



## VIETNAM'S RENEWABLE ENERGY - AN OVERVIEW OF CURRENT STATUS AND LEGAL NORMATIVE DOCUMENTS

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### ABSTRACT

*This paper aims to overview current status on exploiting and applying energy in general and renewable energy in particular in Vietnam and to present the Vietnamese policy on renewable energy. Vietnam is located in a tropical area, which is highly potential for renewable energy development with various sources such as biomass, solar, wind, solid waste, etc. but exploitation capacities on these resources are limited. The Vietnamese Government gradually institutionalizes legal normative documents to promote energy exploitation from local potential renewable energy.*

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## 1 AN OVERVIEW OF VIETNAM'S ENERGY AND RENEWABLE ENERGY

### 1.1 The energy demand and supply in Vietnam

Vietnam's energy consumption has been growing rapidly to support economic growth and industrialization process (COGEN 3 - EC-ASEAN COGEN Programme, 2003). The development of the total primary energy supply experienced a strong rise in last years. Starting at 20,000 ktoe<sup>1</sup> in 1970 of which more than 50% were provided by combined renewable and waste (ECOFYS Germany GmbH, 2009). In recent years, the share of coal and oil has increased much more strongly than the other sources.

According to analysis from ECOFYS Germany GmbH (2009), Vietnam's primary energy supply has been constantly rising and reached 59,415 ktoe in 2008. By energy sources, it is subjected by com-

bustible renewable and wastes with 46%, followed by oil with 26%, coal and peat with 16%, electricity with 11% and gas with 1%. The final energy consumption in 2008 added up to 51,875 ktoe, in which the highest sharing was residential sector of 54%, followed by industrial sector with 24%, transportation 16%, commercial and public services 3%, agriculture and forestry 1%. Between 2000 and 2005, the share of the industrial sector rose steadily whereas the shares of transportation and other sectors have decreased. The energy consumption per capita of Vietnam grew up to 0.69 toe<sup>2</sup> per capita in 2008 while it only got 0.36 toe per capita in 2005.

According to APERC (2006), Vietnam's final energy demand is projected to grow up to 109 Mtoe<sup>3</sup> in 2030. The share of the residential sector is expected to remain the largest, but will reduce to 35%

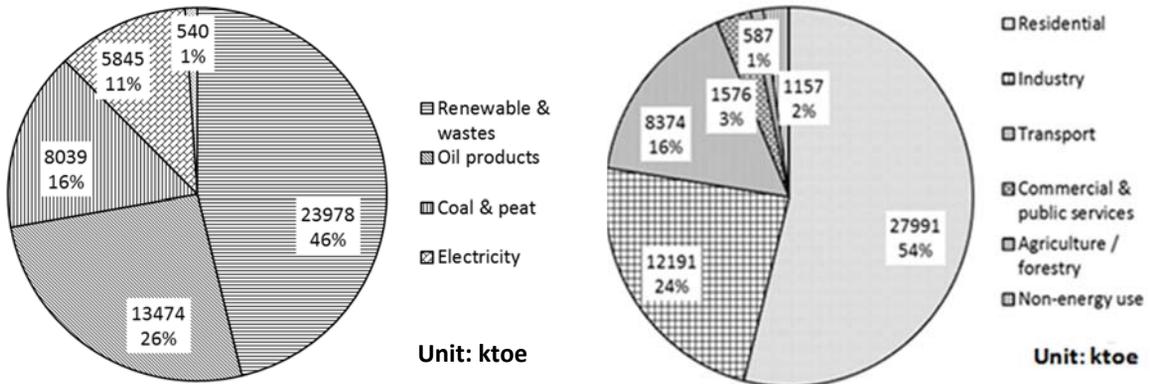
<sup>1</sup> ktoe: thousand tons of oil equivalent

<sup>2</sup> toe: tons of oil equivalent

<sup>3</sup> Mtoe: million tons of oil equivalent

in 2030, as a result of biomass being replaced by commercial energy sources. The industry sector is expected to maintain the second largest share at 35%, followed by transport at 24% and commercial at 6%. Also for outlook to 2030, Vietnam’s primary energy demand is expected to increase to 142 Mtoe in 2030. As Vietnam has significant energy

resources including hydropower, coal, oil and gas, Electricity of Vietnam (EVN) gives high priority to the development of thermal power plants (mainly coal and gas) and hydropower plants (ECOFYS Germany GmbH, 2009). To satisfy all energy demand, every year Vietnam has to import energy from other countries.



**Fig. 1: Shares of total primary energy supply (left) and total final energy consumption (right) in the world in 2008 (ESMAP, 2002)**

In Vietnam, the electricity transmission, distribution and supply are held by EVN. EVN is a state owned enterprise with more than 50 subsidiaries under the Ministry of Industry and Trade (MOIT). In general, EVN’s facilities account for about 74% of generation capacity and the remainder is under control of local or foreign independent power producers. However, in rural area, the EVN only directly supplied electricity to 19% of around 8,800 rural communities due to lack of power transmission lines linked to the national grid (ECOFYS Germany GmbH, 2009). It means that there are more than 80% of rural communities supplied by low voltage electricity from provincial authorities or some private sector.

Vietnam’s seventh power development plan which approved through Decision No. 2081/ QĐ-TTg dated on November 08<sup>th</sup> 2013 sets an ambitious target to achieve nearly 100% electrification from 2016 to 2020, which will cost around \$1.37 billion. It is a big financially challenge but rural electrification is a key to improve of living standard and increase income of rural people. As a result, government lead to develop some off-grid power sources for the remaining communities. Obviously, renewable energies could be high potential to apply as off-grid resources in rural households and villages. Up to the end of 2013, the total capacity of the installed power approximately 30,688 MW, in which

the renewable energy only shares around 6.13%. Detail on the capacity and sharing capacity are shown in Table 1.

