

ASIA ENERGY FORM 2005  
International Energy Security and Regional Cooperation in Asia

Long-term Energy Demand - Supply  
**Role of Renewable and Nuclear  
Energy in Viet Nam**

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# Current Energy Status

## Energy production in 2004:

-Oil Production : 20.4 mil.tons

-Gas Production : 6.332 bil. m<sup>3</sup>

-Coal Production : 25.2 mil.tons

-Electricity Generation : 46.84 bil.kWh

*(hydropower: 18.06 bil. kWh)*

-At present, Viet Nam exports crude oil and coal and imports petroleum products

▪ Crude oil export : 19.5 mil.tons

▪ Coal export : 10.5 mil.tons

Petroleum products' import : 10.9 mil.tons

# Energy Production Forecast

		<b>2010</b>	<b>2020</b>
Electricity	bil.kWh	95	203
Installed Capacity	MW	24,400	42,000
Coal Production	mil.tons	30-35	55-60
Oil & Gas Production	MTOE	27-30	27-30
Oil Export	mil.tons	1-2	1-2

(Note: annual growth of electricity will be approx. 15% until 2010 and 10% until 2020)

# Development Orientations

- Develop and use of diversified domestic energy sources, to meet the growing energy demand for economy development goals;
- Pay attention on ASEAN, APEC, GMS, bilateral and international co-operations;
- Apply appropriate measures to enhance national energy security;
- Promote energy efficiency; RE and Rural electrification
- Environment protection with long-term strategy for sustainable development;
- Formulate a competitive tariff, step-by-step establish energy market
- Formulate investment policies to mobilize capital resources; diversify use of investment schemes: BOT, BTO, JV, IPP
- Human resources development

## Development Orientations (cont.)

- Energy science and technology development
- Encourage implementation of CDM projects: RE, technology transfer Use of Clean Coal Technology
- Develop oil refineries step-by-step to meet domestic petroleum demand
- Study for feasibility; prepare technical, legal framework and manpower for the first nuclear power plant in 2015-2020
- Study for plan a national strategic oil stockpiling program
- Implement large-scale DSM and energy efficiency programs

# Renewable Energy and Uranium Resources

## A. Renewable Energy Potential

### Hydro power:

- technical potential : 30,000 MW, 120 bil. KWh,
- techno-economic potential: 60-83 bil. KWh.

**Small and micro** hydro power is estimated 1,000 MW and energy production: 4 bil. KWh ,

**Geo-energy:** 200MW

**Solar energy** : 43.9 bil. TOE/year, 150kcal/cm<sup>2</sup>, 2,000-2,500 hours/year

**Wind energy** 1400-800-500 kWh/m<sup>2</sup> yearly on islands; in Central highlands and costal areas; in others areas,

**Biomass** 43 - 46 mil. TOE/year,

**B. Uranium ore:** 218 , 000 tons U<sub>3</sub>O<sub>8</sub>

## Legal documents

**Policy on rural electrification**, Ministry of Industry in 2000

**Renewable Energy Action Plan(REAP)**, MOI, EVN and WB in 2001,

**Gov. Decree No. 102 on Energy Saving and Energy Efficiency**, issued on 3 Sept.2003. In Chapter 2 there are stipulations on selection, reasonable substitution of used energy resources in order to use energy more efficiently and promote use of RE resources for saving fossil energy resources such as anthracite coal, oil.

**Inter-governmental Circular** is being drafted to provide guidance for implementation of the Decree and EE&C fund

# Electricity Law

**Electricity Law** was passed by Viet Nam National Assembly on 3 December 2004, effective from 1 July 2005 is

to (a) attract domestic and foreign investments; (b) ensure equality and fair competition in electricity production and trade; and (c) defend legal rights and benefits of electricity consumers. The competition in electricity generation will be encouraged in order to increase total installed capacity;

to improve legislation and establish stronger legal framework for electricity activities, especially for rural energy, electrification. Article 61 on investment in development of electricity in rural, mountainous areas and islands if investment is not profitable GOV has policy to support (i) investment fund, (ii) interest of loan for investment (iii) taxation incentives.



# Government Policy on RE

RE must be developed taking consideration of social, economic, environment awareness, in particular ecosystems, focusing on new and RE application in off-grid rural and remote areas,

- 100% tax exemption for equipment importation applying new and RE technology
- Provide support to RE projects based on average family incomes in rural and mountainous areas
- apply biogas digesters to solve environmental problems and fuel supplying
- Promote solar photovoltaic, water boiling in remote area Promote wind energy in mountainous and peninsular areas that are off grid.
- Small hydropower:
  - Priorities given to micro (<1kW) and small (1kw to 30 kW) hydropower for remote areas and off grid areas
  - Provide financial support for studying, surveying, planning, equipment manufacturing and worker training.

