CHAPTER 3

ROAD MAP, MASTER PLAN AND ACTION PLANS

Chapter 3 Road Map, Master Plan and Action Plans

3.1 Total Picture of Road Map, Master Plan and Action Plans

3.1.1 Road Map and Master Plan

In Vietnam, the "National Strategic Program on Energy Saving and Effective Use for the period of 2006-2015" (hereinafter referred to as the Program) was approved by the Prime Minister in April 2006. The Program consists of 11 "programs", and these programs are grouped into six "groups" which consist of one to three programs.

As one of the objective of this study, the Scope of Works which was agreed by MOIT and JICA stipulates that "to formulate a road map and action plans for the advance of the Program.

The road map will cover all "programs" of the Program, putting emphasis on "programs" which the MOIT presides over.

Regarding the master plan, the above-mentioned Scope of Works stipulates that "to assist in the formation of Master Plan on EE&C" is also one of the objectives of this study.

On February 2009, MOIT and the Study Team exchanged views on preparation of the master plan, and it became clear that MOIT did not have practical policies on the contents and preparation schedule of the master plan, nor began to prepare these policies. It seemed that these policies would not be determined even in September 2009 when the final meeting between MOIT and the Study Team is scheduled. Therefore the both parties agreed that the assistance for preparation of the master plan in this Study is as shown below, as preparation works for formulation of the master plan by MOIT in the future.

a) Review of the structure and contents of the "National Strategic Program on Energy Saving and Effective Use for the period of 2006-2015"

b) Selection of items to be implemented on a priority basis (similar study for the formulation of road map)

c) Proposal on items that should be added to the Program

3.1.2 Action Plans

In the Scope of Works of this study, the following four themes are stipulated.

a) Design and creation of a database system of EE&C and data collection mechanism

b) Recommendation of drafts of legal framework of law and decrees

c) Design of a framework of "Training Centers for Energy Managers" and preparation of implementation program of the Center

d) Design of a framework of "Energy Conservation Centers"

MOIT and the Study Team made discussions many times on priority themes that should be described practically in the action plans putting policy importance and possibilities of continual assistance by Japan into consideration, and agreed that the action plans should be formulated for the following four themes.

a) Education and training for energy management

b) Design and creation of an energy consumption data collection mechanism

c) Standard and labeling and electricity DSM

d) Effective organization structure between central & regional government and strengthening of functions of ECCs

In addition, the Vietnamese government and JICA are now making discussion on establishment of an financial schemes for advancing energy conservation. One of them is two-step loan (TSL) with low interest rate for supporting enterprises to introduce energy efficient facilities, and the other is “Support Program to Respond Climate Change in Vietnam” to support policies for promotion of energy conservation and utilization of renewable energy, both of them will be implemented from 2010.

The outlines of these financial schemes to be implemented in the near future are also put down with the above-mentioned four action plans.

3.2 Roadmap and Master Plan

Reflecting the result of the analysis in Section 2.10, the roadmap and the master plan on each component of National Strategic Program has been drafted. And action plans for higher priority programs are summarized in 3.4. The flow of the analysis and proposal are illustrated in Figure 3.2-1.

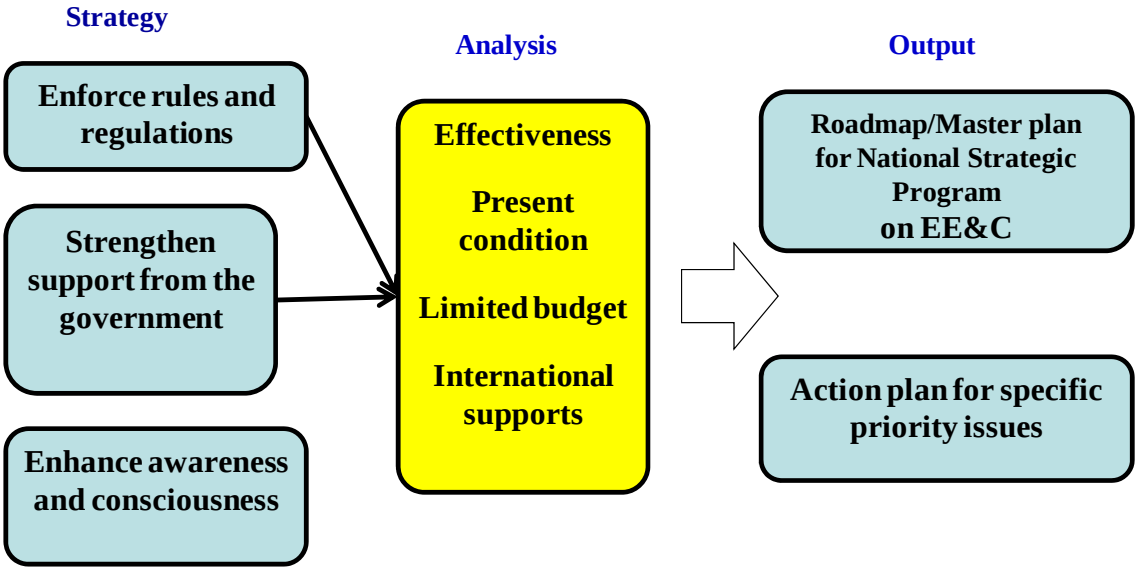


Figure 3.2-1 The Flow of the Analysis and Proposal

Basic grounds for proposed programs in the roadmap and master plan are as follows;

From Japanese experiences by introducing energy management system and steadily operating it (applying the PDCA cycle), at least 5 % EE&C can be achieved. Vietnamese government should continue and accelerate the preparation and enactment for legal frame work of national certified energy manager program. And also Government should strongly focus on awareness program for governmental organizations and private companies about the merit of introducing energy management system.

Following up the labeling program on magnetic ballast, street lighting and T8 lamp, it is quite effective to formulate next labeling programs on ACs, TVs, water heaters and refrigerators etc. and go into steady operation, which will be sure to be spread in the near future in Vietnam, before their popularization. There are several failures in other countries without controlling the energy efficiency criteria on these electric appliances. But introduction of mandatory labeling program (regulation) is not sufficient to achieve the targeted EE&C level. Awareness program for consumers, manufacturers and retailers, and incentive and disincentive program which has a strong linkage to electricity DSM measures should be formulated.

Compared with Japan and surrounding countries, national budget and other resources available for EE&C activity per capita and GDP in Vietnam is quite small. In order to achieve the national target of

EE&C level, it is necessary to invest at least several times larger financial resources. And to achieve the target, firstly road map (total figure) for EE&C promotion should be prepared. Then to secure the budget needed, functional and also technical support from eligible international supporting programs (organizations) should be formulated.

Until 2015 utilizing financial and technical assistance from various donors, the government should concentrate on 1) formulating national energy manager certification program and introducing the target setting agreement program with designated factories, buildings and transport enterprises, 2) disseminate labeling program of selected electric appliances and 3) accelerating DSM measures in electricity. Employing these priority measures, 10% EE&C is achievable, while the programs do not require much financial resource.

DSM in electricity is an effective and speedy measure to promote EE&C and is an effective measure to reduce the electricity peak demand when applying an appropriate electricity tariff mechanism (e.g. raising the lower price of coal and gas for electricity generation.) The expected benefit is not only achieving EE&C, but also mitigating peak demand.

For promoting EE&C in building and transportation, not only enforcement of EC Law but also these measures are considered to be quiet effective;

1) Controlling the rapidly increasing demand by newly construction (especially enhancement of the application of building code)
2) Early establishment of master plan on national transportation. And under this master plan especially introduction of public transportation and modal shift is considered to be quite effective.

Table 3.2-1 Summary of EC Roadmap and Master Plan (1/2)

Group	Program	Contents	Items to be confirmed	- 2010	2011	2012	2013	2014	2015
Group 1 Intensification of management function	Program 1	Intensification of the state administration on energy saving and effective use, organizing controlling system on energy saving (MOIT)	- EC Law and Decrees	To be enforced in 07/2009					Amendment
			- Revision of electricity price in 03/2009			Revision to international market price			
			- ECC (central and local)		Establishment of the Central ECC				
			- Energy Manager (examination, accreditation, training)	JICA expert	JICA expert	National Training Center Examination			2,000 managers or more
			- Other donors' support	DANIDA (MOIT, HTU) $1 mil	DANIDA	DANIDA	DANIDA	DANIDA	DANIDA Total $15 mil
			- EC data collecting mechanism	Pilot Program	Pilot Program	Full fledged operation			
Group 2 Awareness raising	Program 2	Awareness raising of energy saving and effective use (MOIT)	- Focus on specified Projects Effective Priority Program Design (MOIT)	$200,000	ditto	ditto	ditto	ditto	ditto
	Program 3	Incorporation of energy conservation education into the national education system (MOET)	- Endorsement of Programs (MOET) - Financial Support (MOF)	Endorsement					Linkage to ECC
	Program 4	Pilot campaign of "energy saving in household" (MOIT)	- Rural CFL - Home appliances (AC, refrigerator, heater) (MOIT) - Financial Mechanism (MOF) - Linkage to DSM	Program design Pilot projects	Pilot projects	Pilot projects	Pilot projects	Pilot projects	Enforcement EE-AC X unit
Group 3 Promotion of high efficiency equipments	Program 5	Development of energy performance standards and commencement of energy-saving labeling scheme (MOST)	- UNDP/BRESL 2009-2013	UNDP	UNDP	UNDP	UNDP		
			- METI/methodology (Nov. 2008-)	TA for testing model					
			-Calibration	Calibration	Calibration	Calibration	Calibration	Calibration	
					Voluntary	Voluntary	Mandatory		
			- Endorsement or comparative	Endorsement	Preparation for comparative	Comparative			
			- Standards and Labeling should be amended once every 3 to 5 years						
	Program 6	Technical assistant to domestic energy efficiency product manufacturers (MOST)	- Not only manufactures but also retailers (MOIT)	5 cases done	5 cases	5 cases	5 cases	5 cases	5 cases

Table 3.2-1 Summary of EC Roadmap and Master Plan (2/2)

Group	Program	Contents	Items to be confirmed	- 2010	2011	2012	2013	2014	2015
Group 4 Energy efficiency in manufacturer	Program 7	Establishment of controlling model of energy saving and effective use in enterprises (MOIT)	- Target Setting Agreement under the EC law	To be enforced in 07/2009	Operation				
			- UNIDO 2010-2013 (ISO50001, energy audit training) ($1 million)	UNIDO	UNIDO	UNIDO	UNIDO		
	Program 8	Assistance for manufacturers to improve energy efficiency in production line (MOIT)	- JICA ODA loan ($45 million), 12/2009-	Disbursement TA	Disbursement TA	Disbursement TA			EE for X% factories
			- NEDO model projects						
			- Other donors	IFC Market Survey, $2,000					
Group 5 Energy efficiency in building	Program 9	Capacity building for energy efficiency-design and management in buildings (MOC)	- Target Setting Agreement under the EC law	To be enforced in 07/2009	Operation				
			- Building Code	Enforcement	Enforcement	Enforcement	Enforcement	Enforcement	Enforcement
	Program 10	Creation and promotion of energy efficiency building model (MOC)	- EE&C building award - ECO building - Financial mechanism	Enforcement Promotion Program design	Operation Implementation				
Group 6 Energy efficiency in transport	Program 11	Maximum utilization of transportation capacity, minimizing fuel consumption and decrease of emission (MOT)	- Target Setting Agreement under the EC law	To be enforced in 07/2009	Operation				
			- Master plan for national transportation (modal shift and city planning)	Enforcement					
			- Shift to public transportation (inter city, inner city)	Preparation for introduction of Shinkansen, railways	Bus (LPG, CNG, Hybrid, electricity, biofuel)	Enhancement Introduction of Shinlkansen			
Budget				VND 40 billion	-----	-----	-----	-----	VND 400 billion
Energy consumption			Comparing to BAU	-----	-----	-----	-----	-----	-5%

3.2.1 Program No.1: Establishment of National EE&C Management System

Program No.1 is a cross-cutting program which encompasses across the other programs. It complements and supports a vast spectrum of the programs. The major issues to be concerned are described below;

1) Enforcement and Steady Operation of the EC Law

Enactment of the EC Law, which can be the driving force to promote EE&C, is strongly desired. Especially cost-effective measures indicated under the law are (1)establishment and operation of designated factories , buildings and transport enterprises program and certified energy manager program, and (2) establishment of standard and labeling program (comparative label, MEPS). (Regarding the detail of (1), refer "3.4.1 Education and Training for Energy Management" and "3.4.2 Establishment of Data Collection Mechanism." Regarding the detail of (2), refer "3.2.5 Program No.5" and "3.4.3 Labeling program and Electricity DSM Program.")

2) Enforcement on Application of Building Code for Building

Along with the expected economic growth, a lot of large buildings will be constructed from now on. And as a result energy consumption will also increase. Under these conditions the importance of enforcement of building code which can control the energy consumption of newly building construction is quite huge. The strong leadership of MOC is desired. (Refer "3.2.9 Program No.9")

3) Clarification of the Effective Inter-organizational Structure between Central and Local Government and Role and Responsibility of ECC

Legal framework shall be prepared by central government, (centralization; the managing ministry is MOIT). Besides the local governments shall have a responsibility for the EC Law operation and ECC has a responsibility for awareness and supplement for local governmental activity. (Refer "3.4.4 Effective Organizational Structure between Central & Regional Government and Strengthening of Functions of ECCs.")

4) Shift to Appropriate Energy Pricing Policy

Compared with Japan and surrounding countries, Vietnamese electricity price has been operated historically and politically quite smaller. This is one of the source to secure Vietnamese competitiveness, but is also the biggest bottleneck to promote EE&C and renewable energy. Though rapid raise of electricity tariff causes confusion, it is necessary to formulate more functional and market oriented tariff mechanism gradually. (Refer "3.4.3 Labeling Program and Electricity DSM Program.")

Program No.1

1. Program name	Establishment of national management system for promoting EE&C
2. Implementing agency	MOIT, MOC, MOT, MOST, Local Gov, ECC and related Agencies
3. Target group/persons	Establishment of comprehensive and functional management system for promoting EE&C
4. Goal	Nationwide EE&C Promotion
5. Expected result	
6. Expected project cost	
7. Implementation period	2010~2025

8. Description

✓ **Enforcement and Starting operation of the EC Law**

(1) establishment and operation of designated factories, buildings and transport enterprises program and certified energy manager program (Refer 3.4.1 and 3.4.2)
Introduction of designated factories, buildings and transport enterprises program
Introduction of certified energy manager program (training and examination)
Establishment of energy consumption data collection mechanism

(2) Establishment and operation of standard and labeling program (Refer 3.2.5 and 3.4.3)

(3) Establishment and operation of another related legal frameworks

✓ **Enhancement on application of building code (EE&C in new buildings)**
Refer 3.2.9 Program NO.9

✓ **Clarification of the effective inter organizational structure between central and local government and role and responsibility of ECC**

(1) Definition of the role and responsibility of DOIT in each local government which has a responsibility for operating Establishment of 8 ECCs

(2) Legal framework shall be prepared by central government, (centralization, the managing ministry is MOIT). Besides the local governments shall have a responsibility for EC Law operation.

(3) ECC has a responsibility for awareness and supplement for local governmental activity. Refer 3.4.4

✓ **Shift to appropriate energy pricing policy**

(1) Analysis of electricity load pattern (Load management)

(2) Study on electricity DSM measures, such as appropriate (functional) electricity tariff mechanism including TOU tariff (incentive and disincentive measures and power factor bonus and penalty etc.)
Especially the local power voltage drop and increase, which is caused by not well designed distribution network prevents the dissemination of CFL and high efficient electric appliances.
Along with the increase of power factor, it is necessary to promote the effectiveness of electricity transmission and distribution line.

(3) Realization of appropriate electricity and another energy pricing policy

(4) Enforcement on application of energy conservation standard for building (building standard) (Refer "3.2.9 Program No.9)

9. Issues

✓ Both application of building code and enforcement of EC Law are quite important. Not only the strong governmental leadership, linkage between central and local government, but also awareness campaign and endeavor to grow these activities to nationwide circle.

✓ To establish and well operate the energy consumption data collecting mechanism, strong interface among MOIT, MOC, MOT and GSO is indispensable. Periodical information exchange mechanism should be formulated.

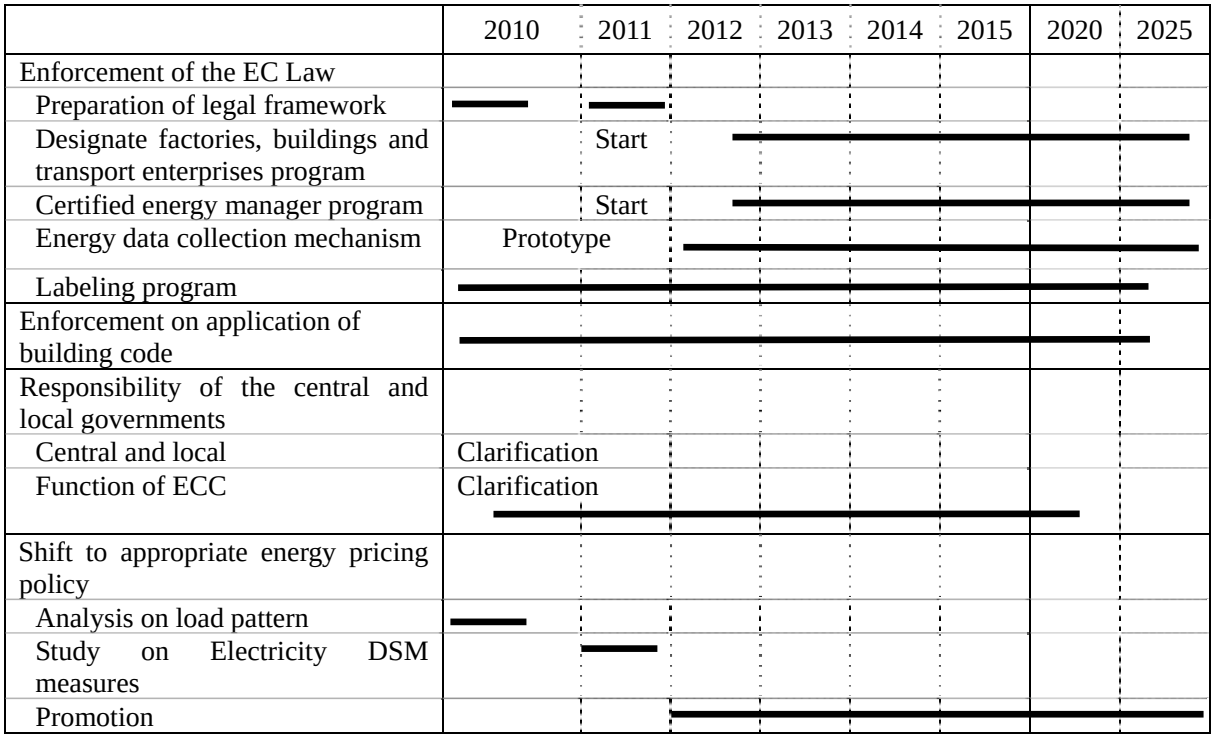
✓ The basic understanding that compared with Japan and surrounding countries, Vietnamese electricity price has been operated historically and politically quite smaller and this. is the biggest bottleneck to promote EE&C. The issue is formulation of practical program to answer this problem.

✓ Awareness for owners and managers of factories and buildings (to self reliant activity)

10. Justification of Technical Assistance

- ✓ Through the dispatch of Japanese expert from the end of 2009 for 2 years, not only technology transfer about Japanese energy management program operation but also the coordination with another donors support can be done. It will be quite effective.(Refer 3.4.1)
- ✓ Japanese technical assistance for establishing National Energy Management Training Center is strongly needed And it is also quite effective to transfer Japanese know how and experiences in this field. Though before the realization of Japanese support, Vietnamese preparation for self financing and human resource shall be secured. (Refer 3.4.1)
- ✓ As one of visible output, the prototype of energy consumption data collecting mechanism has been established. It is expected that Vietnamese government shall utilize and expand the prototype into full fledged model. And MOIT requests JICA the successive technical assistance for data management, analysis and functional operation. It might be effective to carry out a training in Japan or dispatch some experts on this issue. (Refer 3.4.2)

Implementation Schedule



Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Enforcement of the EC Law								
Preparation of legal framework								
Designate factories, buildings and transport enterprises program	noted elsewhere							
Certified energy manager program	noted elsewhere							
Energy data collection mechanism	0.02 – 0.55							
Labeling program	noted elsewhere							
Enforcement on application of building code								
Responsibility of the central and local governments								
Central, local								
Strengthen ECC		0.5	0.5	0.5	0.5	0.5	0.5	0.5
Shift to appropriate energy pricing policy								
Analysis on load management	0.5							
Study on electricity DSM		1						
Promotion			0.1	0.1	0.1	0.1	0.3	0.3

3.2.2 Program No.2: Educational Campaign for Awareness of EE&C

Some lessons learned from the past similar projects in developing countries indicate that the importance of cross-sectorial publication and dissemination of EE&C related information. In the light of such necessity, two priority areas should be implemented:

1) Education and Training Targeting Senior Executives

Because the key to the successful EE&C relies on the activities of the private sector, education and training targeting senior executives are the most important element to promote EE&C. JICA has implemented a variety of EE&C related projects overseas in the past years. The experience has provided that the root cause of obstacle for promoting EE&C is lack of awareness on EE&C at higher management levels of public and private enterprises. It has found that a top-down approach for managerial decision on EE&C related investment is the most effective approach in accelerating EE&C. In the reality, however, very few executives understand effectiveness and feasibility of EE&C related investment. Many enterprises put priority on short-term growth through increased production and underestimate the long-term effects of investing renovation aiming to EE&C through improved productivity. To overcome such situation, education and training for executives are very important to change their mindset. The ideal topics may include: how EE&C investment will effect to long-term prosperity of the company (e.g. contribution to the profit and corporate social responsibility, etc.) The seminar will aim at to make EE&C one of main operational indicators to promote their company as green business from the market.

2) Development of Network of Engineers and Energy Managers

According to the analysis from the energy audit carried out by the Study Team, the most significant needs expressed by energy mangers in the industries and factories is difficulty in access to technical information for implementing EE&C. Practical technical information, particularly good practice collected in Vietnam has been hard to find. For many engineers and managers, information such as EE&C practice implemented in other factories, the most promising technology to introduce, and necessary investment for such technology are of interest. Access to such information, however, is very limited in Vietnam because there is no professional organization for energy mangers and engineers which collect and publish such practical information. Lack of professional organization leads to unavailability of exchanging technical information. Practical information on good practice is high in needs.

In addition, information on the proposed examination for the certification of energy manger is another important area to disseminate because the examination will cultivate human resources basis for practicing energy management in Vietnam. Technical seminars aiming development of the technical capacity of all engineers need to be implemented with priority. As such, networking of EE&C engineers and energy manager is an effective means to disseminate EE&C technology

and to transfer technology through implementation of pilot projects. In order to realize this, the Study Team has proposed to establish a professional organization or association, which assist MOIT's activity.

Program No.2

1. Program name	Educational Campaign for Awareness of EE&C
2. Implementing agency	MOIT
3. Target group/persons	1) education and training targeting senior executives of the private sector and state-owned enterprises 2) Engineers and managers of factories and commercial building responsible for energy management
4. Goal	All people concerned with energy use raise the awareness of EE&C
5. Expected result	EE&C and dissemination is reflected to corporate policies and decisions
6. Expected project cost	US$ 1.0 million
7. Implementation period	Phase 1 (2010-12), Phase 2 (2013-15)

8. Description

Phase 1 (2010 - 2012）

This program consists of the following two components: 1) education and training targeting senior executives, and 2) Networking of Engineers and Energy Mangers.

1) Component 1: Education and training targeting senior executives

- ✓ Executive seminars targeting senior executive officers and other decision-makers of the private sector, the state-owned enterprises, and high level of government officials. The goal of the program is that the participants should start adopting general EE&C knowledge for their operations and day-to-day decision-making.
- ✓ Initial learning objectives are that the participants are able to (1) acquire knowledge in the trend of the latest laws and regulations for EE&C and the measures adopted by the private sector, (2) acquire knowledge in advanced technology in EE&C, and (3) comprehend some of the best practices implemented by advanced companies, etc.
- ✓ Initial highlight is to provide information on good practices in manufacturing in industrial countries. In the following stage II and III, the topics may be tailored to the participants' interest and various additional topics covered as necessary
- ✓ One of the aims of the proposed program is to introduce the roles of MOIT and ECC as "One Stop Centers for EE&C" for those who need technical assistance. Another aim is to initiate employees of the participants to receive & impart education and training program described in the Action Plan "Education and Training (on EE&C for senior executives, etc.)"
- ✓ The program is initially carried out mainly by lectures utilizing audio and visual materials. Large capital investment such as construction of training facility, etc were not considered because initial seminar/training will be held at the training facilities of ECCs and, when necessary, universities

2) Component 2: Networking of Engineers and Energy Managers

- ✓ MOIT will have established a network of engineers and energy managers. The network should be developed when the Energy Manger Program is enacted.
- ✓ EE&C related information (e.g. technical information, interpretation of rules, regulations and procedures, introduction of best practices) may be presented through the network. Issues and constraints associated with the program should be discussed with officials from ministries concerned.
- ✓ The hearing results may be reflected further to implementation of EE&C policies.
- ✓ This program should be continued through the Mid-term.

Phase 2（2013 - 2015）

- ✓ Continuation of the 1st phase

9. Issues

- ✓ This program is closely related to Energy Manger Program. The seminar for the executives is designed to executives with non-technical background. Also, for technical background, it is an introduction for further detailed training. Therefore it should start as soon as the target-setting program is launched. It is expected that those who take this course will recommend subordinates with technical training will attend more sector specific training aiming Energy Mangers
- ✓ Another component aims at those with more advanced technical background. The network may establish when the target setting program launches. Professional organization needs to be a vehicle for this networking

10. Justification of Technical Assistance

- ✓ In the lecture, introduction of good practices in Indonesia will be the most important element of the program. The compilation of the past examples, however, is not sufficient. The initial support to the program may include compilation of the past EE&C practices including the ones supported by JICA. Support to develop such contents may need technical assistance.
- ✓ Teaching methodologies and development of textbook may need to incorporate the past technical assistance by Japan.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
1) Component 1: Education and training targeting senior executives								
Development of seminar contents and textbooks, etc.								
Training of trainers (TOT)								
Implementation of seminars for executives and other decision-makers								
2) Component 2: Networking of Engineers and Managers for Energy								
Preparation for incorporation (by-laws, licensing, etc.)								
Enrollment								
Provision of the services, seminar, etc.								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
1) Component 1: Education and training targeting senior executives								
Development of seminar contents and textbooks, etc.								
Training of trainers (TOT)	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5
Implementation of seminars for executives and other decision-makers								
2) Component 2: Networking of Engineers and Managers for Energy								
Preparation for incorporation (by-laws, licensing, etc.)	0.2	0.2						
Enrollment	0.1	0.1	0.2	0.2	0.2	0.2	1	1
Provision of the services, seminar, etc.	0.2	0.5	0.5	0.5	0.5	0.5	2	2
Total	0.5	0.8	0.7	0.7	0.7	0.7	3	3

3.2.3 Program No.3: Putting EE&C Education into the National Education System

1) Significance of Energy Education

It is significantly important to adapt energy issues into the public education system as a basis to promote EE&C as a part of the National Development Strategy. It is fundamentally important to include energy issues and EE&C into the science and environmental education in public education system.

Environment and energy are significant elements of global issues to be taught in science education. It seeks the responsibilities of science and technology to contribute sustainable development for the benefit of the man kind. In addition, energy education should be taught by the holistic approach which encompasses over the life, the society, and the institution. Such subject is one of important subject because Vietnam lacks abundant natural resources.

Presently, the curriculum for energy and environmental education is not yet fully developed. Many related subject matters are under review and development by MOET based on the National Strategy prepared by MOIT. For example, EPU and HUT has extended the energy-related education program for undergraduate level. The former has a program on Energy Management[1].

2) Energy-related Subjects in Public Education

To promote the state-wide energy education, MOET prepares the related subjects to be adapted in the curriculum from the elementary schools to the high schools. For example, a teaching material has been developed to enhance the energy and environmental education. The material has been completed and MOET has chosen some schools to introduce the materials for experiment. Lessons learned from the pilot program may be accumulated and analyzed to improve and revise further development for nation-wide implementation. The draft curriculum prepared by MOET is in line with the educational purpose which was defined by Vietnam's public education systems. Therefore MOIT should continue to support the curriculum development implemented by MOET.

3) Energy Education as an EE&C Strategy

It is considered that the EE&C strategy is a part of industrial and environmental policy. MOIT needs to promote the following to MOET to strengthen EE&C education.

(1) Postsecondary Education

In the postsecondary education (high school level), energy transfer should be taught employing a simple model (i.e. food chain and electric circuit) in physics, chemistry and biology. In the higher grade, implication of the model and the theory (e.g. heat, light, sound, respiration, food and its digestion, temperature change via chemical reaction, etc.) may be taught in the class.

[1] See 2.6.4 for further discussion on energy management education in higher education in Vietnam.

These subjects shall taught with a holistic teaching approach aiming basic education in the higher education level.

(2) Primary and Secondary Education

In the primary and secondary education (Junior high school and primary school level), energy education may be taught via practical and holistic approach. The methodology that may be useful is to practice EE&C in class room or at home to enhance the learning experience.

In the lower grade of the primary education, the students may learn characteristics of electricity and heat to understand the status of energy. Another approach may be to learn use of energy through experiential research project on how the energy is used in community. For example, it is needed to understand the comparison of various daily motion, and the importance of energy intake from food, etc. It may discuss the fact that the vegetables store energy in their body by gaining energy from the sun. Animals receive energy from the vegetable through diet. In this respect, human being receives energy for motion from the energy stored in foods. The energy is a source of motion of both toys and animals. By developing such a concept, many educational modules may be developed.

In the grade four through six, development of EE&C strategy and practice based on the actual household survey may be effective approach for teaching energy in the class room. Through the program, students may be able to learn energy issues and environmental problem by focusing on EE&C. It focuses on households and class room to learn the complex issues from their own surroundings. The contents include not only energy saving but also heat conduction, form of energy, characteristics of energy, and data analysis, etc. These topics may be covered in the units prepared. The learning through the activities may initiate their parents and the school to practice such EE&C measures, etc.

The learning experience provides learners to extend their local experiment to apply global problems. Higher graders may be able to learn much advanced topics including use of renewable energy, such as PV and wind turbine, etc. The class may be able to learn the fundamentals of such energy sources. In addition, it provides understanding of where the energy used in a community comes from. In the end, the students may be able to enhance their understanding on relationship between energy and the community in much greater detail.

Program No.3

1. Program name	Putting EE&C Education into the National Education System
2. Implementing agency	MOET
3. Target group/persons	Public Education (Primary, Junior High, and High School)
4. Goal	Completion and implementation of the education program on environmental education program linked to EE&C led by the central government
5. Expected result	EE&C initiated by community Complete a groundwork of human resources development meeting the needs of modern industry through environmental education
6. Expected project cost	US$ 1.0 million/year
7. Implementation period	Phase 1 (2010-12), Phase 2 (2013-15)

8. Description

Comprehensive EE&C education adapting to public education system is a basis for advancing the economy into industrialization. Prosperity of adapting EE&C into public education system takes some times but it is a long-term approach for advancing the country. It is to benefit the creating ground work to modern economic development. Therefore this program aims at long term human development.

Phase 1（2010～2012）

- ✓ MOET carries out environmental education combining efficient use of energy, EE&C, electricity safety based on the National Strategic Program on EE&C, etc from kindergarten to university level. In 2007 to 8, Science and Technology Department of MOET has developed side reader and syllabus focusing on energy education. MOET has completed the preparation of the curriculum.
- ✓ The side reader for kindergarten and primary schools level is a picture book which is expected to distribute in 2009. For the junior high and high school level, a variety of subjects (including geography, moral education, economy and society) may cite a variety of topics from the side readers. They are completed and ready for distribution from 2009.
- ✓ In this phase, MOET carries out TOT to train core instructors enough to implement pilot course covering all 63 provinces and direct administrative cities. The pilot project is to test the curriculum and the side reader in all provinces.
- ✓ MOIT needs to endorse MOET's initiatives to extend to all schools by securing funding.

Phase 2（2013～2015）

- ✓ In the phase 2, MOIT and MOET need to analyze the achievement form the activities in the phase1. If the result is promising, the program should be extended to much bigger scale.
- ✓ MOIT may want to include the following contents:
- ✓ In the secondary education, (high schools) the education program may link to basic natural science education preparing to advanced subjects. In physics, chemistry, and biology, energy in a variety of forms are taught through the models of energy transfer, energy movement, and energy storage (e.g. food chain, electric circuit, diet and digestion, chemical reaction and energy, etc.). These subjects may be taught holistic manner to attain the basic concept and characteristics of energy.
- ✓ In the primary education and pre secondary education, holistic and practical approach for teaching is important to attain the basic concept of energy by relating real life situations. Specific approaches include: survey on energy use at household, and creating recommendation for energy saving.

9. Issues

- ✓ MOIT may need to support MOET's initiatives from the sideline. If it is found that the education program is effective for the energy strategy, the following support to MOET may be effective (in the Phase 2):
- ✓ It is important to take EE&C issue into whole part of education of all grades. Extending form local perspective into global one is another effective approach to consider. For advanced students in higher graders, more complex subjects (e. g. renewable energy, including PV and wind turbine) may be covered. In addition, understanding energy sources may lead to understand the relationship between energy and community.

10. Justification of Technical Assistance

- ✓ Energy-related education as a part of environmental education has no precedent in Vietnam. Only few educational contents was developed in the past. For primary and pre-secondary education, it should cover energy issues familiar to the learners' life experiences easy to associate rather than technically complex ones. Experiential learning through practical subjects may help learner to attain good attitude toward realization of EE&C.
- ✓ Teaching methodology commonly observed in Vietnam is heavily involved one-way communication only from the lecturers. Technical assistance may include introduction of practical exercise such as (particularly for lower graders) "environmental accounting book", "energy survey for school and/or households". If necessary specific training enabling such approach may be provided as a technical assistance.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
Development of Textbook (side readers): completed								
Implementation of pilot projects using the textbook and the curriculum								
Revision and updating the teaching materials								
Implementation of teaching in whole country								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Development of Textbook (side readers): completed								
Implementation of pilot projects using the textbook and the curriculum	0.1	0.1	0.3	0.3	0.3	0.4	2	2
Revision and updating the teaching materials								
Implementation of teaching in whole country								
Total	0.1	0.1	0.3	0.3	0.3	0.4	2	2

3.2.4 Program No.4: Pilot Campaign of Energy Saving in Household

The energy consumption in the residential sector is being boosted up by increase in the number of household (about 20 million presently and increases 2 to 3% per annum) and increase in energy consumption per household. Especially, as electricity consumption is rapidly increasing (about 1,100kWh/household presently and increases 8% per annum), replacement of existing incandescent lamp by CFL and encouragement of high efficient type to new demand for home appliances (first-time buyer) are urgent issues. Model promotion projects of CFL and high efficient home appliances should be promptly introduced in this program.

1) Thorough promotion of CFL

Thanks to the past DSM programs by WB and CFL promotion programs currently undertaken by EVN, CFLs have substantially penetrated into households in the urban area. However, further encouragement of promotion in the rural area will be a target to be achieved hereafter.

2) Model projects for promotion of high efficient home appliances

Home appliances are presently beginning to penetrate in households. Once introduced, home appliances will not be replaced during their lifetime, 5 to 10 years. High efficient type should be introduced before home appliance penetration expands. Prompt implementation of model projects is strongly needed.

Program No.4

1. Program name	Pilot campaign of "energy saving in household
2. Implementing agency	MOIT
3. Target group/persons	Consumers
4. Goal	Awareness raising for the merit from introduction of high efficient home appliance
5. Expected result	Expansion of promotion of high efficient home appliance
6. Expected project cost	US$57 million (~2025)
7. Implementation period	2010~2025

8. Description

✓ **Thorough promotion of CFL**

Though CFL is penetrating into households, thorough promotion is needed. It is important to constantly confirm the progress situation of CFL promotion project currently being conducted by EVN and to collaborate with this project. Confirming penetration situation of CFL by market survey, CFL promotion into rural area should be strengthened.

(1) Implementation of market survey: figuring out nationwide penetration situation of CFL
(2) Establishment of promotion scheme: Designing of optimum scheme, e.g., subsidy, UBP (Utility Bill Payback).
(3) CFL promotion activity by means of the sales channel of EVN and PCs

✓ **Model projects for promotion of high efficient home appliances**

Model projects to promote high efficient appliances should be implemented for room air conditioner, refrigerator and water heater which are expected to penetrate hereafter. The model projects will be developed nationwide.

(1) Market survey: Prior to implementation of model projects, market survey is conducted to find out penetration situation of appliances. In addition, long term monitoring survey (1 year) is conducted to figure out actual electricity consumption and effect of voltage fluctuation of grid power. The results will be used for designing promotion scheme.
(2) Establishment of scheme: High price of high efficient appliance requires financial support like subsidy or tax exemption so that high efficient appliances should be penetrated. In addition, UBP (Utility Bill Payback) scheme should be taken into account. Model projects target first-time buyers and collaboration with retail store is needed.
(3) Implementation of model projects: Model project is implemented for room air conditioner and refrigerator in north, middle and south area of Vietnam. Model project of water heater is conducted in north area, where water heating demand is larger. Solar water heater replaces electric water heater.

9. Issues

- ✓ Though CFL penetration increases steadily, actual condition of penetration has not yet figured out. By conducting market survey, promotion should be further encouraged in low-penetration area. In addition, collaboration with EVN and PCs is necessary. Actual status of voltage fluctuation of the grid power, which may cause CFL breakdown, should be also figure out.
- ✓ Home appliances are presently beginning to penetrate in households. Once introduced, home appliances will not be replaced during their lifetime, 5 to 10 years. High efficient type should be introduced before home appliance penetration expands. Prompt implementation of model projects is needed. As model projects are related with DSM, collaboration with EVN and PCs is indispensable.
- ✓ Studying the feasibility of model projects, full scale development is planned.

10. Justification of Technical Assistance

- ✓ Technical assistance for market survey and monitoring survey
- ✓ Technical assistance for establishment of promotion scheme
- ✓ Technical assistance for model projects
- ✓ Offer of Japanese high efficient appliances. Support for establishment of after-sales service (e.g. maintenance technique) framework.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
Thorough promotion of CFL								
Market survey	―							
Establishment of promotion scheme		―						
Promotion activity			―	―	―	―	―	―
Model projects for promotion of high efficient home appliances								
Market survey	―							
Establishment of promotion scheme	―							
Implementation of the projects		―						
Designing of full-scale development			―					
Full-scale development				―	―	―	―	―

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Thorough promotion of CFL								
Market survey (*)	1							
Establishment of promotion scheme		0.1						
Promotion activity			0.1	0.1	0.1	0.1	0.3	0.3
Model projects for promotion of high efficient home appliances								
Market survey (*)	*							
Establishment of promotion scheme	0.1							
Implementation of the projects		0.9						
Designing of full-scale development			0.1					
Full-scale development				4.2	4.2	4.2	21.0	21.0

*: Market survey in the "Thorough promotion of CFL" and "Model projects for promotion of high efficient home appliances" would be combined.

Note: Project scale is; room air conditioner, refrigerator and solar water heater: 10,000 units/year from 2013 to 2025.

Note: Difference in retail price between conventional and energy efficient type: US$420 for room air conditioner, US$130 for refrigerator and US$290 for solar water heater.

Note: The budget appearing at 2020 is for 5 years from 2016 to 2020 and the budget at 2025 is for 5 years from 2021 to 2025.