**Table 1: Installed power mix (as of 31/12/2013)**

Power type	Capacity (MW)	Share (%)
Larger hydro	13260	43.21
Coal thermal	7116	23.19
Gas turbine	7446	24.26
Oil (thermal)	912	2.97
Diesel	70	0.22
Small hydro	1670	5.44
Wind	56	0.18
Biomass	150	0.49
Biogas/MSW	4	0.01
Solar PV	4	0.01
<b>Total</b>	<b>30,688</b>	<b>100</b>

(Cuong, 2014)

**1.2 Renewable energy resources in Vietnam**

In fact, the major driver for rural electrification was established in the Renewable Energy Action Plan (REAP) promulgated by MOIT in 2001 with support from the World Bank and EVN. REAP focuses on rural electrification of remote areas as a short-term opportunity to scale up renewable energy technologies, including micro-hydro, wind, biomass, and solar PV. It establishes goals for renewable energy-based electrification for thousands of households that are not covered by EVN’s grid

expansion planning. This plan divided in two phases; phase 1 target of adding 25 - 50 MW of renewable energy capacity, providing access to electricity for more than 35,000 households by 2010; and phase 2 targets a 3% share for renewable energies in total installed capacity. The World Bank supported two projects on Renewable Energy Development and Rural Energy supported for this plan.

The potential of renewable energy for electricity has been recognized in Vietnam, however, its promise has not yet been realized (ESMAP, 2002). For a summary of the potential use of renewable

energy in Vietnam, see Table 2.

Actually, Vietnam is rich in hydropower resource. The hydropower resource is mainly located in the north and central areas, near the border with Laos and Cambodia. Due to about 70 to 75% the runoff generated in 3 to 4 months per year, this resource is always in shortage in late of dry season. In country, the electricity generated from small hydropower plants has been increasing significantly since 2006, and there are more than 1000 small hydropower plants with capacity over 4000 MW (MONRE, 2010).

**Table 2: Potential use of renewable energy in Vietnam**

Resources	Potential		Region
	Capacity (MW)	Usage (households served)	
Micro-hydropower	90 - 150	200,000 - 250,000	north & central
Isolated mini-grid	300 - 600	300,000	north & central
Grid-connected mini-hydro	400 - 600	not applicable	north & central
Off-grid solar photovoltaic	2	50,000	south & central
Biomass-driven	250 - 400	not applicable	south & central
Geothermal	50 - 200	not applicable	central
Wind power	to be determined	to be determined	central / coastal
Total	1,100 - 1,900	500,000 - 600,000	

(ESMAP, 2002)

Located in the tropical region, Vietnam has stable solar resources in the south and center but substantial seasonal fluctuation in the north. ESMAP (2002) reported that the average solar radiation level in the south and the central regions below 5 kWh per square meter and is almost constant during the year. This energy resource is high potential to apply in the south and the central parts of the country where some rural communities have not yet been connected to electricity grid. The solar energy in Vietnam supplied around 650 kW and has been divided over three market segments: professional applications (50%), institutional systems like hospitals, community centers and battery charging centers (30%), and household systems (20%). Currently, the most used this solar resource is the solar water heater. There are some Vietnamese organizations carrying out research and manufacturing solar water heaters, but on the markets we found most of solar water heaters import from China.

Being an agricultural country, Vietnam is rich in biomass with total potential of biomass resources about 134 million tons (MONRE, 2010). The main biomass sources that can be used to generate electricity are sugarcane, cane trash and rice husks.

The larger industrial sugar mills are located from Da Nang southward. Initial estimates show that this energy source could generate about 120 MW of excess power that could be sold to the grid. Due to 40 million ton of rice produce in Vietnam (GSO, 2011), farmers discharge about 8.0 million tons of rice husk and about 32 million tons of rice straw. As reported by MONRE (2010), only 42% total amount of rice husk and 24% total amount of rice straw used as fuel for brick-kiln, cooking or compressed for artificial plywood, while the remaining is just dumped into river which is of course illegal. In case of power plants fueled by the rice husk, it could supply about 160 - 180 MW. In the MD, there were some rice husk fueled power plants built in Can Tho city and An Giang province and some others are underway in Tien Giang, Dong Thap and Kien Giang province.

Besides that, fuel-wood is an important biomass source in Vietnam. According to survey from livestock waste management in East Asia project (MONRE, 2010), about 70% rural people are using this fuel for daily cooking, and even for heating at cold area. However, biomass for cooking is not sufficiency due to most rural people applying the three-legged stoves for cooking. In fact, this type of stove is low efficiency (8 to 15%) that cause of

wasted fuel and environment pollution. Total fuel-wood consumption in the whole country is estimated of about 24.5 million tons (MONRE, 2010).

With more than 3,000 km of seashore and 70% of the country mountainous, there is likely to be potential for wind power. By recorded from provincial meteorological stations, the database on wind resource is poor systematic and limited to assess for wind power. In estimate, wind power has a remarkable potential of over 500,000 MW in total (Nhan and Duong, 2009). However, the initial investment cost of wind power higher than that of traditional power sources. Thus, wind power can be used for places that cannot be connected to national grid but have potential for wind power. Currently, there are wind power plants operated in Hai Phong, Binh Thuan, Binh Dinh, Ninh Thuan and Bac Lieu.

