 11 December 2008 issued by the Prime Minister (PM) has approved the revised planning of Phu Quoc island district

Decision No.2014/2007/QD-BCT of 13.6.2007 regarding Investment financial economic analysis and power pricing frame for power production projects.

Decision No.32/2007/QD-BCN of July 26, 2007 approving the Planning on the electricity supply system for Phu Quoc island district up to 2010 with a vision to 2020

Decision No.42/2007/QĐ-TTg of 29/3/2007, the Phu Quoc Development and Investment Management (PDIM) was established

Decree No.108/2006/ND-CP of September 22 2006 Detailing and Guiding the Implementation of a number of articles of the Investment Law

Law on Enterprises 2005

Law on Foreign Investment in Vietnam 12 November 1996, amended 09 June 2000

Law on Investment 2005

Statute for organization and operation of Phu Quoc island, Kien Giang province (promulgated under Decision No.38/2006/QD-TTg dated February 14, 2006 of the Governmental Prime Minister).

Internet source:

2008, ADB and clean energy, Asian Development Bank, http://www.adb.org/Documents/Brochures/InBriefs/ADB-Clean-Energy.pdf, 21.3.2009

2009, Advantages and disadvantages of wind energy reviewed, Wind turbines now, http://www.windturbinesnow.com/advantages-disadvantages-wind-energy.htm, 08.5.2009

2009, Advantages of in-depth interview, Center for Strategy Research CSR, http://www.csr-bos.com/approach/focusgroups.html, 12.2.2009

2008, Annual investment report in Vietnam, Vietnam Holdings, thttp://vietnamholding.com/cms/images/filePdf/news/Investor%20Update/vn%20holding%20annual%2008%2013.pdf, 22.3.2009

2008, Asian Development Bank, http://www.adb.org/Documents/Speeches/2006/sp2006007.asp, 21.3.2009

B. Minh, 2007, Wind generated electricity for Con Dao island, http://vietbao.vn/Xa-hoi/Dien-gio-cho-Con-dao/40195595/157/, 22.4.2009

Bui Van Dao, 2008, Off-shore wind energy, Floating wind farm Inc., http://hoithao.viet-studies.info/2008_BuiVanDao.pdf, 01.3.2009

2008, Con Dao will have wind energy in 2010, National Center for Sciences and Technologies, http://vst.vista.gov.vn/home/database/an_pham_dien_tu/MagazineName.2004-06-01.4343/2008/2008_00023/MItem.2008-12-30.3037/MArticle.2008-12-30.3232/marticle_view, 22.4.2009

2009, Current situation in the Finnish labor market, Confederation of Finnish industries, http://www.ek.fi/www/en/work_employment/Current_situation_graphs_ENG.pdf, 20.9.2009

Dam Quang Minh and Vu Tu Anh, 2006, Discussion on wind energy in Vietnam, Energy news blog, http://dam.minh.googlepages.com/NLG_cho_Vietnam.doc, 15.3.2009

2008, Deductive and inductive research, MBA Notes, http://pgdba.blogspot.com/2008/02/deductive-and-inductive-research.html, 12.01.2009

2005, EC-Asean Wind energy development in Asia, http://www.ec-asean-greenippnetwork.net/dsp_page.cfm?view=page&select=207, 29.4.2009

2008, Energy saving, Energy conservation center of Hochiminh city, http://www.ecc-hcm.gov.vn/?menu=89&submenu=89&detail=541&language, 17.01.2009

2008, EVN to buy 2.7 billion kWh of electricity from China in 2009, SAGA, http://www.asset.vn/English/kinhte/nangluong/11754.asset, 22.3.2009

2009, EVN's monopoly in electricity production, transmission and distribution may be separated, propose specialists, Vietnam Business Finance News, http://www.vnbusinessnews.com/2009/02/evns-monopoly-in-electricity-production.html, 23.3.2009

2008, Finland - Vietnam cooperation: potential fields, Vneconomy, http://vneconomy.vn/61995P0C10/hop-tac-viet-namphan-lan-nhung-linh-vuc-tiem-nang.htm, 12.01.2009

Finnish Fund for Industrial Cooperation Ltd., http://www.finnfund.fi/yritys/en_GB/brief/, 21.3.2009

Finnpartnership, http://www.finnpartnership.fi/default.asp?docId=12618, 20.1.2009

2008, Foreign direct investment in Vietnam triples in 2008, The China post, http://www.chinapost.com.tw/business/asia/vietnam/2008/12/27/189529/Foreign-irect.htm, 22.3.2009

2009, Foreign market entry modes, Quick MBA, http://www.quickmba.com/strategy/global/marketentry/, 20.3.2009

2009, General information about Phu Quoc, Phu Quoc island - Vietnam, http://www.phuquoc.info/general.htm, 18.4.2009

2007, Generating electricity is a breeze, VNS, http://vietnamnews.vnagency.com.vn/showarticle.php?num=03SUN071007, 24.4.2009

Ing. Peter L.A Henigin, Vietnam is a potential market for wind energy, http://vneco.vn/index.php?option=com_content&task=view&id=320&Itemid=1, 25.4.2009

Hong Anh, 2009, Electricity: price up, but cut-off continues, VN Express, http://vnexpress.net/GL/Kinh-doanh/2009/02/3BA0BCC9/, 07.5.2009

2009, How does wind energy work?, http://www.pier55.com/Technology/wind-energy.shtml, 19.4.2009

2009, How does wind energy work?, BWEA (UK), http://www.bwea.com/energy/how.html, 19.4.2009

2004, Installing wind turbine in Bach Long Vi island, http://vst.vista.gov.vn/home/database/an_pham_dien_tu/MagazineName.2004-06-01.4343/2004/2004_00021/MItem.2004-11-15.1110/MArticle.2004-11-15.2000/marticle_view, 29.4.2009

2008, Investment in Phu Quoc: flourishing but in slow pace, Sky news, http://dulich.sky.vn/archives/64, 23.4.2009

2009, Investment in Vietnam, Asian-Japan center, http://www.asean.or.jp/invest/archive/speech/fy07%20vietnam/FIA.pdf, 21.3.2009

A. Karagiannidis, M. Wittmaier, S. Langer, B. Bilitewski, and A. Malamaskis, 2008, Thermal process of waste organic substrates: Developing and applying an intergrated framework for feasibility assessment in developing countries, http://ttpl.chemeng.ntua.gr/wte/Pdfs/Karagiannidis_Vietnam_Anaerobic_Venice2008.pdf, University of Applied Sciences Bremen Germany, 07.5.2009

