


## APEC EGNRET

### Energy sector and Financing grid connected renewable energy in Viet Nam

Honolulu, Hawaii, March 30-April 3, 2009

**Vu Van Thai**  
Ministry of Industry and Trade  
Viet Nam



**VIETNAM**

Official country name: The Socialist Republic of Vietnam  
National Day: 2 September  
Capital: Hanoi  
Area: 331,689 square km

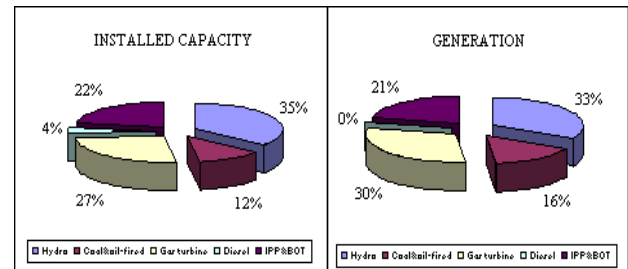
### General Information

- Viet Nam has an area of 331,689 km<sup>2</sup> and 3,260 km coastline. It has territorial waters with an area approximately three times larger than its mainland territory
- Viet Nam had a population of 85 millions. Current GDP per capita in 2008 \$US1050
- Market-oriented reforms since 1986; GDP grew at an average annual rate of 7.9 % over period of 1991-2005, target approved, in June 2006, by National Assembly 2006-2010: 7.5-8.0%.
- Viet Nam is endowed with diverse primary energy resources: Proven reserves of Coal are 3.88 bil.tons (potential 37 bil.tons), Oil - 615-957 mil.tons ( potential 2.3 bil.tons ), Gas - 600 bil.m3 (potential 1,300 bil.m3). Hydropower potential: 60-80 bil.kWh. Renewable energy and Uranium.

## Power Sector in 2006-2007

- **In 2006**, the total installed capacity operated by Viet Nam Electricity (EVN) and IPPs were 9,544 MW and 2,726 MW respectively, making a total of 12,270 MW, from which 37.5 % hydropower, 11.8 % thermal power (coal and oil-fired), 26.6 % gas turbine and 22.2 % non-EVN.
- The generation output was **58,914 bil. kWh**, of which hydropower generation 32.4 %, coal-fired & oil-fired 16.0 %, gas turbine 30.4 % and non-EVN 21.1 %.
- **In 2007** estimated total electricity production of EVN was **67,121 bil. kWh**, 13.7% higher that was in 2006 of which electricity bought from BOT and IPP was 19,338 bil. kWh, increased by 54.1%. EVN sold 58 billion kWh of electricity, an increase of 1.2 % over the yearly target and 13.4 per cent over 2006. The electricity sales helped bring in total revenue of US\$3.5 billion, up 22 %. Electricity consumed by production and household sectors was about 58.19 bil. kWh, of which consumption by industry sector increased by 17.5%.
- The National Power Grid has reached all of cities and provinces.

## Power Generation and Installed Capacity Mix by Source in 2006



## Domestic Primary Energy Supply

**Primary Energy Supply:** By 2010, about 47.5-49.5 million TOE and by 2020, about 91-100 million TOE, of which

**Hydropower:**

- About 35 billion kWh of hydropower in 2010, 60-65 billion kWh in 2020, and 70-80 billion kWh after 2020.

**Coal production:**

- Coal production will reach 35-40 million tons in 2010, 50-60 million tons in 2010, in which a portion is exploited in Khoai Chau (Hung Yen province), and coal production will be increased to 200 million tons in 2050.

**Oil and Gas:**

- The oil and gas production in the period 2006-2010 is about 25-30 million tons/year; 31-34 million tons/year in 2011-2015 and about 34-35 million tons/year in 2016-2015.