Another renewable energy resource is bio-fuel. At present, Vietnam has 6 projects to produce domestic ethanol with capacity of about 100 million L/year on average (MONRE, 2010). Some projects will be put into operation in 2010 - 2011 supplying bio-ethanol to domestic market. According to the Decision No. 177/2007/QĐ-TTg, the direction for bio-fuel development is to meet 1% of oil and gasoline demand of the whole country by 2015, and 5% by 2025.

Another renewable resource available in Vietnam is biogas produced from anaerobic digestion processes. The input materials are various from municipal solid waste, industrial waste, or even agriculture waste. There were some large scale digesters built in several provinces in Vietnam, but the most popular one is small scale of biogas plants (from 4 to 20 cubic meter) which installed at farmer households to treat for livestock wastes (Nguyen, 2011). Many plants are built to treat for livestock waste and also produced biogas which applied for cooking, lighting and running small generators. Even the produced biogas did not sell to the grid, this gas resource supplied in adequate for required cooking and lighting energy at farmer households who own these plants. From study of Oakley (2009), it is estimate about 10 billion cubic meters of gas produced through biogas plants in Vietnam. Especially, cooking with biogas is big innovation that avoids fuel waste and environment pollution as cooking by fuel-wood. In addition, cooking with biogas also saving cooking time and time for fuel-wood collection, easy to clean the pots, saving money for fuel buying. In the Vietnam context, this energy source would be ideal at the

household level, rather than on an industrial scale. Sources are scattered around the country and most gas storages are in remote or rural areas where transport is difficult. Therefore, biogas is not recommended for development on a commercial scale in the long term (Tuan *et al.*, 2009).

There was no available database on geothermal and tidal resource potential in Vietnam. One developer has estimated that about 200 to 340 MW of geothermal is available in central region from 300 hot mineral water sources (Cuong, 2005).

Renewable energy is currently in use in Vietnam, but it makes small part in power supply compared to other energy sources. According to the National Energy Development Strategy of Vietnam, the Government plans to raise the volume of power contributed by renewable resources like wind power, solar energy, geothermal power and bio-fuels to 3% of the commercial electricity capacity by 2010 and 5% by 2020 and 11% by 2050.

## 2 VIETNAM RENEWABLE ENERGY LEGAL NORMATIVE DOCUMENTS

Vietnam's renewable energy legislation is driven by the needs to supply sufficient energy for economic development and ensure environmental protection. Since energy demand is expected to increase four times from 2005 - 2030 and electricity demand increase nine times from 2005 - 2025 (APEREC, 2006), developing renewable capacity will help Vietnam reduce its reliance on foreign sources of energy and ensuring ample energy security in the future.

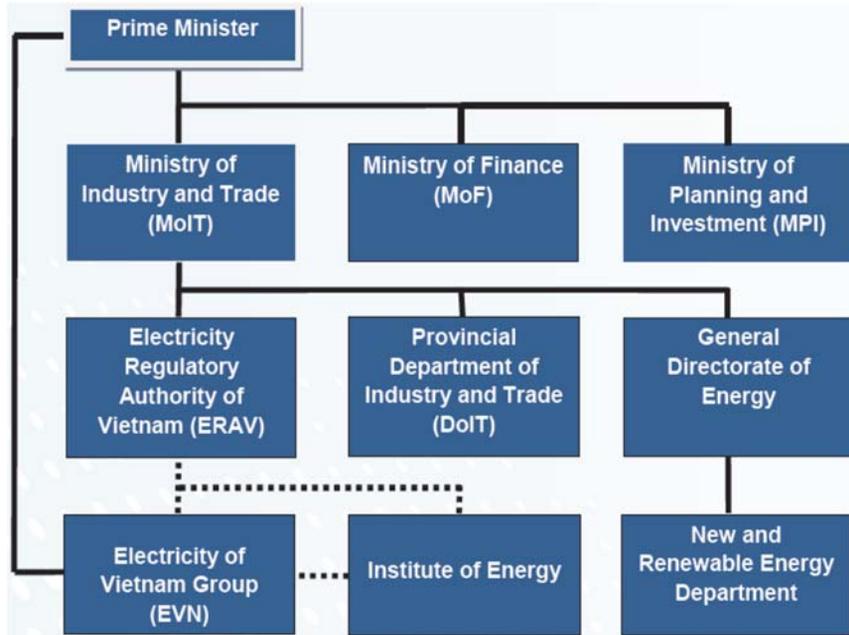
According to Khanh *et al.* (2012), Vietnam has a complex institutional structure in the energy sector. At least three government agencies are directly involved in formulating or implementing renewable energy policy at a national level, with local governments and a number of other government agencies also having influence over either policy or its implementation, as described below.

The Vietnamese Government and Prime Minister are responsible for policies and regulations, strategies and plans for the development of renewable energy sector.

Ministry of Industry and Trade (MOIT) manages all energy sectors, such as coal, oil, gas, electricity, nuclear energy and renewable energies. The ministry is responsible for policy design and national plans subject to Prime Minister's approval.

Ministry of Planning and Investment (MPI) takes the lead role in coordinating and allocating funds for energy projects submitted by line ministries and agencies, for consideration and approval by the Prime Minister.

Ministry of Finance (MOF) is responsible for taxation and energy tariff policies applied to the energy sector.