3.2.5 Program No.5: Development of Energy Performance Standards and Commencement of Energy-saving Labeling Scheme

1) Enforcement of institution

The existing energy performance standards and labeling scheme should be strengthened. Constant revision of standards, shift from “voluntary” to “mandatory” measures, shift from “endorsement” to “comparative” label, display of running cost and/or life cycle cost, target expansion, market survey and database are included.

2) Backup for S&L

For establishment and updating of standards and effectiveness of labeling scheme, it is necessary to constantly carry out market surveys and to develop the database. In addition, establishment of calibration system for testing equipment is indispensable for guarantee S&L quality. Although labeling scheme is expected to bring energy efficiency effect in the long term, it lacks quick-effect. Incentive mechanism should be examined for labeled products.

Program No.5

1. Program name	Development of energy performance standards and commencement of energy-saving labeling scheme
2. Implementing agency	MOST, MOIT
3. Target group/persons	Manufacturers, importers, distributors, retailers and consumers
4. Goal	Penetration of labeling scheme
5. Expected result	Penetration of high efficient product
6. Expected project cost	US$ 4.6 million (~2025)
7. Implementation period	2010~2025

8. Description

Continuation of establishment of energy performance standards and strengthening of labeling scheme (See action plan 3.4.3 for the detail)

- ✓ **Constant revision of standards:** Existing standards are revised constantly (T8 fluorescent lamp, CFL, street lamp fixture, electric ballast, magnetic ballast, air conditioner, fan, refrigerator, electric water heater, solar water heater, 3-phase motor)
- ✓ **Shift from "voluntary" to "mandatory":** Labeling scheme shift from voluntary to mandatory should be examined and realized.
- ✓ **Shift from "endorsement" to "comparative":** Existing endorsement labeling should be shifted to comparative labeling. In addition, Display of running cost and life cycle cost should be examined.
- ✓ **Target expansion:** OA equipments and other home appliance (TV, e.g.), which are expected to diffuse in the near future, should be examined as target items.
- ✓ **Introduction of incentive:** Incentive scheme should be examined for labeled products.
- ✓ **Market survey and database:** By conducting constant market survey, database can be developed. Database is indispensable for updating of standards and labeling scheme and also estimation of energy conservation effect.

9. Issues

- ✓ Wide penetration of labeling scheme requires mandatory measures. Cost reduction incurred on manufacturers to place labels should be considered.
- ✓ In order to provide effective information to consumers, some appliances should be labeled comparative label rather than endorsement one. Display of running cost and life cycle cost should also be examined for effective promotion of high efficient appliance that is generally expensive.
- ✓ Constant market survey helps realize institution update effectively.
- ✓ Support scheme of BRESEL and METI is utilized.
- ✓ Incorporation of labeling scheme into government procurement is investigated.
- ✓ Strengthening and penetration of labeling scheme contribute to mitigation of tight electricity demand-supply balance and peak cut. Programs collaborating with electricity DSM should be formulated.

10. Justification of Technical Assistance

- ✓ Technical assistance for measurement of energy efficiency for standards establishment
- ✓ Technical assistance for maintenance and calibration of testing equipments (especially of air conditioner)
- ✓ Technical assistance for market survey, development of database and related institution update
- ✓ Assistance for implementation of power sector DSM collaborating with the labeling scheme

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
Constant revision of standards	―	―		―	―	―	―	―
Shift from “voluntary” to “mandatory”			―					
Shift from “endorsement” to “comparative”		―						
Target expansion		―		―			―	
Introduction of incentive								
Market survey and database (including update)	―	―			―	―		
		―	―	―	―	―	―	―

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Constant revision of standards	0.1	0.1		0.1	0.1	0.1	0.2	0.2
Shift from “voluntary” to “mandatory”			0.1					
Shift from “endorsement” to “comparative”			0.5					
Target expansion		0.5		0.5			0.5	
Introduction of incentive								
Market survey and database (including update)	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.3

Note: Incentive scheme is to be introduced in Program 4.

3.2.6 Program No.6: Technical Assistance to Domestic Energy Efficiency Product Manufacturers

There are few EE&C equipment manufacturers presently in Vietnam and a large part of products are imported. Therefore, training and support for not only manufacturers but also retail stores are necessary. Labeling scheme should collaborate with this program.

1) Workshop and seminar

By holding workshop and seminar, information of MEPS and labeling is spread to the domestic EE&C equipment manufacturers and retailers.

2) Support for R&D

Support is provided for training of cutting edge of energy efficiency technology and R&D.

3) Award and accreditation for good practice manufacturers and retailers

Award scheme is established for high efficient products and manufacturers that develop them. In addition, accreditation scheme is also established for retailers that is promoting high efficiency products.

Program No.6

1. Program name	Technical assistant to domestic energy efficiency product manufacturers
2. Implementing agency	MOIT
3. Target group/persons	Domestic energy efficiency product manufacturers and retailers
4. Goal	Production and sales promoting of high efficient products
5. Expected result	Penetration of high efficient products
6. Expected project cost	US$ 9.9 million
7. Implementation period	2010~2025

8. Description

- ✓ **Workshop and seminar:** Information of MEPS and labeling is spread to the domestic manufacturers and retailers.
- ✓ **Support for R&D:** Support is provided for training of cutting edge of energy efficiency technology and R&D.
- ✓ **Award and accreditation for good practice manufacturers and retailers:** Award scheme is established for high efficient products and manufacturers that develop them. In addition, accreditation scheme is also established for retailers that is promoting high efficiency products.

9. Issues

- ✓ Support to production technology of T8 and CFL has so far been provided to Rang Dong and Dien Quang. Further improvement of product quality and durability is necessary.
- ✓ Instability of grid power voltage requires stabilizer for some equipments. It is important to develop products into which technology of high-resistance to fluctuation voltage is incorporated.
- ✓ There are few manufacturers presently in Vietnam and a large part of products are imported. Therefore, training and support for not only manufacturers but also retail stores are necessary. Labeling scheme should collaborate with this program.

10. Justification of Technical Assistance

- ✓ Training for energy efficiency technology and high-resistance to fluctuation voltage

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
Workshop and seminar	—	—	—	—	—	—		
Support for R&D	—	—	—	—	—	—	—	—
Award and accreditation for good practice manufacturers and retailers	—	—	—	—	—	—	—	—

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Workshop and seminar	0.1	0.1	0.1	0.1	0.1	0.1		
Support for R&D	0.5	0.5	0.5	0.5	0.5	0.5	2.6	2.6
Award and accreditation for good practice manufacturers and retailers		0.1	0.1	0.1	0.1	0.1	0.3	0.3

3.2.7 Program No.7: Establishment of Energy Management Model for Manufacturing Industry

In the on-site survey of buildings and factories conducted in 2008 in Hanoi, Ho Chi Min and Da Nang, any organized energy management activities were not found. Further, the Decree promulgated in the year 2003 on the energy consumption reporting system has not been familiar to them.

The energy management model for manufacturing industry has two approaches. The first approach is to establish an energy management organization and energy management activities internally in the companies in accordance with the "Designated Factory Program" as provided the EC Law. The second approach is to establish the company organization according to ISO50001 "Energy Management" which is being promoted by UNIDO and to engage in activities to acquire certification.

1) Energy Management Activities in accordance with the Designated Factories Program

The EC Law will be promulgated in July 2010. According to the EC Law, factories with annual energy consumption of more than 1,000 TOE are subject to the law, and have an obligation to establish an energy management system. The MOIT shall start the following projects after the promulgation, and MOIT should provide guidance and support to factories in terms of establishing energy management systems by 2012, in order for them to comply with the energy conservation law.,

a) Conduct seminars to disseminate information about the main objective of the EC Law, the obligations of the factories and the support program provided

b) Send out and collect questionnaires regarding the current status of the energy management designated factories, and confirm the numbers of the factories

c) Establishment of the energy manager certification program

d) Preparation of curriculum and textbook for the energy manager training course, and arrangement of training facility

e) Enforcement of submission of the periodical report and 5-year EC plan and construction and operation of energy consumption database

f) Establishment and implementation of support program for the promotion of energy conservation

Follows ups to factories regarding energy management system must start in 2014. The method of follow up is one official from either MOIT or DOIT together with an energy conservation expert from ECC shall visit the factories to verify the appointment of an energy manager and confirm the contents of the Periodical report and 5 year EC plan, and give guidance regarding the energy management system.

2) ISO50001 “Energy Management”

ISO50001 is scheduled for issuance by end of 2010. Currently, UNIDO is promoting within Vietnam human resources development program to train on energy audit in relation to ISO50001, with time table from 2010 to 2013 and a budget of approximately 1 million dollars . This is deemed to be a human resources development for energy managers and a means to promote energy conservation within the industries of Vietnam.

When business to acquire ISO 500001 certification as part of their company activity, this means that there is no need for MOIT to regulate the companies. However, there remains the need to check compliance with the provisions on the energy management designated factories on of the EC Law.

In ISO50001, the set conditions include energy use plan, appropriate management method, assignment of a person-in-charge, setting of an energy conservation target, data analysis, etc. Further, no-cost and low-cost approaches are mainly promoted, and there is no set performance rate such as energy efficient standards of a machine, etc. Therefore, it is considered that there will be no major discrepancy between this system and the provisions of the EC law.

Program No.7

1. Program name	Establishment of Energy Management Model for the Manufacturing Industry
2. Implementing agency	MOIT
3. Target group/persons	1) Private and national corporations which are Energy Management Designated Factory as well as top management , middle management and upper level managers of government agencies 2) Engineers and managers in charge of energy management in the factory
4. Goal	Establishment of energy management system in the industry to improve the level of energy management
5. Expected result	By establishment of energy management system in the factory, energy management activities will take root.
6. Expected project cost	First period (2010-2013): US$ 5.87 million Second period (2014-2015): US$ 2.6 million Total (2010-2015): US$ 8.47 million
7. Implementation period	First Phase (2010-2013), Second Phase (2014-2015)

8. Description

First Phase (2010-2013)

This program is composed of two components i.e. 1) energy management activities through the implementation of the designated factories program, 2) energy management activities through the implementation of ISO50001 "Energy Management"

1) Component 1: Energy management activities through the implementation of the designated factories program
   - ✓ Since there is very few voluntary energy management activities in Vietnam factory, this component will be implemented by establishing energy management system in accordance with the provisions of the EC Law.
   - ✓ It is necessary for MOIT to implement the following duties by 2012.
     a) Conduct seminar to disseminate the main objective of the EC Law, the obligations of the companies, and the support program
     b) Grasp the number of designated factories by sending questionnaires and collecting them from the designated factories
     c) Construction of certified energy manager program
     d) Preparation of energy manager training course curriculum, textbook and arrangement of training facility
     e) Enforcement for submission of periodical reports and 5-year EC plan and construction of an energy consumption database
     f) Establishing and implementation of a support program for the promotion of energy conservation
   - ✓ In compliance with the EC Law and regulations, factory managers and officers-in-charge of energy management shall establish energy management organization, and has the obligation to submit notifications and reports.
2) Component 2: Energy management activities through the implementation of ISO50001 "Energy Management"
   - ✓ This component makes use of the support from UNIDO in relation to ISO50001 "Energy management" to be releases by year end 2010
   - ✓ UNIDO, with a budget of 1 million dollars, will conduct a capacity building project in Vietnam through energy audits from the year 2010 to 2013.
   - ✓ There is a need for MOIT to check the compatibility of the EC Law and ISO50001.

8. Description (cont.)

Second Phase (2014-2015)

1) Component 1: Energy management activities through the implementation of the designated factory program

- ✓ The MOIT should conduct a follow up survey on the energy management designated factories. The officers in charge of the MOIT or the DOIT together with energy conservation experts should visit the factories to verify the status for the energy management system and the contents of the periodical report and 5 year EC plan, and to provide energy management guidance as well.

9. Issues

- ✓ The establishment of the designated factory program forms the basis of the energy conservation policy. The MOIT has to process a lot of businesses in a short period of time after the enactment of the EC Law. Specifically, the thorough dissemination of the details of the EC Law is a public relations activity. In Japan, when there are amendments to the EC Law, more than 30 seminars are conducted nationwide for factory managers and officers-in-charge of energy management.
- ✓ It is assumed that basic philosophy of ISO50001 is no conflict with the EC Law; however, it is necessary for MOIT to compare ISO50001 with the implementation of EC Law.

10. Justification of Technical Assistance

- ✓ The enactment of the EC Law in July 2010 and the preparation of the implementing regulation (decree and circular) require the cooperation of Japanese experts.
- ✓ On the compatibility of ISO50001 and the EC Law, it is necessary to transmit to MOIT the corresponding information from the Japanese government which was the model of the EC Law.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
1. Designated factory program								
1.1 Dissemination seminar on the EC Law								
1.2 Data gathering of candidate designated factories								
1.3 Establishment of certification system of qualified energy manager								
1.4 Preparation of training course for energy manager including textbook								
1.5 Enforcement of submission of Periodical report and 5-year EC plan								
1.6 Implementation of support program for EE&C promotion								
1.7 Survey of designated factories for follow-up of energy management								
2. ISO50001 “Energy Management”								
2.1 Issuance of ISO50001								
2.2 Assistance project of UNIDO								
2.3 Harmonization of the EC Law (MOIT)								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
1. Designated factory program								
1.1 Dissemination seminar on the EC Law	0.02							
1.2 Data gathering of candidate designated factories	0.01							
1.3 Establishment of certification system of qualified energy manager	Refer to other item							
1.4 Preparation of training course for energy manager including textbook	0.2	0.3						
1.5 Enforcement of submission of Periodical report and 5-year EC plan		1	0.3					
1.6 Implementation of support program for EE&C promotion		0.02	0.02					
1.7 Survey of designated factories for follow-up of energy management	1	1	1	1	1	1		
2. ISO50001 “Energy Management”					0.3	0.3		
2.1 Issuance of ISO50001								
2.2 Assistance project of UNIDO								
2.3 Harmonization of the EC Law (MOIT)								
Total	1.23	2.32	1.32	1	1.3	1.3		

3.2.8 Program No.8: Support for Efficiency Improvement of Production Line

The production line of the manufacturing industry in Vietnam can be categorized into two; one with the equipments installed in the 1970s, and the other after 2000. The site survey conducted in Hanoi, Ho Chi Min City and Da Nnag in 2008 found that the cement factories have old facilities but the iron and steel factory, building floor tile factory, the sanitary ware factory and the dairy product factories have new equipments installed after 2000. Thus, the efficiency improvement measures shall be studied for old equipments and new ones.

1) Efficiency Improvement in Old Equipment

Except for the special products production, replacing old equipments with new equipments is the most optimal efficiency improvement. However, from the viewpoint of economy, lifetime of equipments should also be considered. In this context promoting energy conservation through appropriate maintenance comes to be an useful option.

The conversion of vertical shaft kiln of the cement factories to NSP-type rotary kilns as per guidance of the MOC is a very appropriate program for the promotion of energy conservation and quality management. In case of replacing old equipments, the information on improvement technology and the capital are necessary. The programs which can answer the issues above mentioned is desired. One of the ways on obtaining the information on improvement technology is NEDO model project of Japan. There are two NEDO model projects being implemented in Vietnam. The funds for the model project are shared between Japan and Vietnam, and it becomes a technological exhibit for Vietnam, making it very useful for the dissemination of the technology. MOIT should consider NEDO model project scheme as a means of introducing new technology in another industrial sector.

a) Cement kiln waste heat recovery power generation system (2,950kW): 1998-2001 Ha Tien Cement Ltd.

b) Energy conservation equipment in beer plant: 2003-2005, Hanoi Beer Ltd, Thanh Hoa factory

One of the ways to obtain funds for equipment replacement is Two-Step Loan (low interest loan) from JICA for energy conservation facilities. JICA is now preparing to apply Two-Step Loan, total amount of JPY 4,000 million (US$ 45 million), and can be used for the installation of energy conservation equipment and facilities. This scheme will start in December 2009. The loan interest rate is 6.9% at VND base, and a very favorable rate than the open market interest rate in Vietnam. Continuing to this loan program, voluntary introduction of energy efficient equipment and expansion of loan mechanism are expected. Further, for purposes of enhancing technical capacities of banks (VDB, etc.) and consultants (Universities, ECCs, etc.) for appraising energy conservation equipment, facilities and projects, technical assistance in the form of dispatch of Japanese experts

will be dispatched. Through this technical assistance, the capacity building of energy conservation consultants can be also possible.

It is considered as an favorable measure that the support program of MOIT promote the replacement of old facilities utilizing the above Japanese support scheme.

2) Efficiency Improvement for New Facilities

The new facilities have high productivity and have good energy conservation performance. These new facilities have been introduced in many of the factories; however, there are many cases in which their capacity have not been utilized well. Often, the operation parameters of the facilities are set at the default values provided by the manufacturer. It is necessary for the engineers of the plant to find the most optimal operation parameters for one's own production.

In improving the efficiency of the facilities, together with improving manufacturing technology, improvement initiatives through energy management, particularly, energy consumption intensity is very important. MOIT should have plan to provide the information on success cases of implementation of energy conservation measures via the internet and symposium. Promotion of energy conservation through a technical information exchange shall be considered.

Energy audits shall be required for designated factories (big size factories) under the EC Law, for the factories (small- and medium-scale factories) with less than 1,000 TOE annual energy consumption, free energy audit program shall be simultaneously arranged, which will be a strong driving force for energy conservation in Vietnam, where there are so many small and medium size factories.

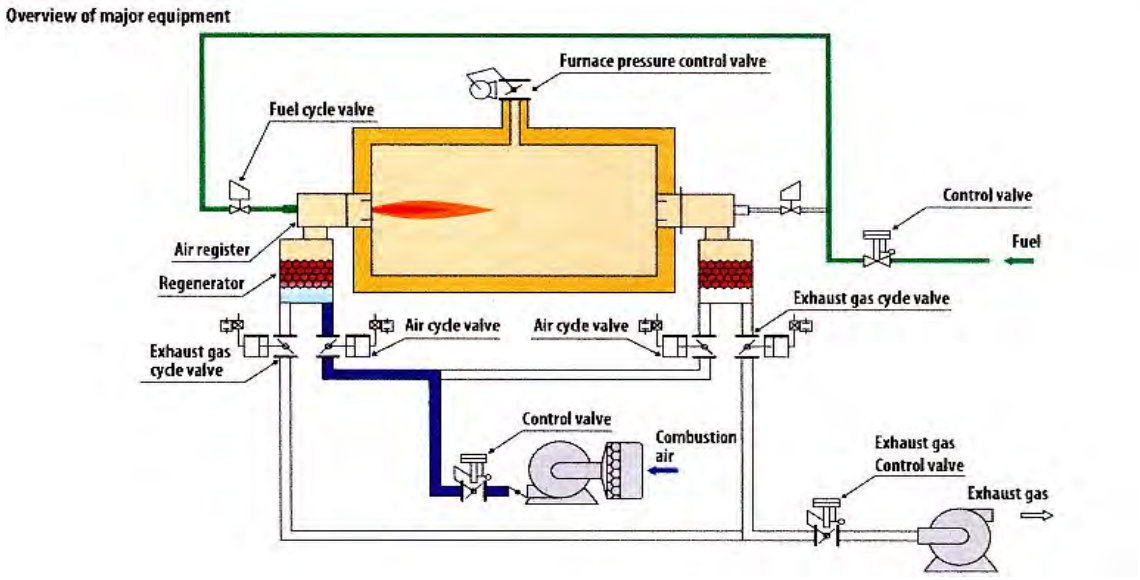
The abovementioned JICA Two-Step Loan may be used for equipment efficiency improvement such as the adoption of inverter control. It is necessary for MOIT to widely disseminate its own energy conservation support measures and that from JICA and overseas donors for the plant and building managers.

3) Energy Conservation Technology and Equipment for Efficiency Improvement of Production Line

The applicable energy conservation technology and equipment are shown in Table 3.2.8-1, in energy conservation potential estimation with on-site study and statistics data. These energy conservation technology and equipment are already introduced in Japan. The outline of large energy conservation effects among energy conservation technology are shown in Figure 3.2.8-1 to Figure 3.2.8-4.

Table 3.2.8-1 Applicable Energy Conservation Technology and Equipment for Efficiency Improvement of Production Lines

No.	Technology and equipment
1	**Iron and steel industry**
1.1	Steel-making process: EAF: Injection of oxygen gas and carbon
1.2	Steel making process: EAF: Scrap pre-heater with waste heat recovery
1.3	Rolling mill: Reheating furnace with regenerative burner
2	**Cement industry**
2.1	Process change: Vertical shaft kiln to NSP rotary kiln
2.2	Material treatment: Vertical type roller mill
2.3	Finishing: Vertical type roller mill or roller press equipment
2.4	Cement kiln: Waste heat recovery power generation
2.5	Cement kiln: Waste material combustion
3	Chemical industry
3.1	Ammonia plant: Waste heat recovery equipment of primary reformer
3.2	Oil refinery: Flare gas and hydrogen recovery system
4	Non-iron metal industry
4.1	Aluminum melting furnace: high efficient furnace with regenerative burner
5	Paper and pulp industry
5.1	Paper sludge treatment: Waste heat recovery equipment of combustion gas
5.2	Effective use of sludge
6	Textile industry
6.1	Dyeing process: High efficiency dyeing process including Jet type dyeing machine with inverter control
7	Food processing industry
7.1	Beer brewery plant : energy conservation equipment
8.	Common technology
8.1	Air conditioner and chiller: High efficiency type with inverter control
8.2	Air compressor: Inverter control type
8.3	Variable speed controller with inverter control for pump, fan and belt conveyer
8.4	Lighting unit: High frequency fluorescent lamp
8.5	Steam boiler: high efficient steam boiler such as small size once through boiler
8.6	High efficiency motor



EE&C effect: 20%-30% Construction cost: 4 to 10 million US$

Figure 3.2.8-1 EE&C Effect by Introducing Reheating Furnace with Regenerative Burner

Shaft kiln

Rotary kiln

Type of cement kiln	Fossil fuel intensity (Mcal/ton-clinker)	Power intensity (kWh/ ton-clinker)
Shaft kiln	1,302	148
Dry type rotary kiln (SP/NSP)	836	141
Saved energy ratio (%)	35.8%	4.8%

Figure 3.2.8-2 EE&C Effect by Replacing Vertical Shaft Kiln to NSP Rotary Kiln

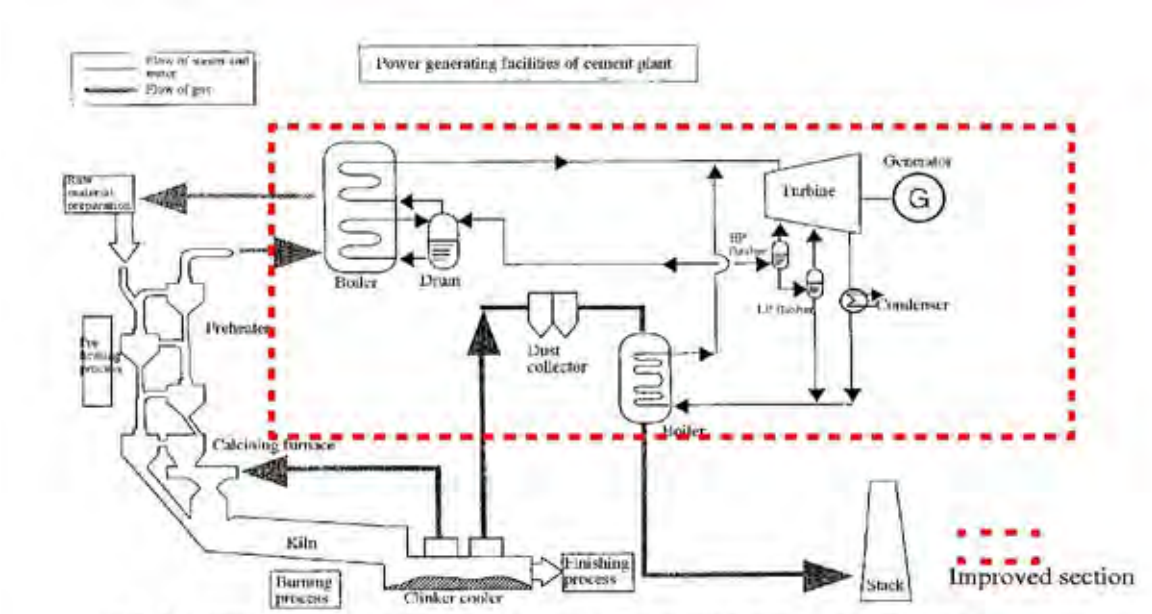


Fig. 1 Concept of power generation using medium-to-low-temperature exhaust gas of cement manufacturing process

Power generation capacity: 23,000kW (2000t/d of cement kiln)
Recovered power ratio: 23,000kW / 100,000kW × 100 =23%
Construction cost: 20 million US$

Figure 3.2.8-3 EE&C Effect by Introducing Waste Heat Recovery Power Generation of Cement Kiln

Dyeing machine with inverter control

Stenter

Steam condensate recovery from dyeing process

Drying machine

EEC effects: 65% of saving of steam, power and water
Construction cost: 4 million US$ for 2,000 ton/day plant

Figure 3.2.8-4 EE&C Effect by Introducing High Efficiency Dyeing Process

Program No.8

1. Program name	Support of Production Line Efficiency Improvement
2. Implementing agency	MOIT, VDB
3. Target group/persons	1) Top management , middle management and upper level managers of private and national corporations, government agencies 2) Engineers and managers in charge of energy management in the factory
4. Goal	Adoption of high efficiency equipment and enhancement of equipment performance through technical information exchange and financial support
5. Expected result	Improving the efficiency of factory equipment will promote energy conservation
6. Expected project cost	First period (2010-2013) : US$11.12 million Second period (2014-2015) : US$12.12 million Total (2010–2015) : US$23.24 million
7. Implementation period	First Phase (2010-2012), Second Phase (2013-2015)

8. Description

The production line of the manufacturing industry in Vietnam can be categorized into two; one with equipment installed in the 1970s and the other after 2000. The on-site survey conducted in Hanoi, Ho Chi Min and Da Nang in 2008 found that the cement factory have old facilities but the iron and steel factory, floor tile factory, the sanitary ware factory and the dairy product factory have new equipment installed after 2000. Thus, the efficiency improvement measures should be studied for old equipments and new ones. And also the low interest loan should be applied to support the project.

First Phase (2010-2013)

1) Efficiency Improvement in Old Equipment
   - ✓ Except for the special products production, replacing old equipments with new equipments is the most optimal efficiency improvement. However, from the viewpoint of economy, lifetime of equipments should also be considered. In this context promoting energy conservation through appropriate maintenance comes to be an useful option.
   - ✓ In case of replacing old equipments, the information on improvement technology and the capital are necessary. The programs which can answer the issues above mentioned is desired. Japanese support scheme includes NEDO model projects and JICA Two-Step Loan (TSL;low interest loan: through VDB).
   - ✓ NEDO model projects were implemented in the following industrial sectors. The funds for the model project are shared between Japan and Vietnam, and it becomes a technological exhibit for Vietnam, making it very useful for the dissemination of the technology. MOIT should seriously consider the NEDO model project scheme as a means of introducing new technology.
     a) Cement Kiln Waste Heat Recovery Power Generation (Co-generation) System (2,950kW): 1998-2001 Ha Tien Cement Ltd.
     b) Energy Conservation Facility in Beer Factory: 2003-2005, Hanoi Beer Ltd, Thanh Hoa factory
   - ✓ The TSL of JICA has a total amount of 4,000million yen (45 million US&), and can be used for the installation of energy conservation equipment and facilities. This scheme starts in 2009 December. The loan interest is about 6%, a very favorable rate than the open market interest rate in Vietnam. Further, for purposes of enhancing technical capacities of banks and consultants for appraising energy conservation equipment, facilities and projects, technical assistance in the form of dispatch of Japanese experts will be provided. Through this technical assistance, capacity building of energy conservation consultants becomes possible.

8. Description (cont.)

2)Efficiency Improvement for New Facilities

- ✓ The new facilities have high productivity and have good energy conservation performance. These new facilities have been introduced in many of the factories; however, there are many cases when its capability is not being maximized. Often, the operation parameters of the facilities are the set values provided by the manufacturer. However, it is necessary for the engineers of the factory to find the most optimal operation parameters for one's own production.
  In improving the efficiency of the facilities, together with improving manufacturing technology, improvement initiatives through energy management, particularly, energy consumption intensity is very important.
- ✓ Energy audits are required of energy management designated factories in the EC Law; For factories with less than 1000TOE annual energy consumption, free energy audit program will be a strong driving force for energy conservation.
- ✓ The abovementioned JICA Two-Step Loan may be used for equipment improvement such as the adoption of the inverter control.
- ✓ It is necessary for MOIT to widely disseminate its own energy conservation policies and that of overseas donors to factory and building managers.

Second Phase (2013-2015)

As for the loan scheme to support energy conservation equipment introduction, JICA TSL shall be improved and finally the establishment of Vietnamese self –reliant loan mechanism shall be planed and implemented.

9. Issues

- ✓ In supplying high efficiency equipment, it is important to conduct supporting policies such as providing technical information, funds, low interest loans and tax incentives. There must be a set standard for the importation of energy conservation equipment and there is a need for measures such as reduction of custom duties, etc.
- ✓ For the implementation of free energy audits, there is a need to train audit experts.

10. Justification of Technical Assistance

- ✓ In order to promote energy conservation loans, registration and certification of energy conservation equipment are necessary. In the preparation of standards for energy conservation equipment, the cooperation of an expert is necessary.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
1. Energy efficiency improvement of old fashion equipment								
1.1 Financial support program (MOIT)								
1.2 support of replacement of shaft type cement kiln to NSP rotary kiln (MOC)								
1.3 Request and implementation of NEDO model project								
1.4 Implementation of Two-Step Loan of JICA (first stage) Improvement of low interest loan scheme (improvement of JICA loan and self-reliant Vietnamese loan as a second stage)								
1.5 Technical assistance on guideline of loan for EE&C equipment								
1.6 Assistance and donation from foreign countries								
2. Energy efficiency improvement of modern equipment								
2.1 Energy conservation audit (Free of charge or 50% subsidized)								
2.2 Dissemination of support measures								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
1. Energy efficiency improvement of old fashion equipment								
1.1 Financial support program (MOIT)	1	1	1	1	1	1	5	5
1.2 support of replacement of shaft type cement kiln to NSP rotary kiln (MOC)	1	1	1	1	1	1	4	
1.3 Request and implementation of NEDO model project	1	2	2	2	2	2		
1.4 Implementation of Two-Step Loan of JICA (first stage) Improvement of low interest loan scheme (improvement of JICA loan and self-reliant Vietnamese loan as a second stage)								
1.5 Technical assistance on guideline of loan for EE&C equipment								
1.6 Assistance and donation from foreign countries								
2. Energy efficiency improvement of modern equipment								
2.1 Energy conservation audit (100 factories per year)	0.03	0.03	0.03	0.03	0.03	0.03	0.15	0.15
2.2 Dissemination of support measures	0.01	0.01	0.01	0.01	0.01	0.01		
Total	3.04	4.04	4.04	4.04	4.04	4.04	9.15	5.45

3.2.9 Program No.9: Capacity Building for Energy Efficiency-design and Management in Buildings

3.2.10 Program No.10: Creation and Promotion of Energy Efficiency Building Model

1) Preface

Deferent from the industrial sector whose energy consumption comes from the production process, the energy consumption pattern of building is quite diversified. Depending on where building is in Vietnam, whose land area is widely spread from the north to the south, energy use of air conditioning is influenced by a climate condition. In addition, the age of building also influences the energy use characteristics.

In a modern building the air conditioning is installed, on the other hand, in an old building where the air conditioning is unnecessary, by the effect of the heat storage time lag of the building structure or by the high ceilings effect (moving the indoor hot air to upper level of the room).

And depend on the usage of a building, energy load patterns in the building are so much different.

Therefore, in order to draw up EE&C promotion plan for buildings, firstly classification by the usage of building shall be done. And next focusing on the building construction rush in Vietnam, the Study Team suggests the effective EE&C promotion plan inform a long-term view.

In this clause, the Study Team firstly analyzes about the whole EE&C promotion plan for buildings, and secondly focuses on each of Program No.9 and No.10.

2) The Present Conditions of EE&C Programs for Building

The EE&C promotion plan for building is suggested in this clause, it is to be confirmed about the present progress on the national program, future direction and the related issues.

(1) Organization Structure to carry out the EE&C Program for Building

MOIT has a responsibility to overview and access the total figure of the national programs. MOC is the responsible body to carry out program No.9 and No.10.

(2) The Present Conditions of EE&C Program for Buildings through the Interview to MOC

To grasp the present conditions and issues of program No.9 and No.10, an interview to MOC has been carried out twice. The interview was carried out to officers of the Department of Science, Technology and Environment that governs the EE&C program in MOC. Persons in charge of EE&C program for building in MOC are only three people, and all of them have an original task for the maintenance of state buildings or institutions and the planning for new

constructions.

Furthermore, the officers in charge of public service for building in 63 local governments hardly have skill to instruct EE&C design and stipulate the application of Energy-efficient Building Code (herein after referred to as "Building Code"). In consideration of these conditions, MOC has been carried out a building EE&C technology training course in northern and southern area of Vietnam to promote the Building Code, twice a year since 2007. In a training course, 100-150 trainees from local governments and state enterprise in charge of building management participate.

However, the training course's contents only focus on Building Code is insufficient, because the EE&C technologies of buildings are wide and complicated. So, for the person who is going to comply the Building Code, the comprehensive and practical contents such as the measurement and the calculation of an energy consumption shall be added. In addition, the training course shall formulated not only the administration side but also applicant side. And now, MOC is documenting a guideline to supplement the Building Code and would like to complete by the end of 2009.

About the Green Building activity under program No.9, the target of it is saving energy for a building and evaluating the 3R activity, and the evaluation criteria is close to the Green Building Award of ASEAN. MOC is now investigating the frame of Green Building activity, and the labeling display for EE&C building is a candidate of future programs.

Regarding the EE&C pilot project of program No.10, a pilot project of solar heat water device in residential area has been carried out for two years from 2009-2010. However, the budget is only 4 billion VND (1.5 billion VND from the Vietnamese government and 2.5 billion VND from state companies), MOC applied to Ministry of Finance for budget increase, but it was not accepted. Therefore, within the less budgets, the pilot project has been going. In future, MOC would like to expand the target of the pilot project into larger energy consumption equipments such as an air conditioning system or illumination .

The limited budget for EE&C is same in all countries, and to secure the appropriate national budget for EE&C, inter-organizational activity among related ministries, MOIT, MOC, MOT, MOF, MOET and MOST, etc, shall be systematically formulated under the leadership of MOIT.

Table 3.2.9-1 The Present Progress of EE&C Programs for Buildings

Program	Plan[1)] (at present)	Issues
No.9 : Capacity building for energy efficiency-design and management in buildings	- Currying out the training course of Building Code (Trainees from local government and state enterprise in charge of related buildings) - Formulate a guideline to supplement Building Code (for completion by the end of 2009)	- Lack of national budget ✓ Cooperation (Joint Coordination Committee) among the EE&C related ministries is quite limited. - Lack of human resources ✓ Contents of training course remains to understand the technical aspects of Building Code. There are few contents from the viewpoint of the applicant side.
No.10 : Creation and promotion of energy efficiency building model	- Green Building Activities (Now in a feasibility study of a system) - Enforcement of a EE&C pilot project (Pilot project of solar heat water device in residential area has been carried out for two years of 2009-2010)	

(3) The Present Conditions and Issues of Building Code

Energy-efficient Building Code for EE&C design and construction of the building , "Building Code" in Program No.9, was formulated based on the study output by U.S. consultant the Deringer Group (Package 4 in DSM project), led by the combination of MOIT (then MOI) and MOC supported by the World Bank and the Vietnam Development Bank.

The Building Code has been promulgated as MOC Decision No.40/2005 "Vietnam Energy Efficiency Building Code" in 17 November 2005. However, the recognition level and legal binding force is quite small at present.

As mentioned above, the training course has been carried out twice a year in order to improve a technical understanding of the Building Code for governmental officers in charge of public service for building. At present, the Guideline as a technical commentary for the Building Code is under preparation.

In comparison with a similar Building Code applied in Japan, European countries and U.S.A., the Building Code of Vietnam is not inferior to them, because this code is systematically designed with concrete numerical values.

The Building Code consists of two main contents, one is a building insulation design (an insulation performance standard by heat transmission coefficient of a roof and an outer wall, etc.) and the other is an equipment design (standard values of performance and efficiency of equipment including ventilation, illumination, water pump and transformer). The Building

1) Plan by MOIT gathering all program

Code is applied not only for the new construction but also in the repair work at the design stage.

In addition, a calculation of annual energy consumption for air conditioning is mentioned in the Building Code that “use of a manual of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is suitable”.

(4) Provisional Calculation of Economic Efficiency by Step-by-Step Application of Building Code

Prior to the enforcement to apply the building code, whose content includes so wide ranged issues and much ahead of present Vietnamese technology level, some revision of the code and the preparation of a guideline to apply the code shall be needed.

For example, the prioritized equipments such as the air conditioning using much energy, should be regulated by the code first. The Study Team analyzed the cost and benefit gained by the introduction/conversion of high efficient air conditioner and the electronic ballast

Procedure of provisional calculation is as follows;

a) A breakdown of energy consumption is made in main 4 sectors of office, government office, super market and hotel (the whole of Vietnam.)

b) The necessary numerical target to achieve the goal of - 5 % energy consumption in 2015 compared with BAU (by VNEEP Goal) is calculated in each building sector respectively.

Figure 3.2.9-1~4 shows the calculation result of an energy conservation potential in EE&C buildings, which introduced only high efficient air conditioning system and electronic ballast The base data comes from the onsite survey result.

White part is the energy conservation potential which will be achieved by introducing EE&C air conditioning and electronic ballast in lighting.

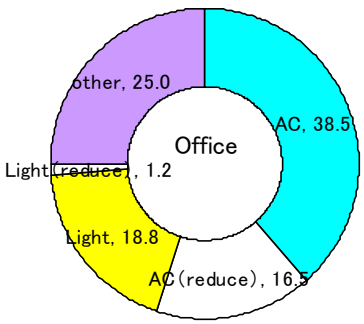


Figure 3.2.9-1 Energy Conservation Potential of EE&C Building (Office)

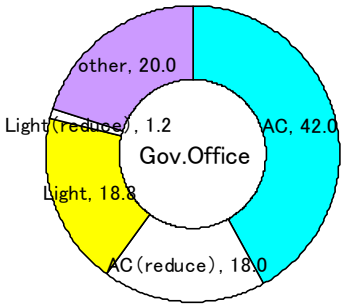


Figure 3.2.9-2 Energy Conservation Potential of EE&C Building (Government Office)

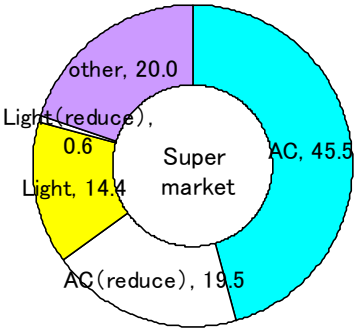


Figure 3.2.9-3 Energy Conservation Potential of EE&C Building (Super Market)

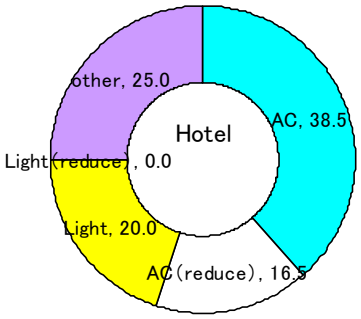


Figure 3.2.9-4 Energy Conservation Potential of EE&C Building (Hotel)

Next, reflecting the data of Figure 3.2.9-1~4, Figure 3.2.9-5 illustrates the target penetrated ratio (%) of electricity consumption in EE&C building in each 4 sector to achieve the VNEEP Goal, 5 % reduction in 2015 compared with BAU. The each electricity consumption is estimated from the basis of JICA energy master plan study (2008) and energy demand data from EVN.