2007, Kien Giang: Phu Quoc is seriously shortage of electricity, Construction newspaper website, http://www.baoxaydung.vn/Main.aspx?MNU=1224&Style=1&ChiTiet=3566, 23.4.2009

Lan Huong, 2009, Development of renewable energy in Vietnam: An untouched energy resource, http://tinmoi.vn/Phat-trien-nang-luong-tai-tao-o-Viet-Nam-tiem-nang-con-bo-ngo-0413268.html, 24.3.2009

Lynch Associates, 1996, Interviewing principle, CASA net, http://www.casanet.org/program-management/personnel/intervie.htm, 16.2.2009

Carter McNamara, MBA, PhD, 2008, Interpreting and Reporting Basic Research Results, Free Management Library, http://www.managementhelp.org/research/analyze.htm#anchor718511, 16.2.2009

2009, Modification of Phu Quoc planning by 2030 and vision future, Kien Giang website, http://www.kiengiang.gov.vn/index2.jsp?menuId=117&articleId=9071, 22.3.2009

2009, New market entry, Bridge Strategy group LLC, http://www.bridgestrategy.com/topics/new_market_entry, 10.3.2009

NG. V. HG, 2005, Electricity tariff in Phu Quoc island, Vietbao.vn, http://vietbao.vn/Xa-hoi/Gia-dien-sinh-hoat-o-dao-Phu-Quoc-1.500-dong-kWh/40114715/157/, 20.4.2009

Ngoc Quan, 2006, Seriously suffered from electicity shortage, is Phu Quoc a truly heaven?, Vietnam Television VTV, http://inside.vtv.vn/VN/TrangChu/TinTuc/CKX/2006/2/8/18032/, 20.4.2009

Nguyen Khac Nhan, 2004, Renewable energies in stead of nuclear power for Vietnam, Vietnam Times Review, http://tailieu.tapchithoidai.org/NKNhan_NLTT_TBKTSG.htm, 25.4.2009

Nhu Hung, 2007, Phu Quoc, on the way to become a high-end eco- tourism center, Communist Review, http://www.tapchicongsan.org.vn/details.asp?Object=14331554&News_ID=30154397, 18.4.2009

Pangea, 2009, Wind power industry in Vietnam: First wind power turbine factory, http://www.worldofrenewables.com/vbnews.php?do=printarticle&artid=3621, 28.8.2009

2006, Phu Quoc will be in serious shortage of electricity in 2008, Lao Dong newspaper, http://www.laodong.com.vn/Home/Phu-Quoc-Nhieu-kha-nang-se-thieu-dien-nghiem-trong-vao-nam-2008/200612/15964.laodong, 23.4.2009

2009, Private firm weighs wind energy for Con Dao, Vietnam net, http://www.lookatvietnam.com/2009/05/private-firm-weighs-wind-energy-plant-for-con-dao.html, 28.8.2009

2009, Procedures for preparing investment projects, Danh Chinh law firm, http://www.luatdanhchinh.com.vn/VN/Details.aspx?AppID=205&ContentID=405, 09.9.2009

2009, Questionnaire Design, http://www.cc.gatech.edu/classes/cs6751_97_winter/Topics/quest-design/, 16.2.2009

2009, RE and EE report, World Bank, http://siteresources.worldbank.org/INTENERGY/Resources/RE_EE_Report_2008.pdf?resourceurlname=RE_EE_Report_2008.pdf, 23.3.2009

2009, Renewable energy development, World Bank, http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY/0,,contentMDK:20708340~pagePK:210058~piPK:210062~theSitePK:336806,00.html, 23.3.2009

Herman Scheer, 2008, Vietnam should learn to turn solar and wind into electricity, Electricity College, http://www.caodangdienhoc.org/TuSachDienHoc/NKNhan/PhongVanGsScheer.pdf, 20.4.2009

M. Chandra Sekhar, http://www.che.iitm.ac.in/~sjayanti/presentations/wind.ppt, 12.1.2009.

2009, Selecting a home turbine, http://www.home-wind-turbines.com/selecting-a-turbine.html, 08.5.2009

Tuanxipo, 2008, Potentiality of Phu Quoc pearl island, Phu Quoc forum, http://www.daongoc.com/diendan/lofiversion/index.php?t2460.html, 18.4.2009

2009, Urban wind turbines - Technology review, Intelligent Energy - Europe, http://www.urbanwind.net/pdf/technological_analysis.pdf, 19.3.2009

2009, Vertical axis wind turbines, http://www.windturbinesnow.com/vertical-axis-wind-turbines.htm, 08.5.2009

2009, Vietnam foreign investment lower but still strong, Monster and critics, http://www.monstersandcritics.com/news/business/news/article_1461603.php#ixzz0AVpJ6kNb, 22.3.2009

2009, Villagers go solar, website of Electricity of Vietnam, http://www.evn.com.vn/Default.aspx?tabid=60&TopicId=17&ItemId=1633&language=en-US, 22.3.2009

2009, Who are the Stakeholders and What Is Their Role In the Electoral Process?, ACE Encyclopaedia, http://aceproject.org/ace-en/topics/em/emh/emh01, 19.3.2009

2009, Wind energy in coastal areas in Vietnam, Lao Dong newspaper, http://www.baovietnam.vn/cong-nghe/152366/18/Nang-luong-gio-ngoai-khoi-Viet-Nam, 29.4.2009

2009, Wind energy system, Green tech, http://www.techstore.ie/Renewable-Energy/Wind-Energy/Wind-Energy-Systems.htm, 18.3.2009

2009, Wind energy's present and future, The solar guide, http://www.thesolarguide.com/wind-power/present-future.aspx, 04.5.2009

2006, Wind generated power: a promising treasure, Energy Conservation Center of Hochiminh city, http://ecc-hcm.gov.vn/?detail=41&language=&menu=89&submenu=95, 20.4.2009

2009, Wind turbine design, http://www.windpower.org/en/tour/design/horver.htm, 08.5.2009

2009, World Bank helps Vietnam promote renewable energy, website of Ministry of Foreign Affairs, http://www.mofa.gov.vn/en/nr040807104143/nr040807105001/ns090618135922/view, 17.6.2009

2009, Writing guides: Reliability and Validity, Colorado State University, http://writing.colostate.edu/guides/research/relval/pop2b.cfm, 10.3.2009

APPENDICES

APPENDIX 1

MOIT and HUT:

1. How do you think about the development of renewable energy, especially wind energy in Vietnam in future?
2. Does the government encourage and give incentives to private sector including foreign investors to participate in this business? Please list any renewable incentives:
3. When do you think that the master plan for renewable energy will be ready?
4. What do you think are the possible strategies for private investors to compromise with EVN in this business?
5. Do you think that it is necessary to build a competitive electricity pricing system open for all interested actors and gradually omit EVN's monopoly?