**Fig. 3: Government management structure for renewable energy**

*(Khanh et al., 2012)*

The Government of Vietnam has had different policies to encourage the development of renewable energy, including improving energy security, reducing reliance on more expensive primary fossil sources, and promoting energy access and rural electrification. In this review, the key legislation of the renewable energy is described by laws/ ordinances and secondary regulations:

**2.1 Laws**

Law on Electricity No. 28/2004/QH11 dated on December 03<sup>rd</sup> 2004 and approved by the Vietnam National Assembly session XI, valid since July 1<sup>st</sup> 2005. The Law outlines the electricity development planning and investment; electricity saving; electricity markets; rights and obligations of organizations and individuals conducting electricity activities and using electricity; protection of electric equipment and facilities, electricity works and electric safety. To guide the Electricity Law’s implementation, Decree No. 105/2005/NĐ-CP, and Decree No. 106/2005/NĐ-CP were promulgated by the government.

Law No. 24/2012/QH13 dated on November 20<sup>th</sup> 2012 approved by the Vietnam National Assembly session XIII, valid since July 1<sup>st</sup> 2013. The Law promulgates on amending and supplementing a number of articles of the Law on Electricity No. 28/2004/QH11. This Law prescribes the electricity development planning and investment; electricity saving; electricity markets; rights and obligations of organizations and individuals conducting electricity activities and using electricity; protection of electricity equipment and facilities, electric works and electric safety. The electricity project investors shall have to strictly comply with law provisions on investment, construction and environmental protection. The competent state bodies shall decide on land assignment or land lease for investors to execute their project. Subjects eligible and conditions for granting, amending or supplementing electricity activity licences are defined in Chapter V.

Law on Technology Transfer No. 80/2006/QH11 dated on November 29<sup>th</sup> 2006 and approved by the Vietnam National Assembly session XI, valid since July 1<sup>st</sup> 2007. The Law provides for the transfer of

technologies in Vietnam, from Vietnam to abroad and from abroad into Vietnam; rights and obligations of organizations and individuals engaged in technology transfer activities; competence of state management agencies; and measures to encourage and promote technology transfer. To implement this law, the Decree No. 133/2008/NĐ-CP was promulgated. Then, the Decree No. 120/2014/NĐ-CP was issued to amend and supplementing a number of articles of the previous Decree No. 133/2008/NĐ-CP, especially on list of renewable energy technologies encouraged for transfer.

Law on Environmental Protection No. 55/2014/QH13 dated on June 23<sup>rd</sup> 2014 and approved by the Vietnam National Assembly session XIII, valid since January 1<sup>st</sup> 2015. The Law provides statutory provisions on environmental protection activities; measures and resources used for the purpose of environmental protection; rights, powers, duties and obligations of regulatory bodies, agencies, organizations, households and individuals who are tasked with the environmental protection task. To implement this law, the Decree No. 19/2015/NĐ-CP was promulgated.

Law on Investment No. 67/2014/QH13 dated on November 26<sup>th</sup> 2014 and approved by the Vietnam National Assembly session XIII, valid since July 01<sup>st</sup> 2015. The Law applies to investors, other organizations and individuals involved in business investment in Vietnam and outward business investments. To implement this law, the Decree No. 118/2015/NĐ-CP was promulgated.

Law on Economical and Efficient Use of Energy No. 50/2010/QH12 dated on June 17<sup>th</sup> 2010 and approved by the Vietnam National Assembly session XII, valid since January 01<sup>st</sup> 2011. The Law provides economical and efficient use of energy; policies and measures to promote economical and efficient use of energy; and the rights, obligations and responsibilities of organizations, households and individuals in economical and efficient use of energy. To implement this law, the Decree No. 21/2011/NĐ-CP was promulgated.

## 2.2 Governmental Decrees

Decree No. 118/2015/NĐ-CP (approved by the Government on November 12<sup>th</sup> 2015 and comes into force from December 27<sup>th</sup> 2015) providing guidance on a number of articles in the Law on Investment on application, control, announcement of conditions for investment; measures for investment assurance, investment incentives; investment

procedures, execution of investment projects, and management of investment by regulatory bodies. The Decree assigns the MPI to work with related ministries and agencies to make a directory of sectors and trades opened for foreign investment as well as conditions for foreign investors to do business in such sectors and trades prescribed in Vietnamese law as well as treaties which Vietnam has acceded to, and post it on the National Foreign Investment Portal.

Decree No. 19/2015/NĐ-CP (approved by the Government on February 14<sup>th</sup> 2015 and comes into force from April 01<sup>st</sup> 2015) detailing the implementation of a number of articles of the Law on Environmental Protection. This Decree is applicable to offices, organizations, households and individuals living and acting in the territory of Socialist Republic of Vietnam, including mainland, islands, territorial waters and airspace.

Decree No. 120/2014/NĐ-CP (approved by the Government on December 17<sup>th</sup> 2014 and comes into force from February 01<sup>st</sup> 2015) of the Government amending and supplementing a number of articles of the Government's Decree No. 133/2008/NĐ-CP of December 31<sup>st</sup> 2008, detailing and guiding the implementation of a number of articles of the Law on Technology Transfer. The Decree expanding the list of technologies banned from transfer from abroad into Vietnam, the number of banned technologies will be increased to 30 from the current 16 (stipulated in the Decree 133/2008/NĐ-CP).

Decree No. 14/2014/NĐ-CP (approved by the Government on February 26<sup>th</sup> 2014 and comes into force from April 15<sup>th</sup> 2014) details a number of articles of the Electricity Law regarding electricity safety, including safety in electricity generation, electricity transmission, electricity distribution, use of electricity in production; and compensation for, and support in, houses, constructions, land and trees in safety protection corridors of overhead electricity transmission lines upon the construction of high-voltage power grid works.

