



**Asia-Pacific  
Economic Cooperation**

**PEER REVIEW ON ENERGY EFFICIENCY IN VIET NAM**

**Final Report**

**Endorsed by the APEC Energy Working Group**

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## PREFACE

According to the guideline on APEC Peer Review on Energy Efficiency (PREE), the objectives of the APEC PREE, endorsed by APEC leaders at their 2007 meeting are to:

- share information on energy efficiency performances as well as on policies and measures for improving energy efficiency;
- provide opportunities for learning from other APEC member economies' experiences and for broadening the network among energy efficiency policy experts;
- explore how energy efficiency goals on an overall and/or sectoral basis and action plans could be effectively formulated in each APEC economy under review, taking into account the diversity of possible strategies that could be used, according to the circumstances of individual member economies;
- monitor progress toward attaining energy efficiency goals on an overall and/or sectoral basis and implementing action plans, if such goals and action plans have been already formulated at the time of the review;
- provide recommendations for voluntary implementation on how implementation of action plans could be improved with a view to achieving energy efficiency goals.

Two activities are undertaken as part of the PREE, namely:

- (a) **Peer Reviews** of volunteer member economies.
- (b) **Compendium** of energy efficiency policies of the APEC member economies based on either APEC voluntary PREE or Energy Efficiency aspects of the IEA Energy Policy Review.

This report presents the result of a peer review on energy efficiency in Viet Nam. Viet Nam volunteered to undertake a peer review and this was the third review of an APEC economy undertaken the PREE.

The primary accountability for each individual peer review is shared by the APEC economy being reviewed and the review team. The peer review in Viet Nam was conducted by a review team of nine experts (see Appendix A, page 52) who visited Viet Nam from 8 to 12 June 2009. During the visit, the team attended comprehensive presentations and discussions on energy efficiency with Vietnamese representatives and experts from various government sectors and private & state companies (see Appendix B, page 53).

The review team wishes to thank all the people who made presentations and spent time for discussions with the team members, especially the representatives of the government from Ministry of Industry and Trade who organized the efficient meetings and benefit visit.

## **EXECUTIVE SUMMARY**

Since 2006, the Viet Nam government has strengthened the policy framework on energy efficiency improvement of various end users in the economy. A number of legal documents covering the planning and implementation of energy efficiency policy and program has been approved and enforced by the government. In this regard, the Viet Nam government has also strengthened the institution for energy efficiency improvement by creating a special agency named Energy Efficiency and Conservation Office (EE&CO) under the Ministry of Industry and Trade (MOIT) This agency is tasked to formulate, develop and implement energy efficiency and conservation policies and programs.

As the part of energy efficiency improvement strategy, the government of Viet Nam developed and launched a comprehensive national energy efficiency and conservation program called the Viet Nam National Energy Efficiency Program (VNEEP). The VNEEP layouts energy efficiency programs up to 2015. In addition, to coordinate and monitor the implementation of VNEEP programs, which involves various government agencies, a national steering committee chaired by the Minister of MOIT has been established. The National Steering Committee comprises members are the Ministry of Construction (MOC), the Ministry of Transport (MOT), the Ministry of Science and technology (MOST), the Ministry of Education and Training, Ministry of Culture and Information, Ministry of Planning and Investment, Ministry of Finance, Ministry of Justice and the Union of Viet Nam Association of Science and Technology.

The review team welcomed the initial achievements of energy efficiency activities generally and particularly the implementation of National Energy Efficiency Programs. However, the team identified that there is a gap between the planning and the implementation of energy efficiency improvement programs. One of the main reasons for the gap is because of lack of information and data to establish an effective monitoring and evaluation system for the energy efficiency improvement strategy and programs. Besides that, focus of energy efficiency programs among agencies is not aligned into achieving the greater objectives of energy efficiency improvement strategy in the economy.

To enhance further the Vietnamese government's efforts on energy efficiency improvement in the economy, the review team made a number of recommendations covering:

- Energy efficiency related to institution;
- Energy efficiency goals and strategy;
- Energy data collection and monitoring;
- Energy efficiency in the industry sector;
- Energy efficiency in the electricity sector;
- Energy efficiency in the residential and commercial sector;

- Energy efficiency in transport sector;
- Energy efficient appliances and equipment;
- Energy efficiency related research and development.

## RECOMMENDATIONS

### INSTITUTIONAL CONTEXT

**Recommendation 1** (page 30). Viet Nam should adopt and enact the Draft Law of Energy Conservation and Efficient Use including the article regarding responsibilities of State management as early as possible which should provide relevant ministries and organizations with legal basis for clear responsibilities and with stable and sufficient financial and human resources to develop and implement effective long term energy efficiency policies.

**Recommendation 2** (page 31). The Government of Viet Nam should start inter-ministry energy efficiency policy coordination at Ministerial level by establishing Ministers' meeting on energy conservation and efficient use of energy under the leadership and chairpersonship by the Prime Minister. The Ministries in the national government, People Committees of provinces and cities and the organization relevant to energy efficiency policies should more closely exchange of data and analysis on energy efficiency policy implementation as well as energy efficiency policy proposals.

### ENERGY EFFICIENCY GOALS AND STRATEGY

**Recommendation 3** (page 33). The Government of Viet Nam should integrate sectoral-based energy efficiency goals that relate to the national aspirational goals specified for the overall economy.

**Recommendation 4** (page 33). The Government of Viet Nam should develop a national communications strategy to keep the aspirational goals in front of the people and enterprises in the country during the timeframe envisioned for the components and programs. In addition, it should develop an energy efficiency educational program for children, from kindergarten through high school, as well as a university based energy efficiency educational program.

**Recommendation 5** (page 33). The Government of Viet Nam should develop a clear and concise "roadmap" detailing how each of the six components will contribute to, and converge upon, meeting the national aspirational goals.

**Recommendation 6** (page 34). The Government of Viet Nam should coordinate actions and efforts of each of the leading Ministries in order to ensure that an integrated and effectual common program management pathway will rapidly emerge and guide the desired energy efficiency transformation of the energy industry.

## ENERGY DATA COLLECTION AND MONITORING

**Recommendation 7** (page 34). The Government should establish an Energy Database Center including the Energy Efficiency team to encourage collection of data required for establishing energy efficiency indicators and monitoring improvements in energy efficiency. In addition, an energy efficiency data and monitoring system covering all sectors included decisions on financing should be established to overcome the lack of energy data, particularly end-use data at subsector level.

**Recommendation 8** (page 35). It is necessary to designate major industries and enterprises in the list for the designated statistics on energy and legally oblige them to report based on the Laws of Energy Conservation and Efficient Use or Viet Nam Statistics.

**Recommendation 9** (page 35). MOIT and EE&CO should evaluate capacity of EE related to organizations in Viet Nam and assign a lead role for M&E to a well-qualified organization. This could be a different organization from the one collecting general energy data.

**Recommendation 10** (page 35). MOIT and IE to address the importance of EE M&E to any ongoing project, e.g. the JICA study on Energy Efficiency Master Plan, and ensure that development of M&E roadmaps is included in the report.

## INDUSTRY SECTOR

**Recommendation 11** (page 37). The Energy Efficiency and Conservation Office of the Ministry of Industry and Trade (MOIT) should formulate EE&C programmes that have targets which are specific, measurable, achievable and time defined. The amount of energy/demand savings that should be achieved by a particular programme should be defined and the time period to achieve it should be clearly stated. The achievements of the programmes should also be measurable, by having studies done both before and after a particular programme is implemented.

**Recommendation 12** (page 37). As audits are almost always a prerequisite for EE&C projects to be implemented in a particular installation/premise, it is important for MOIT together with related agencies, such as the Universities, to:

- i. Build up capacity for personnel who can conduct industrial energy audits. This could also include developing local energy service companies (ESCOs) both in terms of their numbers and their capabilities. This will subsequently enable more EE&C programmes to be undertaken in a commercially viable manner.
- ii. Provide, for a limited time, free or subsidised energy audits, especially for small and medium enterprises (SMEs). This will enable more audits to be done and EE&C measures being implemented. The results can then be publicised and more consumers

may undertake such audits, even without the subsidies, once the general usefulness of such audits can be clearly demonstrated and appreciated.

**Recommendation 13** (page 37). To assist consumers with limited funds for EE&C projects, MOIT with the assistance of the relevant governmental agencies, may have:

- iii. Some public funds being parked with commercial financial institutions to allow for soft financing to implement EE&C measures recommended by energy audits. This may be especially important for SMEs.
- iv. Awareness programmes for financial institutions on the financial viability of EE&C programmes. This will make them more amenable to provide finance for EE&C projects.

**Recommendation 14** (page 38). MOIT should formulate and enforce legal provisions to make energy management mandatory for designated consumers. At the very least, the appointment of energy managers and regular reporting on energy management activities should be made mandatory.

**Recommendation 15** (page 38). MOIT should initiate and maintain energy intensity benchmarking for industrial sub sectors. This can be made easier if the GSO is requested to obtain energy consumption and industrial output statistics from concerned enterprises, if possible on-line, as part of their normal reporting mechanism. With such benchmarking, a particular industrial enterprise can determine its own position in terms of energy efficiency with respect to the best practice nationally or even internationally.

**Recommendation 16** (page 38). MOIT may look into providing technical support to enable local manufacture of energy efficient equipment and appliances. This will enable such equipment or appliances to be made available locally, possibly at a cheaper cost.

**Recommendation 17** (page 39). MOIT should communicate large energy intensive enterprises to deepen their on-going energy management efforts corresponding EE&C National Programs such as,

- Make effective involvement of executive managements
- Set high priority to improve EE&C among management issues
- Check and monitor energy consumption and EE benchmarks regulatory
- Report energy consumption and effective benchmarks to relevant official agencies
- Develop EE&C master plans director and committed by executive managements
- Make all employees aware for effective and smart use of energy
- Visualize energy consumption and EE benchmarks for all employees
- Train engineers to obtain relevant technologies and knowledge for better EE&C

**Recommendation 18** (page 39). MOIT should encourage large energy intensive enterprises to plan appropriate process integration at capacity expansion for better energy efficiency.

Promote energy intensive industry enterprises to introduce best available technologies for better EE, environment and production cost-effectiveness at capacity increase or renovation using effective financial and legal incentives, energy price scheme to accelerate these efforts.

## **ELECTRICITY SECTOR**

**Recommendation 19** (page 42). MOIT need to develop a suitable mechanism strategy for enhancing private sector participation on power plant development. MOIT also needs to continuously review energy pricing policy to reflect real costs of energy supply towards more market approach (electricity tariff in particular).

**Recommendation 20** (page 42). The Electricity of Viet Nam should improve the existing power plant efficiency by implementing the most efficient power plant .

**Recommendation 21** (page 42). The Electricity of Viet Nam should establish a long term energy development program for reducing T & D losses (for instance, for the period 2010-2020).

**Recommendation 22** (page 44). ERAV should improve load research activities so as to identify proper DSM measures.

**Recommendation 23** (page 44). EVN's management should reflect priority of DSM/EE implementation in EVN's organizational structure, e.g. having a separate implementation unit.

**Recommendation 24** (page 45). MOIT and EVN should investigate a sustainable funding mechanism for DSM implementation, e.g. setting a DSM fund with contribution from electricity tariff or placing a levy on the revenue of electricity distribution companies to be used to fund energy efficiency programs.

## **COMMERCIAL AND RESIDENTIAL SECTOR**

**Recommendation 25** (page 46). It is recommended that MOIT should:

- Develop sub-sector level data on residential energy end-use by appliance to aid energy efficiency analysis in building energy use sector.