EVN:

6. What are the solutions executed by EVN to encounter the power shortage in general and in Phu Quoc?
7. How do you think about developing renewable energies in areas where the conditions are favorable in order to produce more power?
8. Does EVN want to cooperate with private partners to develop wind farm?
9. Which prices are possible for negotiating about power selling with EVN?

PIDM:

10. What are the local policies for attracting foreign investment in Phu Quoc?
11. Are foreign investors encouraged by local authority to construct wind farm in Phu Quoc to produce electricity serving for the local usage?
12. Are there any barriers for foreign investors to invest in wind energy project in Phu Quoc?
13. How long does it take to get the local authority's permission for wind farm construction:
14. Do the investors receive any incentives from local authority?

Phu Quoc Power authority:

15. Can you tell me the situation of electricity consumption in Phu Quoc?
16. Do you think that in future the current power production capacity can meet the demand?
17. It is planned to develop Phu Quoc island into a high quality ecotourism center. Hence, the development of clean energy is very beneficial and important. In your opinion, is it possible for wind energy in Phu Quoc?
18. Do you know that foreign investors can invest wind power project in Phu Quoc?
19. What do you think about EVN's status in power sector?

Local households/ hotels:

20. Have you ever heard about renewable energies and wind energy? What do you think about it?
21. What is the electricity monthly consumption of your hotel and cost? What do you think about the current electricity price?
22. Have you ever thought about using other energy sources, for example, solar or wind energy instead of using the traditional power?
23. Do you often have to suffer from electricity cut-off?
    - ☐ Very often
    - ☐ Sometimes
    - ☐ Rarely
    - ☐ Never
24. What are the effects of electricity cut-off to your business? What are your currently applied solutions when the power is cut off?

APPENDIX 2

INTERVIEW SUMMARY FORM	
Name of Interviewee	
Address	
Occupation	
Contact	
Date and time of the interview	
Issues discussed	
Question 1:	
Question 2:	
Question 3:	
Question 4:	
<u>Emerging issues:</u>	
<u>Conclusion:</u>	

APPENDIX 3

THE PRIME MINISTER OF GOVERNMENT	SOCIALIST REPUBLIC OF VIETNAM
No.276/2006/QD-TTg	Independence - Freedom - Happiness

Hanoi , 04 December 2006

DECISION

On selling prices of electricity

THE PRIME MINISTER

Pursuant to the December 25, 2001 Law on Organization of the Government;
Pursuant to the December 3, 2004 Electricity Law and the Government's Decree No. 105/2005/ND-CP of August 17, 2005, detailing and guiding the implementation of a number of articles of the Electricity Law;
Pursuant to the April 26, 2002 Price Ordinance and the Government's Decree No. 170/2003/ND-CP of December 25, 2003, detailing the implementation of a number of articles of the Price Ordinance;
At the proposal of the Minister of Industry,

DECIDES:

Article 1. To approve the roadmap for adjustment of electricity prices in the 2007-2010 period as follows:
a/ From January 1, 2007, the average retail price of electricity will be VND 842/kWh.
b/ From July 1, 2008, the average retail price of electricity will be VND 890/kWh.
c/ From 2010, retail prices of electricity will be market-driven.
Article 2. To approve the plan for adjusting electricity prices in 2007 on the following principles:
- The State continues to support electricity consumers being poor people, low-income earners and rural households (now accounting for 80% of the national population);

- The roadmap for adjustment of electricity prices must ensure incremental abolition of price subsidies for production and that enterprises, even those producing and dealing in electricity, can correctly and fully calculate production costs and practice cost-accounting in a transparent manner;
- Electricity prices must encourage the economical and efficient use of electricity in both production and daily life.

Article 3. Retail prices of electricity from January 1, 2007, are as follows:

a/ The Table of retail prices of electricity applicable to different subjects is included in the Appendix to this Decision;

Selling prices of electricity specified in the Appendix to this Decision are exclusive of value added tax;

b/ The ceiling retail price of rural daily-life electricity is VND 700/kWh;

c/ For electricity retailed by independent electricity generation units directly to different categories of electricity consumers, the retail price brackets shall be agreed by the two parties but must not be higher or lower by 25% than the selling prices of electricity specified in the Appendix to this Decision.

Article 4. Electricity production and business units shall take the initiative in applying measures to raise labor productivity and service quality, striving to reduce management costs and power loss so that from now to 2010, the entire electricity industry will save 3%-4% of costs annually (exclusive of asset depreciation) and the loss of electricity in the entire electricity system will drop to 8% by 2010.

Electricity consumers, first of all production and business enterprises, shall take the initiative in applying appropriate measures to use electricity rationally, especially during peak hours, contributing to well implementing the Government's guideline on the efficient and economical use of electricity.

Article 5. Organization of implementation

1. The Ministry of Industry shall:

a/ Coordinate with the Ministry of Finance in guiding the application of retail prices of electricity specified in Article 3 of this Decision;

b/ Set wholesale prices of electricity supplied for rural areas, dormitories and population clusters according to its competence and in compliance with the principles set in Article 2 of this Decision;

c/ Coordinate with the Ministry of Finance and provincial-level People's Committees in directing the retail of electricity to rural areas at the ceiling prices of rural daily-life electricity specified in this Decision;

d/ Formulate and submit in the first quarter of 2008 to the Prime Minister a plan on retail prices of electricity according to Clause b, Article 1 of this Decision (the average retail price of electricity will be VND 890/kWh from July 1, 2008);

e/ Formulate and submit to the Prime Minister a mechanism for adjusting retail prices of electricity to ensure that from 2010 retail prices of electricity shall be market-driven;

f/ Direct the electricity industry to take measures to save costs and reduce power loss to achieve the targets set in Article 4 of this Decision;

g/ Use revenues from electricity price differences for electricity development investment.

2. The Ministry of Finance shall coordinate with the Ministry of Industry and concerned agencies in assessing the impacts of the adjusted electricity prices on production and life, take the initiative in applying measures to control prices according to its competence and, at the same time, report and propose to the Prime Minister necessary measures to stabilize the market.

3. Provincial-level People's Committee presidents shall direct and supervise units and organizations selling electricity to rural households in their localities to apply the ceiling prices of rural daily-life electricity specified in this Decision.

Article 6. Implementation effect

This Decision takes effect on January 1, 2007.

Ministers, heads of ministerial-level agencies, heads of government-attached agencies, presidents of provincial/municipal People's Committees, electricity sellers nationwide, and concerned units shall implement this Decision.