Decree No. 137/2013/NĐ-CP (approved by the Government on October 21<sup>st</sup> 2013 and comes into force from December 10<sup>th</sup> 2013) detailing a number of articles of the Electricity Law and the Law Amending and Supplementing a Number of Articles of the Electricity Law. Under the provisions of the Decree, to ensure that the conditions of power purchasing for living purposes, the sales of electricity must have distribution grid be capable of

meeting the electricity supply the needs of the buyer; the buyers must have the capacity for civil conduct prescribed by law and the proposal for purchase of electricity accompanied by a copy of the papers, such as: permanent residence, or temporary residence; Certificate of house ownership or decision of granting house, the valid lease agreement with a term of 01 years or more.

Decree No. 103/2011/NĐ-CP (approved by the Government on November 15<sup>th</sup> 2011 and become effective as from January 01<sup>st</sup> 2012) revise the provisions on registration of amendments or additions to a technology transfer contract (“TTC”) in Decree No. 133/2008/NĐ-CP. The Decree provides a separate standard form for the request for registration of a TTC and the request for registration of amendments or additions to a TTC. Decree 103 replaces “notarised copy” with “certified copy” (of the amended TCC in Vietnamese and a foreign language) and further amends the above provision by adding “if the parties to the TTC are Vietnamese organisations and/or individuals, the amended TTC need only be in Vietnamese”. While “notarisation” must be done at a notary office, “certification” can be conducted faster by the People’s Committee of a ward with respect to Vietnamese documents or the People’s Committee of a district with respect to foreign documents.

Decree No. 75/2011/NĐ-CP (approved by the Government on August 30<sup>th</sup> 2011 and enters into force from October 20<sup>th</sup> 2011) on State investment and export credit. Of note, the maximum loan in Vietnamese Dong, subject to single borrower limit of not exceeding 15% of the paid-in equity capital of the Vietnam Development Bank of Vietnam (as lender) as recorded in its most recent financial statements, to an investment project will be 70% of its total investment capital and to an export or import contract, 85% of the total value of such contract.

Decree No. 21/2011/NĐ-CP (approved by the Government on March 29<sup>th</sup> 2011 and enters into force from May 15<sup>th</sup> 2011) provides statistical work on energy use; major energy users; economical and efficient use of energy in state budget-funded agencies and units; energy labeling of energy-consuming devices and equipment; measures to promote economical and efficient use of energy; and examination and inspection of economical and efficient use of energy.

Decree No. 81/2009/NĐ-CP (approved by the

Prime Minister on October 12<sup>th</sup> 2009 and enters into force from December 01<sup>st</sup> 2009) on amending or supplementing a number of articles of the government’s decree No. 106/2005/NĐ-CP detailing and guiding the implementation of a number of articles of the Law on Electricity on protection of safety of high voltage power grid works.

Decree No. 04/2009/NĐ-CP (approved by the Government on January 14<sup>th</sup> 2009) provides for incentives and supports in terms of land, capital, tax and charge exemption and reduction for environmental protection activities. The Decree sets out the conditions for receiving incentives and supports and specifies the types of organizations that may be eligible for incentives and supports such as those that give priority to activities that imply the relocation of seriously polluting establishments or the recycling, reuse or reduction of polluting wastes.

Decree No. 133/2008/NĐ-CP (approved by the Government on December 31<sup>st</sup> 2008 and enters into force from February 02<sup>nd</sup> 2009) detailing and guiding the implementation of a number of articles of the Law on Technology Transfer regarding technology transfer contracts, technology evaluation services and measures to encourage and promote technology transfer.

Decree No. 108/2006/NĐ-CP (approved by the Government on September 22<sup>nd</sup> 2006 and enters into force from October 25<sup>th</sup> 2006) stipulated rights and obligations of investors; guarantees for legitimate rights and interests of investors; investment encouragement and incentives; and state management of investment in Vietnam. This Decree details and guides the implementation of a number of articles of the Law on Investment regarding investment activities for business purposes; rights and obligations of investors; guarantees for legitimate rights and interests of investors; investment encouragement and incentives; and state management of investment in Vietnam.

### 2.3 Prime Minister’s Decisions

Decision No. 31/2014/QĐ-TTg (approved by the Prime Minister on May 05<sup>th</sup> 2014 and enters into force from June 20<sup>th</sup> 2014) stipulated on support mechanism to develop energy project which generate electricity from solid waste in Vietnam. The subjects of application in this Decision shall be the organizations/individuals participating in electric power activities related to the development of power generation projects using solid waste(s) in Vietnam.

Decision No. 24/2014/QĐ-TTg (approved by the Prime Minister on March 24<sup>th</sup> 2014 and enters into force from May 10<sup>th</sup> 2014) stipulated on the support mechanism for the development of biomass power projects in Vietnam. Biomass power project is a power generation plant project that mainly uses biomass fuel for electricity production. Biomass energy used to produce electricity shall include: by-products and residues in agriculture production and agro-forestry processing, and other types of crops that may be used as fuel for electricity production.

Decision No. 50/2011/QĐ-TTg (approved by the Prime Minister on September 05<sup>th</sup> 2011 and enters into force from October 25<sup>th</sup> 2011) stipulated on functions of tasks, powers and organizational structure of the General Department of Energy (GDE) directly under the MOIT. Structure of the GDE included Department of Hydropower and Department of New Energy and Renewable Energy.

Decision No. 37/2011/QĐ-TTg (approved by the Prime Minister on June 29<sup>th</sup> 2011 and enters into force from August 20<sup>th</sup> 2011) the first time set out mechanisms for supporting and developing wind energy project in Vietnam. With a view to boosting up foreign and domestic investments in the wind power sector, this Decision requires the MOIT to prepare a 10-year national wind power development plan for the Prime Minister's consideration and the EVN to purchase all electricity generated by on-grid wind plants at the VAT-excluded price of approximately 7.8 US cents/kWh and introduces a number of financial and land incentives for wind power investors.