**Recommendation 26** (page 46). The MOC should:

- Set a priority in capability building in order to expedite implementation and enforcement of the Building Energy Code as well as to effectively pursue the energy efficiency programs for buildings and construction industry.

- Prioritize and set out the time frame of their projects for their energy efficiency program.

## **TRANSPORT SECTOR**

It is recommended that Vietnamese government should:

**Recommendation 27** (page 47). Enforce fuel economy standards and labelling on new vehicle fleets entering the market.

**Recommendation 28** (page 47). Formulate a tax system for vehicle fleets which promotes transport energy efficiency, reduce congestion and abate environmental pollutions.

**Recommendation 29** (page 47). Develop a comprehensive roadmap for sustainable transport system which includes integrated traffic planning, mass transit infrastructures development and improvement and vehicle fleets energy efficiency improvements.

**Recommendation 30** (page 47). Develop a database for transport sector including fuel consumption and data for new and advanced vehicle (electric, hybrid, fuel cell, etc.).

## **APPLIANCES AND EQUIPMENT**

The following recommendations are proposed to the Vietnamese government:

**Recommendation 31** (page 49). Enforce the minimum energy performance standards (MEPS) and the energy performance labelling as a mandatory requirement for the designated equipments in the legal documents (Laws, Decree, etc). Experiences in other countries have shown that mandatory MEPS is the key underlying sustained appliances and equipments efficiency improvements over time.

**Recommendation 32** (page 49). Integrate and strengthen planning and implementation of the MEPS and labeling programs. The roles and responsibilities of all involved agencies identified with clear actions and deliverable targets.

**Recommendation 33** (page 49). Monitor and evaluate the effectiveness of energy-efficient appliances and equipments programs closely with market data. For this purpose, energy-efficient appliances and equipments sales data could provide good understanding of the market behavior and also would identify proper interventions to be needed by the government.

**Recommendation 34** (page 50). Review periodically (3-5 years) the list of the designated equipments or priority of appliances and equipment to be included in the national energy efficiency promotion programs/projects.

**Recommendation 35** (page 50). Provide appropriate incentives which guaranteeing a specific level of support to different energy-efficient appliances and equipments based on life-cycle cost benefit principle. For example, sales tax and import duty exemptions for the five-star rated air-conditioner models in the market.

**Recommendation 36** (page 50). Develop human capacity and technical needs by providing relevant trainings, international cooperation, and technology transfers.

## **ENERGY EFFICIENCY RELATED R&D**

The following recommendations are proposed to the Vietnamese government:

**Recommendation 37** (page 51). Incorporate energy efficiency improvements R&D efforts in The National Science and Technology Plan. The plan should address comprehensively the R&D needs for energy efficiency improvements such as human capital needs, budget allocation, partnership between government sector and private sector in R&D, and prioritization of various energy efficiency improvements R&D.

**Recommendation 38** (page 51). Synergize R&D efforts with the existing energy efficiency improvement programs.

**Recommendation 39** (page 51). Focus R&D efforts on applied-science where Viet Nam has comparative advantages and will support sustainable energy efficiency improvements and spur innovations.

**Recommendation 40** (page 51). Facilitate industry-academia tie-ups; with suitable funding mechanisms to enhance technology development initiatives that could help increase energy efficiency improvement initiatives in the industry.

## **PART 1: BACKGROUND INFORMATION**

This part of the report was contributed by Viet Nam and includes basic information on energy consumption and the main institution associated with energy efficiency in the economy. The main purpose of this part is to provide the reader with the context within which the review team based its recommendations.

The first section in this part shows the aspect of energy consumption. The second section includes a description of the energy efficiency institution, their current policies and objectives as well as energy efficiency programs.

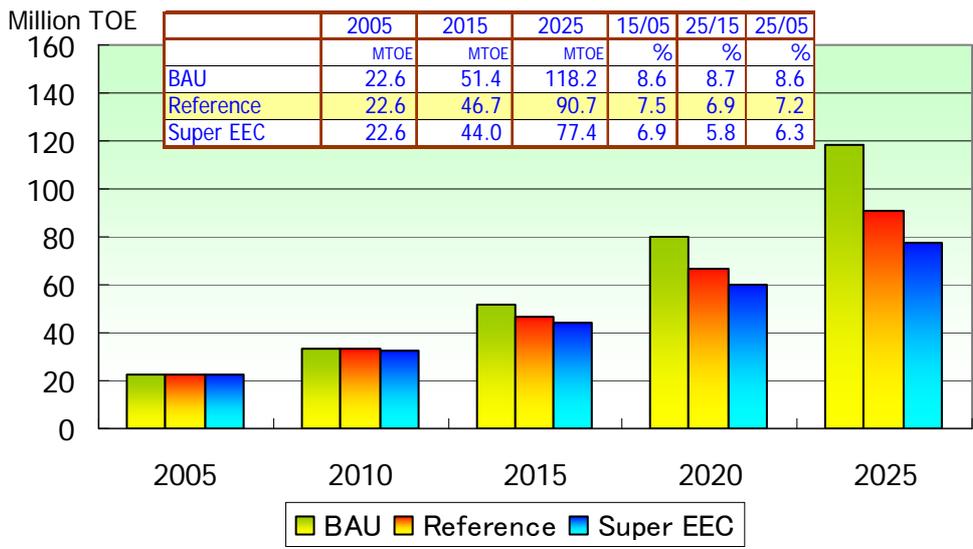
## **1. STATISTICS, FORECASTS AND TRENDS IN ENERGY CONSUMPTION**

In 2005, the total final energy consumption was about 21.8 Mtoe, and the annual average growth rate for the period 1990-2005 reached 11.6%. During the same period, electricity consumption recorded annual 14.2% growth, while oil and gas consumption 11.4% and coal consumption 11.6%. Compared to the GDP annual growth rate (7.55%), the GDP elasticity was 1.9 for electricity, 1.5 for oil and gas and 1.5 for coal, which may be deemed to be very high.

In the energy consumption mix by sectors, industry sector shared 44.0%, transport sector 29.7%, residential sector 16.2%, service sector 7.7% and agricultural sector 2.4%. In the energy consumption mix by energy sources, petroleum products shared 51.5%, coal 27.4%, electricity 17.5% and natural gas 3.6%. The share of power consumption over the total final energy consumption was 17.5%. It is a little bit low, but almost at the same level compared with other Asian economies.

The average primary energy consumption per person was 360kgOE/person in 2005, and the final energy consumption was 264kgOE/person. This figure was about 1/5 of the world average.

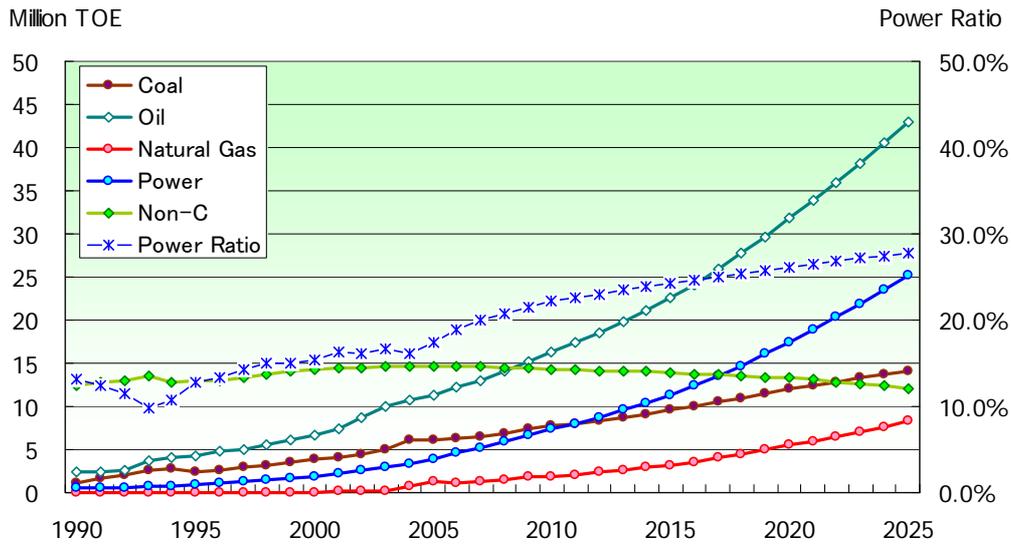
With high economic development, Viet Nam is coming into the stage to require substantial amount of material and energy to construct the nation, develop socio-economic infrastructure and improve living standard. Because of this, energy demand would grow faster than GDP and its GDP elasticity exceeds 1.0. The same phenomena were seen in the past during the development process of Japan and Korea. However, to realize sustainable development under the circumstance that the world energy supply is turning tighter as the energy demand by emerging countries with mega population such as China and India growing fast, it is necessary for Viet Nam to establish its development strategy that makes it possible to avoid the situation that energy demand increase would become serious constraints.



**Figure 1 Outlook of Final Energy Demand** (National Energy Master Plan, Viet Nam, 2008)

Energy consumption will increase in every sector of the economy such as fuel consumption for power generation to accommodate the increasing electricity demand, industrial fuel reflecting economic growth, energy consumption of the residential and commercial sector induced by modernization of life, motor fuel with expanding car ownership.

Along with modernization, electricity and oil become to share the core part of energy demand, and the electricity ratio over the commercial energy demand will steadily increase. Gas demand will also increase as it is clean and convenient to use. Coal consumption will also increase in the industrial sector, while it may decline in the household sector. The non-commercial energy currently sharing 1/3 of the energy consumption would not decrease in absolute volume, but will sharply decrease its share.



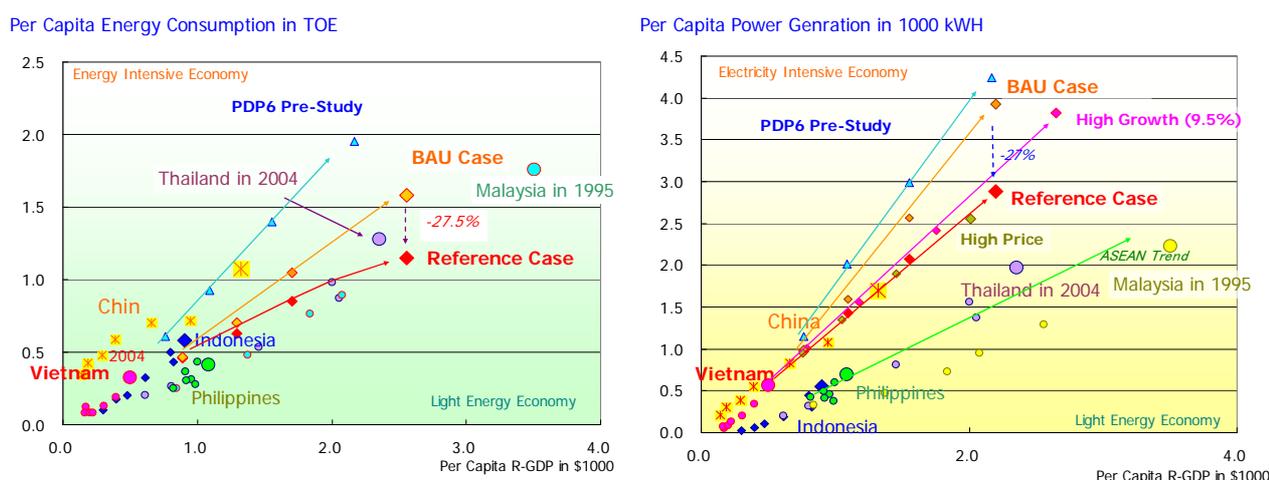
**Figure 2 Final Energy Demand by Energy Type** (National Energy Master Plan, Vietnam, 2008).