This calculation indicates that the EE&C building must be penetrated by 25~30% with high efficient air conditioning and electronic ballast. And, the building stock can not be changed within a few years. Therefore, the enforcement of Building Code shall be done as soon as possible to achieve the VNEEP Goal.

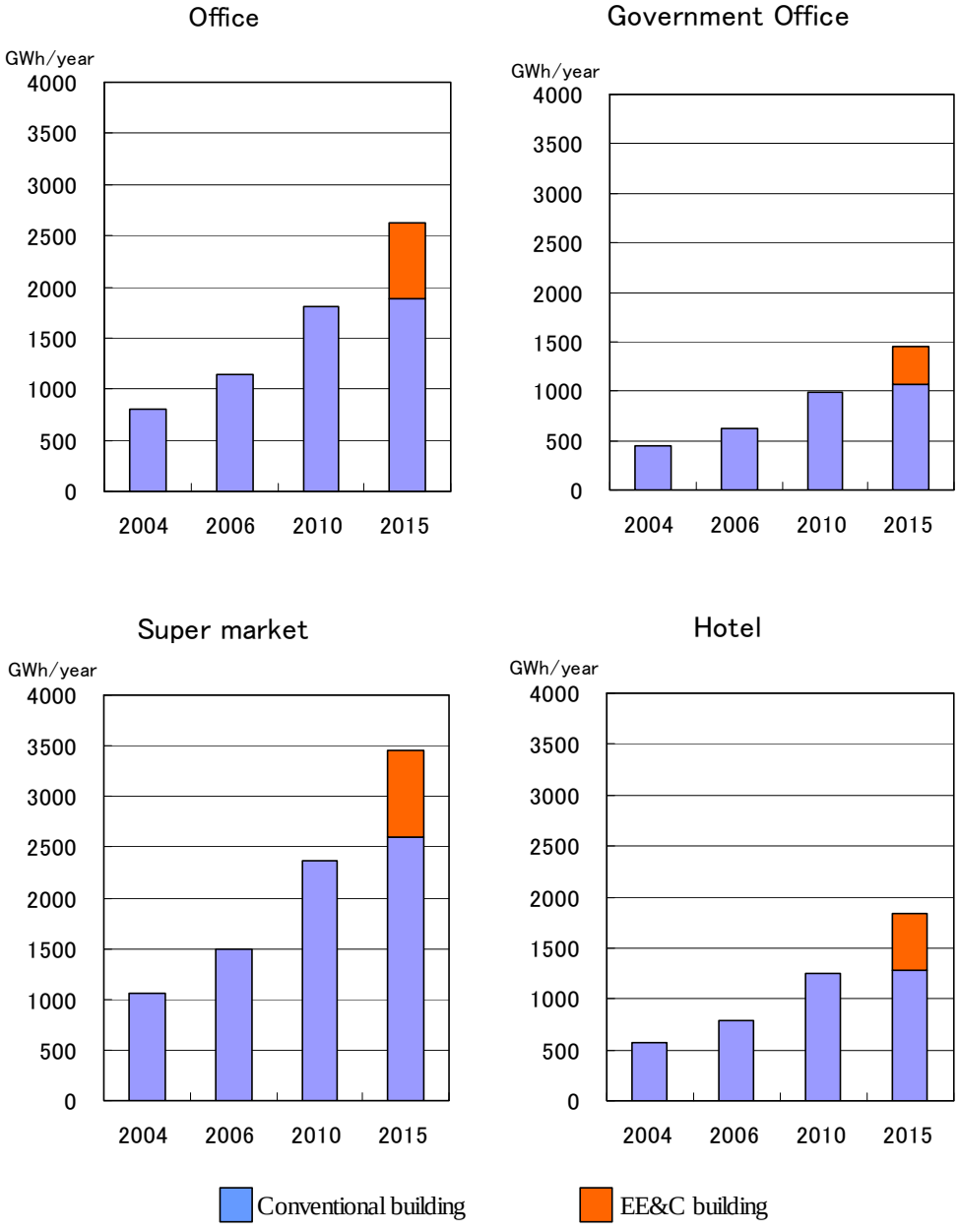


Figure 3.2.9-5 Stock Penetration of EE&C Building in 4 Sectors in 2015

Focusing on air conditioning and lighting above, Table 3.2.9-2 shows the result of the cost and benefit analysis between the conventional equipment and the high efficient one for 5 years, 2011~2015.

By introducing the high efficient air conditioner and the electronic ballast, the incremental cost in 4 sectors in five years from 2011 to 2015 is 43.8 million US$. On the other hand, the consumer's benefit is almost 100 million US$ in these 4 sectors. This is a simple assumption, but the benefit is almost 2 times bigger than the incremental cost. It means that the Building Code can work more effective by giving a priority on so many high efficient equipments

Table 3.2.9-2 Cost and Benefit by High Efficiency Air Conditioning and Lighting with Electronic Ballast in 4 Sector EE&C Building

Sub-sector (Building usage)				Super market	Office	Hotel	Governm ent office	Total
Cost	Unit cost [US$/KW]	AC	Conventional	600	600	600	600	-
			EE&C	1000	1000	1000	1000	-
		Lighting	Conventional	150	150	150	150	-
			EE&C	250	250	250	250	-
	Total input [KW] 1)	AC	Conventional	127,907	93,342	69,721	51,500	342,470
			EE&C	89,535	65,340	48,804	36,050	239,729
		Lighting	Conventional	29,517	33,943	25,353	17,167	105,979
			EE&C	28,415	31,906	25,353	16,137	101,811
	Cost up [million US$]	AC		12.79	9.33	6.97	5.15	34.25
		Lighting		2.68	2.89	2.54	1.46	9.56
	Total			15.47	12.22	9.51	6.61	43.80
Benefit	Electricity reduced	[GWh]	2)	475	362	252	198	1,287
	Expense reduced	[millionUS$]	3)	36.64	27.88	19.41	15.30	99.23

Notice; 1) [W] converted from [Wh] by 50% work among 8,760 hour a year
2) Total reduced from 2011 "1%" to 2015 "-5%"
3) 0.077US$ (1,359VND) per KW as average in Commercial building

3) The Classification of Buildings

(1) Standard for the Classification

As mentioned in 1) above, buildings shall be classified by the usage building for EE&C promotion plan. In the classification, judgment criteria shall be decided considering the characteristics of Vietnamese building conditions as follows.

Table 3.2.9-3 Judgment Criteria for Classification of Buildings

Item	Judgment Criteria	Target
Usage of Building	General private office, government office, hotel, and shopping center	As profiling of buildings, the characteristics of buildings by the usage shall be grasped. The influence on the air conditioning and illumination load fluctuation by a building use condition shall be considered.
Existing Building and New Construction Building	Existing, New construction, Repair Building at 2010 (in case of strict application for Building Code in tentative)	Potential of EE&C by application of the Building Code in new construction and repair construction or by regulation besides the Building Code in the existing buildings shall be considered.
Scale of Building (Energy consumption)	(Annual electricity consumption)	The financing and credit capability is different by the size of building, the feasibility of EE&C implementation shall be considered for mentioned above.

(2) Classification of Buildings

Considering the judgment criteria mentioned above the following classification table (Figure 3.2.9-6) has been figured out.

When the application of Building Code starts in 2010, almost all the buildings in new construction become the target. In the construction of new buildings, big scale buildings are supposed to be designed by the Building Code or similar design criteria. For the small and medium scale buildings, which are out of scope of the EC Law (less than 2.8 million kWh per year), the effect of Building Code application is supposed to be much bigger.

On the other hand, regarding buildings such as hospitals or schools with small energy consumption in the future, the priority for EE&C promotion is lower, because the number and total energy consumption is not so big.

Regarding super markets or shopping centers, according to a local newspaper, a new branch shops are increasing so rapidly that 50 supermarkets in urban area in 2004 increased to 200 in 2009 and 80 % of them are in Hanoi and HCMC. This trend is becoming stronger and expanding into the countryside, too.

An advanced type of supermarkets such as convenience stores in Japan have been increasing particularly in the urban area. It seems that such a store shall be designed by the design code standardized by the headquarters. The Study Team recommends that application system of EE&C building design code be obliged to applied to the supermarkets and chain stores as soon as possible.

Regarding hotels, the new building construction has been accelerated in a long-middle term by the increase of foreigner tourists and the increase of the wealth layer in Vietnam. The need of

EE&C and cost reduction in hotel sector becomes important.

Regarding offices, the air conditioning load is comparatively small with the old and small and the energy consumption is not so big. However, for large-scale offices in big city areas, the occupancy rate is becoming worse, and the co-existing of operation cost reduction for a room and incretion of conformability becomes necessary, and so called “Eco-Building”, an environmental friendly EE&C office building need is increasing .

Regarding government offices, there are many old, small and middle scale buildings, and the air conditioning load are extremely small. In Hanoi, a plan to move the government offices from the center of Hanoi city to the areas of about 6 km western area in 2020-2050 is under consideration. Not only soccer stadium and an international convention center but also some high-rise buildings such as apartments and big scale shopping centers have been completed already. This trend for renewal and area development will increase in the future.

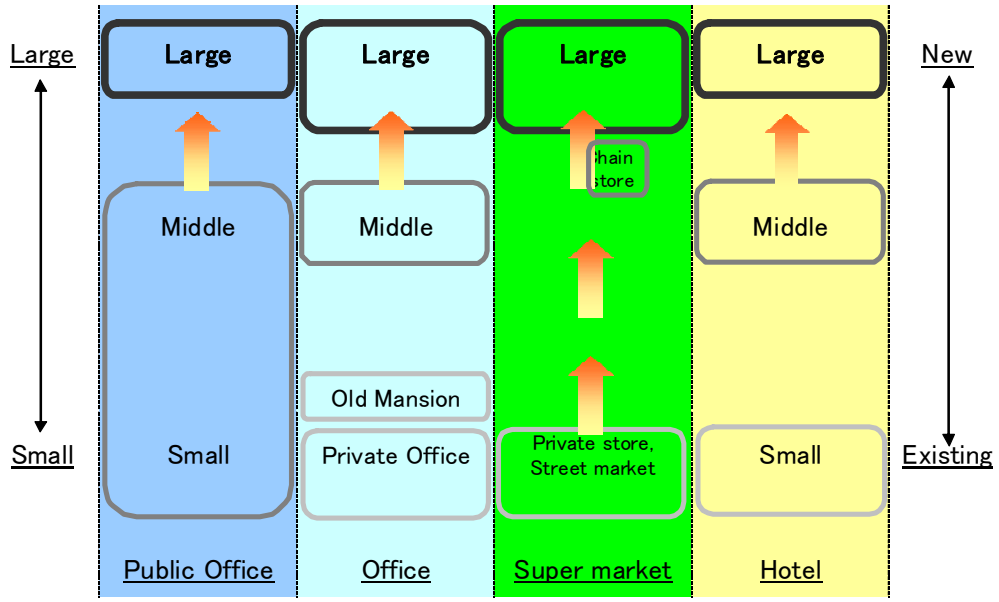


Figure 3.2.9-6 Classification of Buildings

4) Proposal for Promotion Plan by Classification of Building

By the above mentioned classification of buildings, promotion plans for each characteristic are suggested as follows.

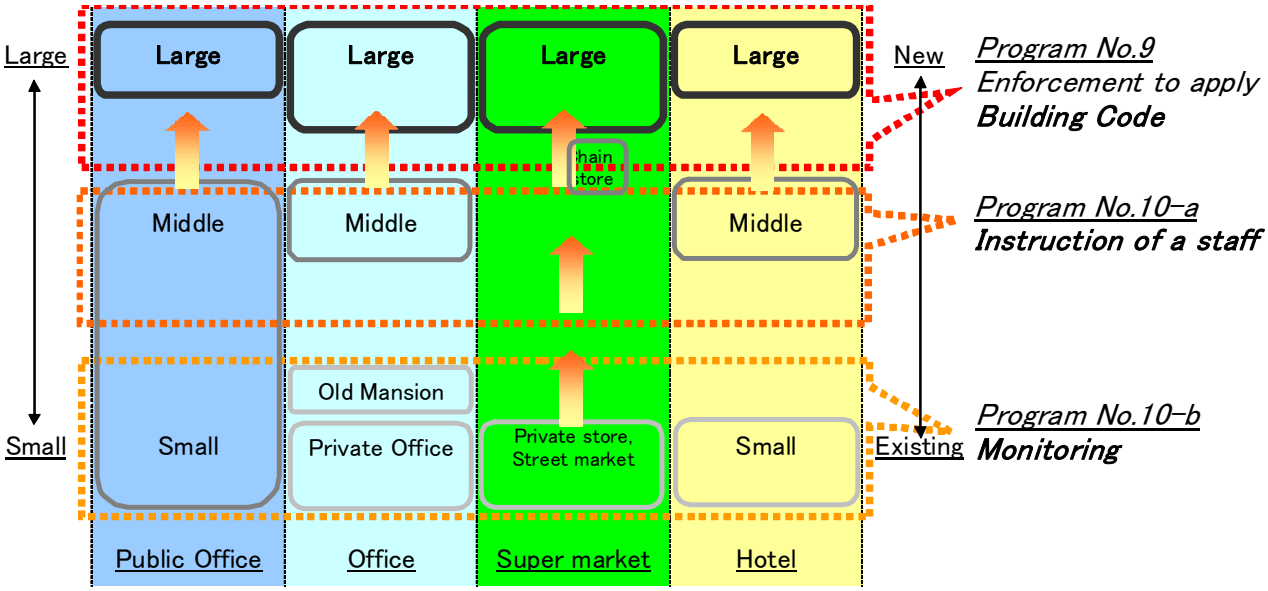


Figure 3.2.9-7 Proposal for Promotion Plan by Classification of Building

(1) Enforcement of Building Code to Large-scale New Buildings

The EE&C design planning in the new construction and enlargement of building is obliged to be attached at the building permission application (Decree No.102/2004 with Building Code of the Ministry of Construction (Decision No.40/2005)).

However, under the present conditions, the application has not been strictly operated, because of the lack of knowledge for EE&C and Building Code, both in governmental officer side and applicant side.

In other words, followings are necessary:

- Promotion of a standard EE&C design of a building, the purpose and the range of Building Code, a way of thinking of a standard, and related laws and ordinances including the penalty, etc.
- Capacity development to apply the Building Code in design of buildings.
- Reinforcement of inspection ability to check and access the drawings, specifications and EE&C planning suitable for the Building Code.

As mentioned above, in big cities in Vietnam and a development plan in the suburbs, there are a lot of new construction plans of office buildings in addition to hotels and a shopping centers. As for the enforcement of the application of Building Code as a minimum standard, it is be expected to gain a big EE&C effect in a building sector.

In order to let an application and use of the standard steadily, concentration in new construction, enlargement and repair of a building of a large-scale building is important at an initial stage.

Next, as a second stage utilizing the know-how of the application to a large-scale building, an action for an application to a small & middle scale building is recommended. (Refer to the description sheet of Program No.9).

(2) Support for Appointment of Energy Management Staff and Organization Activity in Existing Small- and Medium-scale Buildings

Compared with large scale buildings, in small & middle scale buildings, human resources in charge of energy management of building and financing source are limited. However, there exists an organization in charge of minimum maintenance of a building. It is necessary to conduct a systematic program to motivate the organization and person(s) in charge of energy management for EE&C promotion. An energy manager program is to be enacted under the EC Law in July 2010.

The target buildings in this Law are large-scale buildings with more than 2.8 MWh annual electricity conversion, not the small and medium scale buildings. The EC Law stipulates the large-scale buildings as an initial stage.

On the other hand, from the result of questionnaire survey, it is estimated that there is a lot of need of the energy management staffs in small and medium scale buildings more than that in large scale. In small and medium scale buildings, the energy management staffs who have to push forward EE&C promotion are busy on the daily task of the maintenance and repair of buildings. Therefore, it is necessary to select measures for EE&C promotion from the viewpoint of easy apply and effectiveness.

Thus, the following measures are suggested.

- It is useful for them to access the database on the performance and price of EE&C equipments through internet. In this context to develop a data collecting mechanism and conduct a database shall be recommended. And the guideline for EE&C daily operation with easy application shall be drafted and distributed free of charge.
- Capacity development of persons in charge of energy management (up skilling on practical EE&C operation through one-day training).

Conducting one-day training for the staff in charge of energy management to improve their skill to promote EE&C systematically, including the methodology to establish the team for EE&C (how to avoid the centralization of work on the person in charge of energy management), and management issue. It is effective that not only the staffs in charge but also the top management people participate in this training course. (Refer to the description sheet of Program No. 10-a).

(3) Activation of EE&C Market through Monitoring for Existing Small- and Medium-scale Buildings

One of the reason why EE&C renewal and investment has not been implemented in small and medium buildings is that the owner of the building can not get the information for EE&C and access the benefit caused by EE&C activities.

In such cases utilizing external consulting like ESCO is effective, but because of confidentiality clause, the consultants can not disclose the experiences in detail. This comes to be a barrier for building owners and consultants to promote EE&C. And this distortion blocks the EE&C market activation.

Enforcement of EE&C construction monitoring program for specific building is effective in order to breakthrough this issue. It accelerates the basic information sharing about the procedure, points of concern and major technologies among the related stakeholders.

The building to be monitored shall be selected from common small and medium buildings, so as to many owners and engineers can apply the knowhow obtained easily.

The information to be shared is that from the beginning of application for monitoring, through the implementation and to the maintenance and operation stage.

The practical problems in the initial proposal stage and the countermeasures against them, the technological and managerial measures and useful EE&C technology information etc shall be shared among the related stakeholders through the continual monitoring. The most important point for other buildings is whether there are the realistic hint in the monitored building.

Language used in web site shall be Vietnamese, but access from abroad shall be considered secondary. Promotion of EE&C products by manufactures is also welcome to enhance this program contents.

Thus, the following programs are suggested step-by-step.

✓ Phase 1: Model project of replacement from low efficient to high efficient equipment

Monitoring on the replacement of equipment in small and medium buildings shall be done. The information to be collected by monitoring program is the outline and an operation condition of the building, annual energy consumption and cost before and after the EE&C implementation, the expense, financing procedure, and internal work load, etc.

Through internet this information shall be disclosed. For the monitor building, depending on the quality and quantity of the information disclosed, maximum 100% of the expense of replacement work shall be subsidized by the government.

✓ Phase 2: Model project of EE&C consulting

In addition to the information obtained in “Model project of replacement from low efficient to high efficient equipment” of Phase 1 mentioned above, in Phase 2 the

consulting contract price and contract specification, the energy consumption situation before and after consulting and indoor environmental condition, the outline of the procedure from proposal (planning) to engineering, evaluation of the project by a consultant, and cash planning, etc.

Information disclosure shall be done through the internet. For the monitor building, depending on the quality and quantity of the information disclosed, maximum 100% of the expense of total expenditure including consulting fee shall be subsidized by the government.

The points of concern in the two phases mentioned above are as follows;

- The monitored building shall be selected in consideration of the popularity, in another word, applicability from the view point of another buildings.
- It is important for the government to design the program from the viewpoint of the accessibility from abroad. In order to raise a monitoring effect, the monitoring program shall be shown more broadly for overseas not only in Vietnam to introduce the latest EE&C technology from overseas.

Refer to the description sheet of Program No.10-b.

Program No.9

1. Program name	Enforcement to apply Building Code in large newly built buildings
2. Implementing agency	MOC
3. Target group/persons	1) Officers in charge of architecture in local government 2) Designer and constructor of architectural company
4. Goal	Consensus building to apply Vietnam Energy Efficiency Building Code (Decision No.40/2005 by MOC) in newly built buildings and renewal
5. Expected result	Promoting EE&C applying Vietnam Energy Efficiency Building Code (Decision No.40/2005 by MOC)
6. Expected project cost	US$ 1 million/year
7. Implementation period	Phase 1 (2010-2012), Phase 2 (2013-2015)

8. Description

By Decree No.102/2004, it is stipulated to submit EC planning report following the Building Code (Decision No.40/2005) before starting the building construction. But at present the Building Code has not been applied strictly, because of the lack of knowledge to apply EE&C measures in buildings among the designers, owners and local governmental officers. Proposed action plan is as follows;

Phase 1 (2010-2012)

- ✓ Seminars shall be conducted focus on the Building Code and Guide Line (Decree No.102/2004)
  The purpose, target area, basic concept, penalty, etc. of Building Code (regulation and standard for EE&C in building design) shall be explained in one day on-site training and one day lecture. Target participants are the building designers, engineers in construction companies and local government officers. Especially in the lighting design, implementation of electronic ballast, not magnetic, shall be strongly focused. It is quite effective to save electricity consumption in a short time in Vietnam.

Phase 2 (2013-2015)

- ✓ Seminar on building EE&C design and Competition for EE&C building
  To develop the capacity to apply Building Code in the design process, one day training course and two weeks competition for EE&C building shall be conducted for the building designers, engineers in construction companies and local government officers.
- ✓ Seminar on checking and accessing the documentation of building planning permission
  To develop the capacity to check and access the submitted documents of local governmental officers, training course shall be conducted.

9. Issues

- ✓ In big cities there are so many plans to construct huge buildings and building complexes. And to secure the effect of this program, the program's target shall be focus on only the minimum standard Early and steady implementation of this program is considered to be quite effective to control the future increase of building energy consumption.
- ✓ Hanoi University of Civil Engineering and Henchman University of Civil Engineering under MOC have specific intelligence on this field. And regarding on-site EE&C technology, ECCs have a knowledge on it. To formulate and operate this program, the support from MOC, MOIT and MOST is indispensable.

10. Justification of Technical Assistance

- ✓ MOC is now documenting the guideline to apply the Building Code by the end of 2009. But the methodology of evaluation has not been clarified. And inter relationship between EE&C labeling and the Building Code has not been discussed yet. In this context Japanese and another developed countries' guidance is strongly needed to save the time before implementation.
- ✓ Regarding the methodologies to conduct seminars on building code, Japanese experiences, technical support is quite effective for early implementation. Early implementation is a good counter measure against the increasing new building construction.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
1) Phase 1: Seminars shall be conducted focus on the Building Code and Guide Line (Decree No.102/2004)								
- Planning and preparation of seminar								
- Implementation of seminar								
- Follow up								
2) Phase 2:								
Seminar on building EE&C design and Competition for EE&C building								
- Preparation of seminar and design exercises								
- Implementation of seminar and Instruction of design exercises								
- Evaluation of design exercises								
- Follow up								
Seminar on checking and accessing the documentation of building planning permission								
- Preparation of seminar								
- Implementation of seminar								
- Follow up								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
1) Phase 1: Seminars shall be conducted focus on the Building Code and Guide Line (Decree No.102/2004)								
- Planning and preparation of seminar	0.5	0.5	0.5					
- Implementation of seminar	0.5	0.5	0.5					
- Follow up				0.1	0.1	0.1	0.5	0.5
2) Phase 2:								
Seminar on building EE&C design and Competition for EE&C building								
- Preparation of seminar and design exercises				0.2	0.2	0.2		
- Implementation of seminar and Instruction of design exercises				0.2	0.2	0.2		
- Evaluation of design exercises				0.2	0.2	0.2	0.5	0.5
- Follow up								
Seminar on checking and accessing the documentation of building planning permission								
- Preparation of seminar				0.1	0.1	0.1		
- Implementation of seminar				0.2	0.2	0.2		
- Follow up							0.5	0.5
Total	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5

Program No.10-a

1. Program name	Appointment of a staff in charge of energy management and support for organizational EE&C activity in existing small and medium buildings
2. Implementing agency	MOC
3. Target group/persons	Engineers and officers in small and medium buildings (both private and governmental)
4. Goal	Establishment of self reliant energy management activity of the staffs in small and medium buildings
5. Expected result	All the stakeholders participation in energy management activity trough the eligible staffs' leadership mentioned above
6. Expected project cost	US$ 1 million/year
7. Implementation period	Middle term (2010-2025)

8. Description

Compared with large buildings, the human resources and the budget for EE&C in small and medium buildings are quite smaller. In addition the EC Law, there is no description to apply certified energy manager mechanism for small and medium buildings. Though the real need for functional energy management is supposed to remain in them, not only in large buildings. In this context the person in charge of engineering on building maintenance shall be educated to realize functional energy management and equipment operation.

In order to reach the goal, it is important to select the most effective methodologies to promote EE&C and introduce them to the staffs. All the staffs' participation under the leadership of the person in charge of energy management, and strong intention and support of the management shall be formulated.

The following action programs shall be recommended:

- ✓ Establishment and free distribution of the database on EE&C equipment and guideline for EE&C operation

  Promotion of manufacturers for small and medium buildings is not dedicated comparison with that for large buildings. So generally small and medium buildings have less chance to get EE&C equipments. It is useful for them to access the database on the performance and price of EE&C equipments through internet. In this context to develop a data collecting mechanism and conduct a database shall be recommended. The guideline for EE&C daily operation with easy application shall be drafted and distributed freely.
- ✓ Capacity Development of the person in charge of energy management (Skill up on practical EE&C operation through one day training)

  Conducting one day training for the staff in charge of energy management to improve their skill to promote EE&C systematically, including the methodology to establish the team for EE&C (how to avoid the centralization of work on the person in charge of energy management), and management issue. It is effective that not only the staffs in charge but also the top management people participate in this training course.

9. Issues

- ✓ In small and medium buildings generally all the staffs are bound up in their daily works, so the measures to be obtained by the training course shall be designed as much as practical, easy to implement and visually apparent.
- ✓ Not inter organizational competitiveness but family-like group activity shall be prioritized under the leadership of top management.

10. Justification of Technical Assistance

- ✓ In the case of establishing data collecting mechanism and database, IT technology and experiences on this field is quite useful. In this context Japanese or another developed countries experiences and technology shall be needed.
- ✓ Regarding guide line for EE&C, there are many samples in the other countries. In this context referring Japanese or another developed countries' experiences are useful. But the most important point is how to customize it to Vietnam. So not only initial information transfer but the cooperative technology transfer to make up Vietnamese guideline is needed.

Implementation Schedule

	2010	2011	2012	2013	2014	2015	2020	2025
Appointment of a staff in charge of energy management and support for organizational EE&C activity in existing small and medium buildings								
Establishment and free distribution of the database on EE&C equipment and guideline for EE&C operation - Establishment and free distribution of the database on EE&C equipment - Establishment and free distribution of guideline for EE&C operation								
Capacity Development of the person in charge of energy management (Skill up on practical EE&C operation through one day training)								

Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
Appointment of a staff in charge of energy management and support for organizational EE&C activity in existing small and medium buildings								
Establishment and free distribution of the database on EE&C equipment and guideline for EE&C operation								
- Establishment and free distribution of the database on EE&C equipment	0.2	0.2	0.2	0.2	0.2	0.2	1.0	1.0
- Establishment and free distribution of guideline for EE&C operation	0.2	0.2	0.2	0.2	0.2	0.2	1.0	1.0
Capacity Development of the person in charge of energy management (Skill up on practical EE&C operation through one day training)	0.6	0.6	0.6	0.6	0.6	0.6	3.0	3.0
Total	1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0

Program No.10-b

1. Program name	Activation of EE&C market through the monitoring for existing small and medium buildings
2. Implementing agency	MOC
3. Target group/persons	1) Top management in small and medium buildings (both private and governmental) 2) Engineers and officers in small and medium buildings (both private and governmental)
4. Goal	Sharing the basic information for EE&C implementation; procedure, points of concern and major technologies in small and medium buildings
5. Expected result	Stimulation of need for EE&C implementation in small and medium buildings and activation of EE&C market
6. Expected project cost	US$1 million/year
7. Implementation period	Phase 1 (2010-2015), Phase 2 (2013-2015), (overlapping in 2013-2015)

8. Description

One of the reason why EE&C renewal and investment has not been implemented in small and medium buildings is that the owner of the building can't get the information for EE&C and access the benefit caused by EE&C activities.

In such cases utilizing external consulting is effective, but because of confidentiality clause, The consultants can't disclose the experiences in detail. This comes to be a barrier for building owners and consultants to promote EE&C. And this distortion blocks the EE&C market activation.

To answer this issue, EE&C project monitoring program shall be established in order to accelerate the basic information sharing about the procedure, points of concern and major technologies among the related stakeholders.

Monitor building shall be selected from orthodox small and medium buildings, so as to many owners and engineers can apply the knowhow obtained easily.

The information to be shared is that from the beginning of application for monitoring, through the implementation and to the maintenance and operation stage.

- ✓ At the stage of proposal, practical points of concern and against them.
- ✓ Technical and managerial issues and countermeasures against the issues for application of EE&C measures.

These practical information shall be shared.

Language used in web site shall be Vietnamese, but access from abroad shall be considered secondary.

Promotion of EE&C products by manufactures is also welcome to enhance this program contents.

The proposed phased programs are as follows;

Phase 1 (2010-2015)

- ✓ Monitoring program; Model project of replacement from low efficient to high efficient equipment

  Monitoring on the replacement of equipment in small and medium buildings shall be done.

  Major information to be collected and delivered is;
  - Outline and operating condition of the building
  - Before and after the replacement; annual energy consumption and expense
  - Expense of replacement and the process of financing
  - Work load on the replacement, etc.

  Through internet this information shall be disclosed. For the monitor building, depending on the quality and quantity of the information disclosed, maximum 100% of the expense of replacement work shall be subsidized by the government.

Phase 2 (2013-2015) (To be followed up until 2020)

✓ Monitoring program; Model project of EE&C consulting (Phase 2)

Monitoring on EE&C projects shall be conducted. (including the contents of Phase 1)

Additional information on the above mentioned programs in Phase 1 is as follows:

- Contract price and TOR
- The result of before and after the EE&C implementation and indoor environmental condition (temperature, luminous, etc.)
- The outline of the procedure from proposal (planning) to engineering
- Evaluation of the project by a consultant
- Cash planning

Information disclosure shall be done through the internet. For the monitor building, depending on the quality and quantity of the information disclosed, maximum 100% of the expense of total expenditure including consulting fee shall be subsidized by the government.

9. Issues

✓ The monitored building shall be selected in consideration of the popularity, in another word , applicability from the view point of another buildings.

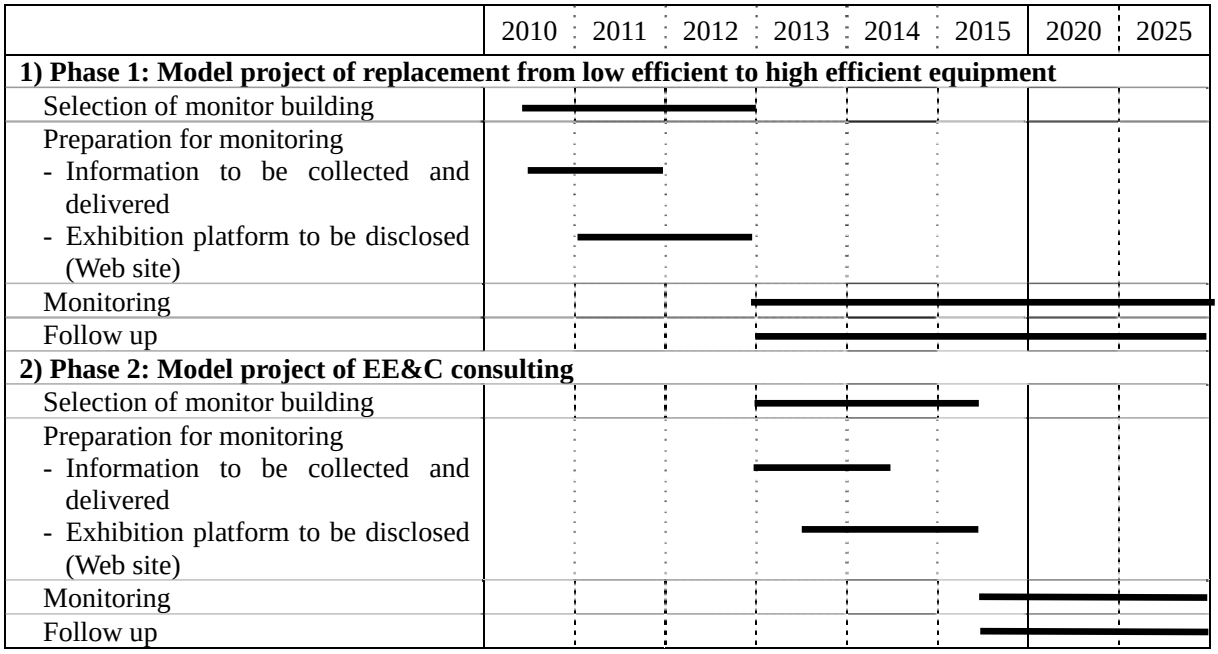
✓ It is important for the government to design the program from the viewpoint of the accessibility from abroad. (In order to raise a monitoring effect, the monitoring program shall be shown more broadly for overseas not only in Vietnam to introduce the latest EE&C technology from overseas.)

10. Necessity of technical assistance

✓ To select the monitor building, wide ranged data of energy consumption, indoor environment, operational condition and financing & management condition etc shall be prepared. But at present this kind of data has not been collected systematically. In this context Japanese or another developed country experiences and referential data shall be needed.

✓ Japanese or another developed country' experiences and technical support is useful. But the most important point is how to customize it to Vietnam. So not only initial information transfer but the cooperative technology transfer to make up Vietnamese self reliant mechanism is to be considered.

Implementation Schedule



Budget

(Unit: US$ 1 million)

	2010	2011	2012	2013	2014	2015	2020	2025
1) Phase 1: Model project of replacement from low efficient to high efficient equipment								
Selection of monitor building	0.5	0.4	0.5					
Preparation for monitoring - Information to be collected and delivered - Exhibition platform to be disclosed (Web site)	0.5	0.3	0.5					
Monitoring		0.3		0.1	0.1	0.1	0.5	0.5
Follow up				0.1	0.1	0.1	0.5	0.5
2) Phase 2: Model project of EE&C consulting								
Selection of monitor building				0.4	0.3	0.2		
Preparation for monitoring - Information to be collected and delivered - Exhibition platform to be disclosed (Web site)				0.4	0.5	0.2		
Monitoring						0.1	0.5	0.5
Follow up						0.1	0.5	0.5
Total	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0

3.2.11 Program No.11: Promoting Energy Conservation in the Transport Sector

Amount of transport is divided in the freight and passenger transport. Freight transport increased by 13.4% per year and passenger transport by 8.7% per year over the 1995 to 2008 (preliminary) period according to the Statistical Year Book by GSO. The intensity to the real GDP in 1994 prices which increased by 6.8% is 2.0 for freight transport and 1.3 for passenger transport. The introduction of public transport system and modal shift should be considered first to conserve energy in the transport sector. Expansion of the railway use as public transport system is desired because the share of inland waterway is 70 % but share of railway is only 2.2 % of total amount of freight transport in 2008 (preliminary). On the other hand, the share of road transport accounts for 69 % of the total passenger transport and its distance is very short comparing with other transport methods. In the passenger transport sector, it is characterized by very small share of the public transport system.

MOT has established a number of "Transport Master Plan", which is specialized for the public transport system or waterway system instead of the integrated transport plan, until now. This time (in 2010), MOT is trying to make a Master Plan for Development of Public Bus System. Such a approach will become an important policy to implement energy conservation by using the public transport system.

Reflecting these situations, promoting energy conservation in the transport sector is composed of three sub-programs like establishment of efficient transport network, energy conservation technology and environmental consideration in the transport sector, and experimental use of Bio-fuel. Here the establishment of efficient transport network is divided in three items like road/railway, seaway/waterway and airway because it is difficult to settle in one program due to various methods of transport.

1) Establishment of Efficient Transport Network

For road/railway, improvement of public transport system (including improving infrastructure) and transport policy to implement it (including comprehensive city transport policy) means an important action plan. Improvement of public transport system (railway and bus) is one of the important factors promoting energy conservation. To this end, improvement of infrastructure and service is required. Challenges in this field are getting technical assistance and/or fund from the advanced countries and combining these assistances with the development of Vietnam as same as other fields.

For seaway and waterway, improvement of public transport system (including infrastructure) and transport policy to implement it (including comprehensive city transport policy) is an important action plan, too. In Vietnam harbor improvement is insufficient although it has a long coastline and rich rivers. It is very important to smoothly link between seaway/waterway and road/railway terminals.

For airway, countermeasures like energy conservation in the air port and introduction of energy conservation equipments and improvement of flying manual for energy conservation, etc. are desired.

2) Energy Conservation Technology and Environmental Consideration in the Transport Sector

Energy conservation in the transport sector is required an introduction of energy conservation vehicle and fuel standard considering environment and eco-driving/green management considering economics and environment.

For introduction of energy conservation vehicle, lightening of vehicle bodies, introduction of regenerative break and hybrid car/electric car, etc. are to be considered. Setting and observing of fuel efficiency standard (for conservation) and fuel quality standard (for environment) based on the international standard is required. Drivers and companies are requested economic actions considering environment in driving cars and managing companies. Improvement of awareness method and manual, etc. to disseminate energy conservation is important.

3) Experimental Use of Bio-fuel

Although the problem that bio-fuel has adverse effect to the food supply is pointed and there are a number of big challenges to be solved, the fact that bio-fuel is excellent fuel as alternative fuel to petroleum in economy and environment is closed up. Mainly bio-ethanol (to gasoline) and bio-diesel (to diesel) is adopted.

In this field, cultivation and dissemination of plants for bio-ethanol and bio-diesel (in Vietnam, bio-diesel project which uses waste from catfish processing factory is planed) and improvement of distribution mechanism and infrastructure, etc. are big challenges.

Program No.11-a

1. Program name	Establishment of efficient transport network (road/railway)
2. Implementing agency	MOT
3. Target group/persons	Railway, bus and taxi
4. Goal	Improvement of public transport system in the city and main road
5. Expected result	Energy conservation and reduction of CO_2 emission
6. Expected project cost	----------
7. Implementation period	2009-2025

8. Description

Improvement of public transport system (infrastructure)

- ✓ Maintenance and improvement of railway network (main railway network), construction of Shinkansen line (it takes six hours between HANOI-HCMC) and then enhancement of local railway
- ✓ Improvement of railway network in the city, or looped underground railway and elevated railway
- ✓ Construction of expressway nationwide (Looped highway in the city and expressway linking the city and local).
- ✓ Improvement of transport system in the city (signal system, transport guide, traffic sign, erection of crossover bridge, setting of central divider and right/left turn lane). Adoption of comprehensive city transport system (environmental reservation, improvement of road to solve traffic problems and city landscape). Application of IT technology.

Countermeasure in software and system (comprehensive city transport policy)

- ✓ Establishment of "Master Plan for Development of Public Bus System"(planed in 2010)
- ✓ Improvement of public transport services (adjustment of fare, maintenance and improvement of railway station and bus stop, enhancement of time table, supply of transport information).
- ✓ Newly-built lane for bus (improvement of bus convenience, securing of safety)
- ✓ Adoption of green management of enterprises (considering energy conservation and environment protection)
- ✓ Eco-drive (environment-friendly driving manner) and barrier-free system for aged people and children
- ✓ Using regulation of Motor-bike and cars with private uses in the city
- ✓ Regulation of parking on the walking road and improvement of parking

9. Issues

- ✓ To improve main railway network, big scale maintenance and newly-construction of railway network are needed. The international cooperation and financial promise are important issue taking into consideration of construction of Shinkansen.
- ✓ To adopt comprehensive city transport policy, investigation activities like case study in the developed countries, analysis of its results and application possibility to Vietnam are important. To this end, the international cooperation and financial promise are needed.

10. Justification of Technical Assistance

- ✓ Technical assistance from the developed countries is indispensable to improve and construct newly railway network including Shinkansen
- ✓ Technical assistance is indispensable to adopt IT technology in transport system.