THE PRIME MINISTER OF GOVERNMENT

PRIME MINISTER

(signed)

Nguyen Tan Dung

TABLE OF RETAIL PRICES OF ELECTRICITY

(Promulgated together with the Prime Minister's Decision No. 276/2006/QD-TTg of December 4, 2006)

Unit of calculation: VND/kWh

No.	Subjects of application of electricity retail prices	Retail price
1	Retail prices of electricity supplied for production	
1.1	Production sectors	
1.1.1	At a voltage of 110 kV or higher	
	a/ Regular hours	785
	b/ Off-peak hours	425
	c/ Peak hours	1,590
1.1.2	At a voltage of between 22 kV and under 110 kV	
	a/ Regular hours	815
	b/ Off-peak hours	445
	c/ Peak hours	1,645
1.1.3	At a voltage of between 6 kV and under 22 kV	
	a/ Regular hours	860
	b/ Off-peak hours	480
	c/ Peak hours	1,715
1.1.4	At a voltage of under 6 kV	
	a/ Regular hours	895
	b/ Off-peak hours	505
	c/ Peak hours	1,775
1.2	Pumping water for rice fields and subsidiary crops	
1.2.1	At a voltage of 6 kV or higher	
	a/ Regular hours	600
	b/ Off-peak hours	240
	c/ Peak hours	1,140
1.2.2	At a voltage of under 6 kV	
	a/ Regular hours	630
	b/ Off-peak hours	250
	c/ Peak hours	1,200

2	Retail prices of electricity supplied for administrative and non-business agencies	
2.1	Hospitals, nurseries, kindergartens, general schools	
2.1.1	At a voltage of 6 kV or higher	875
2.1.2	At a voltage of under 6 kV	920
2.2	Public lighting	
2.2.1	At a voltage of 6 kV or higher	965
2.2.2	At a voltage of under 6 kV	1,005
2.3	Administrative and non-business agencies	
2.3.1	At a voltage of 6 kV or higher	990
2.3.2	At a voltage of under 6 kV	1,030
3	Progressive retail prices of daily-life electricity	
3.1	For the first 100 kWh	550
3.2	From 101 kWh to 150 kWh	1,110
3.3	From 151 kWh to 200 kWh	1,470
3.4	From 201 kWh to 300 kWh	1,600
3.5	From 301 kWh to 400 kWh	1,720
3.6	From 401 kWh	1,780
4	Retail prices of electricity supplied for business and service activities	
4.1	At a voltage of 22 kV or higher	
	a/ Regular hours	1,410
	b/ Off-peak hours	770
	c/ Peak hours	2,615
4.2	At a voltage of between 6 kV and under 22 kV	
	a/ Regular hours	1,510
	b/ Off-peak hours	885
	c/ Peak hours	2,715
4.3	At a voltage of under 6 kV	
	a/ Regular hours	1,580
	b/ Off-peak hours	915
	c/ Peak hours	2,855

APPENDIX 4

MINISTRY OF INDUSTRY AND TRADE No. 18/2008/QD-BCT	SOCIALIST REPUBLIC OF VIETNAM Independence – Freedom – Happiness

Hanoi, 18 July 2008

DECISION

Promulgation of Regulation on Avoided Cost Tariff and Standardized Power Purchase Agreement for Small Renewable Energy Power Plants

---

MINISTER OF INDUSTRY AND TRADE

- Pursuant to the Decree No. 189/2007/ND-CP dated 27 December 2007 by the Government stipulating functions, duties, power and organization structure of Ministry of Industry and Trade;
- Pursuant to the Electricity Law dated 3 December 2004;
- Pursuant to the Decree No. 105/2005/ND-CP dated 17 August 2005 by the Government; stipulating details and guidelines for implementation of some articles of Electricity Law;
- Considering the proposal of the Director of Electricity Regulatory Authority of Vietnam,

DECIDES:

Article 1. Promulgate along with this Decision the "Regulation on avoided cost tariff and standardized power purchase agreement for small renewable energy power plants".

Article 2. This Decision will be in effect from 1 January 2009.

Article 3. The Director of Electricity Regulatory Authority of Vietnam, Director of Administration Office, Chief Inspector, Directors of Institutes, Departments under the Ministry of Industry and Trade, People Committees of provinces, cities under

direct management of the Central Government, General Director of Electricity of Vietnam Group and organizations, individuals operating in electricity field are responsible for implementation of this Decision./.

Recipients:
- Prime Minister, Deputy Prime Ministers;
- Ministries, Ministerial Agencies, Governmental Agencies;
- People Committees, DOITs of provinces, cities;
- People's Supreme Procuracy, Supreme People Court;
- Central Offices of Mass Root Organizations;
- Document Inspection Department (Ministry of Justice);
- Public Gazette;
- Website of the Government;
- EVN;
- Departments, Institutes, Inspectors of MOIT;
- Detained at Administration Office, ERAV, PC

FOR MINISTER
(signed and sealed)
Do Huu Hao
Vice Minister

REGULATION ON

AVOIDED COST TARIFF AND STANDARDIZED POWER PURCHASE AGREEMENT FOR SMALL RENEWABLE ENERGY POWER PLANTS

(Promulgated along with the Decision No. 18/2008/QD-BCT dated 18 July 2008 by the Minister of Industry and Trade)

CHAPTER 1
GENERAL PROVISIONS

Article 1: Governing Scope and objects of application

1. This regulation stipulates conditions, procedures of preparation, amendment, supplementation and abolishment of the electricity tariff applied for small renewable energy power plants which are connected to the national power grid.
2. This Regulation is applied to organizations, individuals who buy or sell electricity generated by small renewable energy power plants.

Article 2: Interpretation of terminologies

In this Regulation, the terms below shall be construed as follows:

1. The Seller: means organization, individual who has permission on electricity activities in the field of small renewable energy power generation.
2. The Buyer: means an electricity distribution unit which has permission on electricity activities in the field of electricity distribution and retailing, has power grid to which small renewable energy power plants are connected to and applies Standardized Power Purchase Agreement promulgated by Ministry of Industry and Trade (MOIT) in buying electricity with the Seller.
3. Avoided cost tariff: means the electricity tariff calculated by avoided costs of the national power grid when one (01) kWh is generated to the distribution power grid from a small renewable energy power plant.
4. Avoided cost: means the production cost per 1 kWh of the most expensive power generating unit in the national power grid, which would be avoided if the buyer purchases 1 kWh of electricity from a substitute small renewable energy power plant.