**Table 1 Final Energy Demand Outlook** (National Energy Master Plan, Vietnam, 2008)

	2005	2010	2015	2020	2025	15/05	25/15	25/05
	MTOE	MTOE	MTOE	MTOE	MTOE	%	%	%
Coal	6.1	7.7	9.6	12.0	14.1	4.5	4.0	4.2
Oil (incl. LPG)	11.3	16.2	22.6	31.8	43.0	7.2	6.6	6.9
Natural Gas	1.3	1.9	3.2	5.5	8.3	9.8	10.0	9.9
Electricity	3.9	7.4	11.4	17.5	25.2	11.2	8.3	9.8
Commercial Energy	22.6	33.2	46.7	66.9	90.7	7.5	6.9	7.2
Non-Commercial	14.7	14.3	13.9	13.3	12.1	-0.6	-1.4	-1.0
<b>Total</b>	<b>37.3</b>	<b>47.5</b>	<b>60.6</b>	<b>80.2</b>	<b>102.8</b>	<b>5.0</b>	<b>5.4</b>	<b>5.2</b>
	%	%	%	%	%	%	%	%
Coal	27.1	23.2	20.4	18.0	15.5	-2.8	-2.7	-2.7
Oil (incl. LPG)	49.9	48.9	48.4	47.6	47.4	-0.3	-0.2	-0.3
Natural Gas	5.6	5.8	6.9	8.3	9.2	2.1	3.0	2.6
Electricity	17.4	22.2	24.3	26.2	27.8	3.4	1.4	2.4
Commercial Energy	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
Non-Commercial	65.0	43.1	29.8	19.9	13.4	-7.5	-7.7	-7.6
<b>Electricity Ratio</b>	<b>17.4%</b>	<b>22.2%</b>	<b>24.3%</b>	<b>26.2%</b>	<b>27.8%</b>	<b>3.4</b>	<b>1.4</b>	<b>2.4</b>

The above energy outlook is compared with the trends in ASEAN countries in following figure. As substantial energy conservation efforts are considered in this outlook, per capita energy consumption in comparison with per capita GDP is considerably lower than the previous forecasts made in Viet Nam. As a result, in terms of total energy consumption, the demand forecast of the Reference Case slightly undershoots the trend of ASEAN countries. However, while substantially lower than the previous forecasts, electricity demand trend of Vietnam still overshoot the ASEAN trend considerably.

At present, power shortage remains in Viet Nam and electricity demand is thought to grow faster than the trend of ASEAN countries. As this plan aims at substantial slow down of demand expanding speed with enhanced energy conservation, reflecting fast income increase brought by economic growth, the per capita annual electricity consumption would triple from the current 550 kWh to 1430 kWh in 2015, and further double to 2,880kWh in 2025. In Viet Nam, electricity has been supplied at cheaper tariff based on the abundant hydropower. It is one of the important energy issues how to improve the resultant high electricity consumption rate.



**Figure 3 International Comparison of Energy Demand**

**Table 2 Final Energy Demand by Sector (National Energy Master Plan, Viet Nam, 2008)**

	2005	2010	2015	2020	2025	05-15	15-25	05-25
	kTOE	kTOE	kTOE	kTOE	kTOE	%	%	%
<i>Final Demand (excl. Non-Com)</i>	22,590	33,199	46,717	66,880	90,655	7.5	6.9	7.2
Agriculture	570	716	830	946	1,159	3.8	3.4	3.6
Industry	10,549	15,540	23,038	35,705	49,957	8.1	8.0	8.1
Materials	5,626	8,903	14,452	24,822	36,661	9.9	9.8	9.8
Non-materials	4,922	6,638	8,586	10,883	13,296	5.7	4.5	5.1
Transportation	6,687	9,592	12,708	16,549	20,781	6.6	5.0	5.8
Commercial & Services	1,322	1,874	2,410	2,974	3,868	6.2	4.8	5.5
Residential & Others	3,462	5,477	7,731	10,706	14,890	8.4	6.8	7.6
Composition	%	%	%	%	%			
Agriculture	2.5	2.2	1.8	1.4	1.3			
Industry	46.7	46.8	49.3	53.4	55.1			
Materials	24.9	26.8	30.9	37.1	40.4			
Non-materials	21.8	20.0	18.4	16.3	14.7			
Transportation	29.6	28.9	27.2	24.7	22.9			
Commercial & Services	5.9	5.6	5.2	4.4	4.3			
Residential & Others	15.3	16.5	16.5	16.0	16.4			
Total	100.0	100.0	100.0	100.0	100.0			

In the other sectors, large increases are forecast in the less energy intensive general manufacturing industry and the residential and commercial sectors. It is because the high value-added type industries such as processing and high-tech will lead the future economic growth rather than the energy intensive heavy industries. In these general manufacturing industries, however, although energy intensity is low, its energy demand growth rate will be highest among sectors reaching almost annual 10%. In these industries where energy is not the main input, electricity and gas will be preferred as they are clean and convenient to use.

## **2. ENERGY EFFICIENCY POLICY AND INSTITUTIONS**

### **2.1 Energy Efficiency in the Current Energy Policy**

Energy Efficiency and Conservation (EE&C) technologies were introduced in Viet Nam since the 1990s as a part of technical and financial assistance programs conducted by international organizations, principally from The Netherlands, Germany, Japan and other countries. This introduction was followed by the implementation of projects addressing the rational use of energy in the cement and ceramics industry sectors and coal fired thermal power plants, together with demand side management (DSM) programs. These projects underpinned the transfer of related technologies and their successful application, and also were the basis for the formulation of government policies to promote energy conservation programs. Since 2003 the efficiency improvement and rational use of energy have been included as a key item in the Policy on Energy Sector Development (2005, at that time MOI, now MOIT), and activities on EE&C have continued to date.

The total energy consumption in Viet Nam from 1990 to 2004 increased at a rate of 11.2% per annum, about 1.5 times of the economic growth rate for the same period. According to the MOIT (The current energy status and legal frameworks and institutions on Energy Efficiency and Conservation in Viet Nam, 2006), projections of the total energy demand to 2020 indicate that it will increase at an average of 8.1% per year. In order to handle the expected energy demand increase, the government has recognized the necessity to implement measures on energy efficiency and conservation from the energy security point of view.

Energy efficiency and conservation (EE&C) measures have not been of marked interest for the majority of energy consumers. At present, overall energy utilization in Viet Nam can be characterized by high losses and low efficiency due to obsolete technologies and equipment used in the industry sector, lack of demand side management practice, public unawareness on the community benefits of energy conservation, and lack of comprehensive national programs on EE&C with clearly defined strategies and scheduled targets.

Outlined below are the main issues affecting the adequate performance and promotion of energy efficiency measures:

- Lack of policy and administrative framework for the promotion of energy efficiency and conservation.
- Inadequate data and analysis on potential energy efficiency improvements, cost and benefits of EE&C opportunities and low-cost measures, and also limited information on technologies and programs that have been adopted elsewhere.
- Financial risks on projects that are developed with limited planning and using technologies and equipment that had not been thoroughly tested under Vietnamese conditions.
- Affordable financing is limited due to lack of commercial lending practices in Viet Nam. Also weakness of the banking sector, relatively small investments assigned for EE & C projects and limited credit available for the residential projects are barriers for the creation of suitable financial instruments.
- Limited interest from end-users partly because their attention is focused on other business priorities.
- Limited availability of local EE&C equipment, due to the low domestic demand for these products and the restricted manufacturing capability in provincial areas in Viet Nam. These issues altogether have discouraged any sizeable investment in energy efficiency measures.

In recent years, following Regulations and Decrees involved in energy efficiency and conservation have been approved by the government:

In 2003 A Decree on Energy Efficiency and Conservation (Decree No.102/2003/ND-CP) was issued.

In July 2004 the Ministry of Industry issued a circular providing guidance for the implementation of energy conservation in the industry sector (Circular No. 01/2004/TT/BCN on Energy Efficiency and Conservation).

Further in 2005 the MOIT released the National Strategic Program on Energy Savings and Effective Use (*Vietnam Energy Efficiency Program, VNEEP*) for the period 2006-2015, which was approved and enforced on 14 April 2006 by the Prime Minister (Decision No.79/2006/QD-TTG). The VNEEP calls for coordinated efforts for improving energy efficiency, reducing energy losses and implementing extensive measures for conservation of energy.

MOIT issued in November 2006 a Guideline for Energy Efficiency Standard and Labelling, in order to assist on the implementation of energy efficiency standards and labelling in appliances (Circular No.08/2006/TT/BCN).

Other related regulations are the Electricity Law approved and enforced in July 2005, comprising sections that specify electricity efficiency in the generation, transmission, distribution and utilization processes. This was followed to the Electricity Saving Program for the period 2006-2010 approved by the Prime Minister in April 2006. Furthermore, the Building Code aiming for the reduction of energy losses and improvement of living conditions in buildings was implemented in November 2005 (Energy Efficient Commercial Building Code No. 40/2005/QD-BXD).

## **2.2 Current Institutional Structure for Energy Efficiency**

MOIT plays the role of focal coordinator on EE&C, and is authorized to administer the implementation of the Vietnam Energy Efficiency Program (VNEEP), and as part of this enforcement, the Energy Efficiency and Conservation Office within the Ministry of Industry and Trade was established on April 07, 2006 (Ministerial Decision No.919/QD-BCN).

The main works of the Energy Efficiency and Conservation Office are to develop the organizations and systems related to improving energy efficiency and conservation on the level of government from the central to local governments.

The National Steering Committee chaired by MOIT was established for the implementation of the VNEEP. Members of the Steering Committee include representatives from the Ministry of Construction, Ministry of Transport, Ministry of Education and Training, Ministry of Culture and Information (Renamed as Ministry of Culture, Sports and Tourism in 2007 August), Ministry of Science and Technology, Ministry of Planning and Investment, Ministry of Justice, Ministry of Finance, and the Union of Vietnam Associations of Science and Technology.

The National Steering Committee and Office on Energy Efficiency and Conservation have completed preparatory tasks including the formulation of the action plans and detailed programs needed to launch and implement the VNEEP successfully in cooperation with other governmental organizations.

## **2.3 Review of Energy Efficiency Programs**

### *National Energy Efficiency Program 2006-2015 (VNEEP)*

The VNEEP is the first-ever comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy in Viet Nam. Phase 1 (2006-2010) aims to start up actively all components of the program; Phase 2 (2011 – 2015) aims to expand each component, based on lessons learned from Phase 1.

The overall objectives of the program are as follows:

- The program is a set of activities to encourage, promote, propagate Energy Efficiency and Conservation (EE&C) in public; science and technology research activities and management measures needed to carry out synchronous activities on energy efficiency and conservation in the whole society.
- Through these activities, the Programme aims to reach certain targets of energy saving, investment reduction for energy supply system, social economic benefit; at the same time contribute to environmental protection course, rational extraction of energy resources, moving toward social economic sustainable development.

In 2007, 30 billion VND (about US\$2 million) of state budget was allocated for 28 projects registered under VNEEP. About a third of these funds were allocated to support two energy efficiency lighting manufacturers. In 2008, 36 billion VND (about US\$2.25 million) were allocated for some 48 projects, many of which were projects initiated in 2007. Of this, about one third was used to set up an energy efficiency laboratory for air-conditioners and refrigerators.

The program's energy savings target is 3% to 5% of total national energy consumption in period 2006 – 2010; 5% - 8% of total national energy consumption in period 2011 – 2015. The program has six (6) components and eleven (11) projects, and the major achievements of VNEEP from 2007 to 2008 are highlighted as follows:

### **Component 1: State Management on Energy Efficiency and Conservation**

Project 1: Complete the legislative framework on EE&C in industrial production, construction site management, domestic activities, and energy consumed equipment.