Implementation Schedule (Program No.11-a)

	2010	2011	2012	2013	2014	2015	2020	2025
Improvement of public transportation system								
Maintenance and improvement of railway network								
Improvement of railway network in the city								
Improvement of transport system in the city								
Countermeasure in software and system (comprehensive city transportation policy)								
Establishment of Master Plan								
Improvement of public transportation services								
Newly-built lane for bus								
Eco-drive etc								
Regulation of Motor-bike and cars								
Regulation of parking on the walking								

Program No.11-b

1. Program name	Establishment of efficient transport network (waterway/seaway)
2. Implementing agency	MOT
3. Target group/persons	Enterprises of waterway and seaway
4. Goal	Increase of utilization of ships
5. Expected result	Energy conservation and reduction of CO_2 emission
6. Expected project cost	----------
7. Implementation period	2009-2025

8. Description

Improvement of seaway/waterway transport system and infrastructure

- ✓ Improvement and newly-construction of port on the main rivers and sea coasts (freight transport; increase of port capacity and improvement of logistics like warehouse)
- ✓ Improvement of port equipment (charging and discharging) and maintenance/construction of the terminal to secure a linkage with road transport equipment (freight and passenger transport; enhancement of convenience of waterway and seaway)
- ✓ Development around port (hotels, restaurant, shopping mall and parking area)
- ✓ Maintenance of existing routs and construction of new routs (including newly-construction of ports)
- ✓ Improvement of efficiency in the freight transport by using RORO ship, etc.

Countermeasure in software and system (comprehensive city transport policy)

- ✓ Improvement of seaway/waterway transport services (adjustment of fare, maintenance and improvement of railway station and bus stop, enhancement of time table, supply of transport information)

9. Issues

- ✓ There are few ports available for big scale ships due to shallow depth of sea in Vietnam. Therefore dredging or offshore berth construction is required.
- ✓ Although seaway is superior in mass transport and environmental reservation, it has challenges like charging and discharging equipment and smooth linkage with road transport. Maintenance of ports and construction of terminals need big money and work force.

10. Justification of Technical Assistance

- ✓ Technical assistance from the developed countries is indispensable to construct modern port (dredging, construction of berth, charging and discharging equipment and introduction of IT)
- ✓ Experience and technical assistance from the developed countries are indispensable to adopt TDM (transport demand management) methods as software correspondence.

Implementation Schedule (Program No.11-b)

	2010	2011	2012	2013	2014	2015	2020	2025
Improvement of public transportation system (infrastructure)								
Improvement and newly-construction of port	———	———	———	———	———	———	———	
Improvement of port equipment	———	———	———	———	———	———		———
Development around port	———	———	———	———	———	———		———
Maintenance of existing routs	———	———	———	———	———	———	———	
Countermeasure in software and system (comprehensive city transportation policy)								
Improvement of public transportation services	———	———	———				———	

Program No.11-c

1. Program name	Establishment of efficient transport network (airway)
2. Implementing agency	MOT
3. Target group/persons	Enterprises related with airway and airport
4. Goal	Increase of public transport system
5. Expected result	Energy conservation and reduction of CO_2 emission
6. Expected project cost	----------
7. Implementation period	2009-2025

8. Description

Hardware response

- ✓ Energy conservation in airport
- ✓ Introduction of energy saving airplane (weight saving airplane)
- ✓ Weight saving of loaded equipments (container etc.)

Software response

- ✓ Making airway manual for reduction of energy consumption

9. Issues

- ✓ Balancing between energy conservation and safety

10. Justification of Technical Assistance

- ✓ Technical assistance is required to survey actual energy conservation in the airway sector of the developed countries

Implementation Schedule (Program No.11-c)

	2010	2011	2012	2013	2014	2015	2020	2025
Hardware response								
Energy conservation in airport	━	━	━	━				━
Introduction of energy saving airplane	━	━	━				━	
Weight saving of loaded equipments	━	━	━	━	━	━		━
Software response								
Making airway manual	━	━	━				━	

Program No.11-d

1. Program name	Energy conservation technology and environmental consideration in the transport sector
2. Implementing agency	MOT
3. Target group/persons	Transport related organization
4. Goal	Improvement of energy conservation and environmental consideration
5. Expected result	Conservation of energy and reduction of CO_2 emission
6. Expected project cost	----------
7. Implementation period	2009-2025

8. Description

Introduction of energy saving vehicle (Improvement of thermal efficiency and CO_2 measures)

- ✓ Weight saving and downsizing of vehicle
- ✓ Introduction of hybrid and/or electric car (control of fossil energy consumption)
- ✓ Introduction of energy conservation technology in the transport sector (regenerative brake, etc.)
- ✓ Introduction energy saving ship (environmental consideration ships relating energy conservation)
- ✓ Weight saving airplane (already referred in Program No.11-c)

Fuel measures

- ✓ Revision of fuel standard for vehicle (car and motorbike): (clarification of fuel standard)
- ✓ Tightening standard on fuel quality (air pollution measures)
- ✓ Tightening maintenance and check of vehicle

Others

- ✓ Ecological driving (energy saving driving)
- ✓ Environment-friendly management in the transport sector (Green management; grasp of energy consumption and implementation of environmental measures)

9. Issues

- ✓ Although up to now, the first priority was to satisfy transport demand, after now satisfying energy demand, energy policy to conserve energy and consider environment is required at the same time
- ✓ Make a balance between weight saving of car and safety

10. Justification of Technical Assistance

- ✓ Technical assistance for case study of the developed countries that have rich experiences on a balancing between weight saving of car and safety and more its introduction in Vietnam is required.
- ✓ Technical assistance on introduction of energy conservation technology in the transport sector is required.

Implementation Schedule (Program No.11-d)

	2010	2011	2012	2013	2014	2015	2020	2025
Introduction of energy saving car (Improvement of thermal efficiency and CO_2 measures)								
Weight saving and downsizing of vehicle	━	━	━				━	
Introduction of hybrid and/or electric car				━	━	━		━
Introduction of energy conservation technology	━	━	━				━	
Introduction energy saving ship				━	━	━		━
Weight saving airplane	━	━	━				━	
Fuel measures								
Revision of fuel standard	━	━	━				━	
Tightening standard on fuel quality	━	━	━				━	
Tightening maintenance and check of vehicle	━	━	━				━	
Others								
Eco-driving	━	━	━				━	
Environment-friendly management	━	━	━				━	

Program No.11-e

1. Program name	Experimental use of Bio-fuel
2. Implementing agency	MOT
3. Target group/persons	Producers and consumers of Bio-fuel
4. Goal	Increase of use of Bio-fuel in transport system
5. Expected result	Conservation of energy and reduction of CO_2 emission
6. Expected project cost	----------
7. Implementation period	2009-2025

8. Description

Study of production and dissemination of Bio-fuel and its utilization

- ✓ Study of production and dissemination of Bio-ethanol
- ✓ Study of production and dissemination of Bio-diesel
- ✓ Examination on issues of circulation of Bio-fuel
- ✓ Adjustment of issues of dilemma between production of Bio-fuel and supply of foods

Measures for Utilization and promotion of Bio-fuel

- ✓ Improvement of infrastructure for promoting use of Bio-fuel
- ✓ Pricing for promoting use of Bio-fuel

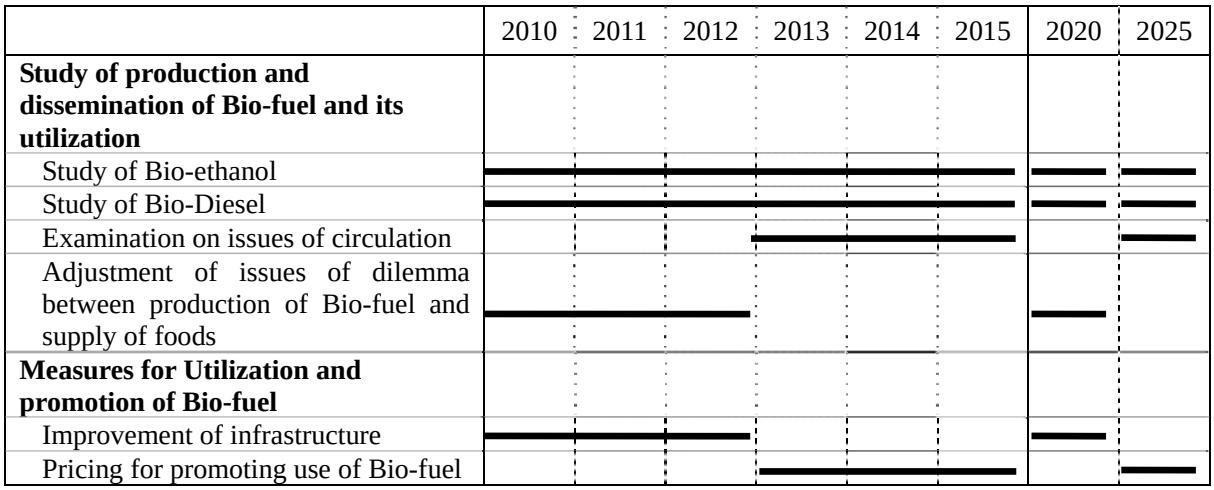
9. Issues

- ✓ Although Bio-fuel is very much friendly to environment and effective in control of fossil energy consumption, examination on issues required for solving challenges to realize use of Bio-fuel (economy, quantitative securing and constraint of circulation of Bio-fuel)

10. Justification of Technical Assistance

- ✓ Technical assistance for case study of the developed countries and experimental introduction in Vietnam is required because Bio-fuel is produced from production of Biomass and recycle of Bio-wastes.

Implementation Schedule (Program No.11-e)



3.3 Effects of EE&C on Economy, Finance and Carbon Dioxide Reduction

3.3.1 Analysis of Effects of EE&C on Economy, Finance and Carbon Dioxide Reduction

In order to evaluate the effects of National Strategic Program on EE&C for economy, finance and carbon dioxide reduction in Vietnam, "The Study on National Energy Master Plan in Viet Nam" (JICA), which was completed in September 2008, was referred. In the JICA'S study, "BAU (Business as Usual) case", continuing the same trend as the past was projected. In our study EE&C effect is evaluated when the national EE&C target 5 to 8% in 2015 were realized in comparison with the BAU case mentioned above. Here we set as 5% EE&C in 2015, 10% in 2020 and 15% in 2025; annually 1% EE&C advance. (Here in after "EE&C case.") The economic and financial effects of the national energy conservation program can be evaluated based on the difference of the energy demand in two cases and energy prices, because the difference of two cases is only the rate of energy conservation. It is, of course, natural that the economic effect is different if preconditioned price level is differed.

Target of the reduction of carbon dioxide through 2020, or 15% reduction from base year of 2005 was published in June 2009, in Japan. According to the forecast by the Institute of Energy Economics, Japan (IEEJ), the total cost is US$ 550.9 billion to implement the maximum energy conservation case, the conservation benefit is estimated US$ 297 billion and the difference of US$ 254 billion is some kind of subsidies or burdens to be secured. For Vietnam, the economic effects can be evaluated, like Japan, based on the cost to implement a political target, or 5 to 8% reduction in 2015, and conservation benefit. But it might be an insufficient evaluation due to the present difficulty in the situation for calculating its cost.

As for the reduction of carbon dioxide, the amount of reduction and its intensity can be evaluated by using the intensity of carbon dioxide reduction by energy sources.

On the other hand, on-site survey as the audit of energy conservation had been conducted in this study. Referring the result of on-site survey, the feasibility to achieve annual 1% EE&C and what kind of political measures is needed was investigated. Regarding the residential sector, on-site survey has not been conducted, so the feasibility to achieve annual 1% EE&C was evaluated through the hearing from related organizations and the former conducted research result.

1) Macro Evaluation

(1) Effects of Energy Demand Reduction by Energy Conservation and its Benefit

The difference of energy demand between "BAU" in the "The Study on National Energy Master Plan in Viet Nam", JICA study, September 2008, and "EE&C" case which we calculate in our report is increasing gradually over the 2005 to 2025 period and reached to 27.54 million tons of oil equivalent (TOE) in 2025. The industrial sector (light industry) has the biggest effects in energy conservation and the household and transportation sectors are followed.

Contribution of the commercial sector is unexpectedly small.

An economic benefit can be evaluated by multiplying preconditioned energy prices by source and the amount of energy consumption by each sector in the JICA study. When estimating based on only energy prices, the total economic benefit over the 2005 to 2025 period reaches 107.2 billion dollars. By sector, the commercial sector has the biggest economic benefit and then the household and transportation sectors are followed. The economic benefit in the industrial sector is small. In this sector, it has a structure that the economic benefit can hardly be created because the industrial sector consumes coal greatly and its price is relatively cheap.

The amount of energy conservation during this period reaches 170 million TOE. It means the economic benefit of US$ 645 is created against the reduction of energy consumption of 1.0 TOE. For Japan that made clear the target of carbon dioxide reduction, the economic benefit is estimated US$ 720/TOE which is a little bit bigger than Vietnam due to the higher energy price levels adopted as the precondition (main reason is the difference of prices assumed in the years when a forecast was done; for example, as for the price of 2007, US$ 90/bbl estimated in the recent Japanese study and about US$ 70/bbl in Vietnam by JICA study done in 2007 and coal prices in Vietnam are cheaper than the international market price, etc.).

In Vietnam, the target of energy conservation to 2015 is set 5 to 8%. However, total cost required to this end is unclear and cost to 2025 is not estimated. According to rough evaluation by using Japanese example, US$ 550.9 billion dollars are required to reduce energy consumption by 400 million TOE (however, this total sum is the requisite cost during 17 years for Japan, so re-estimation during 21 years over the 2005 to 2025 period is needed to apply it to Vietnam. it corresponds to US$ 678.0 billion). In result of converting from 400 million TOE for Japan to 170 million TOE for Vietnam, the total cost to reduce energy consumption by energy conservation is estimated US$ 288.2 billion. The requisite cost for energy conservation is estimated about US$ 181 billion because the economic benefit of energy conservation is US$ 107.2 billion.

Table 3.3.1-1 Economic Effect by EE&C

(Unit: energy consumption; kTOE, economic effect: $1,000)

	BAU	Agricluture	Industry (Light)	Industry (Heavy)	Trans portation	Commer cial	Residential	Total
BAU	2005	570	5,626	4,922	6,687	1,322	3,341	22,590
	2010	716	9,151	6,701	9,660	1,913	5,434	33,725
	2015	830	16,743	9,091	13,285	2,724	8,508	51,384
	2020	946	31,859	12,090	18,029	3,723	13,058	79,975
	2025	1,159	52,029	15,503	23,645	5,362	20,142	118,195
REF	2005	570	5,626	4,922	6,687	1,322	3,341	22,590
	2010	716	8,903	6,638	9,592	1,874	5,325	33,199
	2015	830	14,452	8,586	12,708	2,410	7,529	46,717
	2020	946	24,822	10,883	16,549	2,974	10,435	66,880
	2025	1,159	36,661	13,296	20,781	3,868	14,535	90,655
Dif. of Demand	2005	0	0	0	0	0	0	0
	2010	0	248	63	68	39	108	526
	2015	0	2,291	505	578	314	978	4,666
	2020	0	7,037	1,207	1,480	749	2,623	13,095
	2025	0	15,369	2,207	2,864	1,494	5,607	27,540
	Total	0	89,255	15,016	18,543	9,662	33,851	166,326
Dif. of Merit	2005	0	0	0	0	0	0	0
	2010	0	131,166	14,499	49,679	31,162	67,903	294,408
	2015	0	1,340,732	131,972	437,277	283,276	702,399	2,895,656
	2020	0	4,310,031	320,669	1,094,470	712,095	1,972,535	8,409,802
	2025	0	9,679,593	594,378	2,037,034	1,495,261	4,385,980	18,192,246
	Total	0	54,847,785	3,980,755	13,555,177	9,256,778	25,609,112	107,249,607
	Unit Cost	0	615	265	731	958	757	645

Note: EE&C case is calculated based on the assumption that it reduced by 5% in 2015, 10% in 2020 and 15% in 2025 from BAU case.

Source: JICA "The Study on National Energy Master Plan in Viet Nam" September 2008.

According to the estimation, on the other hand, based on the annual energy conservation budget in Vietnam which is estimated 20-40 billion VND/year, total investment will reach 320 billion VND, or US$ 18.16 million dollars in the case of 20 billion VND, and VND 640 billion, or US$ 36.32 million dollars in the case of VND 40 billion. The economic benefit is very large, because total sum of budget or cost is only US$ 180-360 million even if the total budget increases by 10 times. However, this does not include investment for energy conservation in the industry, building, transportation and household sectors (new/update capital investment, improvement of infrastructure, new purchase and/or replace of energy equipments, etc.) and budgets for subsidies by the Government to promote these investments.

It is natural that the economic benefit will increase if the energy prices increase more than levels supposed by JICA master plan study. In this case, cost for energy conservation can be increased because higher and costly conservation technology might be introduced. Political consideration is required whether implementation of energy conservation inside the economic benefit, or implementation over this benefit due to implement the important political challenges for the country such as "securing energy supply" should be done.

(2) Effect and Merit of Greenhouse Gas Reduction

The amount of greenhouse gas reduction by energy conservation can be calculated based on reduction amount of energy consumption and emission factor of carbon dioxide by each energy source. According to Table 3.3.1-1, the amount of energy consumption reaches 170 million TOE over the 2005 to 2025 period. The amount of carbon dioxide emission in the same period is 410.3 million t-CO_2 (tons of carbon dioxide equivalent) by multiplying the emission factor of carbon dioxide by energy source, and intensity of carbon dioxide emission per 1.0 TOE is 2.47 t-CO_2. The economic benefit per t-CO_2 is estimated US$ 261/t-CO_2.

Table 3.3.1-2 Effect of Carbon Dioxide Reduction

(Unit: energy consumption; kTOE, carbon dioxide: kt-CO_2)

		Agricluture	Industry (Light)	Industry (Heavy)	Trans portation	Commer cial	Residential	Total
Dif. of Demand	2005	0	0	0	0	0	0	0
	2010	0	248	63	68	39	108	526
	2015	0	2,291	505	578	314	978	4,666
	2020	0	7,037	1,207	1,480	749	2,623	13,095
	2025	0	15,369	2,207	2,864	1,494	5,607	27,540
	Total	0	89,255	15,016	18,543	9,662	33,851	166,326
Reduction of CO2	2005	0	0	0	0	0	0	0
	2010	0	628	215	193	102	234	1,372
	2015	0	5,665	1,702	1,647	797	1,940	11,750
	2020	0	17,065	4,046	4,213	1,833	4,945	32,103
	2025	0	37,274	7,404	8,150	3,624	10,863	67,316
	Total	0	217,606	50,441	52,803	23,823	65,603	410,275
	Emsision Unit	0.000	2.438	3.359	2.848	2.466	1.938	2.467

For Japan, the intensity to the requisite sum for energy conservation is US$ 282/t-CO_2 and the economic benefit is US$ 151/t-CO_2. The economic benefit in Vietnam is almost two times for Japan. Some economic benefit can be added on this if it can be traded in the international emission trading market (in the EU/ETC, it is traded with the prices of about US$ 15/t-CO_2) even if it can be traded, not totally but partially, in any way of emission trading.

(3) Supplemental analysis on Vietnamese EE&C national budget

As mentioned above, Vietnamese EE&C national budget is about US$ 2.3 million/year. The comparison of national EE&C budget, GDP, population and total national budget, between Vietnam and Japan is shown in Table 3.3.1-3. Vietnamese EE&C budget is quite smaller than Japanese.

Table 3.3.1-3 Comparison of National EE&C Budget between Vietnam and Japan

Item	Vietnam (A)	Japan (B)	(A)/(B) %
EE&C national budget/year (VND)	40 billion	20,000 billion	0.20 %
	(US$2.3 million)	(US$1.2 billion)	
GDP(2000) (US$)	716 billion	4,900 billion	
EE&C budget/ GDP (%)	0.00032 %	0.024 %	1.33 %
Population	85 million	127 million	
EE&C budget/ capita	470 VND	157,000 VND	0.30 %
National budget (VND)	270,000 billion	12,000,000 billion	
EE&C budget/ national budget (%)	0.015 %	0.14 %	10.7 %
National energy consumption (TOE)	28 million	540 million	
EE&C budget/ TOE	1,430 VND	37,000 VND	3.86 %

In Vietnam, the target of energy conservation to 2015 is set 5 to 8% as mentioned above. The expected financial benefit obtained by this EE&C is calculated in Table 3.3.1-4. Compared with expected (desired) benefit, the input (national budget) is too small. To obtain the target EE&C and benefit, more and more input should be considered. Table 3.3.1-5 shows the Japanese case, and in Japan input (national budget) ratio to expected benefit by EE&C is comparatively bigger than Vietnamese case.

Table 3.3.1-4 Comparison between the Expected National EE&C Benefit and National Budget for EE&C (Vietnam)

Item	2005	2005-2010	2011-2015	
EE&C Target	Base	3-5%→4%	5-8%→6.5%	
National Energy Consumption	28 mil TOE	→	→	
Target EE&C	Base	1.12 mil TOE/year	1.82 mil TOE/year	
Expected Energy Price		10 mil VND/TOE	10 mil VND/TOE	10,000 VDN/litre oil
Expected Economical Effect with proper investment		11,200 bil VND/year	18,200 bil VND/year	(Gov. budget) 40 bil VND/year
				40 bil VND/year

280 - 450 : 1

Table 3.3.1-5 Comparison between the Expected National EC Benefit and National Budget for EE&C (Japan)

Japanese case		1%	Gov. budget
Expected Economical Effect	540 mil TOE	54,000 bil VND	20,000 bil VND/year

2.7 : 1

3.3.2 Micro perspective on GHG Reduction and its Economic and Financial Effects

1) Energy Conservation Potential and Reduction of CO_2 Emission of the Industrial Sector

The energy consumption of the industrial sector can be divided into heavy industries and light industries, wherein heavy industries include the cement manufacturing industry, the iron and steel industry, and the ceramic industry. The estimate of the energy consumption of the industrial sector is shown in Table 3.3.2-1. This estimate has been cited from Table 2.2.5-1 Estimate Energy Demand per Sector in Vietnam of this report.

The energy conservation target which was defined under the National Strategic Program is "5% of Energy Conservation for BAU by 2015."

Table 3.3.2-1 Estimation of Energy Consumption by Industrial Sector

Industry	Unit	2005	2015	2025
Industry (light)	Million toe	5.6	16.7	52.0
Industry (heavy)	Million toe	4.9	9.1	15.5
Total of BAU	Million toe	10.5	25.8	67.5

Although recent data on the energy consumption by sub-sector in industry has not been disclosed, the graph using the available data of 1995 is shown in Figure 3.3.2-1. In 1995, the energy consumption of the cement industry and the iron and steel industry accounts for 65% of that of the whole industrial sector. In 2005, this is estimated to account for approximately 40%, and is considered to have a very big influence on the energy conservation potential of the industry. Thus, the energy conservation potential of the cement and iron and steel industry was conducted based on the on-site survey and related survey documents.

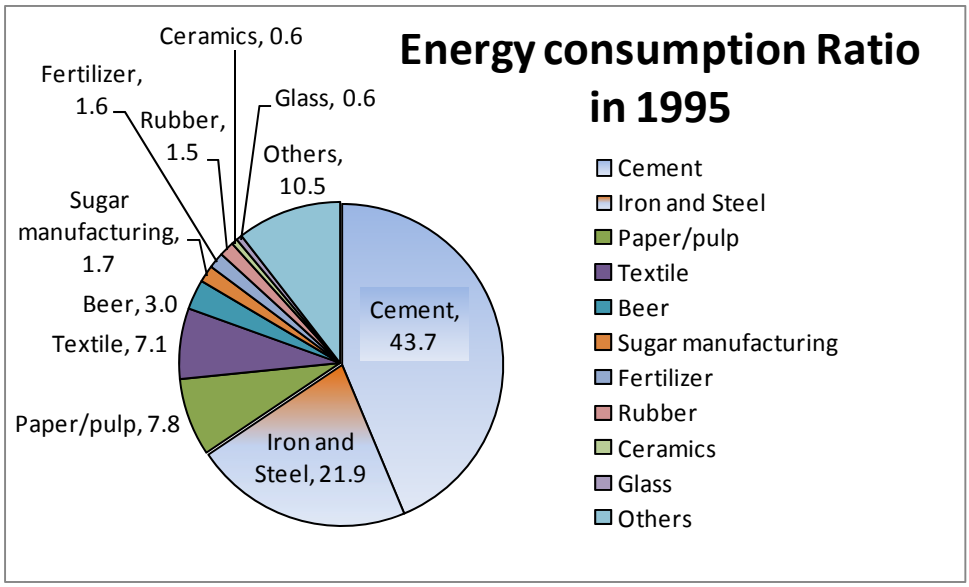
The result of this estimate of the energy potential of the cement industry and iron and steel industry is shown below according to the on-site survey data, statistics data and Vietnamese government document. The details are described in Paragraph (1) and (2) below. Based on the fact that the energy consumption of these two industries account for 40% of the energy consumption of the industrial sector, and the EE&C potential is comparatively bigger, it supposed to be possible to attain 5% or more for BAU by 2015 in the entire industrial sector with appropriate effort.

- Cement industry: 12.2%
- Iron and Steel Industry: 42.2%

On the other hand, the energy conservation potential of the light industry which was calculated from the results of the on-site survey conducted in 2008 October is 15.2%.

Energy saving amount and CO_2 reduction amount in 2015 are calculated by multiplying the energy consumption in Table 3.3.2-1 and the above-mentioned energy consumption potential

(%). The results of calculation are shown in Table 3.3.2-2. (Regarding the energy consumption amount in 2015, the calculation result excesses BAU amount, so it is corrected to keep the energy consumption rate in 2005.) 2.57 t-CO_2/TOE is adopted as CO_2/TOE emission factor which is shown in 3.3.1-1) (1). Estimated CO_2 emission reduction on whole industry in 2015 compared with BAU is 7,720,000 t-CO_2.



Source: JETRO Seminar document released by MOSTE at Haiphong in 1999

Figure 3.3.2-1 Energy Consumption per Industrial Sector (1995)

Table 3.3.2-2 The Estimation of Energy Saving Amount and CO_2 Reduction Amount

		2005		2015					
Industrial sector	Subsector	Macro	Micro	Macro	Micro calculation	Micro assumption	Energy Saving ratio	Saved energy	CO_2 reduction
Unit		TOE	TOE	TOE	TOE	TOE		TOE	t-CO_2
Industry (Heavy)	BAU	4,922		9,091					
	Cement		2,194		5,607	3,315	0.122	404	1,039
	Iron & steel		1,094		4,664	2,758	0.422	1,164	2,991
	Others		1,634			3,018	0.050	151	388
	Total		4,922			9,091		1,315	3,379
Industry (Light)	BAU	5,626		16,743					
	Textile, food		2,813			8,372	0.152	1,272	3,270
	Others		2,813			8,372	0.050	419	1,076
	Total		5,626			16,743		1,691	4,346
Total in industry		10,548	10,548	25,834		25,834		3,006	7,725

(1) Energy Conservation Potential in the Cement Industry

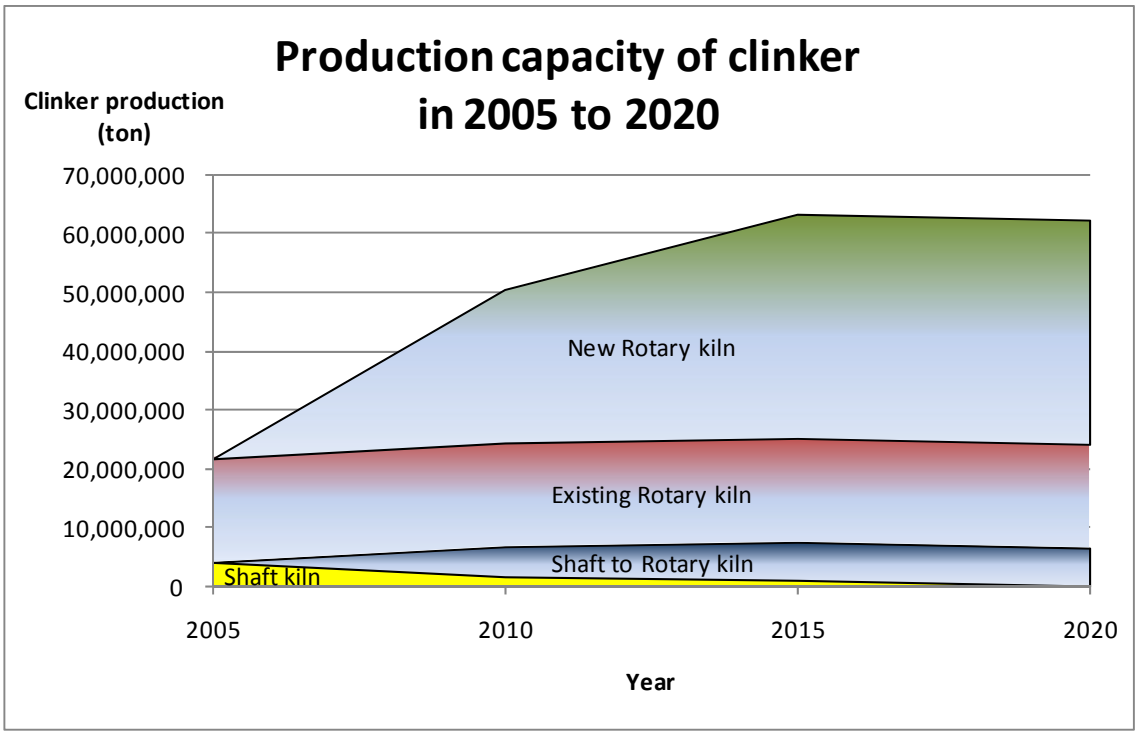
According to 2007 data, there are 14 cement plants in Vietnam with 19 units of cement kilns of more than 2,500 ton/day capacity. Its production capacity is 26.3 million ton/year.

There are 50 local small and medium scale cement plants, with production capacity of 6.41 million ton/year, 10% of which has more than 100,000 ton/year capacity while 90% has less than 100,000 ton/year production capacity. The facilities in these local plants are manly made in China.

On-site survey was conducted for a vertical shaft kiln in the cement plant .

The cement kilns operating in Vietnam are either vertical shaft kilns or dry-type rotary kilns. The vertical shaft kilns as compared to the dry-type rotary kilns have high fuel consumption intensity, producing low-strength clinkers, thus the MOC has instructed that all vertical shaft kilns would have to be replaced with dry-type rotary kilns with production capacity of more than 1,000 ton/day.

Based on the Presidential Decision 180 under the jurisdiction of the MOC and also on the Equipment Plan, cement plants shall complete this conversion from vertical shaft kilns to rotary kilns by 2020. The conversions will proceed from 2010 onwards, and the energy reduction will be realized by the use of high efficiency rotary kilns with NSP. Figure 3.3.2-2 shows the planned production capacity of cement kilns.



Source: Decision 180, May 16 2005: Approval of Vietnam cement industry development plan toward 2010 and orientation toward 2020

Figure 3.3.2-2 Estimated Production Capacity of Cement Kilns

The energy conservation potential of the cement industry in Vietnam is estimated from the following factors:

- Improvement in fuel consumption intensity brought about by the conversion from vertical shaft kiln to NSP type rotary kiln
- Improvement in energy consumption intensity brought about by reinforced energy management of existing rotary kilns
- Improvement in energy consumption intensity brought about by new installations of rotary kilns

a) Conversion of vertical shaft kilns

The annual production capacity of vertical shaft kilns in 2005 was 4.10 million ton. By the year 2020, 2.10 million ton of this will be converted to the NSP type rotary kiln while 2.0million ton will be phased out.

The vertical shaft kiln plant which the on-site survey was conducted in 2008 has a plan to newly install 1,500 ton/day dry-type rotary kiln with NSP by the year 2010, and phase out its vertical shaft kiln by 2015.

The fuel consumption intensity of the vertical shaft kiln is 1,100 kcal/kg-clinker, and its power consumption intensity is 100 kWh/kg.

b) Reinforcing the energy management of existing rotary kilns

The annual production capacity of dry-type rotary kilns in 2005 was 17.80 million ton.

The cement plants with existing dry type rotary kilns will improve its energy consumption intensity by 5% by the year 2015 by means of rotary kiln combustion control, leakage prevention of kiln flue gas system, adoption of inverter control for the fan motors.

Fuel consumption intensity: 850 kcal/kg-clinker in 2005 → 800 kcal/kg-clinker in 2015

Power consumption intensity: 105 kWh/ton-cement in 2005 →100 kWh/ton-cement in 2015

c) New installations of high efficiency rotary kilns

The rotary kilns for new installation until the year 2015 have annual production capacity of 30million ton. The target energy consumption intensity of the new installations, based on Presidential Decision 180, is shown in Table 3.3.2-3.

Table 3.3.2-3 Target Energy Consumption Intensity of New Cement Plants in Vietnam

Targets	Capacity Size (Ton of clinker/day)		
	> 3,000	1,000 - 3,000	< 1,000
Heat intensity (kcal/kg-clinker)	< 730	< 800	< 850
Electricity intensity (kWh/ton-cement)	< 95	< 98	< 100

Source: President Decision No.180

Reflecting the figures is Table 3.3.2-3, the average energy consumption intensity of the new installations has been set as follows:

- Fuel consumption intensity in 2005: 760 kcal/kg-clinker
- Power consumption intensity in 2005: 96 kWh/ton-cement

d) Energy conservation potential in the cement industry

The energy consumption intensity of the cement manufacturing in 2015 is shown in Table 3.3.2-4, an improvement by 12.2% as compared to the year 2005.

In order to attain this energy conservation potential, the followings must be implemented:

- Conversion of vertical shaft kilns by 2020. In order to replace these vertical shaft kilns, financial support measures such as low interest loans are necessary.
- The energy consumption intensity of newly installed cement kilns shall comply with the provisions of the Presidential Decision No.180.
- Existing cement plans are listed as the designated factories for energy management, thus, the MOIT should monitor the status of energy conservation through the periodical report and the 5-year EE&C plan, and provide guidance accordingly.

Table 3.3.2-4 Estimate of the Specific Energy Consumption of Cement Manufacturing

	2005	2010	2015	Improvement in 2015/2005
Production capacity (ton/y)	21,887,000	50,570,000	63,290,000	
Fuel consumption (TOE)	1,962,570	4,104,450	4,974,100	
Power consumption (TOE)	229,814	505,700	632,900	
Energy consumption (TOE)	2,192,384	4,610,150	5,607,000	
Specific Fuel Consumption (kcal/kg)	897	812	786	12.4%
Specific Power Consumption (kWh/ton)	105	100	100	4.9%
Specific Energy Consumption (kgOE/ton)	100	91	89	12.2%

(2) Energy Conservation Potential of the Iron and Steel Industry

The demand for iron and steel products in 2005 was 65 million ton, pig iron production was 875,000 ton wile imported steel was 5 million ton. As shown in Figure 3.3.2-3, the billet production, final steel production and total steel products consumption from 2003 to 2008 has greatly increased.

Figure 3.3.2-4 shows the material flow of the iron and steel sector in 2005. Collating the new installation/additional installation plans for production facilities from 2006 onwards, the equipment capacity is as shown in Table 3.3.2-7, and is estimated to reach 6,475 crude steel ton by 2015.

The energy conservation potential of the iron and steel industry in Vietnam is estimated from the following factors:

- Reinforced energy management if existing facilities and improvement in energy consumption intensity due to improved equipment
- Improvement in energy consumption intensity brought about by new installations of energy conserving equipment.

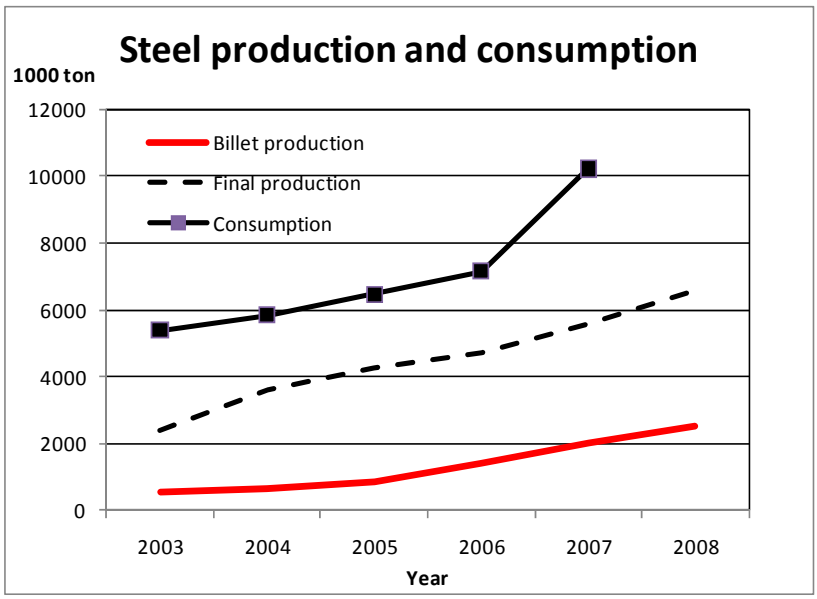
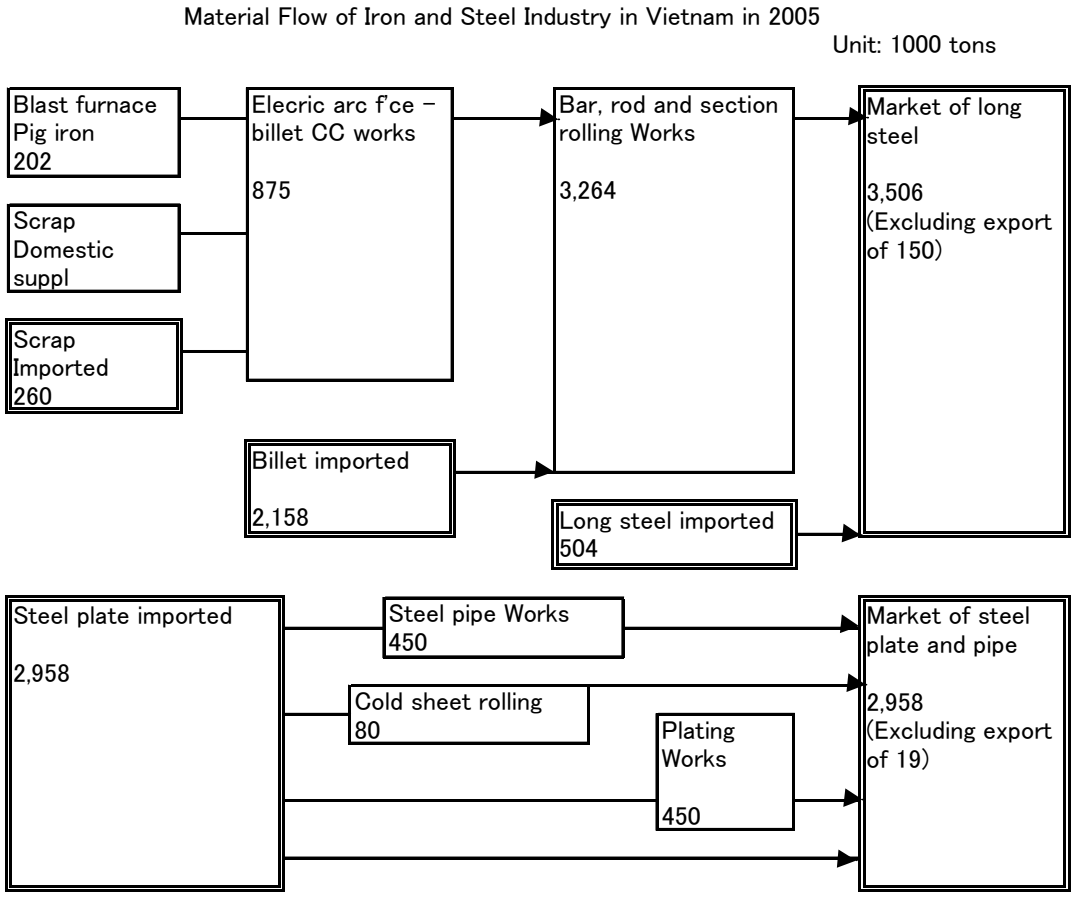


Figure 3.3.2-3 Trends in Production and Consumption Volumes of Iron and Steel



Source: SEAISI, 2006 Coutry reports. SEAISI, Steel Statics Yearbook 2006

Figure 3.3.2-4 Material Flow Diagram of the Iron and Steel Industry for 2005

a) Reinforced energy management of existing facilities and improvement in energy consumption intensity due to improved equipment

Computing the energy consumption in 2005 based on the production volume in Figure 3.3.2-3 and estimated energy consumption intensity in Table 3.3.2-5, the energy consumption for the year 2005 is 1.09 million TOE/year as shown in the bottom line of Table 3.3.2-5.