Decision No. 35/2008/QĐ-TTg (approved by the Prime Minister on March 03<sup>rd</sup> 2008 and enters into force from March 23<sup>rd</sup> 2008) organized and operated the Vietnam Environmental Protection Fund (VEPF). The main functions of VEPF are receiving state budget capital; funding, contributions and entrusted capital from domestic and foreign organizations and individuals in order to finance environmental protection activities nationwide.

Decision No. 177/2007/QĐ-TTg (approved by the Prime Minister on November 20<sup>th</sup> 2007) approved the scheme on development of biofuels up to 2015 with a vision to 2025. This decision aim to develop biofuel, a new and renewable energy, for use as an alternative to partially replace conventional fossil fuels, contributing to assuring energy security and environmental protection. For biofuels, the gov-

ernment has targeted an annual output of 100,000 tons of E5 and 50,000 tons of B5 by 2010 which is equivalent to 0.4% of the country's projected oil and gasoline demand; 1.8 million tons of ethanol and vegetable oil, or 5% of oil and gasoline demand by 2025.

Decision No. 130/2007/QĐ-TTg (approved by the Prime Minister on August 02<sup>nd</sup> 2007 and enters into force from August 17<sup>th</sup> 2007) provides for the investment project according to Clean Development Mechanism (CDM) and several financial mechanisms, policies applied to investment project according to CDM.

Decision No. 110/2007/QĐ-TTg (approved by the Prime Minister on July 18<sup>th</sup> 2007 and enters into force from August 21<sup>st</sup> 2007) approved of the Master Plan for National Power Development in period 2006 - 2015 with vision to 2025.

Decision No. 26/2006/QĐ-TTg (approved by the Prime Minister on January 26<sup>th</sup> 2006 and enters into force from February 24<sup>th</sup> 2006) approved the road-map and conditions for formation and development of different levels of the electricity market in Vietnam. The purposes of this decision are: step by step develop a competitive electricity market in a stable manner, eliminate subsidy for the power industry, increase the electricity consumers' right to select electricity suppliers; attract investment from all economic sectors inside and outside the country into electricity-related activities, gradually reduce the state investment in the power industry; raise efficiency of production and business activities of the power industry, reduce the pressure of increasing electricity price; ensure the stable and reliable supply of electricity with higher and higher quality; ensure sustainable development of the power industry.

Decision No. 176/2004/QĐ-TTg (approved by the Prime Minister on October 05<sup>th</sup> 2004 and enters into force from November 03<sup>rd</sup> 2004) approved the strategy on development of Vietnam electricity industry from 2004 to 2010, with orientations towards 2020. The development objectives of Vietnam electricity industry till 2010 are: to well use sources of hydraulic power (in combination with irrigation), gas and coal for the balanced development of electric sources; to build gas-electricity-nitrogenous fertilizer complexes in Phu My and southwestern area; to step up the research into, and construction of Son La hydroelectric power plant; to research into the plan on the use of nuclear energy; to synchronize and modernize the national elec-

tricity-distributing network; to diversify modes of electricity investment and trading; to work out appropriate policies on electricity use in rural and mountainous areas; to raise the competitiveness of electricity prices as compared with the region.

#### 2.4 Ministerial documents

Circular No. 44/2015/TT-BCT (approved by the MOIT on December 09<sup>th</sup> 2015 and comes into force from January 25<sup>th</sup> 2016) stipulates on project development, avoided cost tariff and Standardized Power Purchase Agreement for biomass power generation projects. This Circular put into practice the Decision No. 24/2014/QĐ-TTg stipulated on support mechanism to develop energy project which apply renewable energy in Vietnam.

Circular No. 32/2015/TT-BCT (approved by the MOIT on October 08<sup>th</sup> 2015 and comes into force from December 07<sup>th</sup> 2015) stipulates on project development and Standardized Power Purchase Agreement for power generation projects using solid wastes. The Circular stipulates the development of grid-connected power generation projects using solid wastes and promulgation of Standardized Power Purchase Agreement for grid-connected power generation projects using solid wastes in Vietnam. This Circular support to the Decision No. 31/2014/QĐ-TTg stipulates on support mechanism to develop energy project which generate electricity from solid waste in Vietnam.

Circular No. 29/2015/TT-BCT (approved by the MOIT on March 31<sup>st</sup> 2015 and comes into force from October 16<sup>th</sup> 2015) prescribing contents, sequence and procedures for preparing, appraising and approving the Biomass Energy Development and Utilization Plan. This Circular regulate for the National and Provincial Biomass Energy Development and Utilization Plans which put into practice of the Decision No. 24/2014/QĐ-TTg stipulated on support mechanism to develop energy project which apply renewable energy in Vietnam.

Circular No. 32/2014/TT-BCT (approved by the MOIT on October 09<sup>th</sup> 2014 and comes into force from November 25<sup>th</sup> 2014) provides the construction sequence, apply the avoidable cost tariff and issuance of power purchase contracts for small hydropower plants (replaced for the Decision No. 18/2008/QĐ-BCT).

Circular No. 06/2013/TT-BCT (approved by the MOIT on March 08<sup>th</sup> 2013 and comes into force from May 01<sup>st</sup> 2013) regulates on the content, process and procedures for preparation, validation and

approval of wind power development planning on national and provincial levels. The Planning mentioned here is the planning project designed to identify the overall theoretical and technical wind power potential across the country, distribution of wind potential by regions or provinces at specific phases by 2020, and with vision to 2030.