#### ***Achievements (2007-2008)***

- Completed the draft “Law on Energy Conservation and Efficient Use”;
- Issued Joint Circular No. 142/2007/TTLT/BTC-BCT of November 30, 2007, guiding the management and use of non-business funds for the implementation of the national target program on economical and efficient use of energy;
- Directed and guided all localities to carry out the energy efficiency activities;
- Set-up the EE&C Centers in Hanoi, Tien Giang to implement program activities at local level in the whole country;
- Organized the workshops, seminars and training on energy efficiency laws, policies, institutional issues, and technology and solutions;
- Developed the website of VNEEP (website: <http://www.eec.moi.gov>);
- Published the leaflets, handbooks, and technical guidelines on energy efficiency.

### **Component 2: Education and Information Dissemination**

Project 2: Public awareness enhancement on EE&C

Project 3: Integrate EE&C in to the national education system

Project 4: Develop pilot models for “EE&C in household” movement

#### *Achievements (2007-2008)*

- Broadcasted EE&C news and releases on national television and radio;
- Developed documentary films on energy efficient technologies;
- Printed EE&C information on various newspapers and electronic media;
- Organized contest on energy efficient buildings;
- Provided guidelines to disseminate EE&C information at all levels of school education system.

#### **Component 3: High Energy Efficiency Equipment**

Project 5: Develop standard and provide energy efficiency label for selected products

Project 6: Technical Assistance to domestic producers on energy efficiency compliance

#### *Achievements (2007-2008)*

- Completed demonstration model for solar water heater and industrial biogas;
- Carried out labelling program for three appliances, i.e., FTL T8- 36W, T5 - 32W, and electronic ballast;
- Collaborated with Viet Nam Standard Centre to develop and issue 3 sets of standards on energy efficiency and testing methods for refrigerators, air conditioners and electric fans;
- Conducted pilot EE&C dissemination for households by Viet Nam Woman Union in six provinces and cities;
- Implemented two programs to support for lighting manufacturers in technology transition process from incandescent lamps into compact fluorescent lamps.

#### **Component 4: EE&C in Industrial Enterprises**

Project 7: Develop EE&C management models in enterprises

Project 8: Support industrial enterprises to improve, upgrade, and optimize technology aiming at energy savings and efficiency

#### *Achievements (2007-2008)*

- Completed in 2008 the survey on energy consumption of more than 500 big enterprises to identify the potential of energy conservation and set the energy consumption rates in the industrial sectors that consume much energy.

#### **Component 5: EE&C in Buildings**

Project 9: Improving capacity on EE&C and conducting EE&C in building design and management

Project 10: Develop pilot models and disseminate EE&C management activities in building operation

### *Achievements (2007-2008)*

- Implemented various propaganda activities led by the Ministry of Construction (MOC)

### **Component 6: EE&C in Transportation**

Project 11: Make optimal use of transportation facilities, equipments, and minimize amount of fuel consumed, and reduce discharge of exhausted gases to environment

### *Achievements (2007-2008)*

- Conducted research activities on enhancement of public passenger transportation in cities and creation of fuel consumption measurement equipment to serve the management and exploitation of Diesel-engine ships for fuel saving purpose.

The VNEEP has provided a national platform for implementing a variety of EE&C in all sectors. However, the first two years of VNEEP implementation has been focused mostly on education, capacity building, and study, and there is much more work to be done. With the introduction of several enabling efforts and capacity building, VNEEP now is a good position to review its objectives and targets, and develop an overall strategy and detailed implementation plan to achieve them. This will aid the government to determine appropriate levels of funding for various initiatives, allow for increased competition and accountability among implementing partners, and appropriate roles for private sector participation and leverage.

### *Energy Efficiency Programs outside VNEEP*

Since 1995, the World Bank (WB) and other international institutions have supported the Government of Viet Nam to implement various programs/projects related to areas of energy efficiency and conservation. The support in the past years not only includes financial packages, but also a variety of technical assistance to local agencies/consultants implementing the projects. Some of the large-scale EE&C programs in Vietnam are summarized in Table 3.

**Table 3 – Major Energy Efficiency and Conservation Programs in Viet Nam**

<b>Project Name</b>	<b>Year</b>	<b>Sponsor</b>	<b>Implementing Agency</b>
1. Vietnam Demand Side Management and Energy Efficiency (DSM) – Phase 1&2	2000-2007	WB, SIDA and GEF	MOIT and EVN
1a. The Pilot Commercial Energy Efficiency Program (CEEP)	2004-2009	WB and GEF	MOIT
1b. Compact Fluorescent Lamp (CFL) Promotion Program (CFL)	2004-2007	WB and GEF	EVN

1c. Fluorescent Thin Tube Lamp (FTL) Promotion Campaign	2004-2009	WB and GEF	EVN
2. Energy Conservation and Efficiency Program for Viet Nam (EE&CP)	1995-2001	GOV and Netherlands, EU, SIDA, UNDP, US-EP	MOST
3. Promoting Energy Conservation in Small and Medium Scale Enterprises (PESME)	2006-2010	UNDP	MOST
4. Viet Nam Energy Efficient Public Lighting (VEEPL)	2006-2010	UNDP and GEF	MOST
5. The Study on Master Plan on Energy Conservation and Effective Use in Viet Nam (EE&CMP)	2008-2009	JICA	by J-Power, a Japanese consultant

### Recent Donor Support and Activities

As there is a wide variety of donor activities, coordination of donor support in the future months and years will be crucial. In October 2008, the MOIT and the World Bank co-chaired an Energy Efficiency Donor Coordination Meeting which included presentations of each donor on their programs and planned activities as well as a roundtable discussion on ideas for coordinating efforts and further sharing of information. The participants agreed that an annual donor meeting of this kind would be beneficial in the future. The following sections summarize the major donor activities in the field of energy efficiency in Viet Nam, based on the respective donor's public documents as well as notes gathered during the donor coordination meeting.

### Asian Development Bank (ADB)

ADB approved in 2007 the Technical Assistance (TA), "Supporting implementation of the National Energy Efficiency Program," which aims to promote energy conservation in the industry sector in Viet Nam. The total cost of the TA is estimated at US\$1.16 million equivalent. The TA has five components namely: (1) Survey of Energy consumption in Industrial Enterprises; (2) Development of a Training Program for Energy Managers; (3) Conducting Energy Audits of Selected Large Industrial Enterprises; (4) Upgrading the Capacity of Existing Energy Centers into Professional ESCOs; (5) Devising a Mechanism for Financing Energy Conservation Plans for Industrial Enterprises. ADB envisions an enhanced role for private sector to complement public sector operations in the areas of energy efficiency and conservation as well as environmental sustainability. Based on the findings from the TA, ADB will consider options to create an industrial energy efficiency financing program. ADB also expressed interest on power plant retrofits of Electricity of Viet Nam (EVN) as well as procurement and distribution of Compact Fluorescent Lamp (CFL) program using the Clean Development Mechanism (CDM).

### **Agence Française de Développement (AFD)**

The support of AFD to Viet Nam's development targets are set out in the Partnership Framework Document (PFD) signed between France and Vietnam in 2006. One of AFD's actions within the framework of the 2006-2010 National Socio-Economic Development Plan is to develop and modernize financial, banking and non-banking sectors. AFD's financed activities support financial sector reforms and Small Medium Enterprise (SME) development. AFD also undertakes its operations in Viet Nam through PROPARCO, a development financial institution for private sector. Energy and environment, including climate change, falls within the framework of AFD's priorities in Viet Nam. AFD co-sponsored a symposium on energy efficiency policies in Vietnam, which was held in Ho Chi Minh City last April 2008 as part of French Week in Viet Nam. Other AFD's on-going support to the energy sector in Vietnam includes hydropower investments, load management and Demand Side Management (DSM), CO<sub>2</sub> mitigation efforts, and modern energy access for all. Future activities under consideration may include development of urban energy efficiency strategies and establishment of credit lines to support energy efficient construction in the housing sector.

### **Danish International Development Agency (DANIDA)**

DANIDA's programmes in Viet Nam are aligned with the GOV's Socio-Economic Development Plan 2006-2010 (SEDP), which was approved by the Vietnamese government in 2006. The Environment Programme (EP) is intended to focus on three thematic areas: (1) urban and industrial environmental management; (2) sustainable energy; (3) management of natural resources. Danish programmes typically builds capacity and knowledge in the Vietnamese institutions and targets key sectors identified by the Vietnamese government. DANIDA has recently approved about US\$15 million technical assistance program, provided through budget support, for the energy efficiency program of the Ministry of Industry and Trade (MOIT). While some details have yet to be worked out, the program would focus mainly on technical training for energy efficiency (including a certification program with local universities) and industrial energy audits, as well as potential support to the Energy Savings Fund (ESF) of Viet Nam.

### **Japan International Cooperation Agency (JICA)**

Beginning October 1, 2008, Japan's Official Development Assistance (ODA) loans provided by JBIC and the grant aid dispersed by the Ministry of Foreign Affairs (MOFA) has been merged into JICA (or the new JICA). One development scheme of JBIC or the new JICA is the Private-Sector Investment Finance program, which supports private enterprises with funds provided as either equity investments or loans. A feasibility study on a proposed energy conservation loan is underway. The main focus seems to provide loans for purchase of equipment from a previously specified "eligible high efficiency equipment list". The design is patterned after a program being implemented in Japan, whereby Government funds are made available at concessional interest

rates to industrial enterprises. The project will be implemented by the Viet Nam Development Bank (VDB), which will lend to private enterprises for their purchase of equipment. JICA is considering a US\$30 million financing program with VDB.

JICA has also implemented a Development Study, “Study on National Energy Master Plan in Viet Nam.” The project objectives are as follows: (1) establish the National Energy Master Plan up to 2025 including energy security, energy diversity, power import-export, rural electrification, promotion of renewable energy utilization, CO<sub>2</sub> emission, energy conservation, investment plan, socio-environmental impacts and international cooperation; (2) develop national database of Viet Nam including socioeconomic data and energy data covering electric power, coal, oil and gas, renewable energy, etc.; and (3) build capacity of the bodies under MOIT. JICA is currently working to develop a roadmap for VNEEP to enhance program results and better help MOIT meet their national targets.

**The Energy Conservation Center of Japan (ECCJ)** has also been actively conducting energy conservation training programs for developing countries mainly in the Asian region, including Viet Nam. The purpose of the training programs is to promote energy efficiency and conservation. ECCJ also provides expert assistance in the development of Energy Conservation Law, with the aim of transferring Japanese successful experiences and information.

### **United Nations (UN)**

The GOV and UN have been implementing the One Plan 2006-2010 initiative, as inspired by the concept of “One United Nations in Viet Nam.” One Plan brings together the comparative advantages of the 14 participating UN organizations within a single planning framework. Two of UN’s organizations that are most active in supporting Viet Nam’s energy sector are United Nations Development Programme (UNDP) and United Nations Industrial Development Organization (UNIDO).

UNDP has been supporting Viet Nam since 1977. One UNDP’s focus areas is Energy and Environment, ensuring that the sustainability of the environment is an important target for Viet Nam. It is also one of eight Millennium Development Goals the country has committed to reach by 2015. UNDP has been implementing the, “Vietnam: Promoting Energy Conservation in Small and Medium-Scale Enterprises”, with a program period from 2005-2010 and budget of US\$28.8 million, part of which is US\$5.5 million from Global Environment Fund (GEF). The project is designed to address the barriers to widespread utilization of energy efficient management practices, operations and technologies in Small and Medium Enterprise (SME) sectors. SMEs are targeted since they currently account 95% of enterprises, provide 26% of employment, and contribute up to 25% GDP. The project is focused on five key SMEs: (1) brick; (2) ceramics; (3) textiles; (4) paper; (5) food processing. The project is composed of six integrated components: (1) policy and institutional support development; (2) communications

and awareness; (3) technical capacity development; (4) energy efficiency services provision support; (5) financing support; and (6) demonstrations.