**Nuclear energy:**

The Government of Viet Nam has issued "Long term strategy on peaceful utilization of nuclear energy until 2020" as a Prime Minister Decision in January 2006, No.01/2006/QĐ-TTg, to start operation of the 1<sup>st</sup> plant by 2020

- **Renewable energy: the share of renewable energy: 3 % in 2010, 5 % in 2020 and 11 % in 2050.**

## Master Plan for Power Development

**The Master Plan for Nation Power Development during 2006-2015 with prospect to 2025 (MP No. VI), Decision No. 110/2007/QĐ-TTg dated 18-7-2007.**

- Meet the demand by socio-economic development of the country with annual GDP of approximately 8.5%-9% and higher during 2006-2010, the forecast of annual load demand growth rate at 17% (base scenario), 20% (high scenario) during 2006-2015, in which high scenario is defined to be scenario for management, the scenario of 22% annual growth rate is for unexpected growth.
- **Tariff to toward the market direction and to encourage the local and foreign investors to invest on power generation projects.**
- **Implement rural electrification, try to achieve 95% communes electrified by 2010 and 100% by 2015, 100% households by 2020.**
- National Steering Committee for MP VI was established in 2007: with a Deputy Prime Minister as Chairman and Minister of Industry and Trade as Vice Chairman.
- **Viet Nam will become a Net Energy Importing Country around 2015**

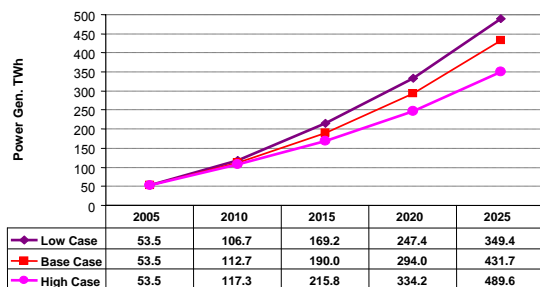
## Power Generation in MP No.VI

- Construct hydro power plants of integrated benefits such as: flood prevention, water supply, power production; the gas power shall be reasonably developed to ensure the efficiency; coal fired power plant development shall be intensified; **small hydro power plants and new and renewable energy shall be developed for remote, mountainous, bordering and island areas;**
- Ensure national energy security and sustainable development, effective exchange of power with countries in the region;
- Complete preparation for investment of nuclear power plant and submit to the PM for approval.
- Properly develop Power centers in various regions of the country to ensure the reliable supply of power locally and reduce the technical power loss in the national Grid as well as to ensure the economic efficiency of the projects, as contribution to the socio-economic development for each region in particular and for the whole country in general.
- Develop new power sources taking in to account those options of in-depth investment and renovation of technology in existing power plants; environment requirements; apply modern technology for new power plants.

## Mater Plan for Viet Nam Power Sector Development (MP VI)

Category	Unit	2005	2010	2020
<b>Electricity</b>				
Generation	TWh	53.4	113.0	294.0
Peak Load	MW	9,255	20,000	50,000
Installed Capacity	MW	11,577	27,000	62,000
500kV	km	3,179	5,000	9,000
	MVA	7,300	11,500	37,500
220kV	km	5,025	11,000	17,000
	MVA	14,765	32,000	86,000
110kV	km	10,290	20,000	-
	MVA	21,100	40,000	-

## ELECTRICITY DEMAND FORECAST



## National Strategic Program on energy saving & effective use

Decision No.79/2006/QD-TTg on 14-4-2006 for 2006 – 2015

### Targets:

- Saving 3 - 5% for the period of 2006-2010 and 5 - 8% for the period of 2011-2015
- Establishing models for energy management
- Populating high-efficiency equipment
- Implementation Building code (MOC)
- Energy Efficiency use in Transport Sector
- Complete national regulatory frameworks to EE&C (Energy Conservation Law, Financial Incentives, reasonable energy prices...) and details implementation plan.
- Awareness rising and capacity building at government, public, and private sector levels is very important in order to "create a demand" for energy efficiency and to the fast development of EE&C.
- Experience sharing is a key issue in energy efficiency and conservation implementation, receiving key information and technical assistant such as "the best practices in energy efficiency and conservation" from more advanced countries like Japan, EU, ASEAN.

## Electricity Saving Program

Decision No.80/2006/QD-TTg for 2006-2010

### Target:

- Raise the community's awareness of electricity saving and effective use.
- Ensure the electricity saving and effective use, security and stability electricity supply.