## Government Policy on RE (Draft Energy Policy)

- Give priority to RE, aimed at increasing to about 2% (equivalent to 900 thousand TOE), 3% (3 million TOE), and 6-7% (22 million TOE) of total commercial primary energy by 2010, 2020 and 2050 respectively. Generation projected to have 3%, 5% and 10% using RE in their total capacity by 2010, 2020 and 2040 respectively.
- Encourages exploitation and use of RE; provides funding for survey, study, experimental processing and construction of model stations using RE; exempts import duties, production tax and dissemination of RE equipment and technology.
- Accelerate the rural and mountainous energy program; increase the number of rural households (RH) using com. energy for cooking from 30% at present to 50% and 80% by 2010 and 2020 respectively; aim to reach 90% and almost 100% of the total RH having access to electricity by 2010 and 2020 respectively.

# Methods to diminish barriers in RE development by REAP

## **a- Assistance in Development of Policy Instruments, Decrees and Regulations**

### **b- Assistance in Financing**

Assistance in capital mobilization and other assistance are needed to establish and operate renewable energy fund in order to help investment in renewable electricity projects. It is necessary to have laws, transparent operation procedures to monitor and evaluate responsibilities of fund management.

To create good conditions to approach commercial credits via partly credit-guaranteeing mechanism and have appropriate resources in terms of level, amount and mechanisms for Gov. subsidy for rural electrification with RE, for commune power grids and stand-alone power systems.

Proposed financial incentives: VAT and income tax reduction, depreciation increase, reduction of tax or credit interest rate for these investments. Simplify procedures, treated equally

## Methods (cont.)

### **c- Technical Assistance**

### **d- Assistance in labour source training**

Supporting Provincial People's Committees (PPCs) in implementing Plan of RE Development as a part of their rural electrification plans. Training courses for local staff to improve their skills.

### **e- Assistance in providing information and improving awareness**

Building awareness for Gov. officials, financial and business communities and public about RE.

Adding and updating data of renewable electricity sources potential as well as market demand to be basis of a national program of renewable electricity development.

Issuing necessary regulations of close coordination among MOI, EVN, PPCs and RE project investors, EVN has responsibility for providing data of plan and amount of communes electrified.

Enhancing community's knowledge of social, environmental benefits of RE projects.

# Policies on Energy Saving (ES)

## Policies of Financial Aid

- Equipment, devices imported for ES, products in list of energy saving products encouraged to import or manufacture are given priority of taxes suited with laws.
- Enterprises, which have projects of investing and manufacturing ES products or importing new technology manufacturing lines to save energy or exploiting R. El. sources, will be considered to get medium or long-term loans from Dev. Support Fund or Science and Technology Development Support Fund.
- Enterprises which implement ES&EE methods will get reward according to the regulations on financial management.
- Supporting research, development and application of ES&EE technologies that tested and certified as efficient in practice.
- Proposing loan mechanism and giving guidance for implementing financial policies in order to encourage use of ES&EE techno-s.
- Research and apply suitable energy tariff in residential sector with objective to promote energy conservation.

## Some Major Activities

- The National Energy Policy submitted to Government for approval,
- Strategy for Electricity Sector development in 2004-2010 with consideration for 2020, approved by the Gov. on 5-10-2004,
- Publishing Electricity Law, effective from July 2005; Decree on the Law implementation guidance, August 2005,
- Establishment of Electricity Regulatory Authority in November 2005

### *Next steps:*

- to implement a Roadmap for step-by-step establishing power competitive market in Viet Nam
- preparing the 6th Master Plan for Power Development,
- preparing an Energy Master Plan,

# Activities and documents related to nuclear power program in Viet Nam

- Study on necessity and possibility of nuclear power plant (NPP) introduction in Viet Nam (1995-2001),  
Nuclear power plant site finding; survey and investigation on nuclear power plant sites,
- Study on nuclear power plant technology; nuclear safety and radiation waste of NPP,
- Nuclear technology comparison, technology option for Viet Nam (preliminary study),
- Pre-Feasibility Study on first nuclear power plant (2002-2004)
- Study on Nuclear Laws: Basic Nuclear Laws for Viet Nam,
- The Strategy for Electricity Sector development in 2004-2010 with consideration for 2020, approved by the Gov. on 5-10-2004, stipulates: *“To continue exploration, study, preparation conditions for construction of Nuclear Power Plant (after 2015) ensuring absolutely safety in use to diversify energy resources”*.
- Electricity Law.