Other on-going activities include: US\$3.0 million UNDP/GEF public lighting efficiency project with Vietnamese Academy of Science and Technology (VAST); US\$4.5 million UNIDO national clean production program for Viet Nam with Hanoi University of Technology; and a US\$3.0 million UNEP/GEF incandescent lamp phase out program. Planned UNDP/UNIDO support from 2010 and beyond include energy efficiency building codes, energy efficiency appliance labeling and standards, capacity building for implementation of the Energy Conservation Law, promotion of Energy Management Standards via ISO 50001 Management Standard, and coordination of climate change adaptation and mitigation efforts.

### **The World Bank Group (WB)**

The WB has been supporting energy efficiency in Viet Nam since 1997. This program began with a US\$3.6 million Swedish Sida-supported TA grant, administered by WB, for: (i) DSM planning and pilots with EVN; (ii) initiation of load management and research functions, also with EVN; (iii) development of initial equipment standards with MOST; and (iv) development of a commercial building code with MOC. Based on the results of this initial TA work, a follow-on Phase 2 project, the Demand-Side Management and Energy Efficiency Project (2003-2009), was developed. This \$20 million program, supported with IDA and GEF funds, included support for: (a) implementation of several larger DSM programs within EVN and the PCs (including TOU metering, CFL and FTL promotion); (b) development and implementation of a pilot commercial energy efficiency program, which included training of service providers and audit/investment grants; and (iii) development of some pilot market transformation programs with solar water heaters and air conditioners with MOIT's EECO.

While the second phase is still under implementation, preliminary results have been substantial, including:

- Successful transformation of the CFL market in Viet Nam from less than 1 million lamps a year in 2004 to more than 10 million by 2007;
- Independent evaluation of EVN's programs reported almost 500 GWh in annual energy savings and ~91 MW in peak load reduction to date;
- Approval and implementation of 100 commercial energy efficiency projects (aggregate investment of US\$5.2 million) with expected energy savings of 34 GWh/year and training of over 100 service providers (referred to as project agents).

The WB is now working with MOIT to conduct an independent evaluation of the commercial energy efficiency pilot program and is considering options for a third phase investment program in 2011.

**The International Finance Corporation (IFC)** has been implementing investment projects with Saigon Thuong Tin Commercial Joint Stock Bank (Sacombank) and Technological and Commercial Joint Stock Bank (Techcombank). The investment project with Sacombank is a credit-linked guarantee, which will back a local-currency loan to Sacombank of up to US\$50 million equivalent. The fund will be provided by one or several local life insurance companies or alternatively, IFC will provide funds to Sacombank directly. The proposed project with Techcombank is to provide a loan of up to US\$20 million equivalent with tenor of up to 7 years. The purpose of the loan is to support Techcombank's medium and long term lending activities to local small-and medium-sized enterprises (SMEs). The local currency loan will be funded by IFC through a US\$-VND swap from an international bank operating in Viet Nam.

As part of IFC's our growing Environmental & Social Sustainability Program, Phase 1 of Viet Nam Cleaner Production & Energy Efficiency Program (VCPEEP) was recently approved. The project will span at least three years. Phase 1 includes US\$1.6 million of financing from the Mekong Private-Sector Development Facility, a large multi-donor trust fund managed by IFC. The objective of the VCPEEP is to promote investment in Cleaner Production and Energy Efficiency (CP-EE) projects by Vietnamese financial institutions. The program will include: (1) advisory and investment services to selected financial institutions; (2) technical assistance to develop the consultancy market for CP-EE investments; and (3) promotion activities to increase awareness among local industries.

## **PART II: REVIEW TEAM REPORT**

This part of the report was written by the review team and presents the team's conclusions and recommendation about energy efficiency policies and programs in Viet Nam.

# 1. INSTITUTIONAL CONTEXT

## 1.1 Critique

- a. Currently, in the Socialist Republic of Viet Nam, “Draft Law of Energy Conservation and Efficiency use (including the article regarding responsibilities of state management)” is under consideration to be submitted to the future session of the National Assembly for its delivery and adoption. A legislative mandate provides long - term support despite short term changes in economic situation. There is also a strong need to provide responsible ministries with stable and sufficient human and financial resources to develop and implement effective long term energy efficiency policies.
- b. To achieve effective cross-sector improvement in energy efficiency requires very strong coordination among relevant ministries and organizations. Organizing the National Steering Committee is a positive step. The members of the Steering Committee include representative of the following ministries and association: Industry and Trade, Education and Training, Culture and information, Science and Technology, Planning and Investment, Transport, Construction, Finance, Justice, and Union of Viet Nam and Science and Technology Associations.

The Steering Committee meetings are held twice a year under chairpersonship of the Minister of Ministry of Industry and Trade. Focal - point officials in relevant ministries are identified. At the same time, policy coordination at Ministerial level will lead to maximum of energy savings potential as political leadership is indispensable for well – coordinated and effective implementation of energy efficiency policies. There is also a room for more close exchange of data information, analysis and evaluation expected and realized effect of energy efficiency-policy-implementation as well as policy-proposals among relevant ministries and organizations for better coordinated policy making and implementation.

## 1.2.....Recommendations

**Recommendation 1.** Viet Nam should adopt and enact Draft Law of Energy Conservation and Energy Efficiency Use including the article regarding responsibilities of State management as early as possible which should provide relevant ministries and organizations with legal basis for clear responsibilities and with stable and sufficient

financial and human resources to develop and implement effective long term energy efficiency policies.

**Recommendation 2.** The Government of Viet Nam should start inter-ministry energy efficiency policy coordination at Ministerial level by establishing Ministers' meeting on energy conservation and efficient use of energy under the leadership and chairpersonship by the Prime Minister. The Ministries in the Central government, People Committees of provinces and cities and the organization relevant to energy efficiency policies should more closely exchange of data and analysis on energy efficiency policy implementation as well as energy efficiency policy proposals.

## 2. ENERGY EFFICIENCY GOALS AND STRATEGY

### 2.1 Critique

Viet Nam, has recently experienced a period when its annual GDP increase (8% p.a.) is no longer as high as its rate of energy consumption (10% p.a.), or in other words, its energy intensity per unit of GDP is increasing dramatically<sup>1</sup>. And this result is occurring at a time when prices and global demand for primary energy (e.g. crude oil) is once more increasing at a rapid pace. In order for Vietnam to maintain a viable and sustainable economic growth pattern, it is critical that the country adopt sound energy efficiency and demand management policies, programs and practices.

Consequently, the Government of Viet Nam has recently undertaken a series of laws, decrees, and decisions to implement a National Energy Efficiency Program. On April 14, 2006, pursuant to (1) the Law on Governmental Organization (12/25/2001), (2) the Electricity Law (12/3/2004), and (3) the Decree No. 102/2003/ND-CP (9/3/2003), the Prime Minister executed a Decision to implement a major energy efficiency program for the country, the *Decision on Approval of the National program on Energy Efficiency and Conservation*. This Decision set forth a set of national targeted goals for the country to save energy:

2006 – 2010 3 to 5% reduction in total energy consumption; and

2011 – 2015 5 to 8% reduction in total energy consumption.

The goals are set against a business-as-usual forecast as the base case and it should be noted that these goals come at a critical time as the average annual growth rate of energy from 1999 to 2006

<sup>1</sup> See, *The Study on National Energy Master Plan in Viet Nam*, MOIT (Viet Nam)-JICA (Japan), Final Report, October 15, 2008

was 12.4% while the average annual economic growth rate (i.e. GDP rate) was only 7.2%<sup>2</sup>. Consequently, Viet Nam's energy intensity is increasing as well.

Additionally, on December 27, 2007, the Prime Minister issued the Decision Approving the National Energy Development Strategy of Viet Nam for the period up to 2020 with an outlook to 2050.

The April 14, 2006 Decision on Approval of the National program on Energy Efficiency and Conservation is the driving force behind the Government of Viet Nam's energy efficiency strategy. The energy efficiency targets (or national aspirational goals) set forth in the Decision (3 to 5% reduction in energy consumption for 2006 to 2010 and 5 to 8% for 2011 to 2015) are coupled with the following six components specified in the Decision that are expected to form a strong foundation for a successful national energy efficiency program:

- Strengthen the legislative framework;
- Increase public awareness through outreach campaigns and the education system;
- Develop energy efficiency standards and labels for appliances and equipment;
- Establish energy efficiency programs for industry;
- Implement energy efficiency in the design and operation of buildings; and
- Reduce fuel consumption and emissions in the transportation industry.

The PREE review team members acknowledge the need for a strong energy efficiency program as a necessary first step to ensure a sustainable and viable energy economy for the country. In addition, the review team acknowledges that the series of actions taken (Laws, Decrees, Circulars and Decisions) can lead to an effective national strategic energy efficiency plan, but that in and of itself does not insure implementation success. A concerted national effort integrated among all government leaders and Ministries must be initiated to implement such a strategy.

Furthermore, the PREE review team recognizes the critical action taken by the Government of Vietnam in setting overall energy efficiency based targets. By memorializing these goals in the Decree, the Government of Viet Nam has set an aspirational goal to (1) drive energy efficiency improvements into the economy, and (2) identify areas for further energy efficiency improvements. The means to achieve these targets however are not well integrated into a sectoral approach which in many countries drives high levels of efficiency into the marketplace. In addition many of the components and programs specified in the Decision are not transformative in nature, but more oriented toward further studies and pilot demonstrations.

<sup>2</sup> From a presentation by Phuong Hoang Kim, Executive Deputy Director of the Energy Efficiency and Conservation Office (EECO) of the Ministry of Industry and Trade (MOIT), June 8, 2009.

In addition, while national aspirational goals can be both a driving force and highly symbolic, they must be championed and frequently repeated into the public's vision. Without a concerted and regular effort by a high ranking government official or well know spokespersons, aspirational goals can fail to garner the impact needed to be successful.

The PREE Review team considers the national aspirational goals to be laudable; however, the goals do not appear to be tied directly into the many programs contained in the six components created to meet the targeted goals. In order to craft a serious and national program to transform the energy market in Vietnam, it will be necessary to fully integrate all programs and implementers under a common effort. The programs and projects initiated under the six components appear to overlap and not be part of an overall roadmap to achieve the national aspirational goals. While the PREE team members recognize that it is necessary to pilot some projects and programs, we are unable to recognize a common pathway for the efforts to culminate in a successful transformation of the energy market.

One praiseworthy aspect of the six components in the Decree is that each has been assigned a steering committee comprised of the various Ministries that have a stake in a particular component. A single Ministry has been named to preside over each steering committee. While this could be a good integrative formula to advance energy efficiency throughout the economy, it does not appear that the requisite integration is occurring. The PREE team notes that in its discussions with various stakeholders, the desirable integration has not manifested itself and instead a “stovepiping” or “turf guarding” is occurring among the Ministerial stakeholders. For a national program to succeed, it will require more sharing and assistance, freely given, among the Ministries.

## 2.2 Recommendations

**Recommendation 3.** The Government of Viet Nam should integrate sectoral-based energy efficiency goals that relate to the national aspirational goals specified for the overall economy.

