IV. RESULTS OF EVALUATION

1. Summary

Relevance

The Project is in line with the policies of both Thai and Japanese government. Moreover, Japan has technical advantage to Thailand in the field of energy conservation. She is one of the best countries promoting energy conservation in all over the world, and has achieved the lowest level of energy intensity. The system of the energy manager developed through the Project is one of the main factors to achieve such a good situation of Japan. In addition, regarding the target group i.e. PRE, there is need to improve practical energy management training. The size of the target group is also appropriate. In conclusion, the project has enough relevance to be implemented.

Effectiveness

The project purpose "High-Quality PRE Training system is set up" was accomplished according to the successful development of Senior PRE and Conventional PRE Training Courses and Examinations. The evaluation conducted by the consultants (i.e. the evaluation for the curriculum of Training Courses and the evaluation for Pilot Implementation of Training Courses & Examinations) and the Questionnaire Survey conducted by the Evaluation Team found that the present quality of Senior PRE and Conventional PRE Training Courses and Examinations is high. However, the quality of achieved outcome cannot be fully evaluated because the pilot trainings were carried out only a few times.

Efficiency

Project activities were done mostly according to the original schedule, and the outputs on PDM were efficiently achieved. From the achieved output, the quality (spec of provided machinery and materials, expertise of Japanese experts etc.), quantity, and timing of the input were generally appropriate. It was proved that installation of Mini-Plant was successfully built on schedule from both Thai and Japanese sides. This achievement deems remarkable because many similar JICA projects have experienced some delay from the past.

Impact

There is much possibility to achieve overall goal from the viewpoint of Verifiable Indicators described on PDM (i.e. the allocation rate of PRE and the submission rate of the six month energy consumption report). More importantly, the submission rate of Target & Plan is expected to go up in future with the benefit of the new ministerial ordinance and the impact of the Project. However, it is not concluded if the outcome of the Project contributes to the overall promotion of energy conservation in Thailand. The reason is that the roles of Senior PRE and Conventional PRE and its Training Courses are not yet explicit in both legislative and technical aspects. DEDE is making efforts to resolve this point in near future based on the evaluation from industrial sector in Thailand. As additional impacts, public awareness rising on energy conservation to industrial sector due to the seminars conducted by the Project and so on was found.

Sustainability

From these result of Questionnaire Survey, it is found that there will be needs for practical energy management training from industrial sector constantly in future. Most of the PRE and Factory managers & owners have positive prospects regarding more energy conservation promotion in Thailand in future. From the side of supplier, DEDE/TD has financial, administrative, and technical capacity. DEDE/TD has a plan to train 5,000 Conventional PRE and 600 Senior PRE in the next 5 years, and the budget has already been planned.

2. Detail: Achievement of the Plan

Narrative Summary	Verifiable Indicators	Result
Overall Goal Energy management in designated factories and buildings is effectively executed to meet the objective of the ENCON Act.	1. By 2008, more than 80% of designated factories and buildings assign PRE. 2. By 2008, more than 70% of designated factories and buildings submit six-month energy consumption reports on their energy consumption and conservation.	1. At present, the target rate i.e. 80% is almost achieved. It will be achieved surely after 3 years. Assignment rate of PRE was 37% on the designated factories and 77% on the designated buildings respectively in 2001, which were the base line before starting the project. The latest data as of 2005 show the assignment rate is 77% on factories and 84%on buildings. 2. It is anticipated that the submission rate of the six-month reports will be more than 70% in 3 years. It shows 63% on factories and 66% on buildings in the data of first half of 2004.
Project Purpose High-quality PRE education system is set up.	By 2005, state examination system for PRE is available and accepted by the business sectors.	- Pilot Training Courses& Examinations (Senior PRE, Conventional PRE, Mini-Plant) were conducted from October 11, 2004 to February 19, 2005. There were 572 participants for Training Courses and 683 participants for Examinations. Details are shown in ANNEX17. - National qualification has not been approved for both Senior PRE and Conventional PRE. Only "PRE" is described as national qualification in ENCON Act. - It is planned that Conventional PRE Training Course becomes compulsory one for PRE, instead of 3 Block Training. Regarding Senior PRE Training Course, it depends on the evaluation from industrial sector from now on.