### General activities:

- Increasing public awareness
- Encouraging electricity efficiency in generation, transmission, distribution and end-user (government offices: saving at least 10% of yearly electrical consumption).
- Energy controlling model for energy saving for at least 40% key enterprises who consume much energy
- The consecutive 3-shift working plan among industrial enterprises which have Pmax/Pmin greater than 2.5 times,
- DSM: encourage using of electricity in off-peak hours ( from 22 to 4 am). In the case of power tariff for industrial use (more than 110 kV), tariff of peak hours is three times larger than off peak hours (excluding VAT).
- Instruction No.19/2005/CT-TTg dated 2/6/2005 by the PM on Power Saving.

## Electric Power Rate Policy

The electricity prices shall be so determined that

- Investors will get reasonable profits, saving energy resources, using renewable energies which don't make environmental pollution, contributing in socio-economic development, especially in rural, mountainous and island areas;
- Encouraging saving electricity and electricity efficiency;
- Implementing reasonable cross price subsidy between customer classes. Reducing and towards eliminating the cross price subsidy between production costs and electricity prices in residential sector, contributing in promotion of production and increasing competition of the enterprises
- Ensuring self determination rights on electricity buying and selling prices within the tariff schedules specified by the State for sellers and buyers in the electricity market.
- Ensuring legal rights and benefits of electricity units and electricity users.

*Decision 276/2006/QD-TTg dated 4/12/2006 by the PM on tariff shall be continued. Electricity tariff reform, in 2007-2010, is considered as the main method of the funding now. Step by step adjust electricity tariff in order to obtain long-run marginal costs to ensure sustainable development of the sector. 1-1-2008, average retail tariff shall be 842 d/kWh from 1/1/08 and 890 d/kWh from 1/7/08. From 1/3/2009 to increase 8% on average by PM decision.*

- From 2010, retail tariff shall be based on market price.
- Prices of IPPs shall be based on negotiation/agreement but shall not be 25% higher/lower than the approved tariff frame.

## Renewable Energy Use

- *Renewable Energy Use Relatively Lower against its Potential*
- The most basic use of renewable energy in Viet Nam is biomass for heat. Fuelwood, agricultural residue and animal waste are used as heat source of households. **Small hydro and biomass (bagasse...)** are used for power generation, though their generation in 2005 was only 265.57GWh, which was approx. 0.5% of the total power generation (51769.68GWh) in Viet Nam
- **In 2007, RE accounted for 2.1% of Installed Capacity of Power generation, including:**
  - Biomass: 1.127%
  - Small hydro: 0.921%
  - Wind: 0.009%
  - PV Solar: 0.008%
- The proportion of renewable energy use is low compared to the potential, although accuracy is not high in evaluating each energy resource.

## Small Hydro Power (SHP)

- No accurate number of SHP potential due to lack of data and cost estimation of the projects.
- Recently SHP plants have been built remarkably due to lower investment compared to other RE sources. Estimated 100,000 SHP plants with total capacity about 300MW are in operation.
- According to SHP (from 2 to - 30MW/plant) Master plan prepared by PECC1 SHP resources are concentrated in Lao Cai, Yen Bai, Ha Giang provinces in the North and Lam Dong in Central. Total capacity is 2,925 MW, production about 13,3 TWh, with average load factor of 0,52.

## Biomass Resources

Bagasse from 40 sugar factories is being used for production of heat and electricity with a capacity of co-generation 150 MW. In 2005, about 2,1 million tons of bagasse (370 kTOE) was used to produce about 300 GWh electricity.

- In 2007 the first land fill gas plant in Go Cat, Ho Chi Minh city was completed with 3 turbine, total capacity 2.4 MW, electricity sell to PC Ho Chi Minh at 754 VND/kWh. Estimated that this plant could produce 9,000 MWh/year until 2020. Other plants with total capacity of about 200MW land fill gas plants and city waste are under preparation.
- Viet Nam is an agricultural country, and there are huge amount of biomass resources such as bagasse, rice husk and rice straws. Most of biomass resources are used as heat source, and power generation is about 50MW. **Potential for power generation: rice husk 100-200 MW; sugar industry (bagasse): 200-250 MW; Others: 100-150 MW**
- Bio-Fuel is considered as the most possible measure of effective use of biomass resources.