Circular No. 32/2012/TT-BCT (approved by the MOIT on November 12<sup>th</sup> 2012 and comes into force from December 27<sup>th</sup> 2012) prescribes the implementation of developing wind power projects and standardized power purchase agreement for wind power projects in Vietnam. This Circular support to the Decision No. 37/2011/QĐ-TTg of the first time set out mechanisms for supporting and developing wind energy project in Vietnam.

Circular No. 96/2012/TT-BTC (approved by the MOF on June 08<sup>th</sup> 2012 and comes into force from August 01<sup>st</sup> 2012) guides the financial mechanism to support electricity price for grid connected wind power projects. The Circular guides the electricity price support by the state for grid connected wind power projects through Vietnam Environmental Protection Fund under regulations of Decision No. 37/2011/ QĐ-TTg on the mechanism supporting the development of wind power projects in Vietnam.

Joint-Circular No. 204/2010/TTLT-BTC-BTN & MT (issued by MOF and Ministry of Natural Resources and Environment on December 15<sup>th</sup> 2010 and comes into force from January 29<sup>th</sup> 2011) amending and supplementing some provisions of Joint Circular No. 58/2008/TTLT-BTC-BTN&MT; and guiding a number of articles of the Decision No. 130/2007/QĐ-TTg on a number of financial mechanisms and policies applicable to investment projects under the clean development mechanism.

Circular No. 97/2008/TT-BTC (approved by the MOF on October 28<sup>th</sup> 2008 and comes into force from November 26<sup>th</sup> 2008) guides the implementation of Article 61 of the Electricity Law on the State's support policies for electricity development investment in areas in which electricity investment and activities would bring about no economic benefits; and for building power transmission lines from electricity meters to electricity-consuming places of households that are social policy beneficiaries and meet with exceptional difficulties in rural or mountainous areas or islands.

Decision No. 18/2008/QĐ-BCT (approved by the MOIT on July 18<sup>th</sup> 2008 and comes into force from

January 01<sup>st</sup> 2009) stipulates the conditions, procedure and formality of issuance, amendment, supplement and cancellation of electricity tariffs applied for small renewable energy power plants, which connect to the national power grid; and applicable to all organizations and individuals who buy and who sell the electricity from the small renewable energy power plants.

Joint-Circular No. 58/2008/TTLT-BTC-BTN&MT (approved by MOF and Ministry of Natural Resources and Environment on July 4<sup>th</sup> 2008) guiding implementation of some articles under Decision No. 130/2007/QĐ-TTg. This circular provides guidelines for collection, submission, management, use of Certified Emission Reductions (CERs) selling fee, management of CERs resulted from CDM projects using ODA funds; subsidy policy to products of CDM projects stipulated under Article 5, Article 9, and Article 16 of Decision No. 130/2007/QĐ-TTg.

Decision No. 30/2006/QĐ-BCN (approved by the Ministry of Industry on August 31<sup>st</sup> 2006 and comes into force from September 28<sup>th</sup> 2006) on promulgating the regulation on investment and construction management applicable to independent power projects. The attached regulation provides for the selection of investors, preparation for appraisal, approval and execution of investment projects, and investment management, applicable to independent power project. And this regulation applies to all organization and individuals that invest independent power projects.

### 3 OTHER GOVERNMENTAL DOCUMENTS

Decision No. 2068/QĐ-TTg (approved by the Prime Minister and comes into force on November 25<sup>th</sup> 2015) approved on the Vietnam's Renewable Energy Development Strategy up to 2030 with an outlook to 2050. The development strategy is encourage/ mobilize all resources from the society and people for renewable energy development and better access to modern, sustainable, reliable and affordable energy sources by all citizens; accelerate the expansion and use of renewable energy sources, increase the domestic energy supply, gradually increase the renewable energy share in the national energy production and consumption in order to ensure less dependence on fossil sources, and contribute to better energy security, mitigating climate change, environmental protection and sustainable socio-economic development.

Decision No. 403/QĐ-TTg (approved by the Prime Minister and comes into force on March 20<sup>th</sup> 2014) on the National Action Plan on Green growth in Vietnam For the Period of 2014 - 2020. This plan composes of 04 main themes, 12 groups of activities and 66 specific activities which should be implemented in synergy and in relevance with contents on: improving awareness; improving institutions; restructuring sectoral, local and entrepreneur economies as well as technology innovations.

Decision No. 166/QĐ-TTg (approved by the Prime Minister and comes into force on January 21<sup>st</sup> 2014) on the implementation plan of the national strategy to protect environment towards 2010, with a vision towards 2030. The Decision promulgating the Decision 577/QĐ-TTg, Decision 1474/QĐ-TTg, Decision 1216/QĐ-TTg, etc.

Decision No. 2081/QĐ-TTg (approved by the Prime Minister and comes into force on November 08<sup>th</sup> 2013) approved the electrification program on rural, mountainous and island at the period 2013 - 2020.

Decision No. 577/QĐ-TTg (approved by the Prime Minister and comes into force on April 11<sup>th</sup> 2013) on approving the master plan for the environmental protection of trade villages by 2020 with vision to 2030. According to the Decision, pollution will continue to be comprehensively tackled in 57 seriously polluted craft villages listed by the Ministry of Natural Resources and Environment. By 2020, all establishments in residential areas engaged in paper, metal and plastic recycle or dyeing, cattle slaughter and other jobs seriously polluting the environment will be relocated to industrial parks and clusters.

Decision No. 1474/QĐ-TTg (approved by the Prime Minister and comes into force on October 05<sup>th</sup> 2012) on issuance of national action plan on climate change period 2012 - 2020. By this Decision, a list of 65 schemes, projects and tasks of the National Action Plan on climate change has been announced. The Decision mentioned on union development and efficiency, saving using energy resources, study and apply new technique for energy production from renewable and green sources.