Output 0. Management system for Practical Energy Management Training Center is established	By 2005: 0-1Personnel, budgets and facilities for the Center are secured.	0-1 Personnel, budgets and facilities for the Center are properly secured. ANNEX10 shows C/P personnel, and ANNEX12 shows budgets from Thai side. 0-1 Facilities for the Center such as the office spaces for the Project, the building for Mini-Plant Training, and so on were properly prepared along with the R/D.
1. State Examination system for PRE is prepared.	1-1A guideline for state PRE-examination is established and disseminated.	1-1 A guideline for state PRE-examination was established and used in Pilot Trainings & Examinations.
	1-2A state examination committee is organized and functioned.	1-2 Organization for implementing Examinations was organized and functioned in Pilot Trainings & Examinations
	1-3Draft(s) of state PRE-examination is made and revised to meet objectives and situations.	1-3 The examination was made and used in Pilot Trainings & Examinations.
2. PRE-exam training courses are established.	2-1C/P is able to operate the machinery and equipment without assistance by Japanese experts.	2-1 On Questionnaire and Hearing Survey, all C/P who are in charge of operation of Mini-Plant answer that they are able to operate the machinery and equipment without assistance by Japanese experts. They have experience at least one time to operate the machinery and equipment in Pilot Implementation of Training Course & Examinations.
	2-2Curricula for PRE-exam training courses are established.	2-2 Curricula for PRE-exam training courses were established and used in Pilot Trainings & Examinations.
	2-3Training materials for PRE-exam training courses are prepared.	2-3 Training materials for PRE-exam training courses were prepared and used

		in Pilot Trainings & Examinations.
3. Implementing structure of PRE-exam training is established.	3-1Curriculum for an instructor's training course is established.	3-1 Trainers (including instructors) Training was conducted in September and October, 2004. Curriculum for an instructor's training course was established and used in Trainers Training. On Questionnaire Survey and Hearing Survey, most of the instructors evaluate Trainers Training good or excellent, but some of them comment that the curriculum is almost same as the one of PRE training courses.
	3-2Training materials for instructor's training courses are prepared.	3-2 Training materials for instructor's training courses were prepared and used in Trainers Training.
	3-3PRE-exam training courses and state PRE-examination for PRE are implemented at least once on trial base.	3-3 Pilot Trainings & Examinations (Senior PRE: 6 times, Conventional PRE: 6 times, Mini-Plant: 12 times) were conducted from October 11, 2004 to February 19, 2005.
4. Follow-up system for PRE is proposed.	4-1A plan for continuously updating the knowledge of PRE is proposed.	4-1, 4-2 Seminars for Follow-up system for PRE were held in July, 2004 and January, 2005. A plan for continuously updating the knowledge of PRE and disseminating the latest information of energy conservation was discussed in the seminar. They were summarized and proposed to DEDE/TD in February, 2005.
	4-2A plan for disseminating the latest information of energy conservation is proposed.	

Activities	Inputs	
0-1Allocating personnel	R/D	Result
0-2Clarifying each task and function.	JAPAN	JAPAN
0-3Elaborating annual working and budgetary plan.	Personnel Long-term Expert - One Chief Advisor	Personnel Long-term Expert: 4 persons - One Chief Advisor
0-4Setting-up and conducting public relations of the Project.	- One Project Coordinator - One State Examination System Expert	- One Project Coordinator - One State Examination System Expert
1-1Establishing the framework of state examination system for PRE.	- One Training Course Expert Short-term Expert Dispatched to complement when needed.	- One Training Course Expert Short-term Expert: 20 persons
1-2Organizing an examination committee.(pilot phase)	Training of C/P in Japan Approx. three (3) personnel per year	Training of C/P in Japan: 16 persons
1-3Preparing of draft(s) of the contents of examination.	Machinery and Equipment Training Equipment	Machinery and Equipment: Approx. 194 Million Yen (70 Million Baht)
2-1Installing and maintaining practical training facilities.		Training Equipment Local Cost: Approx. 7,869,000 Baht
2-2Preparing demand-reflected curricula of PRE-exam training courses.	THAILAND Personnel DEDP Officials	THAILAND Personnel (Management C/P) DEDE Officials: 7 persons
2-3Preparing training materials for training courses (Lecture and Practice) based on the state PRE-examination system.	ECCT Staff Land, Building and Facilities - Office space and necessary facilities for the Japanese experts	ECCT Staff: 4 persons Personnel (Technical C/P): 22 persons Land, Building and Facilities - Office space and necessary facilities for the Japanese experts
3-1Developing and preparing a training course for instructors.	- Office space and necessary facilities for the Thai counterparts personnel	- Office space and necessary facilities for the Thai counterparts personnel
3-2Implementing a training course for instructors.	- Buildings, facilities and space necessary for the installation and operation of the machinery,	- Buildings, facilities and space necessary for the installation and operation of the machinery, equipment
3-3Implementing	equipment and materials to be	and materials were provided by the