## Wind Energy

- Currently only 1 MW of wind power plants are in operation. On Bach Long Vi island, a plant of 800 kW invested by the Government, started its operation in 2004 but now has to stop due to operational fault (not matching between wind speed and power demand load cure. A 30 kW plant provided by NEDO, Japan. In the end of 2008, AEROGIE.Plus company from Switzerland announced that it has been awarded a license of Vung Tau province to build a wind power plant with designed capacity of 7.5MW on Con Dao island which cost 20mil. Euro, to be put into operation in 2010.
- Wind energy potential is about 17,850 MW of which in the North 502, in the Central 8,803 and in the South 855 MW. At level of 60m over ground wind speed is about 6 m/s.
- *In BAU case until 2025 registered plant at good wind speed may have a total install capacity of 658,5 MW with production cost 1,226 – 1,891 VND/kWh.*

## Government Policies

Electricity Law (2005), Article 61 on investment in development of electricity in rural, mountainous areas and islands if investment is no profitable GOV has policy to support (i) on investment fund, (ii) interest of loan for investment and (iii) tax incentives.

**The Master Plan for Nation Power Development during 2006-2015 with prospect to 2025 (MP No. VI), Decision No. 110/2007/QĐ-TTg dated 18-7-2007: small hydro power plants and new and renewable energy shall be developed for remote, mountainous, bordering and island areas;**

Decision No: 1885/QĐ-TTg dated 27/12/2007 by Prime Minister approving Strategy on National Energy Development up to 2020, and outlook to 2050.

- Main contents of strategies related to promotion of RE development:
  - Encouraging study and use of RE, focus on remote mountainous, island areas, provides funding for survey, study, experimental processing and construction of model stations using RE; exempts import duties, production tax on dissemination of RE equipment and technology.
  - Strive to increase share of RE to about 3% of total commercial primary energy in 2010; 5% in 2020 and 11% in 2050.

Draft Strategy, Master plan on RE Development in Viet Nam for 2010-2015 with a vision to 2025 (Completed and submitted Government at the end of 2008 for approval)

## Renewable Energy for Power Generation

- The fundamental policy on the introduction and dissemination of renewable energy as power resource is now being formulated as a result that a long term renewable energy development targets as power source is set in the National Energy Policy.
- At present, there are **no specific incentives for renewable energy promotion** such as advantageous electricity purchase price for renewable energy and obligation of power producers to purchase/produce certain percent of electricity sold from renewable energy power. In addition, when the electricity market is established, which is planned to start from 2009 as part of the electricity sector reform, each power producing companies will be put in a competitive environment. **Because renewable energy power is less competitive in price than conventional power, the installation of renewable energy is expected to be low unless effective incentives.**

## Tax apply to Power plants using Renewable Energy

- Decree 124 dated 11 December 2008, which provides guidance on implementation of the new Corporate Income Tax (CIT) Law effective from 1/1/2009, investment in power plants projects is entitle the following tax incentives: The tax rate of 10% shall apply for 15 years as from the date of commencement of business operation. Within this period, exemption from tax will be granted for 4 years and a 50% reduction of the amount of tax payable for 9 subsequent years. Upon expiry of 15 years (CIT) at the normal rate of 25% has to be paid. **Power plants using renewable energy should enjoy these incentives.**

## Loans for Rural Energy Programs

In the past 10 years, most of Rural Energy programs have been financed from ODA, total loans is about 2 bil.\$US, such as Rural Energy (RE I and RE II) and Rural power Distribution (RD) of WB; rural electrification (VSRE) of SIDA, Sweden; SEIER of WB; Renewable projects are **focusing on off-grid ones**. WB has intention to provide ODA for RE III from 2011 for widen area off-grid .