5. Surplus electricity: means the amount of electricity which is produced in the wet season which exceeds the amount of electricity produced at the load factor of 0.85 in the wet season.
6. Busbar electricity: means the total amount of electricity production minus electricity amount used by the power plant's auxiliary systems.
7. National Load Dispatch Unit: means the unit of power sector which commands, controls power generation, power transmission, power distribution units, operates the national power grid in accordance with stipulated procedures, technical standards and operation patterns.
8. Load factor: means the ratio between actual electricity production and possible electricity production at the operation of 100% rated capacity in certain duration of time (year, season, month, day).
9. Standardized Power Purchase Agreement: means the power purchase agreement issued by Ministry of Industry and Trade, applied to small renewable energy power plants which apply avoided cost tariff.
10. Wet season: means time duration counted from 1 July to 31 October.
11. Dry season: means time duration counted from 1 November to 30 June next year.
12. Year of data which is used in calculation of electricity tariff for year N is taken from 1 July of year (N-2) to 30 June of year (N-1).
13. Renewable energy is the energy produced from such resources as small hydropower, wind, solar, geothermal, biomass, land field gas, gas from waste treatment and biogas, etc.
14. Eligible power plant: means a power generating plant which uses renewable energy and meets the conditions stipulated in the Paragraph 1 of Article 8 in this Regulation.
15. Technical requirement means technical requirements, norms, standards, regulations related to connection of a power plant to the distribution power grid.

CHAPTER II

THE AVOIDED COST TARIFF

Article 3: Tariff structure

1. Avoided cost tariffs are calculated according to time of use in days and seasons in the year, which are stipulated in details in Annex 1 of this Regulation, including 7 following components:
   a. Peak hours in dry season
   b. Normal hours in dry season
   c. Off-peak hours in dry season
   d. Peak hours in wet season
   e. Normal hours in wet season
   f. Off-peak hours in wet season
   g. Electricity surplus in wet season
2. Costs corresponding to the 7 above components of electricity tariff are stipulated in the Annex 1 attached to this Regulation, including:
   a. Avoided electricity generation cost;
   b. Avoided electricity transmission loss cost;
   c. Local environmental damage avoided cost (according to the existing regulation, this component is not taken into account);
   d. Avoided generation capacity cost (only payable during the peak hours in the dry season).
3. Avoided cost tariffs which are applied for the Northern, Central and Southern regions shall be announced yearly by Electricity Regulatory Authority of Vietnam (ERAV).
4. The time of electricity use within a day time is applied for avoided cost tariff in compliance with the stipulations in the existing electricity retailing tariff schedules.
5. The sellers who use standardized power purchase agreement shall install the time of use meters (three prices) in order to meter electricity, serving for electricity payment.
6. The methodology for calculating the avoided cost tariff is stipulated in the Annex 2 of this Regulation.

Article 4: Connection Obligations

1. The Seller is responsible for investment, operation and maintenance of the power lines and step up transformer substation (if any) from the power plant of the Seller to connection point with the power grid of the Buyer.
2. The connection point with the power grid of the Buyer is the nearest point connected to the existing power network of the Buyer. The connection point shall be agreed by the Seller and the Buyer. In case the Seller and the Buyer cannot agreed on the connection point, each party shall prepare connection alternative, submit it to ERAV for consideration and making decision.
3. In the event that the metering and connection points are not the same, the Seller shall bear electricity loss on the connecting power line. Methodology for calculating the electricity loss on the connecting power line is stipulated in the Annex 3 of this Regulation.

Article 5: Risk Sharing Mechanism

1. Seller, when having signed the Standardized Power Purchase Agreement (SPPA) with the Buyer, has right to choose whether or not apply electricity tariff schedule according to the risk sharing mechanism as specified in SPPA.
2. The risk sharing mechanism is the mechanism for applying avoided cost tariff which is annually announced together with preset cap and floor electricity prices based on the avoided cost tariff of the signing year of SPPA. The electricity selling prices for the years after SPPA has been signed will be equal to the avoided cost tariff applicable for that year if that price is in the range between the floor and cap prices. If the avoided cost tariff is higher than the cap price, the cap price is applied and if the avoided cost tariff of that year is lower than the floor price of that year, the floor price of that year is applied.
3. The floor price of each component of the electricity tariff is counted equally to 90% of price of that component in the avoided cost tariff applied for the signing year of SPPA.
4. The cap price of each component of the tariff is calculated equally to 110% of that component in the avoided cost tariff applied for the signing year of SPPA.
5. Maximal time duration for applying the tariff with risk sharing mechanism is 12 years from the signing year of SPPA. The Seller can choose shorter time duration for application. After risk sharing mechanism application time is

expired, tariff used in payment of the electricity charge specified in SPPA shall be the avoided cost tariff which is annually published.

6. When this mechanism is applied, in SPPA it needs to specify specific avoided cost tariff for signing year of SPPA, duration of risk sharing mechanism application, cap and floor prices corresponding to each component of tariff in accordance with risk sharing mechanism as specified in Table 2, Annex 1 of this Regulation.

Article 6: Tariff setting

1. Avoided cost tariff schedule is set and announced annually for each next period of 5 years.
2. The national load dispatch unit is responsible for calculation of avoided cost tariff yearly according to the methodology specified in Annex 2, submit it to the ERAV for reviewing and promulgation.

CHAPTER III
IMPLEMENTATION OF THE TARIFF

Article 7: Standardized Power Purchase Agreement

1. Use of SPPA is compulsory in selling and buying electricity with application of avoided cost tariff between eligible power plants and Buyer.
2. The power purchase agreement which has been signed before the time of application of SPPA shall continue to be in effect to the expiry time as specified in the agreement. Seller and Buyer may agree on shifting to application of avoided cost tariff and SPPA as replacement of signed power purchase agreement.

Article 8: Applicable Conditions for the Seller

1. The power plant eligible for application of avoided cost tariff and standardized purchase agreement are those meet the following conditions:

   a) Installed capacity of the power plant shall be less than or equal to 30MW. In case the seller has many cascade hydropower plants on the same river, total installed capacity of these power plants shall be less than or equal to 60MW;

   b) Whole electricity amount is produced from renewable energy.

2. One power plant which has enough conditions can apply the avoided cost tariff. When carrying out the economic and financial analyses of the project, the regulation of electricity price framework "Temporary regulation on contents of calculation of economic, financial analyses and electricity tariff frame work for power generation plants" promulgated along with the Decision No. 2014/QD-BCN dated 13 June 2007 by Ministry of Industry and Trade and other documents replacing that Regulation has not to be complied with.