## Environment issue

Viet Nam Ratified UNFCCC on 16/11/1994 and Ratified Kyoto Protocol on 25/9/2003.

- Evaluate potential CDM in Viet Nam
- Based on greenhouse gas emission projection: Develop and assess greenhouse gas emission mitigation options in 3 main sectors: Energy, Agriculture (reduce CH<sub>4</sub>), Forestry and land use change (increase carbon sink)
- Identify capacity development needs for institutional arrangement and CDM implementation in the country.
- Develop CDM project portfolio in energy sector.
- MOI Research (2002-2004) entitles "Assessment of GHG reduction potential in energy activities in Vietnam" use of RE to substitute fossil with CDM projects; selecting methodologies for determining baseline of emission for grid connected or off-grid renewable power projects, Bundling Small-Scale CDM Projects such as biomass, wind, solar, SHP projects are considered and proposed in the study.



# Environment with Nuclear Power Plant

## With NPP

- NPP has less CO<sub>2</sub> emission compare to using coal fired PP  
( thousands tones):

	<i>2020</i>	<i>2030</i>	<i>2040</i>
CO <sub>2</sub>	16223.5	28315.7	80614.5
SO <sub>x</sub>	111.4	186.2	548.7
No <sub>x</sub>	51.4	86.7	253.7

Potential of CO<sub>2</sub> trading by CDM ( from 32–210 Mil. USD 2-13 \$US / ton of CO<sub>2</sub> )

## Without NPP

- A coal fired plant with capacity of 2500MW, consumed 6,3 Mil. Tones/year could emit 16,2 ton of CO<sub>2</sub> by 2020,
- By 2030 an additional 28,3 tones CO<sub>2</sub> and 80,6 tones CO<sub>2</sub> 2040 if construct only imported coal fired power plants

## Some results of Pre-FS of NPP in Viet Nam

- Pressurized Water Reactor, Boiled Water Reactor and Heavy Water Reactor are technology options. Light water reactors has got more points.
- First NPP with capacity of 2 x 1000 MW in Ninh Thuan province, Phuoc Dinh commune
- 2 sites suitable for NPP construction are Phuoc Dinh and Vinh Hai, Ninh Thuan province, suitable for 4 units of NPP,
- First nuclear power plant: in Viet Nam nuclear power plant: in Viet Nam around 2017-2020
- Human resources for NPP project, construction and operation are urgent problem if Viet Nam develops NPP
- Radwaste sites will be investigated in the near future

# Main Issues in NPP Development

- *Good international relationship,*
- *Political and economical stability,*
- *Current high growth of economy, science and technology will promote NPP technology transfer and technology self-reliance*
- *Rather good human resource potential for industrial technological and NPP development*
- *Difficulty in financial arrangement for NPP construction,*
- *Industrial disciplines and safety culture of Vietnamese are not yet suitable for NPP development;*
- *Low level of infrastructure development, institutional and legal framework, etc.; Public acceptance,*

# NPP in Power Generation Mix by 2020

<b>Power Plant type</b> (%)	<b>Total capacity, MW; (%)</b>	<b>Production, TWh;</b>
<b>Hydro, pump-storage</b>	16 100; (40,6%)	58,4; (29,0%)
<b>Gas fired</b> (gas demand: 15,9 bil.m <sup>3</sup> imported gas ~ 1,6 bil. m <sup>3</sup> )	12 300; (31,0%)	78,0; (38,7%)
<b>Coal fired</b> (coal demand: 15,2 tr.tấn)	5 600; (14,1%)	33,9; (16,9%)
<b>Imported electricity</b>	3 700; (9,2%)	17,1; (8,5%)
<b>Nuclear PP</b>	<b>2 000; (5,0%)</b>	<b>13,9; (6,9%)</b>
<b>Total</b>	<b>39 700 (100%)</b>	<b>201,3 (100%)</b>

# International Cooperation

Continue cooperate in ASEAN, ASEAN+3, APEC and GMS energy cooperation activities:

- Trans ASEAN Power Grid and Gas Pipeline Projects,
- ASEAN+3 energy cooperation activities,
- APEC Energy Security Initiative,
- APEC Joint Oil Data Initiative,
- GMS Power Grid Interconnection and Power Trade,
- ACMECS (Viet Nam, Thailand, Laos, Cambodia, Myanmar)
- Cooperate with neighbouring and other countries
  - Power Interconnection with PR. China, Lao PDR, Cambodia,
  - European countries in RE, DSM...
  - WB, ADB in Rural Energy, Power system efficiency improvement, development of transmission systems ...