**New loan of ADB for grid-connected projects and rural electrification** with total budget: 151mil.\$US (*Asian Development Fund-ADF, 32 years, grace period 8 years, interest rate 1-1,5%*),

- Financial Mechanism: apply current on landing terms and conditions (*on landing to EVN 7-27years 2,5%*). When needed special mechanism will be decided by Prime Minister.

## Possibility of Renewable Energy exploitation forecast

(Base case)

	2006	2020	2025
• Small hydro	255	1988	2454
• Biomass	157.7	380.7	395.7
• Biogas	0	11	12
• Solar	1.65	3.25	3.25
• Wind	1.5	443	493
• Geothermal	0	214.1	239.1
• Tidal	0	5	15
• Solid waste	2.4	47.4	97.4
• <b>Total (MW)</b>	<b>418</b>	<b>3093</b>	<b>3709</b>
• <b>(GWh)</b>	<b>1.830</b>	<b>13.192</b>	<b>15.980</b>
• <b>Investment capital will be needed about 300\$US/year</b>			

## Summary and Remarks

- Viet Nam is endowed with diverse primary energy resources such as: coal, oil, gas, hydropower, renewable energy-RE (small hydropower, biomass, wind energy, solar, geothermal...).
- Potential of grid connected RE is considerable. **Currently only about 2.3% is in use.**
- Encouraging study and use of RE, focus on remote mountainous areas, islands is indicated in Strategy on National Energy Development and in the Master Plan for Nation Power Development during 2006-2015 with prospect to 2025 (MP No. VI).
- But at present, Renewable energy power is less competitive in price than conventional power due to high investments cost and lack of, financial sources, fixed electricity retail tariff by the Government and cross sector / area subsidize... and **no specific incentives for renewable energy promotion** such as advantageous electricity purchase price for renewable energy and obligation of power producers to purchase /produce certain percent of electricity sold from renewable energy power...

## Summary and Remarks

- Renewable Energy and Electricity from RE always link with rural energy program and play an important role in rural electrification, especially off-grid projects.
- RE financial sources are mainly relied on ODA from international financial institutions and foreign assistance for rural energy in general with a portions for renewable energy.
- Financial mechanism for rural energy/renewable energy: Before 1986: almost 100% of budget from the Government (Central Planning Economy). After 1986 until around 2000: jointly financing by Government and people (cooperatives and individuals). Recently: Government (Central and Local) and Public utilities (mainly EVN) and private financing.
- Local investors from various sectors and foreign investors are encouraged to participate in development of power plants and power distribution networks with investment forms in accordance with the laws of Vietnam. Competent local investors are allowed to mobilize all kind of capital sources for investment of power plants and power network with the mechanism of self arrangement for financing and repayment (from MP No.VI).
- No clear separation of public obligation of utilities and their business activities: the Government may order EVN to build power / renewable energy and transmission/distributions facilities to supply energy to curtains areas defined by the Government base on the request of local government.

## Summary and Remarks

- Inaccurate Data on RE resources (wind speed higher 30m about ground, hydrological data for SHP...) is making difficulty for evaluation and planning programs, projects.
- No sufficient / Lack of Coordination between relevant ministries, provincial authorities in RE development.
- No large enterprises manufacturing and commercial companies supplying RE equipment and services are on place;
- **It is necessary and very important to have:**
- Relevant policy / legal frame work strong and efficient legislations and measures (renewable portfolio standards-RPS, feed-in tariffs, tax and investment incentives, power purchase agreement...) to promote RE in general and RE connected projects in particular.
- RE technology transfer and encouraging local manufacturing to reduce RE equipment

## Summary and Remarks

Sufficient awareness on RE technologies; Increase Local enthusiasm; Enhancing community's knowledge of social, environmental benefits of RE projects.

- Financing services and capability to assess possible loans from banks by local, private developers.
- Establishment of competitive power market with more layers such as public utilities namely EVN, PVPower, Vinaconmin, Song Da, Lilama, foreign and local IPPs, BOT and privates.
- Human resource development in RE.
- External support from international organizations financial institutions and other countries ....
- Encourage investment for renewable electricity by private sectors, cooperatives and entities.
- Invaluable experiences exchange with other countries including APEC member economies.