**Recommendation 4.** The Government of Viet Nam should develop a national communications strategy to keep the aspirational goals in front of the people and enterprises in the country during the timeframe envisioned for the components and programs. In addition, it should develop an energy efficiency educational program for children, from kindergarten through high school, as well as a university based energy efficiency educational program.

**Recommendation 5.** The Government of Viet Nam should develop a clear and concise “roadmap” detailing how each of the six components will contribute to, and converge upon, meeting the national aspirational goals.

**Recommendation 6.** The Government of Viet Nam should coordinate actions and efforts of each of the leading Ministries in order to ensure that an integrated and effectual common program management pathway will rapidly emerge and guide the desired energy efficiency transformation of the energy industry.

### **3. ENERGY DATA COLLECTION AND MONITORING**

#### **3.1 ENERGY DATA COLLECTION**

##### **3.1.1 Critique**

Energy and Energy efficiency data are highly important for proper implementation of national energy management and energy policy making. With these data, the country in particular will be able to analyze energy supply and demand that is required to set out indicative targets for energy policy, environmental policy and energy efficiency policy. Also, it is possible to compare energy efficiency situation at international levels. Especially database of energy consumption is very useful for energy consumption management, it plays important role in estimating of potential of EE&C, evaluation of EE&C activities, etc.

Currently social and economic data are publicly disclosed by GSO. However, data and information in GSO included energy sector are very poor and do not meet analysing energy consumption and supply. In addition, there is not any organization or agency that is officially responsible for data collection and making database on energy efficiency. As a result, these activities have been developed separately by deferent organizations and each specific project. For example, one was developed in the program PECSME and the other in the program VNEEP, or one is developing by the Institute of Energy, and the other by the Hanoi Energy Efficiency Centre. In order to carry out more efficient activities in this field, integration or linkage of these databases should be considered for effective use of collected data.

A part from that, experts on energy statistics and the financial budget are insufficient for making and maintaining the energy database. Thus, it is important to provide training for statisticians by energy experts and a financial source enough for periodically implementing and maintaining all these activities.

##### **3.1.2 Recommendations**

**Recommendation 7.** The Government should establish an Energy Database Centre including the Energy Efficiency team to encourage collection of data required for

establishing energy efficiency indicators and monitoring improvements in energy efficiency. In addition, an energy efficiency data and monitoring system covering all sectors included decisions on financing should be established to overcome the lack of energy data, particularly end-use data at subsector level.

**Recommendation 8.** It is necessary to designate major industries and enterprises in the list for the designated statistics on energy and legally oblige them to report based on the Law of Energy Conservation and Efficient Use or the Law on Viet Nam Statistics.

## 3.2 ENERGY DATA MONITORING

### 3.2.1 Critique

Monitoring and Evaluation (M&E) of energy data in Viet Nam to date are the requirements specified by EE programs or projects by international donor agencies, therefore they are conducted on an ad-hoc project-based basis. Most of the past and ongoing energy data monitoring and evaluation activities are undertaken in a form of energy audit, and most energy audits conducted in Viet Nam up to now are pre-EE implementation audits which aim at identifying EE potentials and measures. Though various EE measures have been implemented throughout the country, post-implementation monitoring is still very limited.

No Vietnamese agency has been assigned for managing, coordinating or supporting this important activity. Based on discussion with Vietnamese agencies during PREE visits, mechanisms or protocols for M&E as well as M&E roadmaps are also not available. However, IE has indicated to the PREE review team that energy data collection and monitoring is one of the key chapters in the study on Master Plan of Energy Conservation and Effective Use in Viet Nam, supported by JICA.

### 3.2.2 Recommendations

**Recommendation 9.** MOIT and EE&CO should evaluate capacity of EE related to organizations in Viet Nam and assign a lead role for M&E to a well-qualified organization. This could be a different organization from the one collecting general energy data.

**Recommendation 10.** MOIT and IE to address the importance of EE M&E to any ongoing project, e.g. the JICA study on Energy Efficiency Master Plan, and ensure that development of M&E roadmaps is included in the report.

## 4. POLICY MEASURES – SECTORAL ANALYSIS

## 4.1 INDUSTRY SECTOR

### 4.1.1 Industry in General

#### 4.1.1.1 Critique

The industrial sector consumed about 48% of the total annual electrical energy and about 45% of the total final energy in the year 2006. The energy intensity of this sector has increased from 129 kgoe per \$1000 of GDP in 1998 to 254 kgoe per \$1000 of GDP in 2006, in constant prices. At present the peak demand in the Vietnamese electrical system occurs between 5.00 p.m. and 8.00 p.m. where the residential sector contributes about 66% of the peak. There is another peak in the morning, with the industrial and commercial sectors contributing about 55% of the peak. This afternoon peak is rising and in fact may have already overtaken the evening peak.

It is thus imperative that attention be paid to promote seriously energy efficiency and conservation (EE&C) measures for the industrial sector. While there have been commendable programmes such as the Promotion of Energy Conservation in Small and Medium Scale Enterprises (PECSME) undertaken together with the United Nations Development Programme, more perhaps can be done.

Most industry owners often have priorities other than energy efficiency. If they have limited financial resources, they may rather invest it in more production facilities where the returns may be higher than investing it in EE&C measures. In this respect, more perhaps can be done to make soft financing available for implementation of EE&C projects and to impress on the local financial institutions on the necessity and the relative viability of such projects.

While having the ‘carrot’ approach, such as having soft financing and fiscal incentives may be advantageous, wielding the ‘stick’ such as by having the necessary legislations with mandatory provisions will be useful. This will gently ‘push’ the parties concerned down the path of EE&C.

The need to conduct energy audits in industrial installations as a first step for implementing EE&C measures cannot be over emphasised. In this respect more perhaps can be done to build up the human resources for this, to provide subsidised audits (for a limited time period) and to develop local energy service companies (ESCOs) to undertake such services.

Where public funds are utilised to undertake EE&C programmes, the programmes should have clear, time specified targets. The achievements of the programmes should be measurable as far as it is technically possible to gauge the effectiveness and perhaps the need to continue such programmes.

During a visit to a steel factory in Viet Nam, the PREE team were provided information on the amount of energy used to produce a ton of the output. Such data (which should be readily available at the consumers end) should be collected by MOIT for all industrial consumers to benchmark the energy intensity of various industrial sub sectors.

PREE team members were made to understand that there is now local manufacture of compact fluorescent lamps. MOIT should encourage the local manufacture of more of such energy efficient equipment and appliances.

#### **4.1.1.2 Recommendations**

**Recommendation 11.** The Energy Efficiency and Conservation Office of the Ministry of Industry and Trade (MOIT) should formulate EE&C programmes that have targets which are specific, measurable, achievable and time defined. The amount of energy/demand savings that should be achieved by a particular programme should be defined and the time period to achieve it should be clearly stated. The achievements of the programmes should also be measurable, by having studies done both before and after a particular programme is implemented.

**Recommendation 12.** As audits are almost always a prerequisite for EE&C projects to be implemented in a particular installation/premise, it is important for MOIT together with related agencies, such as the Universities, to:

- i. Build up capacity for personnel who can conduct industrial energy audits. This could also include developing local energy service companies (ESCOs) both in terms of their numbers and their capabilities. This will subsequently enable more EE&C programmes to be undertaken in a commercially viable manner.
- ii. Provide, for a limited time, free or subsidised energy audits, especially for small and medium enterprises (SMEs). This will enable more audits to be done and EE&C measures being implemented. The results can then be publicised and more consumers may undertake such audits, even without the subsidies, once the general usefulness of such audits can be clearly demonstrated and appreciated.

**Recommendation 13.** To assist consumers with limited funds for EE&C projects, MOIT with the assistance of the relevant governmental agencies, may have:

- iii. Some public funds being parked with commercial financial institutions to allow for soft financing to implement EE&C measures recommended by energy audits. This may be especially important for SMEs.

- iv. Awareness programmes for financial institutions on the financial viability of EE&C programmes. This will make them more amenable to provide finance for EE&C projects.

**Recommendation 14.** MOIT should formulate and enforce legal provisions to make energy management mandatory for designated consumers. At the very least, the appointment of energy managers and regular reporting on energy management activities should be made mandatory.

**Recommendation 15.** MOIT should initiate and maintain energy intensity benchmarking for industrial sub sectors. This can be made easier if the GSO is requested to obtain energy consumption and industrial output statistics from concerned enterprises, if possible on-line, as part of their normal reporting mechanism. With such benchmarking, a particular industrial enterprise can determine its own position in terms of energy efficiency with respect to the best practice nationally or even internationally.

**Recommendation 16.** MOIT may look into providing technical support to enable local manufacture of energy efficient equipment and appliances. This will enable such equipment or appliances to be made available locally, possibly at a cheaper cost.

#### 4.1.1 Steel Industry

##### 4.1.2.1 Critique

The team visited a one of the most excellent steel mill, named Hoa Phat Steel among the Hoa Phat Group nearby Ha Noi. Major products of the mill were small size rods and bars for construction; production was 300 thousand TPY. Most of their products were supplied to Vietnam domestic market. The mill was very clean and organized with well maintained Italian equipment [under ISO9000 Quality Control Management system]. 70% of their raw material as billet was supplied from group factory in Viet Nam and the rest was imported from Russia, China and Ukraine. They established efficient production planning measures to manage about 30 kinds of products in size, shape and delivery schedule to achieve energy efficient operation.

The mill was operated about 20hr a day except 5pm to 9pm with 2 shifts. During the stop in the evening they maintained, cleaned up equipment and changed some rolls and jigs for different size products. The stop also helped Electricity Viet Nam to save their peak demand. Energy consumption in the mill was 30,000MWH/year of electricity (100kWH/t-product) and 8,500t-fuel oil/year (28.5kg/t-product). These energy intensity [benchmarks] recorded the second among steel mills in Viet Nam. All electricity was purchased from Electricity of Viet Nam and fuel oil for their preheat furnace was imported. [They had a plan to substitute imported fuel oil to domestic coal for cost saving.] Energy consumption in the mill was large enough to adopt official Energy Management System in EE&C National Programs, but unfortunately the team

could not find effective communication between the management and [local or central] government or relevant officials.

The group will start new integrated steel works in near future. The mill will concentrate less kinds of products which they have advantages after the new works starts, therefore their will achieve more energy efficient operation. Large capacity expansion in strong economic growth is really good opportunity for Vietnamese enterprises to introduce more efficient equipment with excellent technologies. It is expected that Government of Viet Nam will encourage these effort to improve energy efficiency and cost competitiveness for long term energy security.

#### **4.1.2.2 Recommendations**

Minister of Industry and Trade should

**Recommendation 17.** Communicate large energy intensive enterprises to deepen their on-going energy management efforts corresponding EE&C National Programs such as,

- Make effective involvement of executive managements
- Set high priority to improve EE&C among management issues
- Check and monitor energy consumption and EE benchmarks regulatory
- Report energy consumption and effective benchmarks to relevant official agencies
- Develop EE&C master plans director and committed by executive managements
- Make all employees aware for effective and smart use of energy
- Visualize energy consumption and EE benchmarks for all employees
- Train engineers to obtain relevant technologies and knowledge for better EE&C

**Recommendation 18.** Encourage large energy intensive enterprises to plan appropriate process integration at capacity expansion for better energy efficiency.

Promote energy intensive industry enterprises to introduce best available technologies for better EE, environment and production cost-effectiveness at capacity increase or renovation using effective financial and legal incentives, energy price scheme to accelerate these efforts.