# Cooperation in NPP Development

Need for international and regional cooperation and assistance:

- Human resources development,
- Legal frame work, law and regulations,
- Development strategy,
- Feasibility study,
- Safety,
- Basic facilities for nuclear science and technology,
- Uranium exploration and Fuel supply,
- Waste management,
- Environment protection,
- Public acceptance,
- Policy for localization of equipment...

## Some Training topics

- Nuclear power laws, ordinances, and regulations on safety, law on compensation for nuclear damage legal regulations for smooth execution of laws, institutions, examinations, inspections of NPP construction and operation
- Overall structure of international cooperation for ensuring peace, IAEA, international nuclear inspection, nuclear protection, bilateral agreement;
- Public acceptance, financing of nuclear power plants;
- Institutions for promoting peaceful use and ensuring safety of nuclear power generation (for construction sites, checking reactor type, construction work, environmental assessment, and during fuel handling...) to have competent staff to review and appraise FS, evaluation tender document, to check and issue liaison for nuclear power plants....

## Conclusion

RE has not been well developed due to: lack of policy and institutional framework at national level, especially lack of financial mechanism: incentive pricing/taxation for RE and clean energy. Development necessary legal framework and policy for stronger promotion of RE is very essential;

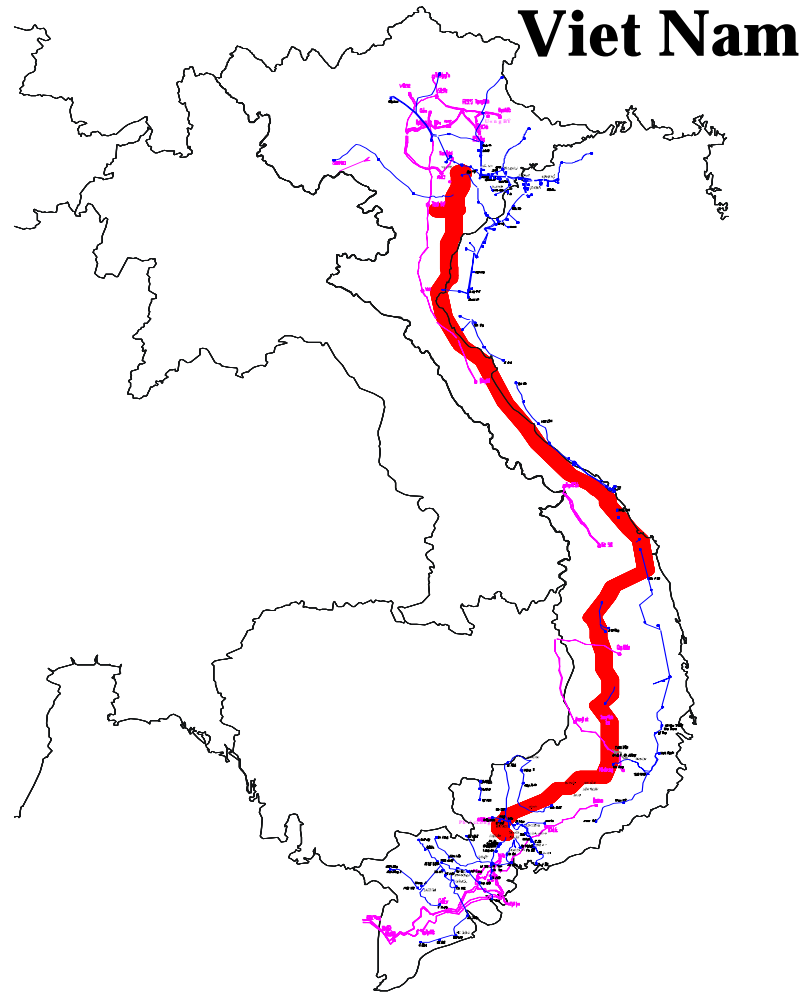
Viet Nam maintains high economic growth therefore stable energy supply, development and diversification of new energy resources, effective management and use of energy, application of advanced technologies for RE and EE&C, CDM, DSM... could be considered as effective technological measures to abate GHG emissions and are priorities in the energy sustainable development program of Viet Nam.



## Conclusion (cont.)

- Development of Nuclear energy and NPP for peaceful use is considered as an option for long-term energy development and energy security measure for Viet Nam,
- Renewable energy could be a good additional clean energy source for sustainable development,
- International and Regional cooperation is a key factor for successful energy development, especially for the first nuclear power plant in Viet Nam,

# Thank You for Your Attention !



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