Decision No. 1393/QĐ-TTg (approved by the Prime Minister and comes into force on September 25<sup>th</sup> 2012) stipulated on the National green growth development strategy. This Decision aims to re

duce the intensity of greenhouse gas emissions and promote the use of clean and renewable energy for the period of 2011 - 2020, with a vision to 2050.

Decision No. 1216/QĐ-TTg (approved by the Prime Minister and comes into force on September 05<sup>th</sup> 2012) stipulated on the National Strategy on Environment Protection to 2020, with visions to 2030. This Decision aims to control and minimize the increase of environment pollution, resource deterioration and biodiversity degradation; to further improve quality of the habitate; to raise the capability of responding climate change, striving for sustainable national development.

Decision No. 432/QĐ-TTg (approved by the Prime Minister and comes into force on April 12<sup>th</sup> 2012) stipulated on the Vietnam Sustainable Development Strategy for the 2011 - 2020. Sustainable and effective growth must come along with social progress and equality, national resources and environment protection, socio-political stability, firm protection of independence - sovereignty - unification and territorial integrity of the country.

Decision No. 2139/QĐ-TTg (approved by the Prime Minister and comes into force on December 05<sup>th</sup> 2011) stipulate on bring into play the whole country's capacity in simultaneously taking measures of adapting to impacts of climate change and cutting down greenhouse gas emission in order to secure people's safety and property as well as for the sake of sustainable development; strengthen people and natural systems' adaptability to climate change while developing a low-carbon economy in order to protect and improve quality of life, guarantee national security and sustainable development in the context of global climate change, and proactively work with the international community in protecting the earth's climate system.

Decision No. 1208/QĐ-TTg (approved by the Prime Minister and comes into force on July 21<sup>st</sup> 2011) approved the National Master Plan for power development in period 2011 - 2020 with the vision to 2030. The general objectives of this decision are efficient use of energy resources in the country in combination with import of primary energy for power production, supplying adequate power with increasing quality, reasonable price for socio-economic development; ensure the national energy security. The important issue from this Decision is to increase the share of electricity generated from renewable resources such as wind and biomass from 3.5% of total electricity generation in 2010 to 4.5% in 2020 and 6% in 2030.

Decision No. 1855/QĐ-TTg (approved by the Prime Minister and comes into force on December 27<sup>th</sup> 2007) approved the National Energy Development Strategy of Vietnam for the period up to 2020 with outlook to 2050. In this Decision, the Government encourages the development and use of new and renewable energy sources; provides financial support for the investigation, research, trial manufacture and establishment of pilot locations; and exempts for the import, production and circulation taxes.

#### 4 DISCUSSIONS

Although there are several legal provisions on the development of renewable energy in Vietnam, these provisions are unsystematic, insufficient and less supportive for promoting such development. At present, Vietnam has policies supporting types of renewable energy separately, for example supporting policies for projects on wind energy, biomass energy, and on solid waste energy. Nevertheless, there is no policy for general development of all existing sources of renewable energy. Therefore, the targets of 4.5% out of the national power system from renewable energy in 2020 and 6% in 2030 could be hard to achieve.

Nowadays, most of countries in the world have a great concern about renewable energy development. Particularly, European countries and the United States of America, the pioneers of renewable energy development with high ratio of renewable energy, passed single laws on renewable energy. In Asia, China early enacted a law on renewable energy giving a strong motive for development of renewable energy such as wind and solar energy in the country. It is obvious that the countries with highly effective use of renewable energy have clear and adequate legal policies for renewable energy, especially issuance of a single law on renewable energy with clear and specific provisions. Success of renewable energy projects is based mainly on capital recoverability, profitability and viability of the projects. A law that clarifies the government policies on renewable energy can give investors legal certainty for their investment and encourage them to invest in renewable energy projects. Thus, it is necessary to issue one single law on renewable energy in order to give legal certainty for investments and facilitate the development of renewable energy in Vietnam.

Together with the issuance of the law to promote renewable energy development and use, practical solutions should be taken into account. They can be

policy on sustainable cooperation between national level and regional one in expanding renewable energy market, promotion of application of new technology, and enabling the use of renewable energy in all key areas of energy market. In addition, it is important to make mid-term and long-term strategies and plans with clear targets of each development stage of economy under national technology programs in renewable energy to develop this energy source. At the same time, strengthening capacity building and human resource development in renewable energy technology and international cooperation in renewable energy technology training is needed to facilitate the development of renewable energy in Vietnam.

## 5 CONCLUSIONS

The demand for energy has been increased strongly in Vietnam. Renewable energy sources distributed 46% of supplied electricity, but mainly from hydropower source - which strongly effects by the out-source water discharge. This negatively affects the sustainable development of the country. In the meantime, the sources for renewable energy are rich and various in Vietnam, but the exploitation of these sources for renewable energy is limited partly due to the policy and law related. The law regulates the development of the whole energy sector and mainly focuses on the traditional power sources. At present, there is no single law for renewable energy.

In recent years, the Vietnamese Government has issued regulations focusing on each type of renewable energy such as wind, biomass and solid waste. This shows that the Government has awareness of this matter. Nevertheless, the present legal normative documents are still unappreciated in attracting investment in renewable energy as well as in developing renewable energy market in Vietnam.

To develop the renewable energy market meeting Vietnam's capacity and demand for energy, it is necessary to have more research on renewable sources. Based on the results of the research, the Government could make legal rules accordingly that are suitable and effective for each kind of renewable energy sources to attract investors to produce renewable energy.

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