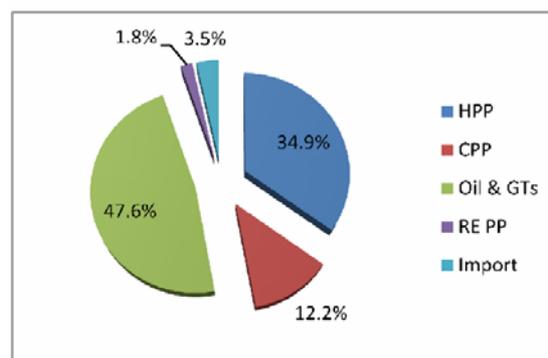
## **4.2 ELECTRICITY SECTOR**

### **4.2.1 Supply-Side**

#### **4.2.1.1 Critique**

The power demand in Viet Nam has increased dramatically for the period of 1996 to 2007 with an average annual growth rate of about 15% per year (EVN annual report, 2007). The peak demand has also increased significantly from 3,200 MW in 1996 to become 12,636 MW in 2007. The amount of power sales has recorded 58,438 GWh in 2007, increased more than 3.8 times compare to the situation in 1996. In order to meet the rapidly growing demand, Viet Nam's power industry has expanded the power plants with various energy sources, enhanced high voltage transmission lines for three regions (north, centre and south) and reduced the transmission and distribution losses up to 10.56% in 2007. The power plant expansion was facilitated by EVN's (Electricity of Viet Nam) and IPP/BOT schemes to provide the total 13,450MW installed capacity. The IPP/BOT share has contributed 22% of the total national installed capacity in 2007. The detail figures on electricity supply and installed capacity are shown in Figure 1 and Figure 2 respectively.

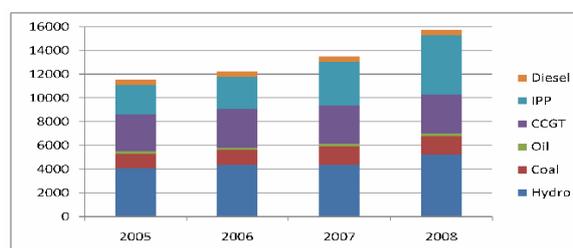
(unit : GWh=1,000MWh)



Source: Made from Viet Nam Institute of Energy, 2009

Figure 1 Electricity Supply by Sources in 2008

(unit : MW)



Source: Made from Viet Nam Institute of Energy, 2009

Figure 2 Installed Capacity Mix

Based on JICA report (2008), during the period of May to July 2005, power shortage was estimated at 800-1,300 MW and the whole northern region including Hanoi City faced

load shedding for several weeks. A part of the reasons of this power shortage was the decrease of hydropower output due to drought conditions, and a lack of reserve margin against peak demand. To overcome the power shortage, EVN has also initiated power import from Yunnan Province and Guanxi Autonomous Region in China starting from the 110/220 kV transmission lines in 2005.

Energy efficiency activities in the electricity sector have been led by introducing the new super critical coal power plant generated by IPP/BOT that has better efficiency compared to the conventional coal power plant. On the other side, systems for the collection of detailed data in each segment of the electricity sector, including data on end-use consumption of electricity, have not been established. This impedes the estimation of potential energy savings and effective targeting of energy efficiency measures.

Based on the report of EVN (2007-2008), the exploitation of hydropower potentials and production of coal used for power plants would be limited by 2015, the following challenges in the Viet Nam national electricity supply systems are:

1. Power plants based on hydro power much depend on water resources availability
2. Power plants based on coal energy sources need to secure stable supply of coal for generating electricity.
3. The future implementation of nuclear power plant needs human resource development and public acceptance, international cooperation, and the technology awareness.

Viet Nam T&D losses fell sharply from 21.4% in 1995 to 11.78% in 2005. EVN reported that total T&D losses in 2008 were 9.25%. It aims to reduce the losses to 8% by 2010. Based on discussion with EVN and Institute of Energy (IE), the official figures for technical, commercial and non-technical losses are not available, however, IE has indicated that most of T&D losses are technical losses.

Most of planning works for electricity transmission and distribution networks in Vietnam have been undertaken by IE, and it is understood that all key measures to reduce network losses have been taken into account during the design phase. IE however has highlighted that the current bottle-neck of HV transmission line in central part of Viet Nam has caused the following challenges in the Viet Nam national T&D system.

1. Unbalance load flow among Northern, Central and Southern region, excess power generation in the Southern region cannot effectively be delivered to the Northern region.
2. Certain parts of T&D networks are overloaded, hence higher T&D losses

#### **4.2.1.2 Recommendations**

**Recommendation 19.** MOIT need to develop a suitable mechanism strategy for enhancing private sector participation on power plant development and to continuously review energy pricing policy to reflect real costs of energy supply towards more market approach (electricity tariff in particular).

**Recommendation 20.** The Electricity of Viet Nam should improve the existing power plant efficiency by implementing the most efficient power plant.

**Recommendation 21.** The Electricity of Viet Nam should establish a long term energy development program for reducing T & D losses (for instance, for the period 2010-2020).

## 4.2.2 Demand - Side

### 4.2.2.1 Critique

The Demand-Side Management (DSM) project, funded by the WB/GEF and SIDA, was implemented by EVN from 2000 – 2007. The objectives of the Demand-Side Management are to develop and expand demand-side management (DSM) business programs and test new market transformation efforts within the national electric utility, Electricity of Viet Nam (EVN). EVN's DSM Phase 1 & 2 was designed to achieve over 120 MW in system peak reduction and electricity savings of about 500 GWh through the implementation of several DSM measures, including:

1. Expanded time-of-use (TOU) metering by procuring and installing TOU meters;
2. Pilot direct load control (DLC) Program introduced by using ripple control systems;
3. Compact fluorescent lamp (CFL) promotion;
4. Fluorescent tube lamp (FTL) market transformation;
5. Supporting programs and technical assistance for DSM efforts.

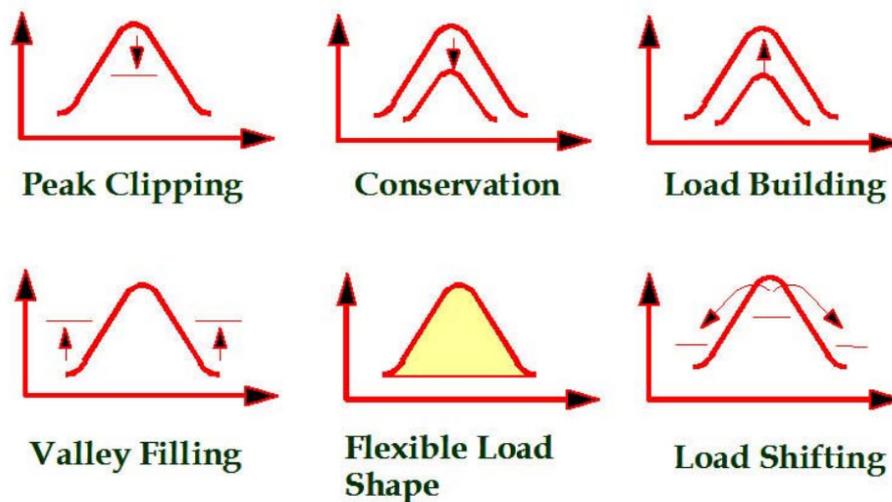
Statuses of the above DSM measures to date are summarized below:

DSM Measure	Status
TOU meter installations in 4,000 large- and medium-sized customers	Completed
Pilot direct load control (DLC) Program	2 pilot DLC projects were introduced in HN and HCMC. The 2 pilot projects received limited customer participation.
Compact fluorescent lamp (CFL) promotion	1 million CFL bulk purchasing and distribution were implemented in 2005 and the domestic CFL market size is now about 20 million units.
Fluorescent tube lamp (FTL) market transformation	The program is an on-going program with demonstration and large-scale implementation in school buildings

Supporting programs and TA for DSM	On-going EE awareness campaign through media (reporters), TV and Radio commercial
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Monitoring and evaluation of impacts of DSM measures against the overall demand and power reduction target has not yet been undertaken, however energy saving from EE lighting measures until the end of 2008 has been estimated at 1 billion kWh. Currently, EVN has various on-going EE measures for residential and industrial sector which are implemented by its business department. Budgets for these EE implementations are a portion of EVN's annual budget.

Most DSM programs will be designed to improve utilities' load shapes which are to be identified through load researches. Various load-shape objectives - Peak Clipping (reduction in the peak demand), Valley Filling (increased demand at off-peak), Load Shifting (demand shifting to non-peak period), Conservation (reduced overall demand), and Load Building (increased demand) as shown in the Figure below - will be identified by the utility.



**Figure 4.1: Load Shape Objectives**

Load research is an important utility activity and provides a wealth of information essential to several key utility functions such as System Planning and Operation, Load forecasts, DSM Planning and Tariff Design. In planning, designing and implementing DSM programs, the information from load research studies combined with market survey data provides key information on how customers use electricity. Load research also provides valuable information on customer classes, or provinces, which contribute to the peak and what appliances contribute to the peak.

This information is the key to developing and designing suitable DSM programs which meet utility objectives. With sufficient load research data, electric utilities can also determine their load shapes and analysis of the load shapes can assist in monitoring and evaluating the impact of DSM programs on the system load shape and on the cost of electricity supply. In Thailand, the Electricity Generating Authority of Thailand (EGAT) has extensively conducted load research in the residential sector and the results have been used to identify priority appliances for their energy labeling programs.

Electricity Regulatory Authority of Viet Nam (ERAV) is responsible for load research activities in Viet Nam, and they have been coordinating with EVN to implement the activities. However, comprehensive load research activities in Viet Nam are still in the early stage and, hence, data is not sufficient to determine sectoral load shapes and contribute from various end-uses, and to design DSM/EE measures. Based on the DSM measures implemented in EVN's DSM Phase 1, it is understood that the program was designed with focus on Peak Clipping and Load Shifting through DSM measures in residential and industrial sector, which is still the two largest end-use sectors in Viet Nam to date. However, due to lack of monitoring and evaluation data, impacts of DSM measures on EVN's load shape cannot be determined.

Based on the discussions with various Vietnamese agencies during the PREE site visit, low electricity tariff (due to subsidy) is considered to be one of the key barrier in EE promotion in Viet Nam, moreover, the following challenges have been recognized:

1. Comprehensive load research data is not available, therefore followings cannot be determined:
  - a. % contribution of different end-use in each sector
  - b. Priority DSM measures based on % contribution
  - c. Impact of DSM measures on EVN's load shapes
2. Financial and human resource capacity of EVN's business department responsible for EE implementation

#### **4.2.2.2 Recommendations**

**Recommendation 22.** ERAV should improve load research activities so as to identify proper DSM measures.

**Recommendation 23.** EVN's management should reflect priority of DSM/EE implementation in EVN's organizational structure, e.g. having a separate implementation unit.

**Recommendation 24.** MOIT and EVN should investigate a sustainable funding mechanism for DSM implementation, e.g. setting a DSM fund with contribution from electricity tariff or placing a levy on the revenue of electricity distribution companies to be used to fund energy efficiency programs.

## 4.3 COMMERCIAL AND RESEDENTIAL SECTOR

### 4.3.1 Critique

Electricity consumption in the residential sector constitutes 42% of total electrical energy use in 2008. This is followed by the 9% total consumed by the commercial and public sector. In all, electricity forms 70% of energy used in households. This high proportion of electricity consumption is attributed mainly to electrical household appliances like refrigerators, air-conditioners, rice cookers and lighting. In response to these increasing trends in electrical energy consumption, the Government of Viet Nam has instituted a series of impressive measures to reduce energy consumption and increase energy efficiency in the sector. These measures under the Ministry of Industry and Trade include:

- Publication of standards for minimum energy performance of appliances.
- Adoption of CFL and TFL lighting and hardware in all buildings.