PRE-exam training courses and a state PRE examination on trial base. 4-1Proposing a plan for continuously updating the knowledge of PREs 4-2Proposing of a plan for disseminating the latest information of energy conservation.	provided by the Government of Japan - Warehouse for equipment - Lecturer rooms and meeting rooms necessary for the transfer of technology - Others facilities mutually agreed upon as necessary for the implementation of the project Local Cost - Adequate budget for operation of the Project - House-expense, petrol and vehicle for the experts (up to 400,000bahts)	Government of Japan - Warehouse for equipment - Lecturer rooms and meeting rooms necessary for the transfer of technology - Others facilities mutually agreed upon as necessary for the implementation of the project Local Cost - Adequate budget for operation of the Project: Approx. 23.5 Million Baht - House-expense, petrol and vehicle for the experts were sufficiently provided.

3. Detail: Evaluation Grid

3-1. Relevance

Evaluation Questions	Result of the Surveys	Remarks
1) Is the Project in line with Thailand's energy conservation policy?	-Assigning PRE for designated factories and buildings was stipulated by ENCON ACT promulgated in 1992. In order to improve the capacity of PRE, the Thai Government requested from the Japanese Government to implement this Project. -The political commitment of the Thai Government for continuous promotion of energy conservation is shown in the government policy papers such as "Primary Energy Conservation 5 Years Plan (2002-2006)", "Promotion Plan for Effective Use of Energy" etc. In fact, budget and related personnel are secured and some programs for energy conservation are implemented by DEDE. -The ministerial ordinance under ENCON ACT was revised in 2004. This revision made it possible for PRE to prepare the periodical report on energy conservation to be submitted to the Government. The level of responsibility and ability expected for PRE was increased.	+ ---------- <Meaning> ++ :Much Positive + :Positive N :Neutral − :Negative − − :Much Negative
2) Is the project in line with Japan's foreign aid policy?	-One of the four important topics of "ODA Charter" and "ODA Mid-term Plan" which shows the details of "ODA Charter" is "Effort toward Global issues" The issue on preventive measures against global warming including energy conservation is listed as one of the top priority issue. Concerning this subject, Asia is designated as top priority area. -In JICA's Country Assistance Implementation Plan for Thailand, Environmental Preservation is designated as one of the five important fields. PEMTC Project is placed as a project under Energy Management Program.	+
3) Does Japan have a technological advantage?	-The figures of energy intensity (primary energy supply/GDP) in 2002 are as follows. (Thailand: 0.45, Japan: 0.09, World Average: 0.29) Japan is the country which achieved world first-class energy conservation level. -The qualified person for energy management in Japan is certified in national qualification. To be certified in national qualification in Japan shows that the person certified is guaranteed to have a certain level of high technique.	++

4) Is the target group of the project i.e. PRE, adequate?	-On questionnaire survey, 90% of PRE replied that educational system by the Government is necessary. - On questionnaire survey, 92% of PRE and 86% of Owners & Managers replied that PRE should become main actor for energy conservation in Thailand. -On questionnaire survey, 81% of PRE and 70% of Owners & Managers replied that to train inside human resources of factories is more effective way to promote energy conservation than to train outside human resources. - On hearing survey, several persons said that promotion of energy conservation should be done not only by PRE but also by Owners & Managers as well as by other related persons. PRE will become the main actor for energy conservation but other related persons effort is indispensable. - As for the Mini-Plant course, the number of trainees becomes 1029, on the assumption that trainees are from 1st & 2nd year designated factories and one trainee from one factory. This course can accept 20 trainees at one time. It is possible to accept about 200 persons per year. Consequently, it will take about 5 years to complete the training of all the trainees. The lecture course of Senior PRE and Conventional PRE can accept many more persons. (more than 100persons at one time)	+