The on-site survey was conducted at hot rolling mills in 2008, and the energy conservation potential that may be brought about by the reinforcement of energy management and imrovement in equipments is 12%. On the other hand, if regenerative burning technology is adopted, there may be an energy potential of 15%, thus, the energy conservtaion potential of hot rolling mills is 15%. The energy conservation potenrial of the other plants such as the integrated iron and steel works, the elecric arc furnace, the pipe mills, the cold sheet mills and the plating works is 10%.

Table 3.3.2-5 Estimated Energy Consumption of Iron & Steel Industry in 2005

Process	Products	Production (1,000 ton/y)	Energy intensity (TOE/t)	Energy consumption (1,000 TOE/y)
Integrated Iron & Steel Works	Billet	300	1,000	300
Electric arc furnace	Billet	575	800	460
Hot rolling mill	Bar	3,264	90	294
Steel pipe mill	Pipe	450	40	18
Cold sheet mill	Cold sheet	80	50	4
Plating works	Plating	450	40	18
Total				1,094

Table 3.3.2-6 Estimated Energy Consumption Intensity of the Iron and Steel industry

No.	Plant	Products	Specific Energy Consumption in 2005 (TOE/t)	Specific Energy Consumption in 2015 (TOE/t)	Specific Energy Consumption in Japan (TOE/t)
1	Integrated Iron & Steel Works	Billet	1,000	900	450
	New installation	Billet & slab		800	
2	Electric arc furnace	Billet	800	720	230
	New installation	billet		500	
3	Hot rolling mill	Bar	90	76	50
	New installation	Bar & Plate		70	
4	Steel pipe mill	Pipe	40	36	30
5	Cold sheet mill	Cold sheet	50	45	40
	New installation	Cold sheet		40	
6	Plating works	Plating	40	36	30

b) Improvements in energy consumption intensity brought about by new installations

Since 2006, there have been many plans for new and additional installations of equipment. As shown in Figure 3.3.2-3, billet production has increased from 875,000 ton in 2005 to 2 million ton in 2007. In 2015, it is estimated that the crude steel production is about 6.5 million ton. For new installations, facilities applying energy conservation technologies will be introduced. The energy consumption intensity of new installations is shown in Table 3.3.2-6 (2015).

c) The energy consumption intensity per ton of crude steel in 2005 and in 2015 are shown in Table 3.3.2-7. The energy consumption intensity is obtained from the energy consumption intensity and equipment capacity of the existing (2005) and new installations (2015) as shown in Table 3.3.2-6. It is estimated that the energy consumption intensity in 2015 is 0.72 TOE/ton-crude steel, a 42.4% improvement as compared to 2005.

Table 3.3.2-7 Trends in Energy Consumption Intensity in the Iron and Steel Industry

No.	Plant	Unit	2005	2015	improvement 2015/2005
1	Production of billet and slab	1,000 t/y	875	6,475	
2	Energy consumption	1,000 TOE	1,094	4,664	
3	Specific energy consumption	TOE/t	1.25	0.72	42.4%

(3) Energy Conservation Potential in the Textile, Food Processing and Ceramic Industries

Based on the results of the energy on-site survey conducted in October 2008, the energy conservation potential of these industries is shown in Table 3.3.2-8.

The average energy conservation potential of these plants is 15.2%.

Table 3.3.2-8 Energy Conservation Potential Based on the Site Survey on Energy

No.	Factory	EE&C potential (%)		
		Fuel	Electricity	Energy
1	Ceramic factory A	12.0	12.7	12.2
2	Ceramic factory B	20.0	26.0	18.7
3	Textile factory C	12.3	15.1	13.7
4	Food processing factory D	11.0	19.3	16.2
	Average	13.8	18.3	15.2

(4) Energy Conservation Potential in Other Industries

The energy conservation potential of industrial sectors other than the iron and steel, cement, textile, food processing and ceramics industries has not been estimated in this study and the exiting study document, however the energy conservation potential will be expected to be achieved at least 5% between the years 2005 to 2015.

2) Building Sector

As for the energy consumption data of building sector, there is an estimation of sectoral total consumption data by the Study on Energy Master Plan (JICA). And regarding the data classified by building usage, there is the electricity consumption data obtained from EVN.

The EE&C potential (effect) in building sector is estimated based on the above mentioned data and the result of the on site survey on buildings

(1) EE&C Potential in Buildings based on the On-site Survey

EE&C potential of building sector is estimated on the basis of individual cases of four buildings which the on-site surveys were carried out. These four buildings are a general private office, a government office, a hotel and a shopping center respectively (refer to 2.8.9 to 2.8.12). Premise condition of estimation for EE&C potential and EE&C measures to be taken is explained in "2.8.2 On-site Survey."

In general, electricity consumption for air-conditioning occupies the majority. Around 10% EE&C is anticipated thorough the enhancement of energy management and implementation of main measures.

(2) Estimation of EE&C Potential and CO_2 Reduction of Building Sector

Annual electricity sales of EVN from 2002 to 2004 and forecast in 2015 and 2025 (Study of Energy Master Plan (JICA)) is shown in Table 3.3.2-9.

In addition, regarding the usage of building, the A building (general and private enterprise office) is categorized in "Foreign Comm" and "JVs and Offices/Banks", the B building (government office) in "Public Offices and Admin Buildings", the C building in "Hotel" ,and the D building in "Wholesale and Retail Shops/Repair Shops".

Table 3.3.2-9 Change and Prospect of Energy Consumption by Building Usage

Unit: GWh

Usege as Onsite survey	Item	2002	2003	2004	*2015*	*2025*
-	I. Agriculture, Forestry & Fishing	480.92	570.87	550.53	*1,789.19*	*4,828.91*
-	II. Industry	12,794.24	15,117.81	17,855.82	*58,030.64*	*156,621.08*
-	III. Commerce	2,161.79	2,126.50	2,481.76	*8,065.62*	*21,768.60*
Shopping Center (D)	1. Wholesale and Retail Shops/ Repair Shops	810.02	898.08	*1,063.99*	*3,457.93*	*9,332.74*
Hotel (C)	2. Hotels	435.77	558.36	*563.78*	*1,832.26*	*4,945.14*
-	3. Restaurants	39.12	28.98	*44.31*	*143.99*	*388.63*
Gov. Office (A)	4. Foreign Comm and JVs	136.18	54.83	*151.65*	*492.86*	*1,330.19*
Gov. Office (A)	5. Offices/ Banks	740.70	586.26	*658.04*	*2,138.59*	*5,771.91*
-	IV. Residence	12,890.04	14,669.69	16,456.68	*53,483.51*	*144,348.65*
-	1. Residential Urban	7,375.07	8,214.43	*9,313.95*	*30,269.94*	*81,696.66*
-	2. Residential Rural	5,514.98	6,455.26	*7,142.73*	*23,213.57*	*62,651.99*
-	V. Public	1,656.26	2,004.15	2,199.67	*7,148.84*	*19,294.27*
Office (B)	1. Public Offices and Admin Buildings	499.12	396.05	444.21	*1,443.65*	*3,896.33*
-	2. Schools/ Universities	360.35	371.60	341.22	*1,108.96*	*2,993.02*
-	3. Public Lighting	309.68	375.64	385.60	*1,253.19*	*3,382.27*
-	4. Hospitals	180.77	240.93	286.05	*929.63*	*2,509.03*
-	5. Culture/ Sports	66.13	71.88	172.79	*561.56*	*1,515.61*
-	6. Telecommunications	197.87	233.57	269.64	*876.31*	*2,365.11*
-	7. Other Public Activities	42.35	314.49	300.17	*975.53*	*2,632.89*
	TOTAL CONSUMPTION	**29,983.25**	**34,489.02**	**39,544.46**	***128,517.80***	***346,861.51***

Source
2002-2005 data: Sale's Department of EVN, other(Italic): estimation by Study team using data from Energy master plan

EE&C potential and CO_2 reduction in 2015 and 2025 (an underline part in a list) is calculated by multiplication of expected energy consumption and EE&C potential (energy reduction rate (%)) from on-site survey by usage of building. The calculation result is shown in Table 3.3.2-10.

Estimating EE&C energy reduction rate (%), the Study Team assumed that the main (clear effective) action except desiccation (dehumidification) system shall be done by 2015. And the Study Team also assumed that the other EE&C measures (additional EE&C achievement of 5% equivalent) and desiccation system will be introduced by 2025.

Regarding the update to desiccation system, the Study Team assumed that the rate of introduction to be about 1/2 of the whole, because the desiccation system is effective only for general office buildings and governmental office buildings in the northern Vietnam with high humidity.

Conversion factors used among different energy sources are as follow;

The primary energy conversion: 0.277 TOE/kWh (the power generation efficiency is 31%) 0.426 kg-CO_2/kWh

Table 3.3.2-10 shows that there is space of EE&C promotion about 11% in 2015 and about 19% in 2025 by introducing the appropriate effective EE&C technologies and energy management system.

Table 3.3.2-10 EE&C Prospect of Building Sector

Item	Usage by On site survey	Estimated Consumption (a1) 2015	Estimated Consumption (a2) 2025	EE&C potential by Onsite survey [%] (b1) 2015	EE&C potential by Onsite survey [%] (b2) 2025	EE&C Potential (a1)*(b1) 2015	EE&C Potential (a2)*(b2) 2025
Wholesale and Retail Shops / Repair Shops	Shopping Center (D)	3,457.93	9,332.74	11.6%	16.6%	401.12	1,549.23
Hotels	Hotel (C)	1,832.26	4,945.14	10.8%	15.8%	197.88	781.33
Foreign Comm and JVs	Office (A)	492.86	1,330.19	6.6%	20.2%	32.53	*222.14*
Offices/ Banks	Office (A)	2,138.59	5,771.91	6.6%	20.2%	141.15	*963.91*
Public Offices and Admin Buildings	Gov. Office (B)	1,443.65	3,896.33	15.0%	32.0%	216.55	*1,207.86*
TOTAL [GWh]		9,365.28	25,276.31	-	-	989.23	4,724.48
TOTAL [TOE]		2,594,183,000	7,001,538,000	-	-	274,016,000	1,308,681,000
TOTAL EE&C potential ratio [%]						10.6%	18.7%
CO2 [t-CO2]		3,990,000	10,768,000	-	-	421,000	2,013,000

Itaric **: = (a2)*0.5*(b2) + (a2)*(b1) ; Because decicant system will be introduced only office in Northern Vietnam, the team consider that a half of estimate consumption receives benefit of desicant system and the other half receives benefit excluding it.**

(3) The Feasibility to achieve the EE&C Target in "National Strategic Program on EE&C"

In the "National Strategic Program on EE&C," the EE&C national target is defined as 5 to 8% for BAU in 2015, and this can be achieved with appropriate measures.

As mentioned above, the EE&C and CO_2 reduction potential is about 11% in 2015 and about 19% in 2025 can be achieved in the whole building sector.

Through both of questionnaire survey and on-site survey, it is suggested that the most important measures are "introduction of energy management system as first step" for existing buildings and "enforcement of the application of a EE&C building code" (immobilizing in design) for new buildings. By concentrating on these two issues, EE&C in a building sector will be promising.

3) Residential sector

In this part, energy conservation effect is estimated in the case where high efficient home appliances penetrate hereafter into the residential sector. It is necessary for promotion of high efficient appliances to comprehensively drive forward the program 4 (Pilot campaign of "energy saving in household), program 5 (Development of energy performance standards and commencement of energy-saving labeling scheme) and program 6 (Technical assistant to domestic energy efficiency product manufacturers) in the "National Strategic Program on EE&C".

(1) Target appliances

The appliance and equipment to be analyzed are room air conditioner, refrigerator and water heater, which are beginning to rapidly penetrate into the houses in Vietnam and consumes large amount of electricity, and also lamp which are currently being replaced by CFL (See Table 3.3.2-11).

Table 3.3.2-11 Target Appliance

	Conventional type	EE type
RAC	Popular product in the Vietnamese market	EE product in Japan (Top runner)
FRG		
WH	Electric water heater in Vietnam	Solar water heater in Vietnam
LMP	Incandescent lamp in Vietnam	CFL in Vietnam

Note: RAC, FRG, WH, LMP means room air conditioner, refrigerator, water heater, lamp, respectively.

(2) Prerequisites

a) Number of penetration

Figure 3.3.2-5 shows supposed future number of penetration of each appliance. The number of possession of room air conditioner and refrigerator in Vietnam is given based on the Japanese past trend. The trend of Vietnam around 2006 resembles with that of Japan around 1968 for room air conditioner. As for the refrigerator, trend in Vietnam around 2006 resembles with that of Japan around 1960. Each appliance is supposed to penetrate from each present level at the speed equivalent to the Japanese past case.

Regarding water heater, its energy source in Japan has historically varied from wood fuel, kerosene to gas, and electricity has recently got into the market. On the other hand, electric water heater has been the major type from the initial stage of penetration in Vietnam. Consequently, electric water heater is supposed to increase from 7.6 units/100 households in 2006 ("Living Standard" in Vietnam) to 150 units / 100 households in 2030. Regarding lamp, 453 units / 100 households is supposed to increase to 700 units / 100 households. In addition, number of household is supposed to be 26.4 million in 2015 from 19.83 million in 2006.

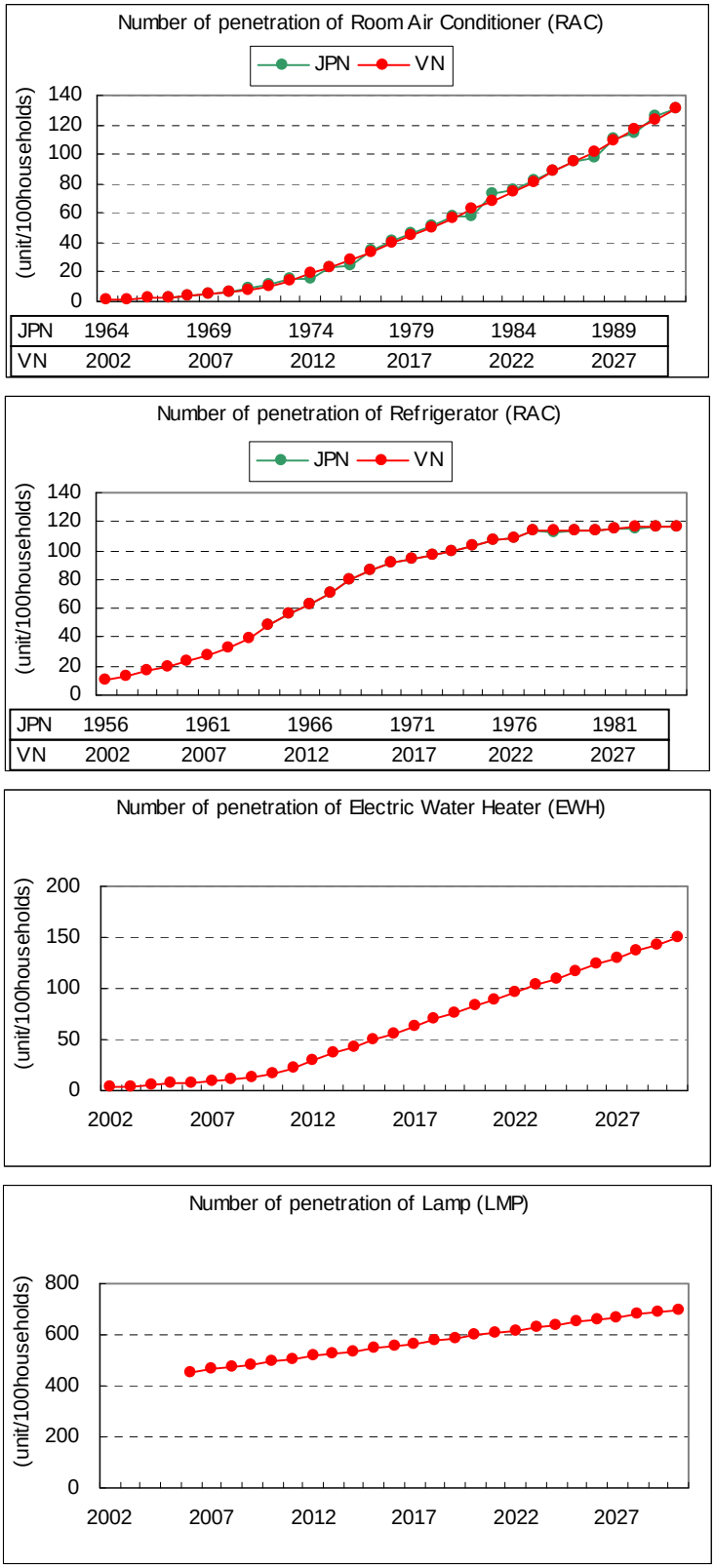


Figure 3.3.2-5 Assumption of Penetration of Each Appliance

Note: Penetration number in the past in Vietnam is cited from "Living Standard" for room air conditioner, refrigerator and water heater, and from "Project of CFL Promotion in Vietnam (prepared by Jyukankyo Research Institute for Ministry of Economy, Trade and Industry, Japan) 2006" for lamp. Penetration number in Japan is cited from "Trend of household consumption (Economic and Social Research Institute, Cabinet Office, Government of Japan)".

b) Annual electricity consumption of each appliance

Table 3.3.2-12 shows annual electricity consumption of each unit appliance in Vietnam.

Table 3.3.2-12 Annual Electricity Consumption by Appliance in Vietnam

(unit: kWh/year)

	RAC	FRG	WH	LMP
Conventional	2,043	805	1,038	46
EE	1,364	549	0	20

Note: Conventional and EE water heater is electric water heater and solar water heater, respectively. Conventional and EE lamp is incandescent lamp and CFL, respectively. Introduction of solar heater can cover the whole heating water demand in the household, which leads to no consumption of electricity.

Source: "Program Planning for Promotion of Energy Efficient Home Appliances in Vietnam, (prepared by Jyukankyo Research Institute for Ministry of Economy, Trade and Industry, Japan) 2007" and "Project of CFL Promotion in Vietnam (prepared by Jyukankyo Research Institute for Ministry of Economy, Trade and Industry, Japan) 2006"

c) Retail price

Table 3.3.2-13 shows retail price of each appliance.

Table 3.3.2-13 Retail Price

(unit: US$)

	RAC	FRG	WH	LMP
Conventional	530	318	138	0.3
EE	953	445	424	4.2

Note: Conventional room air conditioner and refrigerator are in the Vietnamese market and EE type is in the Japanese market.

Note: Conventional and EE water heater, incandescent lamp and CFL are in the Vietnamese market.

Source: "Program Planning for Promotion of Energy Efficient Home Appliances in Vietnam, (prepared by Jyukankyo Research Institute for Ministry of Economy, Trade and Industry, Japan) 2007"

d) Scenarios

The scenarios below are defined for estimation of energy conservation effect.

BAU: All appliances penetrating hereafter are conventional. The whole electricity consumption in the residential sector is supposed to be that of BAU in "Energy Master Plan in Vietnam, JICA, 2006.

Maximum potential case: All appliances penetrating hereafter are EE. Regarding lamp, incandescent lamp will be replaced by CFL, leading to elimination from stock market in 2030.

Goal achievement case: The goal in the "National Strategic Program on Energy Conservation and Effective Use", 5 % decrease from BAU in 2015, is achieved.

(3) Calculation Results

Figure 3.3.2-6 shows the estimated prospect of residential electricity consumption. In the BAU case 67.1 billion kWh is consumed in 2015. To achieve the goal, electricity consumption should be reduced to 63.7 billion kWh (bar chart). The maximum conservation potential is estimated to be 41%. The CO_2 emission can be reduced by 1,600 kt-CO_2 from 31,800 kt-CO_2 in 2015 by achieving the goal (Figure 3.3.2-7).

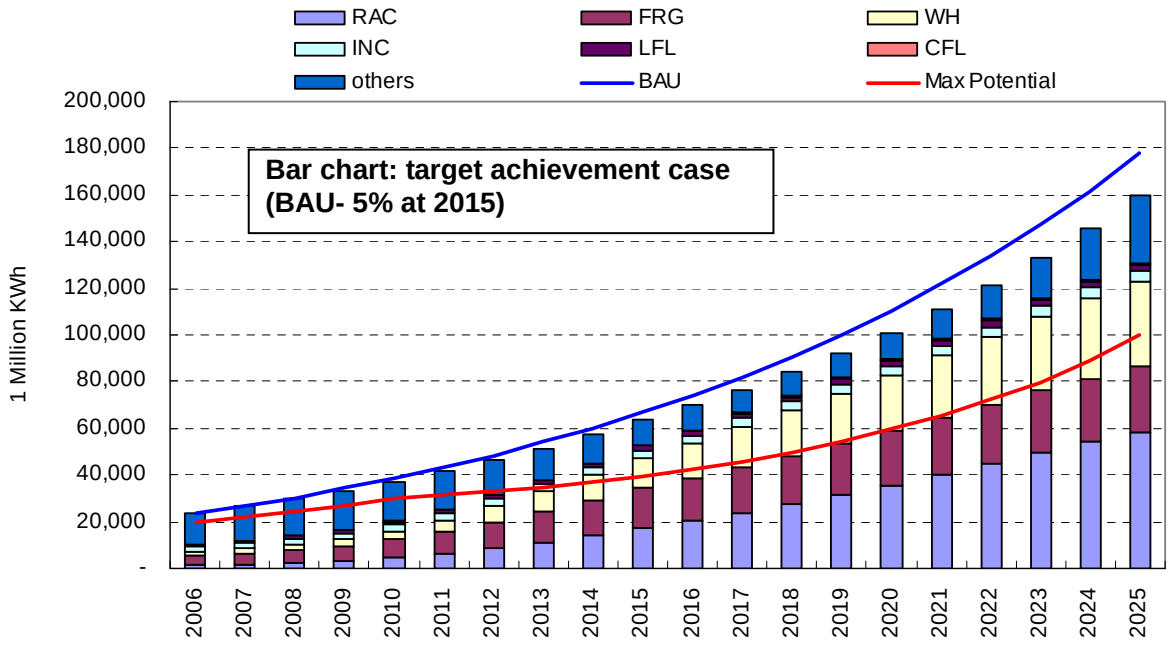


Figure 3.3.2-6 Residential Electricity Consumption

Note: BAU is cited from the BAU of "Energy Master Plan in Vietnam, JICA, 2006", which is forecast from top-down approach by econometrics. Goal achievement case and Maximum potential case are estimated from bottom-up approach. These two approaches do not have consistency.

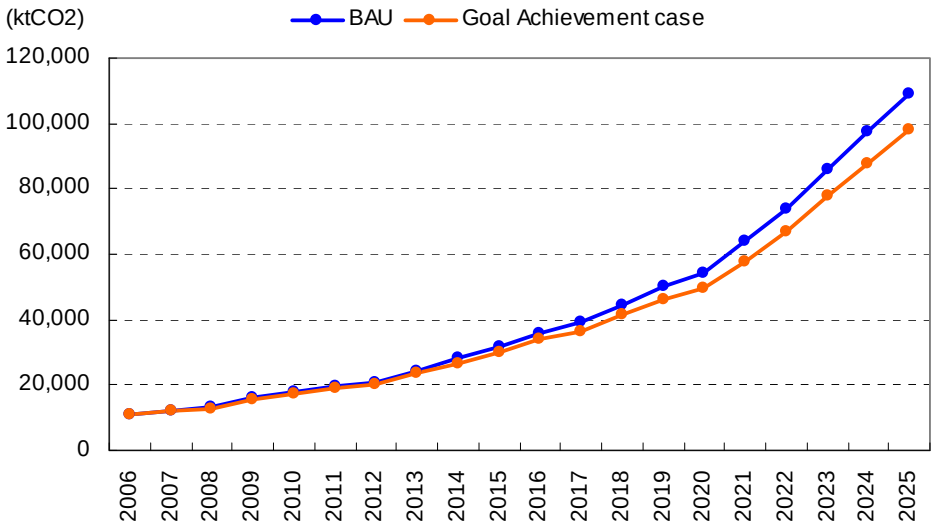


Figure 3.3.2-7 CO_2 emission from Residential Electricity Consumption

The quantity and cost of energy efficient appliances necessary for achieving the goal are analyzed below.

Table 3.3.2-14 Necessary Volume of EE Appliance to Achieve the Goal in 2015

			RAC	FRG	WH	LMP
Possession per household (2015)	Total	volume/100 household	34	87	50	344
	of which EE	Volume/100 household	6	16	3	61
Possession nationwide (2015)	Total	1,000 volume	8,952	22,918	13,090	90,798
	of which EE	1,000 volume	1,663	4,461	808	16,085
	Percentage of EE		19%	19%	6%	18%
Shipment nationwide (average for 2006~2015)	Total	1,000 volume/year	913	2,040	1,287	3,914
	of which EE	1,000 volume/year	185	496	90	1,562
	Percentage of EE	—	20%	24%	7%	40%

Note: The year 2006 is the starting year, where the latest statistic data are prepared.

Table 3.3.2-14 shows the quantity of energy efficiency appliances necessary for achieving the goal in 2015. In order to achieve the goal, 20% of 910,000 annual sales volume of room air conditioner (190,000) and 20 % of 2 million annual sales volume of refrigerator (500,000) should be energy efficient type and also, 7% of 1.3 million annual sales volume of electric water heater (90,000) should be solar water heater, and 40% of 3.9 million annual sales volume of lamp (1.6 million) should be CFL.

The difference in retail price between energy efficient type and conventional type multiplied by annual necessary sales volume of energy efficient product yields necessary cost (see Table 3.3.2-15). The amount of cost reaches US$171 million/year in average to achieve the goal, while electricity expense is reduced by US$106 million annually.

Table 3.3.2-15 Necessary Cost and Reduction in Electricity Expense (Annual Average: ~2015)

(unit: US$)

Cost					Reduction in Electricity expense
RAC	FRG	WH	LMP	Total	
78 million	63 million	26 million	4 million	171 million	106 million

Note: necessary cost = (price difference between EE and conventional type) × (number of EE product)
Note: Electricity price is 6.4 cent (=1,100VND)

(4) The role of "National Strategic Program on EE&C"

As shown by estimation results, approximately 20% of annual sales volume of room air conditioner and refrigerator should be energy efficient type, 7% of water heater should be solar water heater and 40% of lamp should be CFL so that the electricity consumption can be reduced

by 5% from BAU as targeted in the "National Strategic Program on EE&C". In a nationwide, the annual average necessary cost (US$171 million/year) exceeds the benefit (US$106 million/year). However, introduction of energy efficient products bring benefit to the national peoples in the life cycle of products that is estimated 4 to 9 years (Table 3.3.2-11 and Table 3.3.2-12).

CFL has been widely introduced into households in the urban area, thanks to the past DSM programs and ongoing projects being conducted by EVN (5 million CFL nationwide). Thorough promotion of CFL in the rural area by Program 4 is required to achieve the national goal.

Regarding room air conditioner, refrigerator and water heater, although Program 5 and Program 6 can encourage consumers' preference in energy efficient product in the long term, they lack of fast-acting. It is strongly requested to implement immediately DSM projects harmonized with Program 5 for wide promotion of energy efficiency appliance cooperating with the power sector companies.

3.4 Action Plans

3.4.1 Education and Training for Energy Management

1) Purpose

Capacity development of Energy Managers in factories and commercial buildings

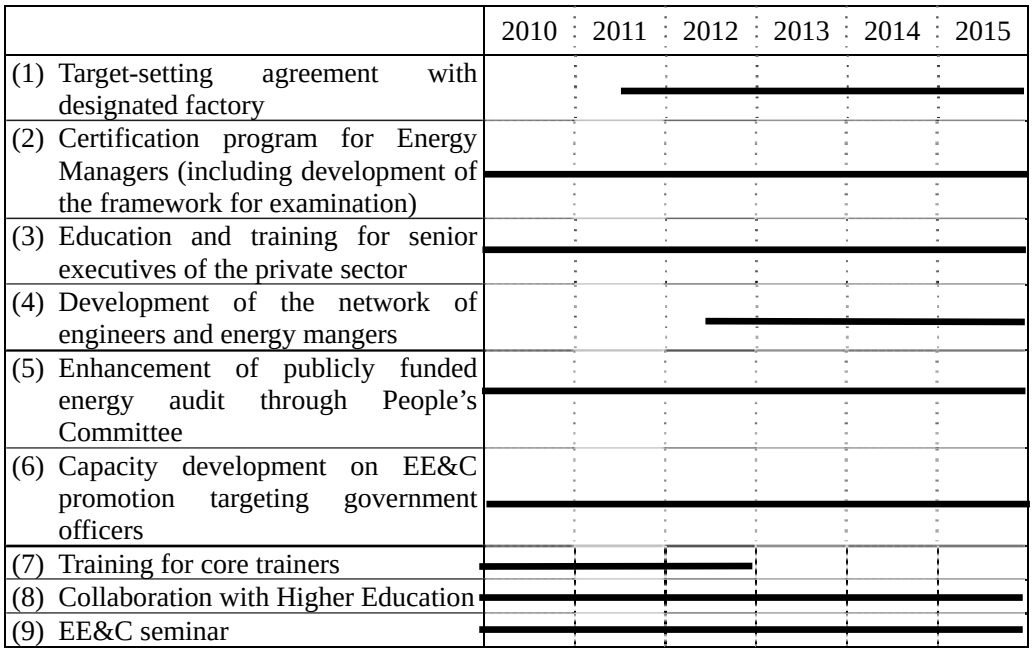
2) Implementing Agency

MOIT

3) Necessary Cost, Personnel and Machinery/Equipment

Items	Cost	Note
(1) Target-setting agreement with designated factory	US$1.0 million/yr	3 years (2010-12)
(2) Certification program for Energy Managers (including development of the framework for examination)	US$1.0 million/yr	3 years (2010-12)
(3) Education and training for senior executives of the private sector		
(4) Development of the network of engineers and energy mangers		
(5) Enhancement of publicly funded energy audit through People's Committee	US$1.0 million/yr	3 years (2010-12)
(6) Capacity development on EE&C promotion targeting government officers	US$0.3 million/yr	
(7) Training for core trainers	US$1.0 million/yr	3 years (2010-12)
(8) Collaboration with Higher Education	US$0.3 million/yr	
(9) EE&C seminar	US$1.0 million/yr	3 years (2010-12)
Total	US$5.6 million/yr	

4) Implementation Schedule



5) Description

In this section, a specific measure to introduce effective energy management system in industries and commercial buildings is discussed. They are closely related to the National Strategy discussed in the Chapter 2 and the strategy derived from the Study. The items listed here is inter-related and they may be carried out simultaneously. A precondition for implementation of these segments is early enactment of the proposed EC Law. MOIT has explained that the draft [1)] is still in review by the National Assembly and expected to be approved by mid 2010.

Education and training program includes the following nine segments. They are: (1) Target-setting agreement with designated factory, (2) Certification program for Energy Managers (including development of the framework for examination, (3) Education and training for senior executives of the private sector, (4) Development of the network of engineers and energy mangers, (5) Enhancement of publicly funded energy audit through People's Committee, (6) Capacity development on EE&C promotion targeting government officers, (7) Training for core trainers, (8) Collaboration with Higher Education, and (9) EE&C seminar. They are explained in the following section.

(1) Target-setting Agreement with Designated Factory

a) Current Status of the Target-setting Agreement Program

The target setting agreement program consist of (a) designating factories and commercial buildings whose energy consumption exceeds a certain amount, (b) nominating a qualified energy Manager (or managers) who is responsible for overseeing effective energy use at respective factories and commercial buildings, (c) mandatory and periodical reporting of annual energy usage, (d) voluntary or mandatory agreement for annual energy use reduction, and other necessary measures and (e) provision of support to those who comply with the program. Currently, the government of Vietnam is preparing various prerequisites and preconditions for introducing the program.

MOIT estimates the number of designated factories (and building, etc) 4,000 as of 2015. The target of the coverage of the program is 50% of the factories (2,000) by 2015. 2,000 factories is expected to assign energy mangers with qualification. The framework for procedural design for energy manager is based on the estimation of creating calmative number of 2,000 certified energy managers by 2015.

b) Preconditions for Implementation of the Target-setting Agreement Program

In addition to above, the Target-setting Agreement Program requires other precondition. They include: (a) enhanced awareness of senior executives through consensus building by

1) Discussed in 2.3.

leading industries, etc., (b) establishment of examination for qualification certificate of energy manager, and (c) appropriate number of qualified energy Managers are nominated and assigned to the designated factories.

Other preconditions may include: (d) "heat conversion table" for calculating energy usage is published annually, (e) external consultants who provide energy audit services to designated factories are trained and available, (f) sufficient number of energy engineers who can perform internal energy-related basic diagnosis for large companies (in-house auditors) are trained and available, (g) various supporting mechanism to request external auditor for seeking energy audit services, and (h) in addition to the mandatory energy usage reporting, designated factories shall mandatory pledge annual energy usage reduction (energy usage reduction with legal binding). Combining all the measures listed above, EE&C may be promoted in Vietnam. Currently MOIT is undertaking to prepare for the preconditions listed above. In the meantime, technical and financial support for MOIT's initiatives is necessary.

c) Criteria for Designation of the Factories

In order to introduce the Target-setting Agreement Program, the criteria for designating the factories based on annual energy consumption needs to be defined. The criteria for the regulation is difficult to establish because Vietnam does not have a functional energy database to monitor industrial energy consumption. It is expected that MOIT will utilize the database currently the Study Team has been developing for this purpose. Reliable criteria will be established once the energy database is operational. It should be noted that the cost for administering the program relies on the number of designating factories. The administrative cost for the program needs to be reviewed and balanced based on the benefit attained.

d) Details of the Reporting Requirements

The designated factory may be subject to reporting annual energy consumption and obliged to reduce a certain percentage of total energy consumption annually. The data submitted by the factories should be compiled and may be utilized for the macro energy policy of Vietnam such as accurate energy supply and demand statistics, industrial input and output, etc. The procedure for the reporting requirements, however, is still under review. Therefore no announcement for the regulation and requirements has been made to the public. It is highly necessary for the government of Vietnam to finalize the procedures and to announce them to public as early as possible because such reporting requirement is linked to availability of EE&C technology in industries. The capacity to deal with such requirements is also associated with availability of audit services and EE&C related information in market. These elements should be considered when the program is realized. Apart from periodical reporting

on energy consumption, it needs an enormous effort from designated factories, local government and central government in data handling, checking, feedback and analysis. Sufficient human resources and budget should be prepared for this. Figure 3.4.1-1 shows the flow of periodical energy consumption reporting system in Japan and Vietnam (draft). In Japan, the central government takes a lot of measures and annual energy consumption data base is managed by ECCJ. Besides Vietnam has once failed to manage the periodical reporting system (started in 2004). Reviewing this failure Vietnam is now considering utilizing GSO to collect periodical energy consumption data. In Vietnam, the draft idea of periodical reporting should be communicated as early as possible to the local governments and targeted factories (Discussion follows).

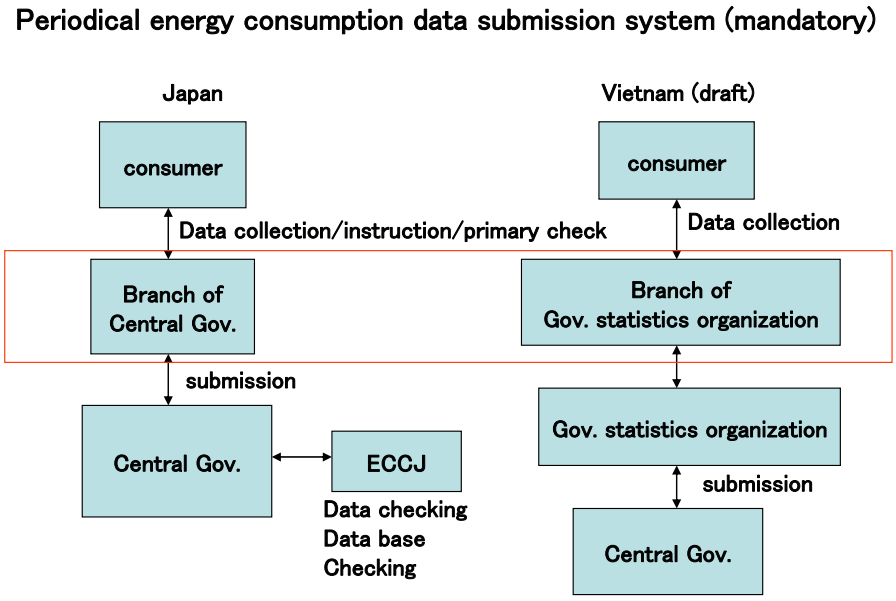


Figure 3.4.1-1 Mandatory Annual Reporting for Vietnam (Draft)

(2) Accreditation of Certified Energy Manager License

a) Estimating Applicants of the Examination for the Certificate

In order to secure 2,000 certified energy managers by 2015, the four years between 2011 and 15 is critical moment. At least 500 energy mangers should be certified every year in the four year period. The proposed procedure for granting certification has two separate tracks [2)], by examination and by training. Each track will grant 250 certifications every year. Applying the pass-fail rate [3)] of Japan in the similar examination and training (e.g. 25% for examination, 70% for training), the examination should be carried out by at least 1,000 applicants and the training should host 360 participants every year.

2) Discussed in the sections follow.

3) According to ECCJ, the success rate of the examination in Japan is approximately 25%. That of the National Training for the Certification is approximately 70%.

b) Organizational Arrangement for the Examination and the Training

The certification for the Energy Manger will be granted to (a) those who passed the national examination carried out by MOIT, or (b) those who successfully complete the training program designated by MOIT. As indicated above sections and to secure enough number of qualified energy managers within the timeframe, the following framework for training program needs to be considered (see Figure 3.4.1-2).

There is a need of consensus building among stakeholders for energy management because, MOIT currently does not have a clear plan for implementation. To carry out the framework, MOIT shall organize a committee (i.e. Advisory Committee for Energy Manager Program) comprising of external experts, academia, representatives from high energy consumers to oversee the examination and the accreditation process of the training. The committee shall advise the minister of MOIT on framework of the proposed Energy Manger Program, and review and oversight on the program. The tentative frameworks to be advised and announced are shown in the Table 3.4.1-1. Preparation of by-laws and defining the competency standard for the energy manger is among the highest priority to complete.

Local technical universities and other training institutions including local ECCs may develop and prepare training programs and furnish necessary training facilities complying with the guidelines set by the committee. Accreditation is granted to universities and other institutions when the committee inspects and reviews their programs and other requirements set by the committee.

Once an organization receives an accreditation, it implements training in accordance with the guidelines defined by MOIT. On the very last day of the training program, participants are asked to take the final examination. Those who fulfill the minimum requirements including passage of the examination are entitled to be awarded the certification of energy managers. On the other hand, those who apply for the state examination for the certification, take the examination conducted by the committee. Both tracks for awarding the certification should be administered by the committee.

The Study Team proposes that not all procedures for awarding the certification are exclusively carried out by the Central Government, and that some training courses are decentralized to training institutions (e.g. universities and ECCs). This decentralization may create sufficient number of able energy managers within target timeline up to 2015. Passage rate, drop out rate, right answer rate, etc are used to evaluate the effectiveness of the training courses provided by individual training institutions.