Article 9: Procedures for preparation and application of the avoided cost tariff

1. Procedures for preparation of the annual avoided cost tariff are as follows:

   a) The national load dispatching unit is responsible for updating database serving calculation of the avoided cost tariff;

   b) Prior 31st August every year, national load dispatching unit shall prepare draft avoided cost tariff for the next year then submit it to ERAV for reviewing and promulgating;

   c) Prior 01 December every year, ERAV shall review and approve the avoided cost tariff which is prepared by the national load dispatching unit.
2. ERAV is responsible for announcing avoided cost tariff for the next year at the website of ERAV and website of MOIT at the latest two days from the date of new tariff promulgation.
3. In case the avoided cost tariff has been not announced on time, the avoided cost tariff of the previous year is still temporarily applied. The new avoided cost tariff shall be applied for the whole year after being announced. The parties shall reimburse each other the difference of payment between the old tariff and new tariff at the first payment to be made since new tariff is applied.

CHAPTER IV
ORGANISATION OF IMPLEMENTATION

Article 10: Obligations of the ERAV

1. Development, revision, supplementation of the methodology for preparing avoided cost tariff and submitting it to the Minister of Industry and Trade for promulgation.

2. Directing the national load dispatching unit to preparation of annual avoided cost tariff in order to ensure publishing tariff on time.
3. Reviewing and promulgating avoided cost tariff which has been prepared by the national load dispatching unit.
4. Keeping confidentiality of information related to the costs of power plants, which have been used for calculation of the avoided cost tariff.

Article 11: Obligations of the Seller

1. Seller is responsible for selling whole electricity from the busbar of the power plant to the Buyer, when avoided cost tariff and SPPA are applied. For the purposes of supplying electricity to the un-electrified villages, communes in vicinity of the power plant on the request of the local authority, the seller can sell a portion of electricity production at the electricity price agreed by writing, in accordance with laws, to the local power distribution units at the agreement of the Buyer in advance.
2. The seller is responsible for sending one copy of signed SPPA to ERAV at the latest 30 days from the date of its signature.

Article 12: Obligations of the Buyer

1. Buyer is responsible for agreement, signing SPPA with the Seller and complying with the avoided cost tariff if Seller satisfies requirements stipulated in Article 8 of this Decision and stipulations in other related legal documents.
2. The Buyer is responsible for buying whole electricity generated to the power grid by the Seller, except the electricity portion sold to the local power distribution unit according to the stipulations in Paragraph 1 Article 11 of this Regulation.

Article 13: Obligations of Power Sector Entities

1. The national load dispatching unit is responsible for preparation of annual avoided cost tariff and keeps confidentiality of information related to costs of the power plants which are used for calculation of tariff.
2. The thermal power plants which are assigned by ERAV are responsible for providing necessary data to the National Load Dispatching Unit serving calculation of avoided cost tariff.

APPENDIX 5 (translated by Do Thi Bich Hang, writer of this research)

MINISTRY OF INDUSTRY	**SOCIALIST REPUBLIC OF VIETNAM**
No. 2014/QĐ-BCN	Independence - Freedom - Happiness

Hanoi, 13 June 2007

DECISION

Provisional regulations on investment financial and economical calculation and analysis and power pricing frame for power production projects

MINISTER OF INDUSTRY

Pursuant to Decree No.55/2003/NĐ-CP dated 28 May 2003 issued by the Government regarding functions, authorities, responsibilities and structural organization of Ministry of Industry;

Pursuant to Decree No.105/2005/NĐ-CP dated 17 August 2005 issued by the Government detailing and guiding the implementation of a number of articles of Electricity Law;

Pursuant to Decree No.16/2005/NĐ-CP dated 07 February 2005 issued by the Government regarding management of construction work investment projects;

Pursuant to Decree No.112/2006/NĐ-CP dated 29 September 2006 issued by the Government regarding amendment and supplementation of a number of articles of the Decree No. 16/2005/NĐ-CP on management of construction work investment projects;

In consideration of the proposal of Head of the Energy and Petrol Department;

DECIDES:

Article 1. Promulgate along with this Decision the "Provisional regulations on investment financial and economical calculation and analysis and power pricing frame for power production projects"

Article 2. The decision will be in effect after 15 days since the signing date and will be in replacement of the provisional regulations on investment financial and economical calculation and analysis and power pricing frame for power production projects" promulgated in attachment with Decision No.709/QĐ-NLDK of 13 April 2004 issued by Minister of Industry.

Article 3. Director of Administration Office, Chief Inspector, Directors of Institutes and Departments under Ministry of Industry, and organizations, individuals operating in electricity field are responsible for implementation of this decision./.

c.c:
- Ministries, Ministerial level agencies;
- Governmental agencies;
- Ministers, Vice Ministers;
- People Committees of provinces, cities;
- Departments, Institutes of Ministry of Industry;
- As in Article 3;
- Filing: office, NLDK, PC.

ON BEHALF OF MINISTER
VICE MINISTER
(signed)

Chau Hue Cam

MINISTRY OF INDUSTRY **SOCIALIST REPUBLIC OF VIETNAM**

Independence - Freedom - Happiness

PROVISIONAL REGULATIONS ON

Provisional regulations on investment financial and economical calculation and analysis and power pricing frame for power production projects

(Promulgated in attachment with Decision No.2014 /QĐ-BCN of 13 June 2007 issued by Ministry of Industry)

Chapter I

GENERAL PROVISIONS

Article 1. Objectives and scope of adjustment

This regulation provisionally stipulates content of the investment financial and economical calculation and analysis and power pricing frame for power production projects, which shall be basis for negotiation of electricity selling contract, and uniform methodology for effective selection of electricity production projects.

Data provided in Appendix 1 depends on conditions of the competitive electricity market, except for specific agreement between Seller and Buyer or guiding of authorized state agencies.

Article 2. Objects of application

This Regulation is applied to organizations and individuals who make investment in electricity supply projects.

In cases where there exist differences from the regulation guiding method and statistics used for calculation, investors shall enclosed explanation during process of appraisal, approval and negotiation of the PPA.

Article 3. Principles for implementation

Whenever there are requests to analyze the financial and economical efficiency of the electricity supply projects, investors shall implement in accordance with instructions of this Regulation.