The Ministry of Construction has in 2005 developed a comprehensive building energy code covering building thermal envelope performance, improved indoor ventilation and lighting conditions and other minimum electrical equipment performance requirements. The building energy code became effective in 2007. In addition, the Ministry of Construction has also developed a list of projects to support and implement energy efficiency in the construction industry such as:

- Capability building to facilitate activities of energy efficiency and energy efficient building design and management.
- Development of procedures for managing energy efficiency.
- Identified actions to implement energy efficient and conservation program in construction works.

However the MOC is also aware of the barriers to implementing the energy efficiency program. The significant barriers include:

- Lack of policies and effective management tools for energy saving and use in building works.

- Low technical capability so that the implementation and enforcement of the building energy code may be hampered.

Although data on energy consumption at the broad economic sector level is available and has been used to channel efforts to reduce energy consumption, but at the sub-sector level such as end-use data pertaining to electricity consumption by appliance types like refrigerators, rice cookers and air-conditioners are not available. This may hamper efforts to bring energy efficiency measures to the next implementation level.

### 4.3.2 Recommendations

**Recommendation 25.** It is recommended that MOIT should:

- Develop sub-sector level data on residential energy end-use by appliance to aid energy efficiency analysis in building energy use sector.

**Recommendation 26.** The MOC should:

- Set a priority in capability building in order to expedite implementation and enforcement of the Building Energy Code as well as to effectively pursue the energy efficiency programs for buildings and construction industry.
- Prioritize and set out the time frame of their projects for their energy efficiency program.

## 4.4. TRANSPORT SECTOR

### 4.4.1 Critique

Energy consumption for transport activity increased at more than 10% per year in last decade. The share of oil consumption over the final energy consumption is currently at 52%, about 60% of which is consumed by the transport sector. However, the Decree on Energy Conservation and Energy Efficiency (102/2003/ND-CP) doesn't outline any specific measures on the transportation energy efficiency improvements except a responsibility by Ministry of Transport to coordinate with MOIT on energy efficiency and conservation measures for facilities concerning to transportation.

Nonetheless, in the framework of National Energy Efficiency Program, Project No.11 has been formulated to reduce transport energy consumption and abatement of pollution by optimal utilization of vehicles. However, the program has not been implemented as per schedule because of lack human capacity and financial constraint. At the same time, lack of the data and information such as energy fuel consumption for kinds of transport is also another barrier for promotion of EE vehicle in Viet Nam.

The PREE found that specific transport energy efficiency improvements are not in the scope of work of Ministry of Transport. The Ministry focuses on its core duty which is to ensure the transport system is functioning well to move people and goods. As such, energy efficiency improvements only appear as incidental outputs from the core duty's activities such traffic planning to reduce congestion or transport infrastructures improvements.

In line with rapid economic growth, private vehicle ownerships have been growing steeply in Viet Nam. The growing private vehicles ownerships for personal and business purposes have strong implication to increase transport energy consumption. Viet Nam has to manage its growing transport energy demand by improving the fuel economy of new vehicles entering the market.

#### **4.4.2 Recommendation**

In line with the review carried out by the PREE team, the following recommendations are proposed to the Vietnamese government:

**Recommendation 27.** Enforce fuel economy standards and labelling on new vehicle fleets entering the market;

**Recommendation 28.** Formulate a tax system for vehicle fleets which promotes transport energy efficiency, reduce congestion and abate environmental pollutions;

**Recommendation 29.** Develop a comprehensive roadmap for sustainable transport system which includes integrated traffic planning, mass transit infrastructures development and improvement and vehicle fleets energy efficiency improvements;

**Recommendation 30.** Develop a database for transport sector including fuel consumption and data for new and advanced vehicle (electric, hybrid, fuel cell, etc.).

## **5. APPLIANCES AND EQUIPMENT**

### **5.1.1 Critique**

Viet Nam promulgated a Decree on Energy Conservation and Energy Efficiency (102/2003/ND-CP) on 3 September 2003. The decree, among others, stipulates measures for improvement of energy use of products and facilities. Under the Decree, manufactures of energy-use products and facilities are requested to incorporate energy-efficiency features and are required to provide necessary information in terms of energy efficiency and energy consumption rate of the products. The energy consumption rates will be verified and after verification, the

products will receive an Energy Efficiency Quality Products Certificates which eligible the products for endorsement labeling.

The Prime Ministerial Decision 79 2006/QĐ-TTg of the 14 April 2006 approved the Electricity Saving Program for the period 2006 to 2010. The Electricity Saving Program authorizes the Ministry of Industry and Trade (MOIT) to issue a labeling procedural guideline circular which will assist suppliers put a label on high-efficiency electric appliances: electric motors, fans, air conditioners, fluorescent-tube lamps (FTLs); and FTL ballasts. Technical standards for equipment energy performance will be issued by the Ministry of Science and Technology (MOSTE). The Electricity Saving Program also calls for MOIT to develop a road map for replacement of 40 million incandescent lamps with CFLs, FTLs, and T5 lamps. On the other hand, the national utility, Electricity of Vietnam (EVN) has been implementing a national DSM program since 2001, and is currently implementing a national program to distribute compact fluorescent lamps and thin-tube fluorescent lamps.

Vietnam is currently in the phase of rapid economic growth. To follow suit the rapid economic development is the strong growing demand and uses of appliances and equipment - ranging from refrigerators and air conditioners in homes, to photocopiers and lighting equipment in office buildings – which will drive more demand for energy, i.e. electricity. In meeting the growing power demand and managing the power load efficiently will be a great challenge to the government. In this regard, improving the energy-efficiency of appliances and equipments by standards and labeling will be the most cost-effective types of policy to address the surging power demand and managing power loads efficiently. Energy-efficiency standards and labeling have the potential to effect complete market transformations for different classes of energy-saving products, at a cost far below the cost of providing new energy supply.

A lack of standards can result in inefficient appliances and equipments entering the market and locking consumers into years of additional costs and sub-standard performances. Mandatory energy standards such as Minimum Energy Performance Standards (MEPS) will provide efficient and effective solutions in improving energy efficiency of appliances and equipments. At the same time, labeling, especially Mandatory Energy Performance Labeling (MEPL) will enhance the implementation of MEPS. MEPL is also could improve market penetration of energy-efficient products by creating a well informed society. The PREE team identified that Vietnam has recently issued MEPS for a few products; however, they have yet to begin enforcement. Furthermore, Viet Nam has also designed both a comparative and endorsement energy label, but a clear road map for implementation and mechanism for applying them have not been yet developed.

Integrated institutional approach for MEPS and labelling program planning and implementation is important because the roles and responsibilities for energy efficiency are vested with various

agencies. However, the PREE team found this important link in the appliances and equipments energy efficiency improvement efforts is missing. Currently, the implementation of MEPS and labelling has been on *ad hoc* basis and without a clear strategy. MEPS and labelling programs should be developed in a holistic manner with a clear strategy and well-defined roles and responsibilities of the agencies involved.

Generally, the most energy-efficient model in a group of product class is more expensive than that of others but over the long run the energy-efficient one will provide more savings and cost-benefit. However, the lower initial investment cost element on inefficient product will always outweigh the long run savings and benefits element. The PREE team therefore believed that for better penetration of the most energy-efficient appliances and equipments into the market, and to establish a niche, requires strong support from the government. The support could be provided as fiscal or financial incentives to manufactures, importers or buyers of the most energy-efficient appliances and equipments in the market.

The PREE team realised that Viet Nam has limited local knowledge of the technical basis and terms for carrying out a benefit-cost analysis for energy labeling and MEPS requirements. This limitation impeded Viet Nam to promote the use of MEPS and MEPL on a wider scope vigorously. Furthermore, technical barriers such as limited number of energy efficiency testing laboratories or no accredited laboratories are also a huge barrier for Viet Nam in implementing MEPS and labelling effectively and efficiently.

### 5.1.2 Recommendations

In line with the review carried out by the PREE team, the following recommendations are proposed to the Vietnamese government:

**Recommendation 31.** Enforce the minimum energy performance standards (MEPS) and the energy performance labelling as a mandatory requirement for the designated equipments in legal documents (Laws, Decree, etc). Experiences in other countries have shown that mandatory MEPS is the key underlying sustained appliances and equipments efficiency improvements over time.

**Recommendation 32.** Integrate and strengthen planning and implementation of the MEPS and labeling programs. The roles and responsibilities of all involved agencies identified with clear actions and deliverable targets.

**Recommendation 33.** Monitor and evaluate the effectiveness of energy-efficient appliances and equipments programs closely with market data. For this purpose, energy-efficient appliances and equipments sales data could provide good understanding of the market behavior and also would identify proper interventions to be needed by the government.

**Recommendation 34.** Review periodically (3-5 years) the list of the designated equipments or priority of appliances and equipment to be included in the national energy efficiency promotion programs/projects.

**Recommendation 35.** Provide appropriate incentives which guaranteeing a specific level of support to different energy-efficient appliances and equipments based on life-cycle cost benefit principle. For example, sales tax and import duty exemptions for the five-star rated air-conditioner models in the market; and

**Recommendation 36.** Develop human capacity and technical needs by providing relevant trainings, international cooperation, and technology transfers.

## **6. ENERGY EFFICIENCY RELATED R&D**

### **6.1 Critique**

The important role of research and development (R&D) in energy efficiency improvement is spelled out in the *Decree on Energy Conservation and Energy Efficiency (102/2003/ND-CP)*. The decree stipulates that R&D should be a main tool for improvement of energy efficiency in various sectors in Viet Nam. The decree also mandates various organisations in the government at central and local levels to put reasonable efforts on R&D of energy efficiency improvement. The contents of energy efficiency R&D in the decree are: development of suitable energy efficiency and conservation technologies in the industrial sector; promotion of those technologies developed from R&D efforts and improvement of energy efficiency in production activities of Vietnam people especially in the rural and remote areas. The decree also calls the government to allocate suitable budget for R&D works in energy efficiency improvements from the Science-Technology Research and Development Fund.

As a developing economy, Viet Nam's efforts on R&D of technical energy efficiency improvement are still at an infancy level. At the moment technical energy efficiency improvement is not at the top priority of the government's R&D efforts list. The PREE team believed as a fast developing economy, Viet Nam has huge technical energy efficiency potentials to be tapped by R&D efforts. Even though R&D efforts need substantial financial and human capacity, the benefits that could be generated through these efforts will support a sustainable path for energy efficiency improvements efforts over time.

R&D is an important component for the economy's sustainable energy efficiency improvements and also to spur innovations. Certain areas of energy efficiency improvements are depending on local conditions such as climate, chemical and physical properties to produce the best benefits of energy efficiency improvements. On top it energy efficiency improvement is dynamic and always has many rooms for improvement.

## 6.2 Recommendations

In line with the review carried out by the PREE team, the following recommendations are proposed to the Vietnamese government:

**Recommendation 37.** Incorporate energy efficiency improvements R&D efforts in The National Science and Technology Plan. The plan should address comprehensively the R&D needs for energy efficiency improvements such as human capital needs, budget allocation, partnership between government sector and private sector in R&D, and prioritization of various energy efficiency improvements R&D;

**Recommendation 38.** Synergize R&D efforts with the existing energy efficiency improvement programs;

**Recommendation 39.** Focus R&D efforts on applied-science where Viet Nam has comparative advantages and will support sustainable energy efficiency improvements and spur innovations; and

**Recommendation 40.** Facilitate industry-academia tie-ups; with suitable funding mechanisms to enhance technology development initiatives that could help increase energy efficiency improvement initiatives in the industry.

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