Table 3.4.1-1 Standards and Guidelines by the Energy Manager Certification Committee

No.	Items	Description
1	Standard Competency for Energy Managers	Minimum level of necessary competency fro Energy Managers (MOIT develops a set of required competency to be referred to)
2	Procedures and Standard for Examinations	Procedures and methodologies for implementation of examination.
3	Standard for Training Institutions	Requirements for accredited training institutions (i.e. facilities, human resources, experiences, etc.)
4	Standard Training Curriculum and Requirements	Standard training curriculum to be used as reference by accredited training institutions (including minimum requirement for granting the certifications).
5	Standard Training Material (textbooks, etc.)	Standard training materials to be used as a reference by accredited training institutions (including textbooks for participants)
6	Examination Material	State examination for Energy Manager Certification

c) Conducting Training Needs Assessment

As shown in the Figure 3.4.1-2, there are two tracks to attain the certification for Energy Mangers. One is a track through educational records and completing the examination. Another is completion of National Training accredited by MOIT. MOIT is in reviewing the possibility of establishing certification for Energy Manger and the certification for Energy Auditors [4)] . The former is for experienced energy related engineers in factories who manage the energy use efficiently. Some technical universities have expressed their concern on educational level of applicants. In the other hand, MOIT needs to secure appropriate number of certified Energy Manger within four years in order to maintain the smooth launch of the EE&C Law. To achieve such target, there needs a consideration for those who lacks higher education in energy management, and those who lacks experience after graduating from the universities. This qualification is sensible issues to carry out the program. Therefore, consensus building among stakeholders is important prior to the launch of the program.

In addition, furnishing education and training program, development and preparation of the training curriculum, establishment of training institutions, securing able trainers, etc are among issues to prepare in order to start the program. To do so, a need assessment is significantly important because these are the basis to designing the framework for training. In particular, contradicting objectives of securing appropriate number of energy mangers and maintaining proper energy management in the field is a key issue to consider. The training design is important element to realize functional training course in Vietnam.

4) In the article 8 of the draft EC Law, it stipulates the organization which provides energy audit as1) established under the Company Law, 2) Hiring the person who has certification by MOIT and/or experiences in energy conservation and 3) having measuring instrument, analyzers and vehicles, but doesn't stipulate the requirement for certified energy auditor.

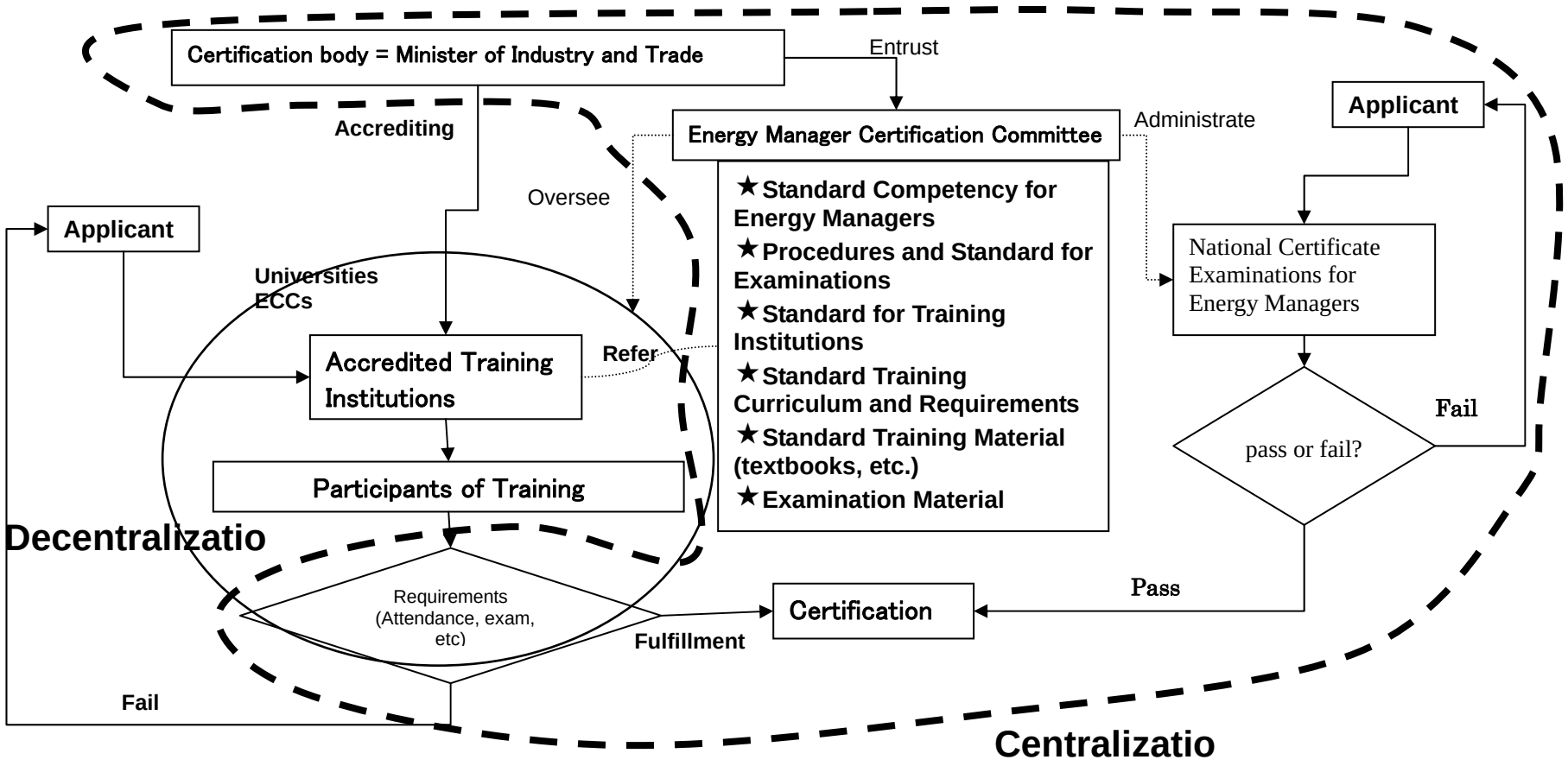


Figure 3.4.1-2 Framework of Examination and Training for Energy Manager Certification

(3) Training for the Private Sector Senior Executives

a) Prospective Participants

According to the MOIT's plan for Energy Manger Program, the training program is designed to field-based engineers. JICA's experiences of technical cooperation projects in energy management improvement has indicated that the seminars for targeting senior executives and other decision-making positions of the private sector such as presidents, managing directors and factory directors are effective. As known to management theories, "Goal-setting should be most effective when it is carried out by top-down approach. A bottom-up approaches is applied the most effective [5)] when deciding the rules and procedures are decided." This executive seminar is the highest priority among various training and education for EE&C.

The analysis from the Study shows that the positive effect of an EE&C investment is not understood accurately by the senior management. Senior executives tend to ignore the necessary investment for EE&C while their priority is put on production. They underestimate the impact of energy saving to the bottom line. The study shows that such mentality of the senior executives are one of major constraints to carry out the EE&C program. Therefore, education and training program targeting senior executives are important. In addition, environmentally consciousness is an important indicator for the excellent company which the market respects.

b) Competency

The majority of the prospective participants of the seminar are mangers with non-technical background. It should be noted that the seminar needs to be introductory courses for those with non-technical background. The contents of the seminar may needs to cover such areas as financial and strategic aspects of EE&C and its implication in the corporate settings. Therefore it should provide the participants an opportunity to present the most up-to-date winning strategy utilizing EE&C and the current legal framework, etc.

c) Approaches for Capacity Development

A challenge of implementing capacity development for senior executives of the private sector is that the in-service training is difficult to implement because of scheduling laminations (low incentives for the executive to participate more than two-day training). Well-coordinated and designed tactics for such training is indispensable to carrying out effective training for senior executives.

In the past experience of JICA, (i) invitation by or presence of minister (or higher government officers), (ii) obvious benefits after completing the program, (iii) topic specific

5) Described in 3.2.2

seminar targeting the current affairs on EE&C, and (iv) introduction of the most up-to-date or state of art technology on EE&C have been effective approach for inviting senior executives.

Examples of initial topics may include (i) current legal affairs and response to enterprises, (ii) introduction of advanced technology, and (iii) introduction of the best practice. More specific and technology-oriented topics may be selected at latter phase. The most important element of the training is to allow participants develop long-term relationship with the ECC provide to play a role for a focal point on EE&C

(4) Development of the Network of Designated Factories and Energy Managers

The problems that engineers in the Vietnamese industry have are lack of access to technical information on EE&C and to information regarding best practices on EE&C at other factories, etc. Information exchange as well as information sharing on EE&C technology is rarely happening. Many factory engineers are in need of information on how and what others are doing in order to review objectively their own EE&C practices. In particular, EE&C should be built upon others' experiences and lesson learnt in the past. Ongoing discussions on the certification program for Energy Managers and technical seminars, as well as the preparation for the certification examination are among the topics that need a higher level of information sharing. Such networking among engineers and Managers is one of the effective approaches to promote and disseminate technology in EE&C and to strengthen awareness in EE&C. Such program needs to be carried out as soon as possible because they have a higher priority.

(5) Free Energy Audit Partnership Program (Continuation and Expansion of the Existing Program through People's Committee)

The existing partnership program for energy audit trough provision of a grant to the local people's committee has been effective for promoting EE&C. The program should be extended and strengthened.

In order to expand the existing program, local ECCs as implementing agency needs to be strengthened. The audit results should be systematically collected and compiled to develop benchmark and standard for judging EE&C. Audit support to the industrial sector has been identified as one of the most prosperous Official Development Assistance (ODA) projects by donor community. These results should be included in the standard.

The important thing in energy audit supported by public funding is to carry out the audit as many times as possible. Through the provision of free audit and consultation, local consultants should be employed and strengthened. In addition, audit by public funding should be opportunities for the local ECCs to develop capacity to consult and to provide training with the private sectors.

Audit should be limited to preliminary audit. Audit under the partnership program may be at a preliminary-level which aims at energy reduction through a good house keeping. Additional audit training may be provided local consultants.

Detailed energy audit may be carried out on a commercial basis followed by the preliminary audit. Audit results such as energy use, EE&C activities, potential energy saving, etc. should be compiled anonymously and be disclosed publicly to promote EE&C. (Audit results obtained on a commercial basis should be kept confidential.) Information on best practices in Vietnam should be collected and disclosed as match as possible.

(6) Human Resources Development Targeting the Officers of the Government

a) Competency

The Study Team has assessed the current and required competency of MOIT and other various stakeholders concerning energy management policies over the past six site visits. EE&C Office of MOIT and other offices of the related ministries responsible for promoting EE&C are expected to act as a 'control tower' of the EE&C policy to implement and promote EE&C by coordinating various resources and knowledge available through establishing partnerships with domestic and international donors for financial and technical assistance. To meet with such expectation, the Study Team will consult with MOIT to assist their capacity development targeting various groups and individuals (see Table 3.4.1-2).

b) Direction and Main Subject for Capacity Development

(a) Senior Officials of MOIT (Manager, Director and up)

Capacity development of senior officials of MOIT aims not for strengthening their technological expertise, but for strengthening their awareness in EE&C, enhancing their understanding of comprehensive policy implications and schematics on EE&C, and improving communication skills. Training programs for EE&C policy making may be provided either in Japan or in countries where energy management programs has been effectively and successfully implemented. A packaged training for better communication may be provided by local venders in Vietnam.

The competency that may be acquired here may include a training to strengthen the will to complement EE&C comprehensively rather than specific and technical ones. For strengthening planning capacity, it is recommended that specifically designed training in Japan by JICA would be suitable. For strengthening communication capacity, it is recommended that a package training available in Vietnam may be suitable.

(b) Officers in charge of EE&C at MOIT

Capacity development of officers in charge of EE&C at MOIT aiming for EE&C policy making may be provided as well through both overseas training programs and/or self-study on EE&C good practices in other countries. The contents of the self-study cover: current trend (i.e. EE&C policy, standardization via ISO), advanced EE&C technology, schematics of EE&C promotion (particularly of financial schematics, etc.).

Ability for EE&C policy implementation can be attained through OJT, which covers specific project management employing PDCA cycle, PCM, etc and strengthening communication skills. This project management is very important to utilize external resources such as manpower, materials, technology and funding, and the competency attained through OJT would be the most effective to collaborate with external consultants and donors.

(c) Staffs of ECCs

The staffs of ECCs may need to strengthen their expertise and ability for EE&C technology and energy management. The training programs are emphasized on “Training of Trainers” (TOT) to ensure sufficient number of core trainers who play a leading role at respective ECC. The specific contents of the training programs are focused on factory-based energy audit technique (e.g. planning, measuring, analyzing, reporting, and compilation of energy audit results). When participants complete the training program, they come to be able to instruct these audit technique to their own trainees at ECCs. Project management employing PDCA cycle and PCM may be necessary as well for them to study. Furthermore, quality control employing ISO9000, 14000 and 50001 series are significantly important because ISO is to start international standard in Energy Management System (ISO50001) from 2010. These training programs may be carried out through OJT and/or workshops by external experts.

Table 3.4.1-2 Issues and Direction of Capacity Development for MOIT and ECCs

Target	Subject	Example of Competency	Measures for Capacity Development
Senior Officers of MOIT	Planning	- Knowledge in good practice (EE&C policy, advanced technology, etc) - Knowledge in EE&C schematics (finance, etc)	Overseas training and self-study of good practice
	Implementation	- Communication skills - Leadership skills	Training (OJT, Workshop) by local training venders,
Officers in charge of EE&C at MOIT	Planning	- Knowledge in good practice (EE&C policy, advanced technology, ISO50001, etc) - Knowledge in EE&C schematics (finance, etc)	Training overseas and self-study of good practice
	Implementation	- Skills and knowledge in project management (PDCA, PCM, etc.) - Communication skills	OJT and Workshop by external experts
Staffs of ECCs	Implementation	- Factory-based energy audit technique (planning, measuring, analysis, reporting, compilation, etc.) - Project Management (PDCA, PCM, etc.) - Communication skills	OJT and Workshop by external experts

(7) Training of Core Instructors

In order to carry out above training, trainer training needs to be implemented as soon as possible. In particular, core instructors who promote EE&C at ECCs need to be trained. The training curriculum is to be developed based on the guideline set forth by the committee discussed in the section (2)-b). Actual training may be carried out by the local ECCs. The contents of the training should be practical ones, which utilize actual measuring devises, and to analyze the data obtained form the field work. These training should be taught by instructors who are familiar to experiential teaching methodologies. To do so, a specialist in experiential training design needs to be dispatched if necessary.

(8) Collaboration with Higher Education Institutions (Universities)

Technical universities in Vietnam maintain the highest level of engineering education [6)]. To promote EE&C, collaboration with these universities is necessary. Historically, universities in Vietnam have trained future leaders for managing state-owned enterprises. Utilizing their resources has high level of relevancy. Technical universities, particularly, has been a source of human resources and have network of engineers. They are asset to Vietnamese industry.

In the other hand, education in university is holistic and not compatible with very specific training of energy management in factories. Taking related courses in the universities and

6) Discussed in 2.6.

diploma may be prerequisite of the qualifications but requirements. Experience in factories is very important for evaluating one's skill and knowledge. While graduates from the technical universities are working energy-consuming industries, they may want to be given some kind of advantages for taking the examination. Making university diploma prerequisite for the certification may have negative impact by making light of "knowledge in the site" and "practicality of energy management".

Even though Energy Manager has itself the word "manager", it is a qualification to work in the field not as manager sitting on the desk. As seen in many developing countries, "managers" has a tendency for keeping themselves away from production lines.

As the Study Team proposed in Figure 3.3.4-2, accreditation process through publication of the guidelines developed by the state committee would be especially beneficial to both higher education institutions and the private sector when universities are willing to participate in the training program aiming to the certification program. Universities may adopt their curriculum to prepare for the professional certification program. The private sector may easily recruit graduates with necessary skills and knowledge from those universities whose national exam passage rate is high.

(9) Implementation of EE&C seminars and training

Extending EE&C seminars and training in all major cities in Vietnam is another important strategy for realizing the National Energy Strategy. Through the process, "Dissemination of advanced EE&C technologies", and "Capacity development of EE&C engineers" should be realized, In the initial phase, particularly, sector-specific (e.g. textile, food, cement & ceramics, steel, etc) and industrial machinery-specific (e.g. air conditioners, electric power, pumps, compressed air, lighting, converters, rotating fans, etc.) seminars, training and education, and publications for promoting EE&C should be undertaken. Publications should be in Bahasa Indonesia. The highest priority should be placed on basic topics covered in the proposed examination for Energy Manager Certification. The training should be carried out by combing on the job (OJT) training and class room training. Combination of on-the-job training and classroom teaching should be considered effectively depending on the contents and type of the training.

6) Introduction of ISO 50001 Series and Implication of EE&C Promotion

Currently ISO is preparing ISO50001 Series, international standard for energy management system. The draft is under review expected due October 2010 by a committee comprising by representatives from various countries.

Purpose of preparation of ISO50001 is to seize energy saving opportunities through simple cost-saving activities focusing on optimization of motor, compressed air and boiler through

introduction of standardized energy management procedures, etc defined by the international standard. The experience of Japanese technical assistance has shown that a half the energy saving may be attained through day-to-day practice of routine system optimization without large investment. Based on the experiences overseas, EE&C measures combining strong energy management practices and minimal EE&C investments (with a short pay-back period) would be effective and applicable in Vietnam. It is, therefore, the on-going trend on introducing ISO50001 should be carefully acknowledged.

The proposed schedule for the preparation of the new ISO standard goes in line with Study Activities and promotion activities on EE&C thereafter. In order to incorporate the study result into the newly established international standard, ISO50001 should be included at the very initial stage of preparing institutional framework development for EE&C in Vietnam. More specifically, prospective training and education that may be carried out in Vietnam should be incorporated ISO50001 when they are designed. It should be also noted that ISO50001 and Japanese Energy Manager Program which the team is proposing to Vietnam has no strong difference in practice. Therefore the both can compliment each other.

3.4.2 Establishment of Data Collection Mechanism

1) Goal

The Goal on establishing Database for EE&C is to collect and supply of information on energy production and consumption in general and at the same time, to promote energy conservation and contribute reduction of energy cost and greenhouse gas emission (especially, carbon dioxide) through submission of the Periodical Report and Five- year Plan by designated enterprises.

2) Implementation Organization

Implementation Organizations and their roles for "Periodical Report" and "Five-year Plan" are as follows (based on the EC Law (draft)).

Table 3.4.2-1 Implementation Organizations and their Roles (Draft)

Organization	Role
GSO	- Issue "Periodical Report" for industry sector - Collect "Periodical Report", Disclose statistic data
PSO/DSO	- Input "Periodical Report"
MOIT	- Finalize data collection mechanism - Finalize EE&C database - Make designated enterprises list (every year) - Make sample form for "Periodical Report", "Five-year Plan", and "Implementation Report of Five-year Plan" - Feed back "Periodical Report" and "Five-year Plan" to designated enterprises
DOIT	- Input "Five-year Plan" - Input "Implementation Report of Five-year Plan"
MOC	- Make designated buildings list (every year) - Make sample form for "Periodical Report", "Five-year Plan", and "Implementation Report of Five-year Plan" - Feed back "Periodical Report" and "Five-year Plan" to designated building
DOC	- Input "Periodical Report" - Input "Five-year Plan" - Input "Implementation Report of Five-year Plan"
MOT	- Make designated transport business enterprises list (every year) - Make sample form for "Periodical Report", "Five-year Plan", and "Implementation Report of Five-year Plan - Feed back "Periodical Report" and "Five-year Plan" to designated transport business enterprises
DOT	- Input "Periodical Report" - Input "Five-year Plan" - Input "Implementation Report of Five-year Plan"
Designated enterprises	- Submit "Periodical Report" - Submit "Five-year Plan" - Submit "Implementation Report of Five-year Plan"
MOIT (IPSI)	- Maintain online system and database

Note: Prepared by JICA Study Team based on the EC Law (draft)

3) Required Budgets, Staff Assignment and Equipments

(1) Roles of Each Ministry

The amount of present operational works done by GSO will be decreased by the needless of data input works if on-line system goes well. However the role of the local offices executes this kind of operational work as a proxy will increase due to increasing number of designated enterprises and including enterprises and local area, that can't access to the internet, in this system. The role of checking data continues to be required even in case of using the internet. The importance of checking information, which can't be understood if doesn't act in the province, such as production trends of the local enterprises and their address etc. may increase.

According to the EC Law (draft) under discussion, MOIT is, basically, in charge of specifying designated enterprises in the industry sector, MOC in charge of the building sector and MOT in charge of the transportation sector. "Five-year Plan" to be submitted by designated enterprises should be submitted to the local offices of each Ministry (DOIT, DOT and DOC) and they submit to the central Government. As for "Periodical Report", designated enterprises should submit it to the local offices of GSO (PSO or DSO) and send its copy to the local offices of each Ministry. The local offices of GSO submit to the central GSO with sending its copy to each Ministry. These relationships are showed in the Figure 3.4.2-1.

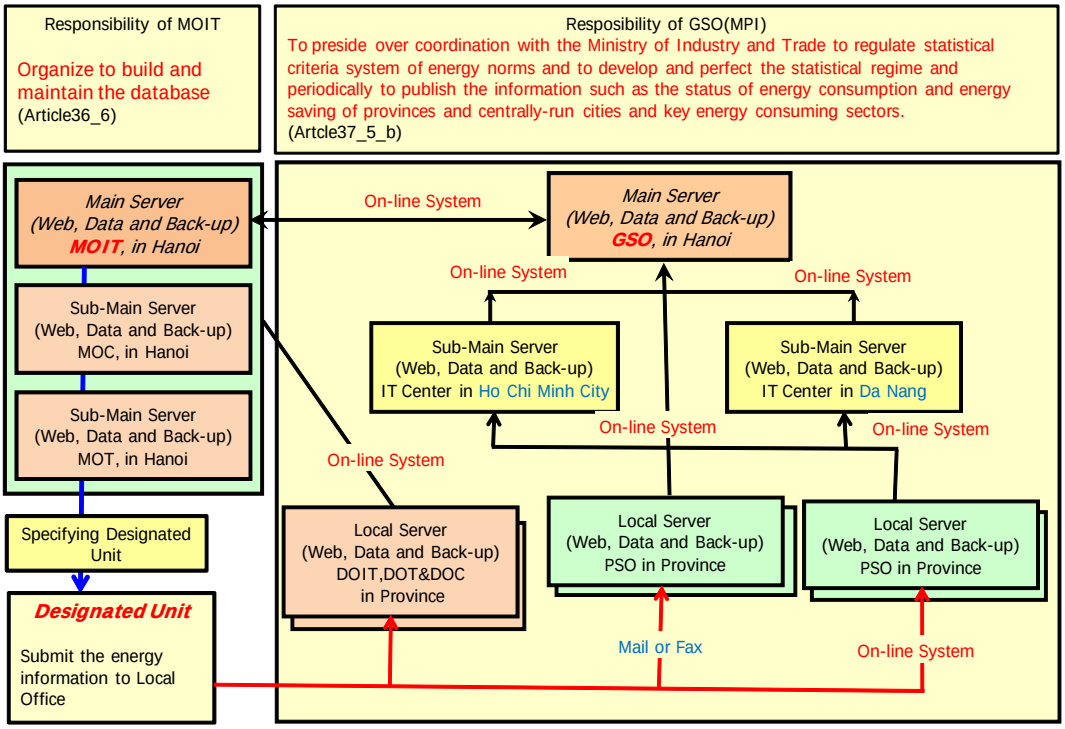


Figure 3.4.2-1 Data Collection Routes (Periodical Report and Five-year Plan)

As for the data collecting mechanism proposed by The Study Team on energy consumption and intensity, making a decision for the choice whether MOIT etc. is in charge of collecting and checking data with its responsibility, or cooperation between MOIT etc. and GSO is required is left in the future.

Considering present situation of data collecting mechanism and ability for checking data in Vietnam, it is better that designated enterprises submit energy information to the local offices of GSO (PSO or DSO) and these information receive technical checks by the local offices. They send the checked data to the local office of each Ministry (DOIT, DOT and DOC). The local office of each Ministry checks energy data again from the point of content. After that, energy information are sent to each Ministry and stored as Database in the data server inside of MOIT through the final check (in case of MOT and MOC, two Ministries have sub servers and persons in charge of each Ministry check data in the reference field and send their data to MOIT).

GSO is in charge of collecting and compiling the original energy data directly sent from enterprises due to its rich experience on data handling. Each Ministry is in charge of checking energy data of designated enterprises from the expert point of view and finishing Database up due to its rich knowledge about business of designated enterprises in the reference field. It is naturally considered that such duty allotment among Ministries etc. means the most effective data collecting mechanism at this moment.

As for installation of various servers inside of the central Government like MOIT etc, main server is installed in MOIT and sub servers are installed in MOT and MOC. Each server is composed of Web server, Data server and Backup server. Data server has two kinds of server like “original data server” and “processed data server”.

Designated enterprises send the original data to the local offices of GSO and the local offices check these data technically. Each Ministry and GSO cooperate an issue whether new installation of special server in GSO is needed, or not.

(2) Stuff Assignment

After duty allotment among each ministry is cooperated, staff assignment is followed according to each role. In the future, the maintenance and management are possible and effective to subcontract the consultant outside of the central government. Also some part of evaluation on Five-year Plan and Periodical Report can be subcontracted by setting evaluation standard and point accounting. Each ministry in charge can confirm the evaluation only to enterprises of which point is low and recommend them if it is necessary. Also it is thought that very small number of full-time staff of each ministry can manage Database, if these environments can be prepared. It is desirable that the required number of staff should be examined by farther more investigation and implementation of the pilot plan

because new operational works may be happened by using the internet.

(3) Evaluation of Required Equipment

The development of Database for energy conservation in the "First Preliminary Pilot Program", which will be explained later part, doesn't require specific additional machines and equipments because the existing servers and personal computers can be used. But establishment of the full scale Database require the specified server and so on.

Considering the network system shown at the beginning of this chapter, the Web server, Data server and Backup server are requested inside the central Government and each server needs to have the firewall which prevents from the illegal invasion not to delete, falsify data, and prevent outflow of data etc. It is required to ascertain carefully and with room how many data will be treated because the required cost for development of the firewall depends on the number of treated data. It is desired that such a preparation is needed if the maximum 100,000 data will be treated.

Hard disk capacity required for the server is enough to be 400GB considering the amount of treated data. It should be prepared two kinds of hard disks, one of which is for the original data input directly by enterprises and another of which is for data opening to the public and is enhanced, processed to the level endurable the opening and checked by the manager of data. It is desirable that the backup server should be prepared because certain protection equipment should be installed to prevent accidental or designing deletion of data.

Based on the precondition that the hard disk might be crashed physically, it is required to prepare the backup server to crash. Preparing double or triple backup equipments is important very much like this.

Installing multiple hard disk system with big capacity doesn't require so big money considering present trend of large cost down of hard disk and additional install can be possible if it happens necessary in the future. However it is desirable that as for the personal computer for the server, the newest and highest one should be selected which can process in high speed and has a big volume of CPU memory. It is necessary to set it comfortably and availably considering number of users of the Database. In the past, in accessing to the web site of GSO, speed of processing time is very slow and it is very difficult to get data from GSO, but today speed of processing time is very much high and comfortable. Using these experiences of GSO, capacity of hard disk should be decided.

At the introduction stage, the lowest rough cost estimation is as follows. Total money accounts for about US$21,000. Although this calculation is different by time and place, the cost will increase by several times considering the reliability and security. For example, cost of personal computer will increase US$163,800 if the Web server are going to be installed in

the local offices like DOIT (even if such preconditions like installation of the lowest cost of each server and Firewall are considered, additional costs will be increased by 63 times in the middle case shown in Table 3.4.2-2). And supposing that MOT and MOC other than MOIT install the same kinds of server as MOIT, total cost for Database will increase three times, at least, or US$554,400 in the maximum case.

As for necessary equipment and cost, examination by MOIT shall be required on how much money is needed and how much steps are required to actualize.

Table 3.4.2-2 Equipment Cost for Establishment of Data Collection Mechanism

	Low High	Numbers		
		Minimum Case	Middle Case	Maximum Case
- Web Server:	1,000 ～ 5,000	1	63	×3
- DB Server:	2,000 ～ 5,000	1		×3
- Back-up Server:	2,000 ～ 5,000	1		×3
- Personal Computer for data	1,000 ～ 2,000	1	63	×3
- Hub:	100 ～ 1,000	1	63	×3
- Firewall:	500 ～ 3,000	1	63	×3
- Total:	6,600 ～ 21,000	21,000	184,800	554,400

Note: CPU: Intel® Core™ i7- 965
Memory: DDR3-SDRAM 8GB-24GB
Hard Disc: 400GB - 1,000GB

4) Implementation Schedule

Rough sketch about on-line system and structure of database for establishment of Database is explained up to now. The action plan to realize this target is proposed as follows. A schedule of action plan for implementation of data collection system to 2015 is shown in Table 3.4.2-3. Five action plans are set in total.

Table 3.4.2-3 Implementation Schedule for Data Collection Mechanism

	2009	2010	2011	2012	2013	2014	2015	Organization
Build Database Collection System								
Proposal Databse System								CP/JICA
Establishment of DB system for Energy Conservatio								CP/JICA
Input trial Data and Check								CP/JICA
Implementation of First Pilot Plan								
Sect Designated Enterprises								MOIT,MOC,MOT,GSO (JICA?)
Implement Data Input								Designated Enterprises
Check Data Collection System								MOIT,MOC,MOT,GSO (JICA?)
Check DB System								MOIT,MOC,MOT,GSO (JICA?)
Evaluate and Improve First Pilot Plan								MOIT,MOC,MOT,GSO (JICA?)
Adjustment of Data Form (base on EE&EU Law)								
Adjust Periodical Report Form								MOIT,MOC,MOT
Adjust Notification Report Form								MOIT,MOC,MOT
Adjust Five-year Plan Form								MOIT,MOC,MOT
Adjus Notification of Five-year Plan								MOIT,MOC,MOT
Implementatio of Second Pilot Plan								
Select Designated Enterprises								MOIT,MOC,MOT,GSO
Input Data								Designated Enterprises
Adjust Data Collection System								MOIT,MOC,MOT,GSO
Adjust DB System								MOIT,MOC,MOT,GSO
Implementation of Data Collection and Revision								
Decision of Designated Enterprises and Addition								MOIT,MOC,MOT,GSO
Submit Periodical Report								Designated Enterprises
Submit Notification Report								Designated Enterprises
Submit Five^year Plan								Designated Enterprises
Feed back to Periodical Report								MOIT,MOC,MOT,GSO
Feed back to Notification Report								MOIT,MOC,MOT,GSO
Feed back to Five-year Plan								MOIT,MOC,MOT,GSO

The first one is the building of Database program for energy conservation which continues until end of September 2009. In this term, almost Database system for energy conservation will be established where Database system means software system from data input to output and data collection system means hardware system using the internet system. At the end of this period, however, data collection system is not made yet. In the future, main server and sub server (Web server, Data server and Back-up server) will be installed in MOIT, MOT and MOC and cooperation with each organization of GSO will be created.

The second one is implementation of "First and Experimental Pilot Plan" of which term is from about September 2009 (about time in completion of Database for energy conservation) to the end of 2010. Designated enterprises in the Pilot Plan will be set for, for example, "enterprises with 5,000 employees or more" under GSO's cooperation in order to clarify the standards of actual energy consumption and investigation objects. GSO investigates the enterprise survey every year. The number of employees is one of the standards for survey. Based on this standard, for example, the number of enterprises with 5,000 employees or more reached 81 companies in Vietnam (actual number of 2006: GSO). The enterprises with 5,000 employees or more belongs to big company. It is natural to specify first these enterprises as designated enterprises and collect/compile energy information. In this case, these enterprises have many branches and factories because they are big companies. So actual number of designated enterprises increases by several times and may become 200-300.

Merit of specifying big company as designated enterprises is that it makes possible to collect energy information using on-line system by enterprises without bothering local office of MOIT and GSO etc. And it is easy to nominate proper person in charge or contact person and to exchange information and opinion for effective work in future and checking system etc. between the Government and enterprises based on relatively correct and reliable energy information. Through hearing with enterprises, improvement of Database system and collecting mechanism can be got easily if cooperation of these enterprises can be received.

The third one is adjustment of each "report form" which is the Periodical Report, Notification Report and Five-year Plan. Although these report forms might be clarified by the EE&C Law and its decree which are scheduled to pass the National Assembly next year of 2010, they will be decided actually referring the results of the above-mentioned Pilot Plan. It is more realistic to leave the discretionary power about decisions in detail inside MOIT, MOT and MOC. It is desirable to complete each form until the end of 2010.

The forth one is implementation of "Second Pilot Plan". The number of designated enterprises is decided by one of following two methods. One is to decide it based on the standard such as energy consumption or floor space using the experience of "First Pilot Plan". Another is to expand the scale of Database by selection of the enterprises with 1,000 employees or more, number of which is more than 1,000 companies. In this case, number of designated enterprises increases to 2000 or more in considering branches and factories. Also, data collection system through the local offices can be checked. That is to make the countermeasures to increase number of data by execution of "Second Pilot Plan", although data processing more than 100,000 will be required finally. Possibility of operation in hardware like the server and its software inside of MOIT, MOT and MOC and ideal way of cooperation with GSO can be examined specifically. It is desired that it starts with preparation in the middle of 2010 and terminates until the end of 2011.

The last stage of the fifth action will be after 2012. Designated enterprises are decided based on the EE&C Law which will be enacted in 2010. Data input will start with actual data in 2011. It is desired that input and check of data will be terminated until about March, 2012 lately and afterwards it brings to the state that it is possible to analyze the energy conservation by spending several months. Data collection system will be improved based on specific experiments of Database system and collection system since next year.

After the Database activity gets on the right track, it is composed of two processes such as process in which energy consumption will be surveyed and designated enterprises will be specified every year, and another process in which energy information of designated enterprises can be collected, checked, stored and supplied for use. These processes will be done simultaneously, and it is desirable to improve them by check and revise in the process activity.

Experiments should be basically accumulated by the Vietnamese human and capital resources since "First Pilot Plan" in 2009, in some case it may happen that the financial assistance from the

oversees organizations like JICA can be extend one more year.

Table 3.4.2-4 Cyclical Activity for Database

	Government Specify designated enterprises	Enterprises/Designated enterprises Register designated enterprises	Government Collect information	Designated enterprises Submit Information
Sep				
Oct	Prepare next database activity		Prepare next database activity	
Nov			Inform the provided date next year, for example February	Prepare Submission of information, Report/Plan next year
Dec				
Jan	Send Questionnaires on Energy Consumption to All Enterprises			
Feb		Send company information for specifying		Submit Information, Periodical Report and Five year Plan to the Government
Mar	Come back of Answers on Energy Consumption to the Government		Collect and Check Information, Report/Plan by the Government	
Apr				Submit Information, Periodical Report and Five year Plan to the Government
May	Decide Designated Enterprises by the Government		Collect and Manage Information, Report/Plan by the Government	
Jun	Send Decision to Designated Enterprises from the Government		Storing of Processed Data on Energy Conservation by the Government	
Jul	Send ID, Password, Designation number			
Aug		Resister designated enterprises	Establishing of EC&EU Database for Policy Making and Publication	
Sep				
Oct	Prepare next database activity		Prepare next database activity	
Nov		Prepare Submission of information, Report/Plan next year	Inform the provided date next year	
Dec				

5) Energy Data Collection Mechanism and Database

As previously mentioned in 2.4, designated enterprises in Japan submit their periodical reports by filling a report form and handling works of these data are very huge. In case of Vietnam, we propose an online system for enterprises to directly submit Five-year Plan and Periodical Report using the internet system in order to reduce these kinds of data handling works.

However, emerging new works different from input by hand should be noticed due to requiring confirmation of data consistency such as miss input and common energy unit, securing data and new protection system like “Firewall” to prevent deletion of data from miss operation, even if there is no malice, due to on-line system.

Configuration of new on-line system is shown in Figure 3.4.2-2.

- ✓ Enterprises access on-line system and input data following the menu on screens.
- ✓ Enterprises who cannot access on-line system submit their reports to local offices by filling the report form.

- ✓ Local offices input the data using on-line system; for example, 5 year EC plan to DOIT, DOC and DOT, and periodical report to DSO and PSO.
- ✓ After checking data, input data are stored in Database Server at the central office.
- ✓ Local offices install Web server to enhance reliability and security.

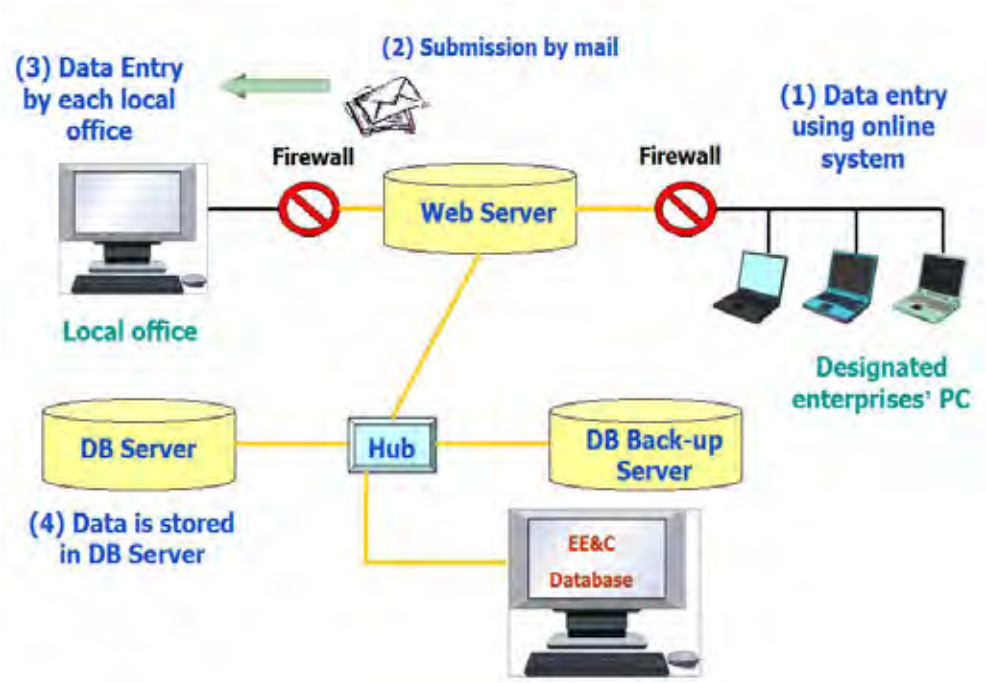


Figure 3.4.2-2 Integrated Network System proposed by the Study Team

However, it requires very long time to complete this kind of system because it cannot be achieved over night. For example, following challenges are considered.

- ✓ Specification of designated enterprises

  According to the EC Law (draft) in Vietnam, enterprises should report their actual energy consumption. In this case, enterprises that owe obligation to submit reports are limited to "designated enterprises", so designated enterprises should be first confirmed. According to the EC Law (draft), enterprises with actual energy consumption of 1,000 TOE or more in case of the industry sector and building with actual energy consumption of 800 TOE or more in case of the building sector are specified designated enterprises and amount of these energy consumption standards are raised 2 or 3 times of energy consumption standard before mentioned.

  At the present situation when energy consumption by enterprises isn't clear, preliminary investigation or "Pilot Plan" should be done. In the pilot plan, for example, collection and examination of energy information are required first for deciding standards for designated

enterprises and establishment of Database. It is heard that “pilot plan for floor space” is under investigation now because Vietnam has not accurate information on floor space of building.