Article 4. Interpretation of terminologies

In this Regulation, the terms below shall be construed as follows:

1. *Economical analysis* is evaluation of the feasibility and effects in term of economic aspect. Result of the economical analysis shall be basis for authorized agencies to whether grant the investment permit or not, or decide assistance mechanism for the projects (interest compensation, budget support, tax incentives and other incentives) in order to encourage project implementation.
Regarding some special projects, alternatives shall be made if necessary.
2. *Financial analysis* is evaluation of the feasibility of the proposed projects in viewpoint of investors in order to orient the investors in capital mobilization modes, financial mechanism for the project to achieve proper profits while ensuring sustainable, long-term and effective performance of the project. Result of the financial analysis shall be basis for prioritizing investment decisions.
3. *Total investment* (I) is total investment expenses for construction, installation and putting the project into practical operation. Total investment of project can be made of: Equity (I_{csh}) and Liabilities (I_v).
4. *Discount rate* (i) is the expense for investment capital in percentage (%), used to convert cash inflow and outflow in economical and financial analysis of the project years to the first year of investment.
Discount rate applied for the economical and financial analysis include: economical discount rate (i_k%) and financial discount rate (i_f%).
5. *State capital mobilized projects* are projects defined at Clause 1 Article 58 of Decree No.108/2006/NĐ-CP dated 22 September 2006 promulgating and guiding implementation of a number of articles in Investment Law.

Chapter II
ECONOMICAL AND FINANCIAL ANALYSIS OF ELECTRICITY SUPPLY PROJECTS

Article 5. Economical analysis of the investment project
1. The economical analysis of the investment project is to evaluate the following indicators:

a) Economic Internal Rate of Return (EIRR %);

b) Cash Flow before Tax ($CFBT_k$/I);

c) Net Present Value (NPV_k);

d) Economical Benefit/ Cost ratio (B/C_k).

2. These indicators to evaluate economical effect of the project are calculated based on the $CFBT_k$ of the project years and economical discount rate $i_k\% = 10\%$.

3. The government encourages electricity supply projects that do not use state capital and generate EIRR% $\geq$ 10%.

Article 6. Financial analysis of the investment project

1. General principles in financial analysis of investment projects:

a) Financial analysis of investment project is applied to proposed technical alternatives and is considered based on viewpoint of the investors in order to select the optimum alternative;

b) Regarding considered alternatives, several factors such as investment capital, allocation of investment capital, allocation of loan interests, and function and operation mechanism of the project in the electricity system, mobilized hours to reach maximum capacity shall be calculated in details. Electricity supply projects must be based on the planning approved by authorized agencies, capacity and electricity production volume according to operation period shall be determined for calculation of annual sales revenue.

c) Number of mobilized hours to reach maximum capacity of power plants applied to the economical and financial analysis is stipulated as follows:

- Coal thermal generated power plants: Number of hours to reach maximum capacity ranges from 6,500 hours/ year to 7,000 hours/ year.
- Mixed cycle gas turbine power plants: 6,500 hours/ year to 7,000 hours/ year.
- Hydropower plant with installed capacity of > 30MW: Number of hours shall be calculated based on hydrographical system, reservoir regulation with consideration of the requirement to ensure downstream water level in dry season of each work and be applied from 4,000 hours/ year to 5,500 hours/ year.
- Hydropower plants with installed capacity $\leq$ 30MW: Number of hours shall be calculated based on hydrographical system, reservoir regulation with consideration of the requirement to ensure downstream water level in dry season of each work and be applied from 3,000 hours/ year to 7,000 hours/ year.

2. Financial indicators to be calculated in financial analysis include:

a) Main Net Present Value (NPV_f);

b) Cash Flow after Tax ($CFAT_f/I_{csh}$);

c) Financial Internal Rate of Return (FIRR %);

d) Financial Benefit/ Cost ratio (B/C_f);

3. Indicators to evaluate financial effects of the invested projects are calculated based on the $CFAT_f$ of the project years and the financial discount rate i_f% (weighted average financial discount rate of capital sources).

$$i_f\% = \frac{Icsh}{I} icsh\% + \frac{Iv}{I} iv\% (1 - t\%)$$

Where:

I_{csh}: Total equity in total investment capital.

I_v: Total liability in total investment capital.

I: Total investment capital.

i_{csh}%: Rate of return of equity.

i_v%: Interest rate of loan capital (stipulated at Article 8.2).

t%: Corporate income tax rate.

In case the equity is made from different sources, the Rate of return of equity (i_{csh}%) shall be used to determine the financial discount rate (i_f) which is calculated based on weighted average principle of all capital sources.

Investors shall be responsible for capital structure and rate of return of every source of mobilized capital.

Article 7. Requirements for economical and financial analysis

1. Contents of the economical and financial analysis include calculation of indicators shown in the three following tables:

a) Table 1: Sales revenue estimate

b) Table 2: Cash flow before tax and economic effective indicators

c) Table 3: Cash flow after tax and financial effective indicators

2. Forms of the tables mentioned in Clause 1 of this article are provided in Appendix 2.

Article 8. Modes of capital mobilization and financial alternatives

1. Capital mobilized from investors

a) For electricity supply projects, investors must ensure the equity proportion in accordance with prevailing regulations;

b) Equity (including all contributed capitals of shareholders) is the contributed capital of the investors to the project.

2. Loan capital (the estimated loan capital = total investment capital - equity).

a) Regarding projects having specific loan agreements or capital mobilization commitment, in financial analysis, the investment capital for these projects according to loan terms (interest rate, grace period, payment period) shall be agreed in loan agreement or commitment;

b) If loan capital is a mix of different sources, the interest rate of loan capital (i_v%) shall be weighted average discount rate of all capital sources;

c) For projects having undefined loan sources and commercial loan expectation, it is necessary to calculate several alternatives of capital mobilization, where at least the following two options must be included:

Option 1: 100% loan capital mobilized from domestic commercial loan.

Option 2: maximum 85% foreign loan for imported equipment from abroad by credit mode - goods supplier, the remaining capital is domestic commercial loan.

Interest rate of the domestic loan capital shall be equivalent to that of inter-banking long term domestic loan at time of project establishment.

Interest rate of the foreign loan capital shall be following the export credit loan terms at time of calculation.

Payment period shall be from 10 to 15 years depending on payment capability of each project and regulations of banks at time of calculation.

The maximum grace period shall be equivalent to the construction period.

Article 9. Sensitivity analysis in financial analysis of project

Sensitivity analysis shall be carried out for financial analysis of project in order to evaluate risks occurring to investors after implementing the project. Sensitivity analysis shall be executed for the following alternatives:

1. Investment capital increases 10%.

2. Electricity decreases 10%.

3. O&M costs, fuel cost increase 10%.

4. Total investment capital increases 10%, electricity decreases 10%.

Article 10. Input data and calculation assumption

1. Basic data used for economical and financial analysis of electricity supply projects follows Appendix 1.

2. Time of calculation shall be the beginning year of project implementation and shall be considered the first year of project.

3. Financial analysis of project shall ignore inflation, price escalation of currency (both foreign and domestic currencies).