✓ Adjustment and cooperation of on going energy database projects

At present, it is said that GSO has no database for energy. So as the first step, it is executing the pilot project for making energy balance table under an assistance of SIDA (Swedish International Development Cooperation Agency), in which questionnaire investigation of energy conservation for 100 of energy enterprises and for 2,000 or more of building and household will be executed between June to September, analyzed in October and finalized making the report in December. The result of the pilot project shouldn’t be monopolized by only one Ministry, but also hopefully coordinated with MOIT that is going to make Database for EC&EU. At the meeting attended by the staff of both Ministries and members of the Study Team, this kind of cooperation issues were discussed and the first step for cooperation started.

✓ Adjustment of the relationship between the existing data collection mechanism

At present in Vietnam, the socio-economic information are collected and made public every year as “Statistical Yearbook of Vietnam” by GSO. In order to make the statistical yearbook, GSO established the mechanism like data collection, compilation and publication with mobilizing all its capacity. As for establishment of Database for EE&C, “Energy Data Collection Mechanism” for designated enterprises should be newly established. In that case, it is required the adjustment on the point whether utilization of existing data collection mechanism in cooperation with GSO, or creating the new data collection mechanism for EC&EU. Also accompanying this, adjustment of staff assignment and procurement of equipment (server etc) is required, too. It includes adjustment not always between MOIT and GSO but also among MOIT, MOT and MOC etc.

Total structure of Database is shown in Figure 3.4.2-3.

After “login”, information of enterprises is input and then function is selected. Function is composed of Input, Correction, Output, Management and Printing of report forms.

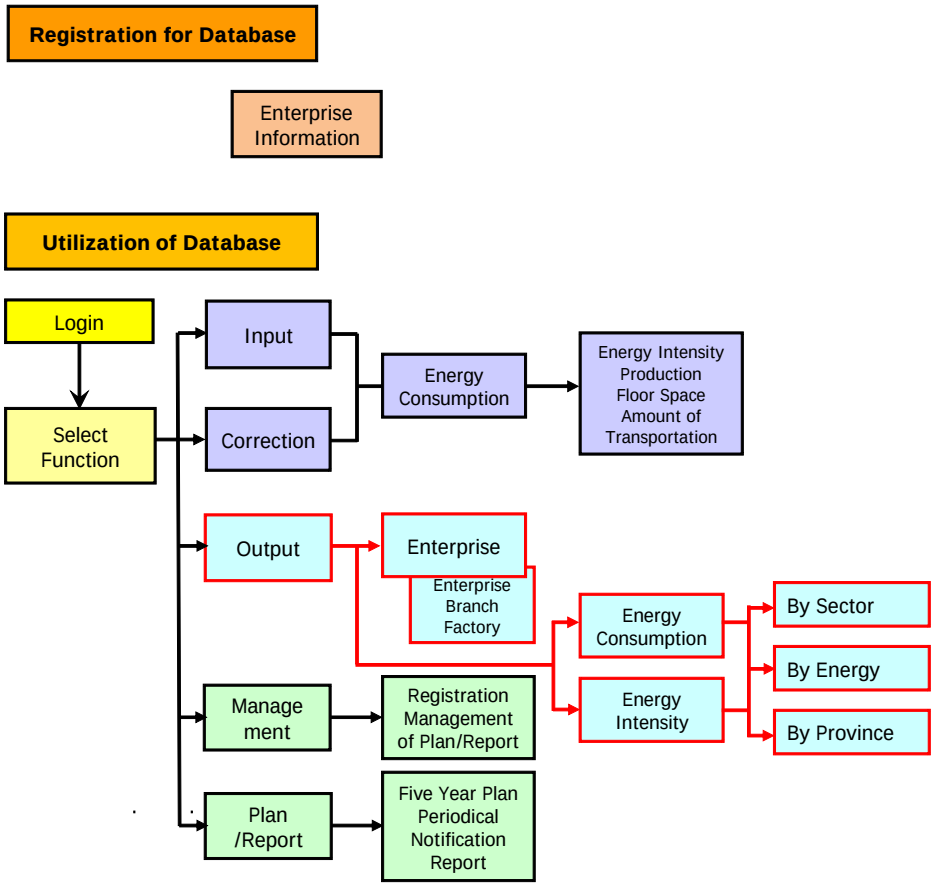


Figure 3.4.2-3 Total Structure of Database for EE&C

a) Registration

As mentioned before, designated enterprises should be specified first. So MOIT should grasp the actual energy consumption by enterprises and then fix standard of energy consumption for designated enterprises (1,000 TOE etc is fixed as the standard under the EC Law). After fixation, MOIT informs the decision to enterprises and designated enterprises makes registration.

Designated enterprises select “Registration” on the “Login” screen and input the required information about enterprises. After input by enterprises, the information are sent to MOIT etc. (here MOIT, MOT and MOC). Person in charge of MOIT etc. confirms the data (enterprises data) and decides user ID, password and designation number and informs them to enterprises. After that, designated enterprises can exchange information with MOIT etc. and their local offices by input user ID and password.

Table 3.4.2-5 Registration List of Designated Enterprises (for enterprises)

Information of Enterprise	
Name of Enterprise	
Representative of Enterprise	
Category of Designation	
Designation Number	
Web Address	
Province	
Address of Enterprise	
Phone Number	
Fax Number	

Contact Person for the Report	
1. Name	
2. Section	
3. Position	
4. Phone Number	
5. Fax Number	
6. E-mail Address	

Table 3.4.2-6 Decision of Designated Enterprises by MOIT, etc.

Person in Charge	
Name of Enterprises	
ID Number	
Password	
Designation Number	
Province	
Category of Sector	
Date of Registration	

b) Login

Designated enterprises access the online system using the internet and input user ID and password sent by MOIT etc. On the screen for function selection, “Input (Correction)”, “Output”, “Management Function” (this function is limited for only MOIT, etc.) and “Printing Forms” are displyed. Enterprises select “Input”.

c) Input

Input screen is composed of “Designated Enterprises” (enterprises information are displyed automatically, if it has already registered, but designation number should be input only at the first time), “Enrgy Consumption”, “Energy Intensity” and “Each Report”. Designated enterprises, after confirming their information, input their “energy consumption” and “denominator for energy intensity”. In case of making each report, each forms is coming on screen after checking “Printing Forms” and category of report. The information already input is displyed automatically. Required deta for making report should be input.

c- 1) Input of actual energy consumption

After input of actual energy consumption, these data are automatically converted in G-Joule and TOE based on conversion factor decided beforehand by the Government.

As for in-house produced electricity, designated enterprises input amount of generation and fuel consumption for generation at the same time. This fuel for generation is included in energy consumption by enterprises. And purchased electricity is amount of electricity consumption at the recipt edge. Table 3.4.2-7, for example, shows that fuel for generation of in-house produced electricity is described in diesel oil of 318kl in the column of fuel for generation.

Table 3.4.2-7 Example of Description of Energy Consumption (common in each sector)

Type of Fuel & Energy	Unit	Annual Energy Consumption							Year ( )		
		Consumption	For Generation	Energy Expense 1000VND	Total	Conversion Factor (kcal)		TOE	Conversion Factor (G-Joule)		GJ
Steaming Coal	T	2,000	0		2,000	5,500	kg	1,100	23.0	T	4.61
Coking Coal	T	0	0		0	6,000	kg	0	25.1	T	0.00
Anthracite Coal	T	1,000	0		1,000	6,500	kg	650	27.2	T	2.72
Other Coal	T						kg		0.0	T	0.00
Gasoline	**kl**	1,000	0		1,000	8,266	L	827	34.6	KL	3.46
Jet Fuel	**kl**	1,000	0		1,000	8,767	L	877	36.7	KL	3.67
Kerosene	**kl**	1,000	0		1,000	8,767	L	877	36.7	KL	3.67
Diesel Oil	**kl**	1,000	318		1,318	9,006	L	1,187	37.7	KL	4.97
Fuel Oil (A)	**kl**	1,000	2		1,002	9,341	L	936	39.1	KL	3.92
Fuel Oil (B/C)	**kl**	1,000	0		1,000	10,009	L	1,001	41.9	KL	4.19
LPG	T	1,000	0		1,000	12,136	kg	1,214	50.8	T	5.08
CNG	T	1,000	0		1,000	13,043	kg	1,304	54.6	T	5.46
Other Petroleum	**kl**						L		0.0	KL	0.00
Natural Gas	M3	1,000	0		1,000	9,771	M3	977	40.9	M6	4.09
LNG	T	1,000	0		1,000	13,019	kg	1,302	54.5	T	5.45
Other Gas	M3						M3		0.0	M6	0.00
Steam	T	1,000			1,000	640	kg	64	2.7	T	0.27
Biomass	Kl	1,000			1,000		L		0.0	KL	0.00
Bioethanol	Kl	1,000			1,000		L		0.0	KL	0.00
Biodiesel	Kl	1,000			1,000		L		0.0	KL	0.00
Hydro	MWh	1,000			1,000	860	kWh	86	3.6	MWh	0.36
Geothermal	MWh	1,000			1,000	860	kWh	86	3.6	MWh	0.36
Purchased Electricity	MWh	1,000			1,000	860	KWh	86	3.6	MWh	0.36
In-house Produced Electricity	MWh	1,000				860	KWh	86	3.6	MWh	0.36
Total Electricity	MWh	2,000				860	KWh	172	3.6	MWh	0.72
Total of Energy Consumption								12,573			52.64
Change from the Previous Year (%)											

c-2) Input of denominator for energy intensity (turn over, floor space and transport)

Turn over (industry), floor space (building) and amount of transport (transport: ton/km and person/km) are input to calculate energy intensity for each sector. Although, on the input screen, the denominator to calculate energy intensity is input, on the output screen, energy intensity itself is displayed by dividing energy consumption with the denominator.

However, in case of enterprises belongs to industry, only “amount of production (and Turn

over)"is displayed, floor space in case of building and "freight transportation" and "passenger transportation" in case of transport are only displayed.

These energy data are sent to the local offices such as DOIT etc. or PSO, DSO. Adjustment is required which rout should be selected. After checking data, these data are stored in the data server in MOIT, etc. as formal data of the reference year to be used by the related organizations.

Table 3.4.2-8 Input of Denominator to Calculate Energy Intensity

Amount of Production for Industry		
Name of Main Products	Annual Production	(unit)
1		
2		
3		
Turn Over		VDN

Floor Space for Building		
Name of Building	Total Floor Space of Building	(Unit)
		(M^2)

Amount of Transportation in Freight Carriers		
Freight Carriers	Amount of Transport	(Unit)
Railway		(Ton/Kilo)
Trucks & Trailers		(Ton/Kilo)
Automobiles		(Ton/Kilo)
Ships		(Ton/Kilo)
Air		(Ton/Kilo)

Amount of Transportation in Passenger Carriers		
Passenger Carriers	Amount of Transport	(Unit)
Railway		(Person/Kilo)
Buses		(Person/Kilo)
Automobiles		(Person/Kilo)
Ships		(Person/Kilo)
Air		(Person/Kilo)

d) Output

Output displays "Information of Enterprises (energy consumption, energy intensity and various reports by enterprises)" and "Energy Consumption (summated by sector and category nationwide and provincially)".

Output has three control levels. On the central Government level (MOIT, MOT, MOC and GSO), there is no restriction, or they can access the information of enterprises and all data summated nationwide/provincially and use management function (however, MOC, MOT and GSO are limited in their reference territory). Officers of the central Government can manage the energy information sent to the Government using management function.

On the local office level (DOIT etc and PSO/DSO), they can access the information of

enterprises in the reference province, energy data summated nationwide/provincially and use management function to control it.

On the enterprises level, they can access only the information of itself on the enterprise information and cannot access the information of other enterprises to keep the company secret. They can access data summated nationwide/provincially, but cannot use the management function.

d-1) Output example of the information of enterprises

On the output screen, a menu according to the control level is displayed after retrieving with selection menu. The information of enterprises is composed of energy consumption, energy intensity and various reports (Five-year Plan and Periodical Report). Output example of energy consumption and energy intensity are shown as follows.

Table 3.4.2-9 Output Example of Information of Enterprises (Energy Consumption)

Type of Fuel & Energy	Unit	Annual Energy Consumption							Year ( )		
		Consumption	For Generation	Energy Expense 1000VND	Total	Conversion Factor (kcal)		TOE	Conversion Factor (G-Joule)		GJ
Steaming Coal	T	2,000	0		2,000	5,500	kg	1,100	23.0	T	4.61
Coking Coal	T	0	0		0	6,000	kg	0	25.1	T	0.00
Anthracite Coal	T	1,000	0		1,000	6,500	kg	650	27.2	T	2.72
Other Coal	T						kg		0.0	T	0.00
Gasoline	**kl**	1,000	0		1,000	8,266	L	827	34.6	KL	3.46
Jet Fuel	**kl**	1,000	0		1,000	8,767	L	877	36.7	KL	3.67
Kerosene	**kl**	1,000	0		1,000	8,767	L	877	36.7	KL	3.67
Diesel Oil	**kl**	1,000	318		1,318	9,006	L	1,187	37.7	KL	4.97
Fuel Oil (A)	**kl**	1,000	2		1,002	9,341	L	936	39.1	KL	3.92
Fuel Oil (B/C)	**kl**	1,000	0		1,000	10,009	L	1,001	41.9	KL	4.19
LPG	T	1,000	0		1,000	12,136	kg	1,214	50.8	T	5.08
CNG	T	1,000	0		1,000	13,043	kg	1,304	54.6	T	5.46
Other Petroleum	**kl**						L		0.0	KL	0.00
Natural Gas	M3	1,000	0		1,000	9,771	M3	977	40.9	M6	4.09
LNG	T	1,000	0		1,000	13,019	kg	1,302	54.5	T	5.45
Other Gas	M3						M3		0.0	M6	0.00
Steam	T	1,000			1,000	640	kg	64	2.7	T	0.27
Biomass	Kl	1,000			1,000		L		0.0	KL	0.00
Bioethanol	Kl	1,000			1,000		L		0.0	KL	0.00
Biodiesel	Kl	1,000			1,000		L		0.0	KL	0.00
Hydro	MWh	1,000			1,000	860	kWh	86	3.6	MWh	0.36
Geothermal	MWh	1,000			1,000	860	kWh	86	3.6	MWh	0.36
Purchased Electricity	MWh	1,000			1,000	860	KWh	86	3.6	MWh	0.36
In-house Produced Electricity	MWh	1,000				860	KWh	86	3.6	MWh	0.36
Total Electricity	MWh	2,000				860	KWh	172	3.6	MWh	0.72
Total of Energy Consumption								12,573			52.64
Change from the Previous Year (%)											

Table 3.4.2-10 Output Example of Information of Enterprises (Energy Intensity)

Amount of Production for Industry		
Name of Main Products	Energy Intensity	(unit)
1		
2		
3		
Turn Over		VND

Floor Space for Building		
Name of Building	Energy Intensity	(Unit)
		(M^2)

Amount of Transportation in Freight Carriers		
Freight Carriers	Energy Intensity	(Unit)
Railway		(Ton/Kilo)
Trucks & Trailers		(Ton/Kilo)
Automobiles		(Ton/Kilo)
Ships		(Ton/Kilo)
Air		(Ton/Kilo)

d-2) Output of data aggregated nationwide/provincially

Output example of the energy information is as follows. Output form of nationwide and provincial level is the same. Although data is displayed between 2010 and 2014 in this example, database program designs that data can be displayed to the year of data existing, or it can be displayed to 2011 if there is no data after 2011, also displayed 2020 if there is data to 2020.

i) Total of energy consumption and the industry sector

Total energy displays the four sectors like energy consuming industry, building, transportation and energy supply industry. As for the industry total (energy consuming industry and energy supply industry), four kinds of energy sources (coal, petroleum products, gas and electricity) are displayed and also, as for each industry, four kinds of energy sources are displayed by category of industry.

Table 3.4.2-11 Output Example of Total Energy Consumption

Total Energy Consumption by Sector (ktoe)					
	2010	2011	2012	2013	2014
Total Energy Consumption					
Energy Consuming Industry					
Building					
Transportation					
Freight					
Paseenger					
Energy Supply Industry					

Table 3.4.2-12 Output Example of Total Industry Sector

Energy Consumption in the Industry Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Total Industry					
Coal					
Petroleum Products					
Natural Gas					
Electricity					
Energy Consuming Industry					
Coal					
Petroleum Products					
Natural Gas					
Electricity					
Energy Supply Industry					
Coal					
Petroleum Products					
Natural Gas					
Electricity					

Subsector of energy consuming industry is composed of about 20 sectors (like textile industry and paper/pulp industry etc) and subsector of energy supply industry is composed of main energy sources like coal, oil, gas and electricity.

Table 3.4.2-13 Output Example of Subcategory of Energy Consuming Industry

Energy Consumption in the Energy Consuming Industry Sub_Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Iron & Steel					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Non-ferrous Metals					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Metal Processing & Fabrication					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Mineral & Mining					
Petroleum Products					
Natural gas					
Coal					
Electricity					

Table 3.4.2-14 Output Example of Subcategory of Energy Supply Industry

Energy Consumption in the Energy Supply Industry Sub_Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Power Generation & Supply					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Oil & Gas					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Coal					
Petroleum Products					
Natural gas					
Coal					
Electricity					

ii) Building sector

As for the building sector, energy consumption is summated by energy source in the total of building sector and about 20 subsectors (offices, hotels, restaurants etc).

Table 3.4.2-15 Output Example of Total Building Sector

Energy Consumption in the Building Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Building					
Petroleum Products					
Natural gas					
Coal					
Electricity					

Table 3.4.2-16 Output Example of Subcategory of Building Sector

Energy Consumption in the Sub_Building Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
State Office					
Petroleum Products					
Natural gas					
Coal					
Electricity					
City & Province Public Office					
Petroleum Products					
Natural gas					
Coal					
Electricity					
Hospital					
Petroleum Products					
Natural gas					
Coal					
Electricity					

iii) Transport sector

In the transport sector, total energy consumption and subsector total like freight transport

and passenger transport are displayed. Energy sources are divided in the petroleum products like gasoline, jet fuel, diesel, fuel oil and LPG, and more biofuel and electricity. Subsector of transport sector is composed of road, railway, seaway and airway by modal. Each subsector is displayed in seven energy sources mentioned before.

Table 3.4.2-17 Output Example of Total of Transportation Sector

Energy Consumption in the Transport Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Transport					
Gasoline					
Jet Fuel					
Diesel					
Fuel Oil					
LPG					
Biofuel					
Electricity					

Table 3.4.2-18 Output Example of Subcategory by Modal of Transportation Sector

Energy Consumption in the Sub_Transport Sector by Energy Source (ktoe)					
	2010	2011	2012	2013	2014
Railroads					
Gasoline					
Jet Fuel					
Diesel					
Fuel Oil					
LPG					
Biofuel					
Electricity					
Trucks & Trailers					
Gasoline					
Jet Fuel					
Diesel					
Fuel Oil					
LPG					
Biofuel					
Electricity					
Automobiles					
Gasoline					
Jet Fuel					
Diesel					
Fuel Oil					
LPG					
Biofuel					
Electricity					

The information mentioned above is displayed nationwide/provincially. In case of province, selection of the province is designed on the screen.

Table 3.4.2-19 Selection of Province on Screen

Code	Name of Province
P01	Vinh Phuc
P02	Bac Ninh
P03	Ha Tay
P04	Hai Duong
P05	Hai Phong
P06	Hung Yen
P07	Thai Binh
P08	Ha Nam
P09	Nam Dinh
P10	Ninh Binh
P11	Ha Giang
P12	Cao Bang
P13	Bac Kan
P14	Tuyen Quang
P15	Lao Cai
P16	Yen Bai
P17	Thai Nguyen
P18	Lang Son
P19	Quang Ninh
P20	Bac Giang
P21	Phu Tho
P22	Dien Bien
P23	Lai Chau
P24	Son La
P25	Hoa Binh
P26	Thanh Hoa
P27	Nghe An
P28	Ha Tinh
P29	Quang Binh
P30	Quang Tri
P31	Thua Thien-Hue
P32	Da Nang
P33	Quang Nam
P34	Quang Ngai
P35	Binh Dinh
P36	Phu Yen
P37	Khanh Hoa
P38	Kon Tum
P39	Gia Lai
P40	Dak Lak
P41	Dak Nong
P42	Lam Dong
P43	Ninh Thuan
P44	Binh Thuan
P45	Binh Phuoc
P46	Tay Ninh
P47	Binh Duong
P48	Dong Nai
P49	Ba Ria-Vung Tan
P50	TP. Ho Chi Minh
P51	Long An
P52	Tien Giang
P53	Ben Tre
P54	Tra Vinh
P55	Vinh Long
P56	Dong Thap
P57	An Giang
P58	Kien Giang
P59	Can Tho
P60	Hau Giang
P61	Soc Trang
P62	Bac Lien
P63	Ca Mau

3.4.3 Labeling Program with Electricity DSM Program

1) Objective

To stunt the growth of electricity demand and electricity peak demand and also orient the electricity tariff to the market price, high-efficiency electric appliances shall be disseminated national wide in collaboration between the labeling program and the electricity DSM program (including electricity tariff mechanism), with appropriate financing (including the proposed approach to utilize CDM).

2) Implementation Agency

MOIT:	Policy design and monitoring of the labeling program and the electricity DSM program
MOST:	Establishment of energy saving standard for the labeling program
EVN, PC:	Implementation and operation of the electricity DSM program
MOF:	Financial support of program implementation
VDB, etc.:	Management of ODA loan, etc.

3) Necessary Cost, Personnel, and Machinery and Equipment

(1) Role of Agencies

MOIT draws up a comprehensive policy of power sector and monitor the implementation steps.

EVN and PC support MOIT's policy planning and implement and operate the plan based on the policy.

Preparation of the 7th power development master plan started from July 2009. Main subject of this plan is planning of power development plan based on power supply and demand trend, however the power supply shortage after 2013 becomes obvious, so to mitigate the growth of electricity demand becomes a high priority issue.

MOF shall have a responsibility to secure appropriate budget for EE&C, however at present it is impossible to secure enough budget for national EE&C promotion. So utilizing various kind of international donors support should be considered.

(2) Personnel Allocation

Personnel allocation shall be done based on the selected project need. Practical personnel allocation and of the operation methodology shall be discussed referring the experiences of EVN, which has been already implemented. To conduct national wide project, JV composition with EVN and PC or setting up new entity including foreign companies, which have much experiences on the project operation, are expected to promote the project.

(3) Evaluation of Machinery and Equipment Needed

Objective appliances should be selected based on the expected energy saving effect and the economical benefit, utilizing the standard and labeling program. To use Standard and labeling program, shift of the labeling scheme from voluntary to mandatory measures and shift of labeling type from endorsement to comparative are the principal issues to be tackled. The Study Team recommends the air-conditioners refrigerators, solar-heaters, and lamps as the recommended target appliances. Table 3.4.3-1 shows the major expenditure to be secured to implement and operate it.

Regarding the implementation of electricity DSM program, preliminary study and pilot project shall be done before full fledged dissemination of popular appliances. Full fledged program shall start in 2013.

Table 3.4.3-1 Necessary Cost

Item	Cost	Remark
(1) Design and operation of the labeling program	US $0.5 million/year	
(2) Installation of Labeling testing equipments	US$ 1 million/year	
(3) Pilot project of high-efficiency electric	US$ 1 million/year	2010~12
(4) Programmatic CDM	US$ 0.5 million/year	
Total	US$ 3 million/year	
(6) ODA loan (Residential, Public) full scale project of high efficiency appliances	US$ 43 million/year	2013~

4) Implementation Schedule (Draft)

Along with the progress of the labeling program, high-efficiency electric appliances should be promoted. So the pilot projects will start in parallel with the development of labeling program, and soon after the pilot project and development of the labeling program completion, full scale projects should be started (refer to Table 3.4.3-2 Implementation Schedule).

Table 3.4.3-2 Implementation Schedule

Item	2010	2011	2012	2013	2014	2015
(1) Design and operation of labeling program ✓ From endorsement to comparative label ✓ From voluntary to mandatory						
(2) Establishment of labeling testing equipment						
(3) Pilot project of high-efficiency electric appliances						
(4) Full scale project of high-efficiency electric appliances						
(5) Programmatic CDM						
(6) Finance methodologies ✓ ODA loan for Industry and commercial sector ✓ New ODA loan for domestic and public sector(JICA)ODA						
Revision of electricity tariff ✓ Reflection of real fuel cost on the electricity tariff ✓ Response to energy market price						

5) Labeling Program and Electricity DSM Program

Power sector in Vietnam has two problems, one is the power supply shortage for the exponential growth of electricity demand, and the other is the shift from net energy exporting country to net energy importing country after around 2015. Moreover average electricity tariff still keeps around 5 cent/kWh by energy price curb policy for power sector, and this social welfare tariff level will force Vietnam to bear the big burden of national budget after Vietnam changes to net energy importing country, and also prevent people from the effort for EE&C.

To realize Vietnam stable economical development, it's an urgent issue to realize the stable power supply and make a smooth shift to energy market price by comprehensive implementation from both power supply and demand.

Though Vietnam strengthens the power capacity based on the 6th power development master plan, the delay of commencement of many power stations becomes a reality after 2012, so preparation of the 7th power development master plan stared and it will be summarized in 2010.

It is very important to promote the electricity DSM program in collaboration with the labeling program for the curb of the growth of power demand to dissolve and mitigate the shortage of power supply along with the present shortage of power supply and the delay of power development.

(1) Labeling Program

Periodical revision of the energy performance standards currently under development shifting the labeling scheme from voluntary to mandatory measures and shifting the labeling type from

endorsement to comparative are the principal issues to be tackled. The detailed proposed schedule of each appliance or equipment is presented below. See "3.2.5 Program No.5: Development of Energy Performance Standards and Commencement of Energy-saving Labeling Scheme" for issues and necessity of technical assistance.

a) T8 fluorescent lamp, CFL, street lamp fixture

Conduct market survey and revision of standard in 2011. Shifting the labeling scheme from voluntary to mandatory measures and shifting the labeling type from endorsement to comparative in 2012 are under discussion among related organizations. Conduct market survey and revision of standard in 2015.

b) Electronic ballast, magnetic ballast

Conduct market survey and revision of standard in 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2015.

c) Air conditioner

Conduct market survey and revision of standard in 2010. Comparative label from 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2013.

d) Electric fan

Comparative label from 2010. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2014.

e) Refrigerator

Conduct market survey and revision of standard in 2010. Comparative label from 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2013.

f) Electric water heater

Continuation of endorsement labeling scheme planned to start from 2009. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2014.

g) Solar water heater

Continuation of endorsement labeling scheme planned to start from 2009. Shift of the labeling scheme from voluntary to mandatory measures in 2012. Conduct market survey and revision of standard in 2014.

h) Three-phase motor

Continuation of endorsement labeling scheme planned to start from 2009. Shift of the labeling scheme from voluntary to mandatory measures in 2014.

i) Washing machine

Conduct market survey and development of standard in 2010. Comparative label from 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012.

j) Electric rice cooker

Conduct market survey and development of standard in 2010. Comparative label from 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012.

k) Television

Conduct market survey and development of standard in 2010. Comparative label from 2011. Shift of the labeling scheme from voluntary to mandatory measures in 2012.

l) OA equipment

Conduct market survey and development of standard in 2012. Comparative label from 2013. Shift of the labeling scheme from voluntary to mandatory measures in 2014.

Table 3.4.3-3 Schedule of Energy Consumption Standard and Labeling Program

	2009	2010	2011	2012	2013	2014	2015	2025
T8 fluorescent lamp	RS EL		MS, RS	CL L Mdt			MS, RS	
CFL		EL	MS, RS	CL L Mdt			MS, RS	
Street lamp fixture	EL		MS, RS	CL L Mdt			MS, RS	
Electric ballast		EL	MS, RS	L Mdt			MS, RS	
Magnetic ballast	EL		MS, RS	L Mdt			MS, RS	
Air conditioner		MS, RS	CL	L Mdt	MS, RS			
Electric fan		CL		L Mdt		MS, RS		
Refrigerator		MS, RS	CL	L Mdt	MS, RS			
Electric water heater	EL			L Mdt		MS, RS		
Solar water heater	EL			L Mdt		MS, RS		
3-phase motor	RS EL					L Mdt		
Washing machine		MS, ES	CL	L Mdt				
Electric rice cooker		MS, ES	CL	L Mdt				
TV		MS, ES	CL	L Mdt				
OA equipments				MS, ES	CL	L Mdt		

RS: revision of standard, MS: market survey, ES: establishment of standard
EL: endorsement label, CL: comparative label
L Mdt: Label mandatory

(2) Electricity DSM Program

a) EPP (Efficient Power Plant)

An Efficient Power Plant (EPP) is a virtual power plant consisting of a bundle of energy efficiency investments that provides predictable load carrying capacity in almost the same way as provided by a generating unit. Since the conventional power plants (CPP) are being

developed by the criteria of cost effectiveness, so the electricity price must become higher as the demand increase. On the other hand EPP has a possibility to bring more national economical merit rather than CPP. In order to realize EPP scheme not only the governmental leadership but also the involvement of EVN shall be necessary.

EVN conduct the promotion program of CFL, and solar-heater by use of subsidiary system, which is the typical EPP model. Development of EPP program in collaboration with the national labeling program is extremely helpful.

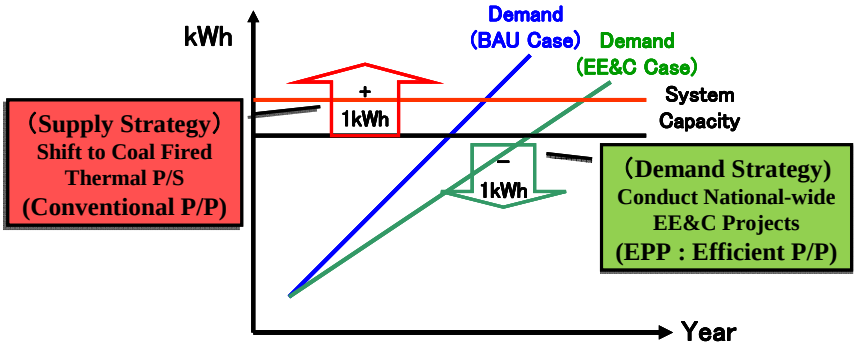


Figure 3.4.3-1 Image of EPP

Option	CPP	EPP
Description	Power Plant Construction	A Bundle of Energy Efficiency Projects
Fuel Consumption	Burns 0.26 toe/MWh	No fuel
Emission	CO2, SOx and NOx	No Pollution*
Cost	5Cent/kWh (2006 avg.)	1-2Cent/kWh (CFL case)

Figure 3.4.3-2 Effect of CFL EPP

If the conventional (low-efficient) AC is introduced now, It will be used for about 10 years. We have to wait till 2020 that it will be replaced. So, the EE appliance should be introduced now. Unless we can not catch up the energy crisis. (Refer Figure 3.4.3-3) At the latest, during the period of 2009-2012 the preparation for introducing a functional mechanism to promote high efficient appliances. Rapid implementation of the mechanism is desired after that. Compared with CPP, EPP's lead time is shorter and on the other hand the expected EE&C effect is as big as 4.4 million kW (in the case of 3.3.2-3).

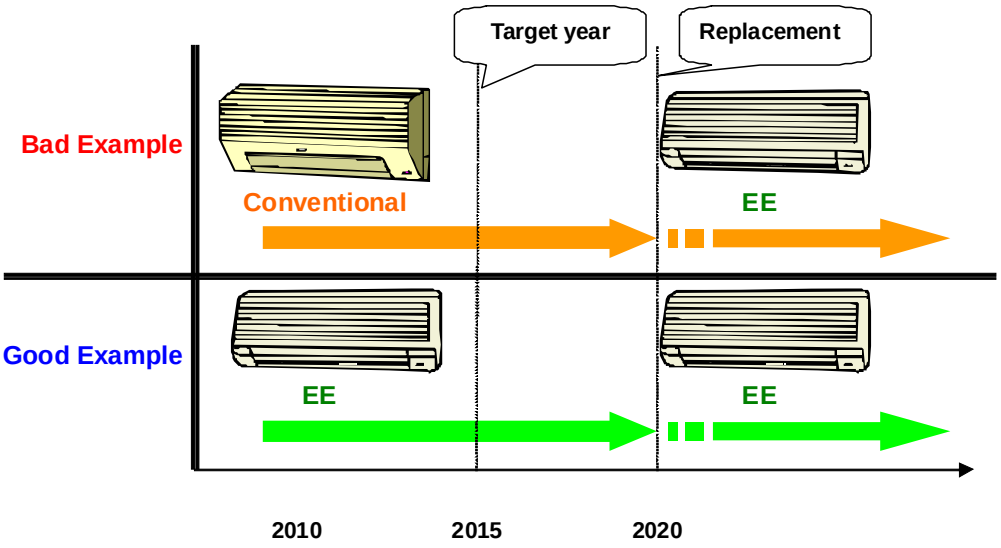


Figure 3.4.3-3 Cycle of Replacement on Air Conditioner

b) Finance (Application of ODA loan)

Vietnam national EE&C budget is too small compared with the national EE&C target as mentioned at 3.3.1. The introduction of special-purpose tax, which imposes the charge on a flat percentage of energy price, should be considered in future. However, the immediate introduction of special-purpose tax and increase of EE&C budget are a difficult situation from at present socioeconomic circumstances, so the finance from international donors and ODA loan from JICA and so on are absolutely necessary.

Objective segments and equipments of EE&C promotion are as shown in Figure 3.4.3 -4, (A) Industry and Commercial sector, (B) Public sector including public utilities, and (C) Electric appliances centered on lighting and cooling.

For the industrial sectors (A), the disbursement of JICA/VDB low interest loan has been decided. (Refer 3.4.5) It is expected to formulate a new ODA loan to be applicable to the public sector (B) and the small appliances like lighting and air conditioner etc. As for loan criteria, the number of stars of the labeling scheme can be applicable.

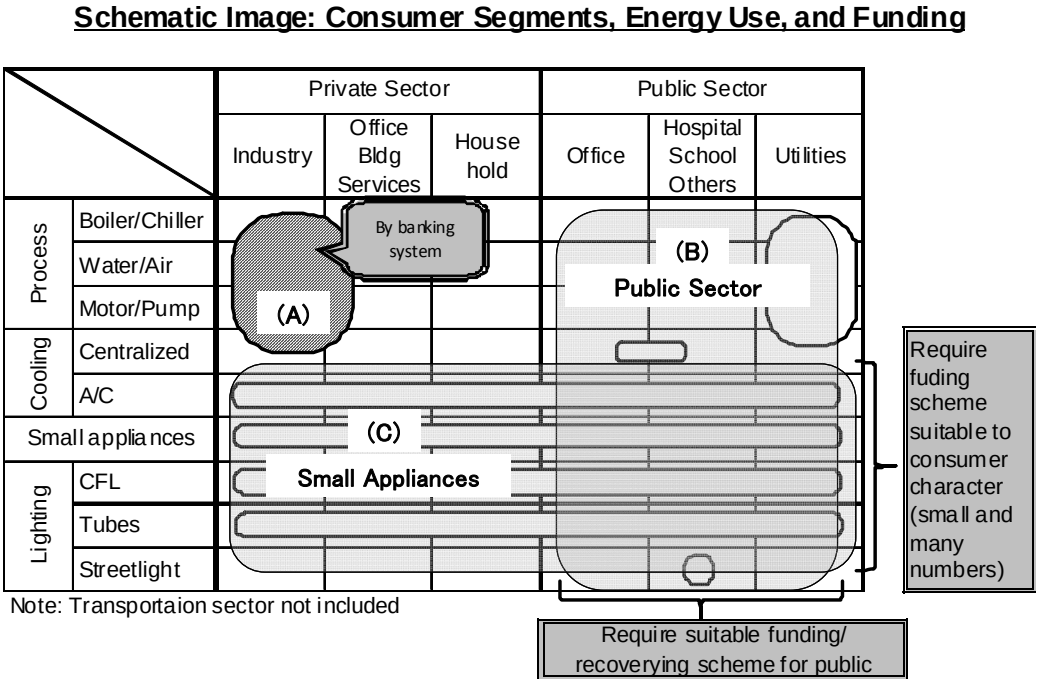


Figure 3.4.3-4 Image of Objective Sectors and Financial Scheme

c) Electricity tariff

Electricity tariff was raised by an average 8.92% on March 2009, however an average tariff is still around at 5 cent/kWh and it's also still a low price compared with the international market price Electricity tariff will be amended reflecting the market price in 2010. The Study Team suggests that firstly the electricity tariff policy should focus on the tariff structure compatible with the developing cost of power stations, and secondly introduce the functional tariff mechanism to apply for energy market price.

The increase of electricity tariff compatible with the developing cost is the inevitable, but the impact of tariff revision for low income customers is able to be curbed by conducting in parallel labeling program for electric appliances and promotion program by the use of financial.

Fuel price charge correction should be introduced for the application for energy market price.

Outline of referential Japanese electricity tariff mechanism is shown in Table 3.4.3-4. There are so many options compared with Vietnamese one. About (A) residential tariff, (B) Commercial and industrial tariff, and (C) Fuel price charge correction mechanism, the detail s are shown later.

Table 3.4.3-4 Comparison of the Tariff Mechanism between Japan and Vietnam

Items		Vietnam	Japan
Basic Condition	Climate	North: Temperate South: Year Round Tropical	Temperate, 4 seasons
	Yearly Load	North: Summer and Winter Peak South: Constant	Summer and Winter Peak
	Daily Load	Rural: Evening Peak Urban: Afternoon Peak	Summer/Afternoon Peak
Tariff Calculation Formula		Power Volume Charge	Basic + Power Volume Charge
Fuel Cost Adjustment		None	Yes
Collection Cost Saving Discount		None	Bank Account Discount
Donation for Environment Protection		None	Green Electricity Donation
TOU (Time of Use) Tariff		Time of Day Tariff	Seasonal and Time of Day Tariff
Power Factor Consideration		–	Basic Charge Over 85%: Discount Below 85%: Price Increase
Optional Contract		None	TOU for Households
			Load Management Contract
			Emergency Contract

Firstly Japanese electricity tariff is designed as cost basis (price reflects the total costs, market price). Figure 3.4.3-5 shows the relationship between the electricity tariff and generation cost (2005).

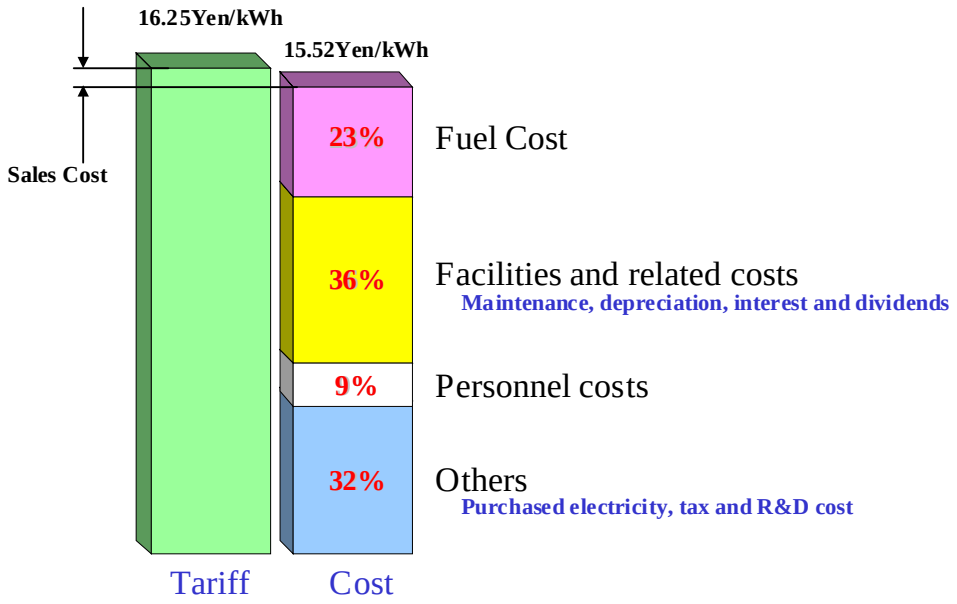


Figure 3.4.3-5 Electricity Tariff and Generation Cost in Japan

(A) Electricity tariff in residential sector

Shown in Table 3.4.3-5, electricity tariff in residential sector is composed of six items.

Table 3.4.3-5 Electricity Tariff in Residential Sector

	Items	Calculation method
A	Basic charge	Based of contracted ampere
B	Power volume charge	One month consumption
C	Fuel cost adjustment	Automatically adjusting charge because of fuel price and currency rate change
D	Account transfer discount	Collecting EL bill
E	Consumption & local tax	5%
F	Green electricity donation	Natural energy supporting fund
	Total	A+B±C－D＋E＋F

Basic charge is defined by the contract ampere, besides the power volume charge by the monthly electricity consumption. (Table 3.4.3-6) Basic charge increases with the accordance of the contract ampere, and it becomes a disincentive for extra consumption. And many tariff options are prepared（tariff on peak hours are several times larger than that on non peak hours. The consumer has so many options, and these mechanism contributes electricity peak cut and peak shift.

Table 3.4.3-6 Basic Charge and Power Volume Charge

Items	Grade		Yen
Basic Charge	10A	1 Contract	273
	15A		409
	20A		546
	30A		819
	40A		1,092
	50A		1,365
	60A		1,638
Power Volume Charge	0-120	1kWh	16.05
	120-300		21.04
	>300		22.31

(B) Electricity tariff in commercial and industry sector

Shown in Table 3.4.3-7, there are 15 types of tariff options, by sector, voltage, season, and by contract etc.

Table 3.4.3-7 Tariff in Commercial and Industrial Sector

Sector	Voltage	Seasonal and time of day tariff	Contract
Buildings, stores, Department stores and supermarkets	Ultra high voltage	Yes	
		None	
	High voltage	Yes	Contract power: >500kW
			Contract power: <500kW
		None	Contract power: >500kW
			Contract power: <500kW
Stores and factories using motors	Low voltage	None	
			High load
			Thermal storage
Factories	Ultra high voltage	Yes	
		None	
	High voltage	Yes	Contract power: >500kW
			Contract power: <500kW
		None	Contract power: >500kW
			Contract power: <500kW

Regarding the concept and outline of typical examples, the following tariff mechanism is explained.

- For Buildings and hopping centers etc
- For high voltage consumers
- Seasonal and time of day tariff
- Over 500 kW contract

Table 3.4.3-8 Tariff Calculation Methodology

Basic Charge	$\text{(Basic Unit Price)} \times \text{(Contracted kVA)} \times \frac{\text{(185-Power Factor)*}}{100}$
Power Volume Charge	(Unit Price of Season and time) × (Electricity Consumption) ±(Fuel Cost Adjustment)
Total	(Basic Charge) + (Power Volume Charge)

*Incentive/Disincentive by Power Factor

Basic charge includes the power factor adjustment (contribute to the electricity company's benefit).

Seasonal and time of day tariff multiplied by the monthly electricity consumption makes power volume charge（per kWh）, and finally fuel cost adjustment is applied to

this amount.

This total amount makes the electricity tariff (Table 3.4.3-8)

Table 3.4.3-9 shows the basic charge table (per kWh).

Table 3.4.3-9 Basic Charge table

	Contracted Capacity	Yen /kW
High Voltage	Commercial	1,560
	<500kW	1,175
	>500kW	1,650
Ultra-High Voltage	20kV Supply	1,510
	60kV Supply	1,460
	140kV Supply	1,410

Figure 3.4.3-6 and Figure 3.4.3-7 shows the typical image of seasonal and time of day tariff power volume charge. Electricity consumption of night time and off-peak hours are specially promoted by this tariff mechanism

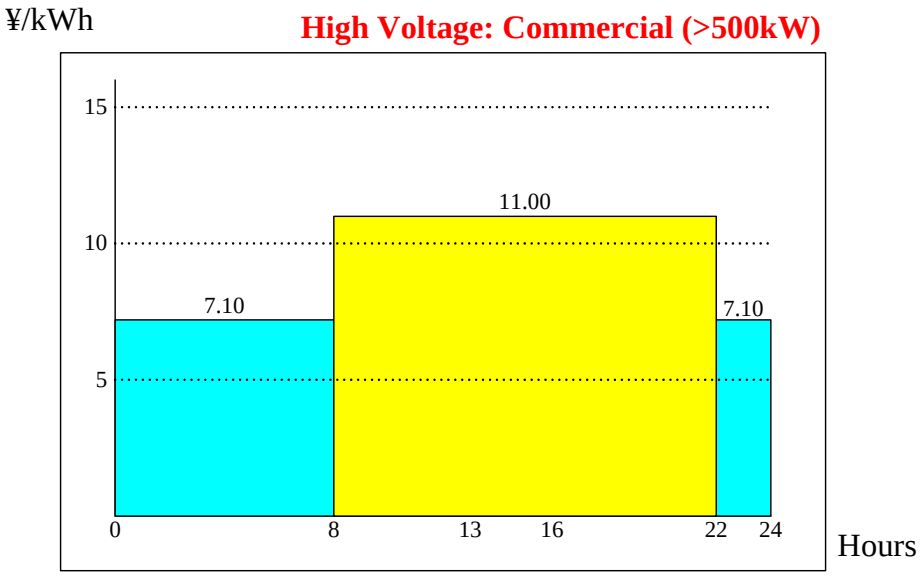


Figure 3.4.3-6 Power Volume Charge (October - June)

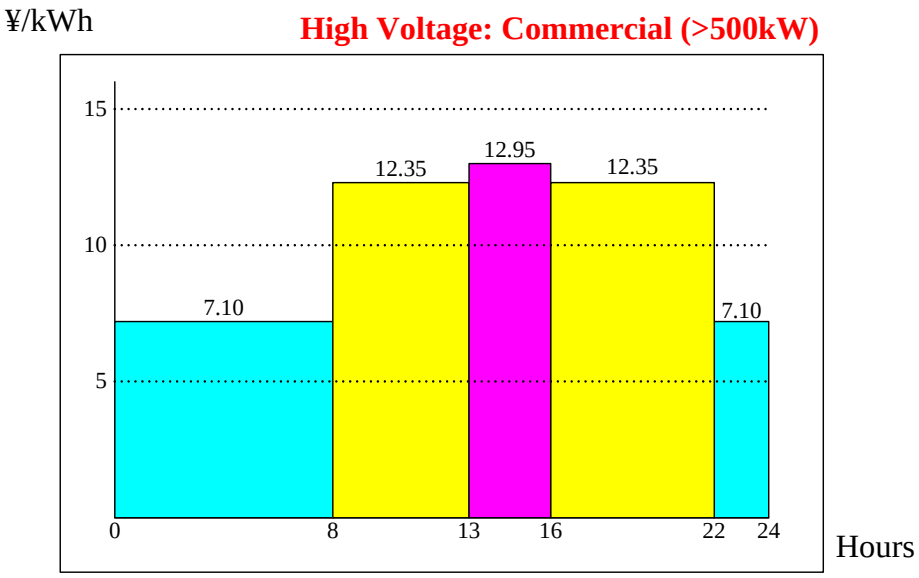


Figure 3.4.3-7 Power Volume Charge (July - September)

(C) Fuel Cost Adjustment

The generation cost fluctuates by the change of oil, LNG and coal price, and also the exchange rate. In Japan when the range of fluctuation excesses the defined limit, the electricity tariff shall be automatically revised reflecting the fluctuation (Fuel Cost Adjustment)

Reflecting the average fuel price calculated by the formula below, the electricity tariff changes following the formula shown in Figure 3.4.3-10.

$$\text{Average Fuel Price } A_f = 0.1837 \times P_{\text{Crude Oil}}\,(¥/\text{KL}) + 0.4461 \times P_{\text{LNG}}\,(¥/\text{Ton}) + 0.2582 \times P_{\text{Coal}}\,(¥/\text{Ton})$$

Table 3.4.3-10 Relationship between Tariff Correction (Change) and Fuel Price Fluctuation

Average Fuel Price (A_f)	Tariff Change	Rate
>¥41,100	Maximum 41,100	¥0.14/kWh/¥1,000 Change
¥41,100 ~ 28,700	Increase Tariff	
¥28,700 ~ 26,100	No Change	-
<¥26,100	Decrease Tariff	¥0.14/kWh/¥1,000 Change

d) CDM

EE&C project can be more feasible by the application of CDM. Regarding CDM for EE&C, (1) applying programmatic CDM led by MOIT and EVN, and regarding individual projects,

(2) the national wide promotion projects of not only CFL but electric appliances, which also contribute the electricity peak cut in evening time, can be recommended. However, the formation of CDM needs to settle the responsible organization and secure the time for at least half a year as a preparation period before project commencement, and the budget for drawing up the application form.

(A) Programmatic CDM methodology approved in June 2007

Generally EE&C projects are said to be too small for CDM. But applying "programmatic CDM" methodology, after declaration of "Program of activities", multiple small projects could be bundled and accumulated as one programmatic CDM and small scale CDM methodologies on EE&C can be applied. This methodology is desired to be applied to EE&C CDM project.

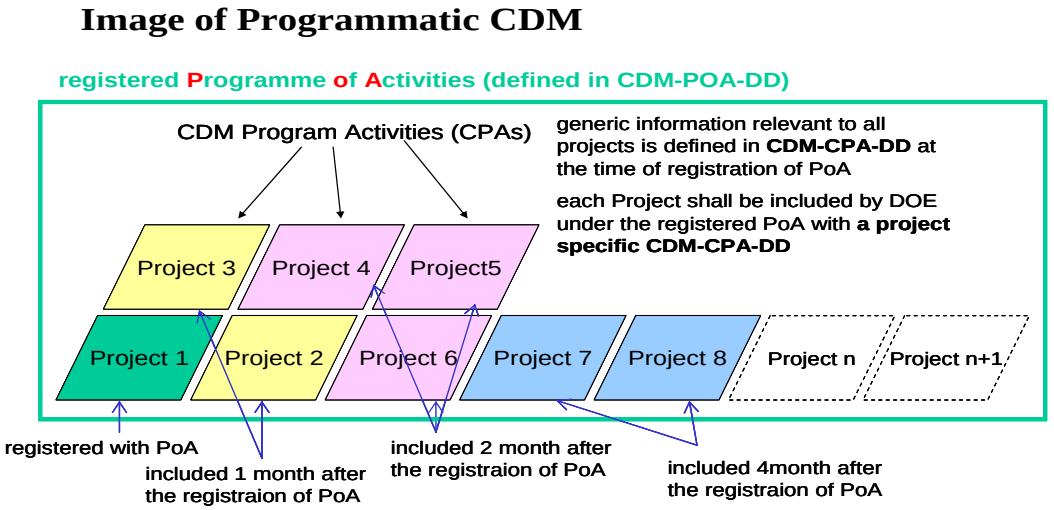


Figure 3.4.3-8 Programmatic CDM

(B) New methodology of CFL promotion project

Especially in Vietnam, development of national program to implement CFL and solar-heater, which contribute electricity peak cut in evening, and declaration as programmatic CDM can be recommended. Recently new methodology of programmatic CDM, which is about to be approved by UN, should be monitored. (AMS II-C, II-J)

3.4.4 Effective Organization Structure between Central & Regional Government and Strengthening of Functions of ECCs

1) Purpose

Development and strengthening MOIT's function and capacity for promoting EE&C and institutional arrangement for organization responsible for human resources development on EE&C.

2) Implementation Agency

MOIT

3) Necessary Cost, Personnel, and Machinery and Equipment

Items	Cost	Note
(1) Strengthening Function of MOIT		
1) Reorganization and Restructuring of Divisions of MOIT	US$ 0.1 million/yr	
2) Expanding Duties and Staffing of ECO	US$ 0.3 million/yr	
3) Traaining (mostly OJT)	US$ 0.1 million/yr	
(2) Local expansion of ECC		
1) Empowering local ECCs through redistribution of power and authority	US$ 0.1 million/yr	
2) Expanding Duties and Staffing of ECC	US$ 1.0 million/yr	US$ 0.1 million/yr
3) Training (mostly OJT)	US$ 0.3 million/yr	
Total	US$ 1.9 million/yr	

4) Implementation Schedule

	2010	2011	2012	2013	2014	2015
(1) Strengthening Function of MOIT						
1) Reorganization and Restructuring of Divisions of MOIT						
2) Expanding Duties and Staffing of ECO						
3) Training (mostly OJT)						
(2) Local expansion of ECC						
1) Empowering local ECCs through redistribution of power and authority						
2) Expanding Duties and Staffing of ECC						
3) Training (mostly OJT)						

5) Description

(1) Strengthening Function of MOIT

The ECO of MOIT is responsible for all aspects of EE&C policies in Vietnam. It is under a division of the Science and Technology Department. Currently all of 14 officers are assigned to the office while all officers hold the post of different departments concurrently. Compare to the responsibility of the office, the working salutation is not sufficient enough to make important

decisions regarding EE&C. Therefore the organizational arrangement for the sections concerning to EE&C should be much strengthened in the future. The empowered office responsible for EE&C will make more effective and centralized advises to the Ministers. The new office should be able to coordinate with other departments and ministries for promoting EE&C effectively.

a) Reorganization and Restructuring of Divisions of MOIT

The first task to strengthen the function of MOIT is to reorganize and restructure the divisions of MOIT. Currently, most associates in ECO are working with part-time basis by holding different responsibilities and duties other than the work at ECO. The tasks carried out by them include both those designated closely with ECO and not. It is necessary for ECO to sort out such intermingled tasks to improve the efficiency of services performed by the associates of ECO.

b) Expanding Duties and Staffing of ECO

Many proposed activities listed in the Study is to be categorized under the jurisdiction of ECO. Considering the fact that the enactment of the proposed EE&C Law is in progress, ECO will have more responsibilities, To catch up such trend, expansion of duties and staffing of ECO is required.

c) Training (mainly OJT)

To meet the extension of duties and staffing of ECO, extensive training is necessary. The contents of the training is shown in the following:

(a) Necessary Competency

ECO of MOIT is expected to promote EE&C in Vietnam as the control tower to carry out the EE&C policy. ECO needs to collaborate with various agencies and ministries both domestic and international to promote EE&C by combining resources available. For example, (1) coordinate with local people's committees for securing the quality of services provided by local ECCs, (2) Preparation of establishing the Energy Conservation Center of Vietnam for an implementing agency of promoting EE&C. For the latter item, the following training may be appropriate to ensure the capacity necessary for the services: (See Table 3.4.4-1).

(b) Direction and Main Subject of Training and Development

i) Senior Officials of MOIT (Manager, Director and up)

Training and development aiming to senior officials of MOIT (manager, director and up) is significant because it communicate the goals of the EE&C policy in Vietnam to get a popular support. To realize such condition, communication training based on organizational dynamics is provided.

ii) Officers in charge of EE&C at MOIT

The staff at ROC needs to function in the following areas: (1) coordination with stakeholders such as people's committee, and (2) implementation for tasks to establish ECCV in the long

run. The proposed training is inline with these areas. Therefore communication training to enhance mutual agreement, and OJT and case study on good practice assisted by external consultants and trainers.

Table 3.4.4-1 Capacity Development for Human Resources Development Aiming at Organizational and Institutional Strengthening

Target	Item	Examples of Competency	Measures for Capacity Development
Senior Officers of MOIT (Manger, Director and higher)	Coordination with Stakeholders	- Communication capacity for negotiating with stakeholders including people's committee - Agreement with Stakeholders	- Communication Training - Conflict Management Training
	Preparation of establishment of ECCV	- Development of new organization and institution - Communication skills - Leadership	- OJT and/or workshop by external consultants
Staff of MOIT (EOC)	Coordination with Stakeholders	- Communication capacity for negotiating with stakeholders including people's committee - Agreement with Stakeholders	- Communication Training - Conflict Management Training
	Preparation of establishment of ECCV	- Communication Skills - Agreement with Stakeholders	- OJT and/or workshop by external consultants
Staff of ECC (existing and new)	Reorganizing and Restructuring of the role and duties of ECC	- Organizational Development (redefining mission statement, leadership training) - Communication Skills	- OJT and/or workshop by external consultants
	Promoting Activities of ECC	- Communication (Public Relation) - Marketing (Dissemination) - Facilitation	- OJT and/or workshop by external consultants

iii) Staff of ECCs (existing and new)

The training for the staff of the proposed ECC (both existing and new) is aimed at reorganization and restructuring of ECC, and promoting EE&C activities. More specific contents for the former include organizational development such as redefining the mission statement and leadership training as well as communication training including public relations and marketing. .In additions, consensus building with various stakeholders is another area for the prospective training. These training may be provided through OJT and workshop by the experts.

(2) Establishment of ECC in Local Provinces

As discussed in the sections in 2.5, establishment of eight ECCs needs to be realized from the viewpoint of empowering the central office in MOIT responsible for EE&C. Since Vietnam has

very long territory from north to south, the proposed locations of ECC shown in Table 2.5.2-1 is reasonable. If established as planned, MOIT may be able to distribute some power and responsibilities to these local ECCs to better service for respective regions. Implementation of this plan, however, seems challenging because the mission of ECC has not yet clarified and resources such as budget, human resources and technology are limited. Though it is challenging, putting sufficient resources by the government will make it possible to realize such a plan. Effectiveness of this plan is considered high because it eventually strengthens the function of MOIT on EE&C. It is, however some drawback existing because the available resources (budget, human resources, technology, management structure, etc) is limited. Establishing all eight ECC as planned is challenging. The provision of services consistent throughout the nation is another challenge for MOIT to carry out development of ECCs locally.

Table 3.4.4-2 is to discuss the possibility of establishing regional ECCs and strengthening of function of MOIT. A result of the preliminary study shows that the ECCs should be organized under the jurisdiction of local People's committees and they should define and clarify the roles and responsibility by furnishing mission statement. Concurrently, a MOIT section responsible for EE&C needs to be much strengthened and expanded because the section may oversee and administer the most up-stream of EE&C policies of Vietnam for years to come.

The Study Team would like to recommend the "Option D" because it can utilize information, technology, experience, human resources, budget and organization most effectively and efficiently. This option may expect positive impact for promoting EE&C in Vietnam. At the same time, MOIT and related organizations shall continue the feasibility study of taking the "Option D", because it requires comprehensive restructuring of the existing ECCs and ECO in Vietnam.

Table 3.4.4-2 Preliminary Analysis of Strengthening the Function of MOIT and Establishment of Local ECCs

Option	Advantage and Merit	Disadvantage and Short Comings
(A) Establishment and Operation of Eight ECCs Simultaneously Throughout the Country	- EE&C may be effectively promoted because the all ECC will be established in major cities and industrial centers simultaneously throughout the country - Local ECC may carry out the EE&C program tailored to local needs. - The network of ECCs may accelerate dissemination of EE&C. - Each region will be able to have so-called one-stop center for EE&C.	- Lack of "control tower" may diverge the directions of ECCs if EEC office of MOIT is not strengthened. - Current limited resources may be dispersed by many ECC simultaneously throughout the country. Securing sufficient budget is critical. - Accumulation of knowledge and experience may be difficult. - Capacity and effectiveness of ECC in respective regions may be vary. Each ECC has different history and mission, etc. This makes it difficult to ensure uniform quality of services throughout the country.
(B) Strengthen the Function of a Section of MOIT Responsible for EC&C	- Centralization of information and concentration of knowledge and technology will help empowered MOIT accumulate know-how and knowledge of EE&C in one place. - Centralized organization will easily demonstrate services as it was intended by MOIT. It will follow the direction of the project as it was originally intended. - This may create a so-called one-stop service center for EE&C in Vietnam	- No storing foot solders to implement the policy. - Central office needs to hire many local staff directory to familiarize the policy to industries, etc. - One national section cannot cover whole country. Collaboration with the local ECC necessary
(C) Combination of (A) and (B) (Establishment of eight ECC and strengthening the function of EC&C section of MOIT simultaneously)	- Merger and integration of similar organizations and offices in EE&C under the guidance and direction by the national EE&C center. This may be able to utilize local resources and its unique capacity for promoting EE&C more effectively. - The network of ECC led by the empowered MOIT section center will resolve the shortcoming listed in this analysis.	- Nationally coherent human resource policy is essential for realization of this plan. Recruit and job assignment should be carried out nationally, not regionally. - Diversity of the organizations may be constraints to merge into a single organization
(D) Local ECCs are placed under the People's Committee. the function of EC&C section of MOIT simultaneously	- Each ECC will be able to utilize the local customer-base - Current service quality standards maintained - MOIT may be able to direct and instruct the local ECC. May be easy to reflect the policy to local ECC activities.	- Demarcation of roles and responsibility between MOIT and the local centers is essential. -Complexity in the line of command. Local ECC may need empowerment to act independently

Source: JICA Study Team

a) Establishment of the National Training Center for EE&C (National EE&C Center)

(a) Background and Purpose

As Vietnam waits for the enactment of the proposed EC Law, expectations for extending EE&C activities to wide range of area is increasing. ECC with an function to implement such activities locally, is not fully capable for providing such services to various clients. It is expected to create a mechanism to carry out consistent EE&C service throughout the country. To do so, needs for training and human resources development will be recognized significantly. MOIT has identified that the trainer training for teaching ECC trainers is higher priority among various training programs. In order to carry out such training program effectively, ECC Vietnam should be established as the national training center for EE&C.

The role of ECCV include promotion of ECC activities to factories and commercial building, dissemination of energy efficient machinery and equipment, implementation of national certificate training and examination for Energy Mangers, and EE&C promotion to general public (see Table 3.4.4-3).

In addition to the above-mentioned eight ECCs, the team recommends that MOIT to establish the National Training Center for EE&C (National EE&C Center) under the jurisdiction of MOIT. There is a high level of needs in Vietnam to establish an entity to carry out the training discussed in the section 2.6. Such organization, however, is yet to be established. ECCs in local levels has attempted to carry out such training and other services to local community. They are not coherent in the light of the national EE&C policy. MOIT lacks sufficient number of able trainers to provide the services. Each ECC is under the jurisdiction of local People's Committee, use of ECC for coherent EE&C is not available.

It is expected that the education and training needs will be increased when the EE&C Law is enacted. MOIT has realized significant training needs for core trainers who is teaching EE&C in the local ECC. The National Training Center for EE&C is effective means to realize EE&C.

(b) Basic Design of the Training Center

The center provides trainer training aiming core trainers of local ECCs by collaborating some technical universities [1)]. The center will be initially established in Hanoi and will develop curriculum and training modules prior to implementation of the trainer training. When it is fully developed, similar training center will be established in the Southern region (e.g. HCMC) as early as possible.

As discussed, the purpose of the training center is to oversee human resources development concerning to EE&C in Vietnam. In Vietnam, there is limited human resources base available

1) Initially MOIT will collaborate with Hanoi University of Technology (HUT), Electric Power University (EPU), Ho Chi Ming University of Technology (HCMUT), and finally Da Nang University of Technology (DUT).

because EE&C has not been practices. The Study Team has found that experts in the private sector is not sufficient. To fill such gap, the center may need to collaborate with the universities to employ expertise and knowledge in order to complete the ground work of EE&C in Vietnam.

Table 3.4.4-3 The Role of the ECC Vietnam

Items	Note
1. Promoting EE&C in Factories and Buildings, etc.	
a) Provision of information related to EE&C laws, rules and regulations and/or EE&C technologies	
b) Survey and analysis on EE&C at factories and buildings, etc.	
c) Energy Audit and proposing EE&C measures, etc.	
2. Promotion of Material and Equipment for EE&C	
a) Provision of Information on EE&C Material and Equipment, etc.	EE&C Labeling Program may be of prospective program for implementation
b) EE&C Award Program. Exposition for Promoting EE&C Equipment, etc.	
3. The National Certification Examination for Energy Managers	
a) National Examination and Training for the Certificate for Energy Managers	Additional certificate for officers responsible for management of energy in smaller enterprises may be necessary for long-term objective. New licensing program for energy auditors (e. g. energy auditing agency or entity) may be reviewed and examined
4. Promotion and Dissemination of EE&C Targeting General Public	
a) Practicing EE&C at Households, Schools, and Work Places	
b) Support for EE&C Promotion Activities at Local Communities	
c) Information Campaign on EE&C through Internet and Publication, etc.	Development and preparation of textbook for EE&C examination necessary

(c) Clarification of the Role and Specification for the Training Center

Development of the training center is one of the priority issue because it is to administer and oversee the training for the Energy Manager Certification. The basic design of the development of the Training Center depends on institutional framework of the certification program. Currently the framework for the certification is still in review. Therefore the basic design of the training center is finalized when who trainees are, number of the trainees,

competency levels of trainees, goal and objectives, curriculum, etc. are defined. When the information is defined, specifications of the facility including floor area of the building of the center, necessary machinery and equipment, etc. At the time of writing, the framework of the training is not yet defined. Therefore the specification for the center cannot be defined.

By finalizing the specification for the training center , it will provide detailed information on budget, technology and machinery and the timeframes to prepare for the establishment of the center. MOIIT acknowledges that it should be trained sufficient number of engineers within the short period of time (approximately within four years from enactment of the EC Law). The development of the center may be of interest of not only the central government but also local People's Committees. In addition, some donors may want to invest to the project.

b) Future Pan of ECC and Institution (Proposal)

(a) Concept of ECC

As discussed in the previous sections, dissemination of proper EE&C technology depends on effective EE&C policies in Vietnam. As shown in the Figure 3.4.4-1, promotion of effective EE&C is realized through strengthening organizational capacity of the section responsible for EE&C.

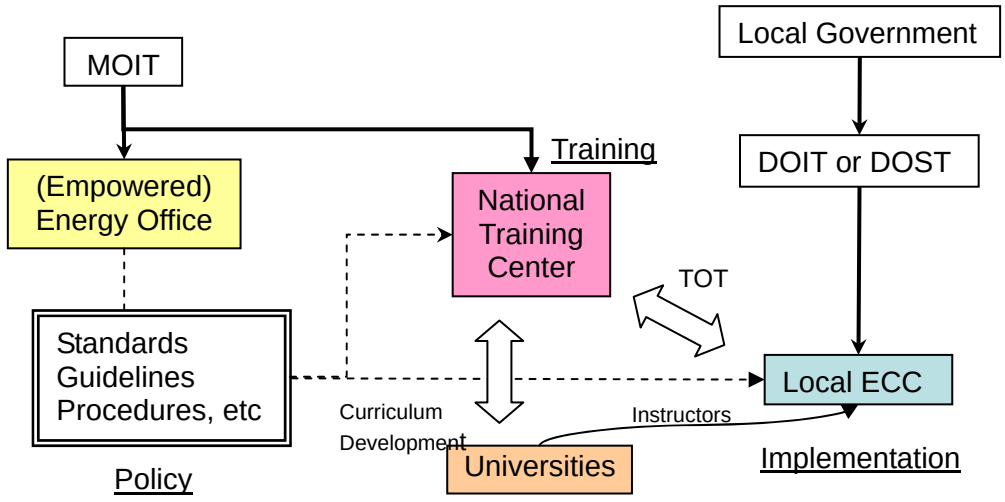


Figure 3.4.4-1 Future Plan of ECCs and Institution

It is not only strengthening mere one section of the central government, but also to strengthen policy implementation and coordination between central and local government. The policy discussed in this Study is effective to improve the industrial competitiveness of the industries of Vietnam.

(b) Development of National Certification Programs Other Than the Energy Manager

i) Needs of National Training Certification for Energy Management Targeting Small Enterprises

The proposed Energy Manger Certification Program was targeting to those industries and commercial buildings whose energy consumption is comparably large. Under the program, the MOIT will be able require to submit annual energy usage plan from these industries. Introduction of the Energy Manager Certification Program and the Target-Setting Program provides a framework for promoting appropriate use of energy through combination of issuing professional certificate, mandatory annual energy use reporting for industries and commercial buildings which consume large volume of energy. The program aims at strengthening a state-level control over the large energy users for their consumption and management through promoting effective energy use.

In the other hand, a program to oversee small-scale energy users should be established as a next step for the proposed Energy Management Certification and the target-setting program. It is recommended that this program for smaller enterprises should be designed to be adopted by the smaller energy users for they lack technical and human resources. For that reasons, the proposed energy management program applied to the small energy users should be much easy to adopt for them for it is aimed at disseminating EE&C to small enterprises.

ii) Development of the procedures for the certification program on Energy Auditors

MOIT considers that the energy audit for preparation of the mandatory reporting should be carried out by external service providers who has a license fro auditing. In order to realize such a framework, additional national certification program for energy auditors may be considered.

Proposed energy auditor is an external consultant who provides services on analysis of energy usage by collecting, and assessing energy use of client enterprise. The auditor provides a report on how to effectively provide its services by rational use of energy. The services provided by the auditor may require much high level of complexity. For example, the competency required by the auditors may include not only analysis of energy usage by factories and commercial buildings, but also ability to recommend a particular EE&C technology economically and technologically feasible for its client's needs. In order to provide such services as a professional, the auditor may need to have skills and knowledge of a wide variety of production possesses. In reality, to meet with a thousand of industries' needs, development of such license is challenging while maintaining its authenticity of the qualifications. Currently, Vietnamese side considers to carry out a licensing examination as soon as possible. The Study Team has recommended that the such examination is difficult to establish because the complexity of setting minimum standard for the nature of the services he/she provides.

Preconditions of possible establishment of such qualification is that there is a large human resources pool of engineers who are knowledgeable for energy management since the knowledge and experiences associated with EE&C and production management is indispensable qualification of energy audit. A realistic approach for establishing the proposed energy auditors is to start such certification program after a large human resource pool is established. The needs of auditors may be voiced to establish such qualification among the qualified energy managers. To do so, such qualified persons should be selected from the most qualified energy mangers with rigorous selection process, including written examination, oral examination and assessment of successful achievement of EE&C. In short run, the Study Team recommends that it should allocate limited resources to the proposed Energy Manager Certification Program in the short term objective.

3.4.5 Financial Support Program for promoting EE&C

1) Establishment and operation of low interest loan mechanism for promoting EE&C

To improve the efficiency of production line, as described in 3.2.8, it is effective to enhance the energy management and to introduce the high efficient equipments. And especially financial program to support the implementation of EE&C equipment is quite important.

JICA and Vietnamese government are preparing to establish a financial support mechanism to implement EE&C equipments. That is an ODA two-step low interest loan program, MOF is the borrower, Government of Japan is the lender (through JICA). VDB borrows from MOF and provides to industrial investors. The loan scheme is shown in Figure 3.4.5-1. The Energy Efficiency Equipment List for loan application will be prepared to make the loan assessment easier

Draft loan mechanism is as follows:

Loan program for energy saving

a. Limit credit: Maximum 85% of total investment (based on the project VDB shall decide the criteria)
b. Interest rate: Equal to current national rate for development (VND 6.9 %/year, USD 5.4%/year)
c. Credit term: Maximum 20 years, grace period: 5 years
d. Target: Investment for EE&C equipment installation

Loan criteria

a. Saving 20 % of annual energy consumption
b. Project with energy audit report: VDB would fund 50% of expenditure for making energy audit report.
c. Giving priority to designated industrial enterprises belonged to the sub sector such as steel, cement, food processing and textile.

A synergy effect is expected between the certified energy manager program which shall be enacted in 2010.

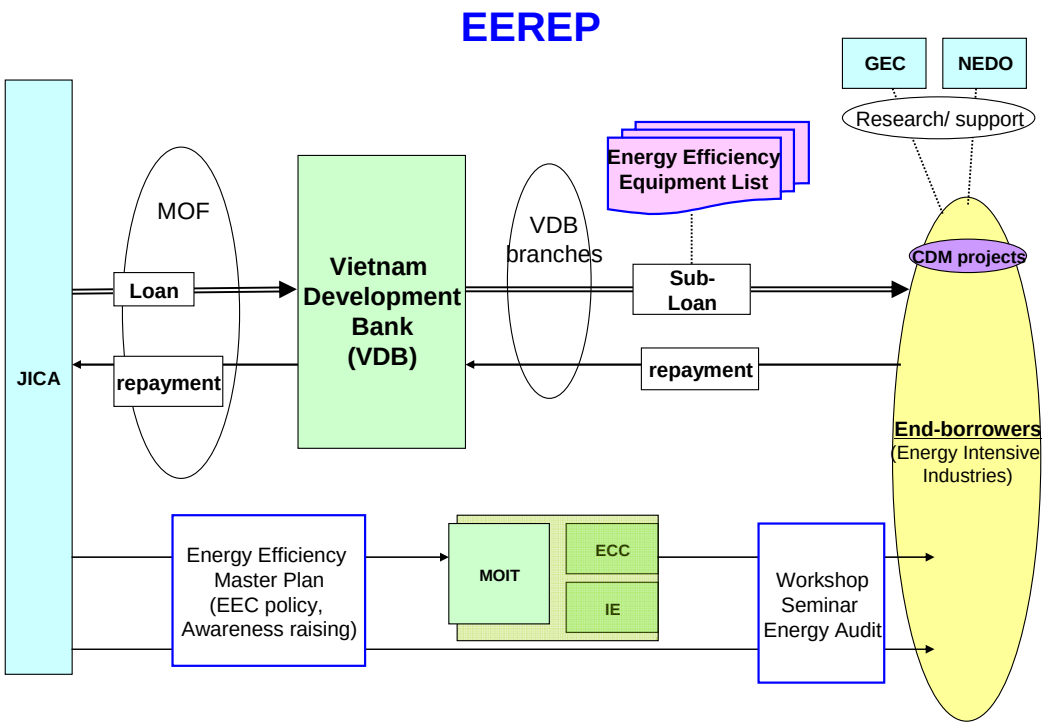


Figure 3.4.5-1 JICA Loan Mechanism for EE&C

2) Support Program to Respond Climate Change (SP-RCC) in Vietnam

JICA has a plan to formulate Support Program to Respond Climate Change (SP-RCC) in Vietnam jointly with the international donors such as AFD (France). Vietnamese government established the "National Target Program to respond to climate change" (NTP-RCC; Prime Minister's Decision 158, December 2008). This program intends to accelerate the implementation of the Policy Action (PA) for the major issues under 3 major pillars as follows:

(1) Mitigation (promoting renewable energy and energy efficiency, forestry and agriculture management, waste management and promoting CDM projects etc.),

(2) Adaptation (improvement of water quality and quantity, irrigation management, integrated coastal management and fishery, disaster prevention etc), and

(3) Cross-cutting (Storage of basic data for climate change and promoting research, establishing financial mechanism, mainstreaming climate change issues into Socio-Economic Development Plan (SEDP) and awareness raising and HRD etc.)

Policy matrix (the target indicator for loan disbursement) which is under discussion is shown in Figure 3.4.5-1. This matrix coordinates with the output of this study. Together with the TSL scheme, it is expected that this matrix work for promoting EE&C as a check list of short term action plan.

Table 3.4.5-1 Policy Matrix for Support Program to Respond Climate Change (1/2)

Vietnam: Support Program to Respond to Climate Change (SP-RCC)
As of 2009/10/2 (Revised after 2TM)

Attachment 2

[Trigger actions: with underline]

Sector	Outcome/ Target	1st Cycle CY2008-9 Actions	Responsible Institutions	Indication of 2nd Cycle CY2009-10 Actions	Responsible Institutions	Indication of 3rd Cycle CY2010-11 Actions	Responsible Institutions
A. Mitigation							
1 Energy							
1.2 Energy Efficiency and Conservation							
	1.Develop policy framework to save 5-8% of the total energy amount consumed nationwide in the period of 2011-2015 *[PM79/2006]*	**1.1.1 Prepare the regulatory framework for improving energy efficiency and conservation activities in Vietnam** Criteria: *Submit the draft of Law on Energy Conservation and Efficient Use to National Assembly* *Status: The Law has been submitted on August 2009.* *Note: The draft Law include "EE&C in civil construction works, transport and key energy consuming agencies" and "tax exemption and reduction for EE&C activities". It will be approved by National Assembly on May 2010*	MOIT (Energy Efficiency & Conservation Office (EECO))	**1.2.1 Prepare the regulations to enforce the Law on energy efficiency and conservation** *Criteria:* *"Submit decrees on detailing and guiding the Law on Energy Conservation and Efficient Use to Government Office.* *"Prepare an action plan to overcome the bottlenecks that have been identified through recent pilot projects and to promote the implementation of the EEC Law* *Status. EECO is drafting the decree on detailing and guiding the implementation of Law*	MOIT (EECO)	**1.3.1 Complete the research of the financial mechanism for improving energy efficiency and conservation activities in Vietnam** *Criteria:Issue the MOF decision on fiscal incentives for EE&C investment and for the promotion of labeling mechanism*	MOF MOIT (EECO)
						1.3.2 Prepare the institutional framework for improving energy efficiency and conservation activities in Vietnam *Criteria Issue Decision on institutional arrangement of EE&C*	MOIT (EECO)
				1.2.2. Develop target for specific industrial sectors *Criteria: Target (roadmap etc) for specific industrial sectors (2-3 sectors) is developed based on Program 8 VNEEP.*			
1.3 cross-cutting for energy sector							
	1. Prioritise actions in RE and EE&C and assess the impact of these actions			**1.2.1. Assess the most efficient measures in terms of cost, GHG abatement and economic benefit** *Criteria: The first draft of research report on assessment of the most efficient measures in terms of cost, GHG abatement and economic benefit is completed* *Status:* *Note: AfD started to support research on this topic*	MOIT(EECO) MONRE	**1.3.1. Develop 7th Power Development Plan (PDP)with a Strategic Environmental Assessment (SEA)** *Criteria: The first drafts of 7th PDP and SEA including Demand Side Management research and Impact of Energy Efficiency Program are completed* *Status:*	

Table 3.4.5-1 Policy Matrix for Support Program to Respond Climate Change (2/2)

Sector	Outcome/ Target	1st Cycle CY2008-9 Actions	Responsible Institutions	Indication of 2nd Cycle CY2009-10 Actions	Responsible Institutions	Indication of 3rd Cycle CY2010-11 Actions	Responsible Institutions
A. Mitigation							
2 Transportation & Construction							
	Develop the plans and activities of energy conservation in transportation and buildings to save 5-8% of the total energy amount consumed nationwide in the period of 2011-2015 **Reduce GHG emission from transportation**			**1.2.1 Formulate the "Master Plan for development of public bus system" to promote modal shift to public transport system, including the contents to promote CNG/LPG bus operation** *Criteria: Mater Plan including promotion of CNG/LPG bus operation is issued and launched.* *Status: Draft of Master Plan will be submitted to Prime Minister in October 2009, and PM will issue the decision of approval in end of 2009 to be implemented in first quarter of 2010.*	MOT (Dept. of Transportation & Dept. of Environment)	**1.3.1 Launch pilot projects for CNG/LPG bus system in selected cities based on Master Plan** *Criteria: Launch pilot projects in 5 major cities including southern areas*	MOT (Dept. of Environment)
				1.2.2 Formulate the National Program to control exhausted gas emission periodical inspection of motorcycles and mopeds to develop the regulatory framework to promote the inspection *Criteria: National Program is issued and launched* *Status: Draft of National Program will be submitted to Prime Minister in October 2009, and PM will issue the decision of approval in end of 2009 to be implemented in first quater of 2010.*	MOT (Dept. of Environment, Vietnam Register)	**1.3.2 Launch pilot projects for exhausted gas emission periodical inspection in 02 selected cities** *Criteria: Launch pilot projects in Hochiminh city and Hanoi or Danang*	MOT (Dept. of Environment, Vietnam Register)
				1.3.2 Prepare the Technical Guideline to implement the appropriate building code *Criteria: Complete the formulation of the Technical Guideline and conduct trainings for government officials to have skills to implement the building code under the Technical Guideline* *Status: Revised building code will be approved by MOC Minister by the beginning of 2010, and the Technical Assistance for building the technical guideline and for implementing training courses are necessary*	MOC (Dept. of Science & Technology & Environment)	**1.3.3 Complete "National program on development of green building in Viet Nam 2010-2015"** [hearing from MOC]	MOC (Dept. of Science and Technology)