Article 11. Financial Internal Rate of Return (FIRR%)

Financial internal rate of return (FIRR%) of electricity supply projects shall not exceed 15%.

Chapter III

ORGANIZATION OF IMPLEMENTATION

Article 12. Others

During implementation of the regulation, any obstacles or arising inappropriate matters if found shall be reflected to Ministry of Industry by organizations and individuals for timely consideration, supplementation or amendment./.

ON BEHALF OF MINISTER

DEPUTY MINISTER

(signed)

Chau Hue Cam

BASIC DATA STIPULATED IN ECONOMICAL AND FINANCIAL ANALYSIS OF ELECTRICITY SUPPLY PROJECTS

(Promulgated along with Decision No.2014 /QĐ-BCN dated 13 June 2007 of Minister of Industry)

1. Project period:		
-	Hydro power plants	
+	Installed capacity > 30MW	40 years
+	Installed capacity ≤ 30MW	20-40 years
-	Coal thermal power plants	25-30 years
-	Mixed gas turbines	25-30 years
-	Large scale diesel	20 years
2. Operation and Maintenance costs:		
Operation and maintenance costs are calculated based on fixed cost and variable cost. or can be calculated based on % of investment capital[1] as follows:		
-	Hydro power plants	
+	Installed capacity > 30MW	0,5% - 1,0% investment capital
+	Installed capacity ≤ 30MW	1,0% - 2,0% investment capital
-	Coal thermal power	
+	% sulphur in fuel <1%	2,5-3% investment capital
-	Coal thermal with FGD	
+	% sulphur in fuel <2%	3,5% investment capital
+	% sulphur in fuel >2%	4,5% investment capital
-	Oil thermal	

[1] Investment capital = Construction and installation cost + Equipment cost

+	% sulphur in fuel <2%	3,25% investment capital
+	% sulphur in fuel >2%	3,5% investment capital
-	Gas thermal	
+	Diesel oil driven	2,5% investment capital
+	Gas driven	2,0% investment capital
-	Mixed cycle gas turbines	
+	Diesel oil driven	5,5% investment capital
+	Gas driven	4,5% investment capital
3. Pricing frame specified in economical and financial analysis of electricity supply projects		
- Prices applied for **hydro power plants with installed capacity > 30MW**		
Dry season: (from 01/10 to 30/06 of the following year)		2,50 – 5,00 US cent/kWh
Wet season: (from 01/07 to 30/09)		2,00 – 4,70 US cent/kWh
- Prices applied for **hydro power plants with installed capacity ≤ 30MW**		
Dry season: (from 01/10 to 30/06 of the following year)		2,70 – 5,20 US cent/kWh
Wet season: (from 01/07 to 30/09)		2,50 – 5,00US cent/kWh
- Prices applied for **coal thermal power plants**		
Dry season: (from 01/10 to 30/06 of the following year)		3,50 – 5,00 US cent/kWh
Wet season: (from 01/07 to 30/09)		3,50 – 4,40 US cent/kWh
- Prices applied for **mixed gas turbines**		

Dry season: (from 01/10 to 30/06 of the following year)	3,50 – 4,70 US cent/kWh
Wet season: (from 01/07 to 30/09)	3,50 – 4,50 US cent/kWh
4. Taxes	
- Corporate income tax - VAT - Natural resource tax, land tax, etc.	In accordance with areas and incentives (if any) *In accordance with prevailing regulations*
5. Calculation currency	
Vietnamese Dong (VND) shall be used for calculation.	

FORMATS USED FOR ECONOMICAL AND FINANCIAL ANALYSIS OF ELECTRICITY SUPPLY PROJECTS

(Promulgated along with Decision No.2014/QĐ-BCN dated 13 June 2007 issued by Minister of Industry)

Project Title:.....

Table 1: Sales revenue estimate (starting from income generated year)

Unit:.....

Fiscal year	..	..	..	..	..	..	..	..	..	..	**Total**
I. Revenue (I = 1+2+3+4) 1. Electricity sales 2. Other benefits gained from the invested project (if any) 3. Price assistance (if any) 4. Other benefits gained due to multi-functional project or synthetic benefits (if any)											

II. Total expenses (II = 1+2+3) 1. Direct expenses (1 = 1.1+1.2+1.3+1.4) 1.1. O&M 1.2. Material, fuel/ Electricity buying expense 1.3. Fixed asset depreciation 1.4. Other expenses 2. Natural resource tax, land tax, etc. 3. Interest payment (including all loan sources) **III. Earning before Interest and Tax (EBIT)** (III = I - II) **IV. Income tax** (IV = III x tax rate) **V. Earning after Tax EAT** (V = III - IV)											

Table 2: Cash Flow before Tax and economical indicators (starting from first year of implementation)

Unit:.....

Fiscal year	007	008	009	010	011	012	..	..	..	..	**Total**
I. Sources (I = 1+2+3+4+5) 1. EBIT (Item III. Table 1) 2. Interest payment [2] 3. Depreciation (Item II.1.3 Table 1) 4. Remain value of fixed assets (calculated at the last year of project) 5. Salvage value of movable capital (calculated at the last year of project)											

[2] Only payment for domestic interests, interests payment for foreign bank branches operating in Vietnam (exclusive of direct foreign interest payment)

II. Expenses (Investment capital allocated along with project progress) **III. Cash flow before tax** ($CFBT_k$) = I - II **IV. Discounted cash flow before tax** **V. Accumulated discounted cash flow before tax**											

Remark:

III: for calculating EIRR

IV: for calculating NPV_k

V: for calculating payback period

B/C_k = Revenue/(Total investment capital +II.1.1+II.1.2+II.1.4)

*With reference to data in **Table 1***

Table 3: Cash Flow after Tax and financial indicators (starting from first year of implementation)

Unit:.....

Fiscal year	007	008	009	010	011	012	..	..	..	..	**Total**
I. Sources (I = 1+2+3+4) 1. Net profit after tax (EAT) (Item V. Table 1) 2. Depreciation (Item II.1.3 Table 1) 3. Remain value of fixed assets (calculated at the last year of project) 4. Salvage value of movable capital (calculated at the last year of project) **II. Expenses** (II = 1+2) 1. Equity (I_{csh} is allocated along with project progress) 2. Principal payment **III. Cash flow after tax** ($CFAT_f$) = I - II											

IV. Discounted cash flow after tax											
V. Accumulated discounted cash flow after tax											

Remark:

III: for calculating FIRR

IV: for calculating NPV_f

V: for calculating payback period

B/C_f = Revenue/(Total equity +II.1+II.2+II.3)

*With reference to data in **Table 1***