3-2. Effectiveness

Evaluation Questions	Result of the Surveys	Remarks
1) Is the project purpose achieved?	- See "Achievement of the Plan". (Supplementary data and information are as follows) - On Questionnaire Survey, all TD managers answered the project purpose is achieved. - On Questionnaire Survey and Hearing Survey, more than 80% of Thai C/Ps concerned i.e. TD managers, BERC managers, and Mini-Plant Training Lecturers & Instructors answered "adequate" for the project term. However, some people did "too short". About half indirect Thai C/Ps i.e. Senior PRE Training Lecturers and Conventional PRE Training Lecturers answered the term is not adequate. - The outcome of the project such as Training Courses & Examinations and PRE Supporting System was tested only once in the project term. To contribute to energy conservation in Thailand, It should be evaluated from industrial sector and developed more from now on.	+
2) Is the output of the project high quality?	- The quality of Senior PRE and Conventional PRE Training Course will be developed in future by more pilot implementation and revise, and after that, they will become the final version. The proper evaluation should be done at that time. However, within the present situation, we could evaluate that they are mostly adequate because of following reasons. a) It is found in the evaluation conducted by Thammasat University Research & Consultancy Institute in 2004 that Senior PRE and Conventional PRE Training Course are better than former training i.e. 3 Block Training from the viewpoint of quality, and also they are in line with the needs from industrial sector b) The consultant who conducted the evaluation of Pilot Implementation of Training Courses & Examinations evaluated that the quality of them is mostly adequate. c) From Questionnaire Survey, follows are found. [Examinations] - 73% of PRE answered difficulty is adequate, and 20% of them answered "Very difficult" or "Difficult". 67% of them answered the technical level is enough to promote energy conservation in respective factories actually.	N

	- 85% of Mini-Plant lecturers & Instructors and 76% of Senior PRE and Conventional PRE Training Lecturers evaluate "Excellent" or "Good" for Examinations. [Training Courses] - Regarding training Course and its curriculum, 71% of PRE, 92 % of Mini-Plant lecturers & Instructors and 90% of Senior PRE and Conventional PRE lecturers evaluate "Excellent" or "Good" for overall quality of Training Courses. - 80% of PRE who participate Training Courses answered that they have enough skill to promote energy conservation in respective factories. [Quality of Instructors & Lecturers] - 64% of PRE evaluated "Excellent" or "Good" and 26% of them did "Not so good" or "Bad" for Trainers quality. - 97% of Trainers answered that they have enough ability to manage Training Courses. - All C/P who were in charge of operation of Mini-Plant answered that they were able to operate the machinery and equipment without assistance by Japanese experts.	
3) Are there factors that inhibited or contributed to achieve the project purpose?	- Because the oil price went up during the project term, awareness rising on energy conservation would be promoted among the factories and buildings owners, managers, and PRE.	+

3-3. Efficiency

Evaluation Questions	Result of the Surveys	Remarks
1) Are the five outputs achieved?	- See "Achievement of the Plan". (Supplementary data and information are as follows) - On Questionnaire Survey, all Thai technical C/Ps answered that the Project contributed to rise their technical level on energy conservation.	++
2) Seen from the achieved output, were the quality (spec of provided machinery and materials, expertise of Japanese experts etc.) , quantity, and timing of the input appropriate?	[Overall] - On Questionnaire Survey, all Thai C/Ps evaluate "Excellent" or "Good" for efficiency of the project activities. - No overall remarkable inefficiency has been observed. [Mini-Plant] - Installation of Mini-Plant was efficiently conducted almost on schedule. It tends to be done behind the schedule in the example of similar JICA project. However, in this Project, The timing between construction of building for Mini-Plant by Thai side and procurement of Mini-Plant by Japanese side was much efficient. - On hearing survey, it was commented that if there were additional equipment which is commonly used in respective factories in Thailand such as air conditioner and chiller system, and so on in Mini-Plant, DEDE/TD could implement Mini-Plant Training Course more efficiently. - Some machinery for measurement attached Mini-Plant and its spare parts can be procured only from Japan. Thai side will have to order them to Japan after the Project. [Others] - The regular meeting has been held between Thai side and Japanese side once in a week. It has helped mutual understanding about the situation of the Project and contributes to manage the Project efficiently.	+

3-4. Impact

Evaluation Questions	Result of the Surveys	Remarks
1) Will the overall goal be achieved?	- See "Achievement of the Plan". (Supplementary data and information are as follows) [Submission rate of the Target & Plan] - Concerning the Target & Plan reports, the submission rate is 34 % for the designated factories and 28% for the designated buildings as of 2005. - Under the amended ministerial ordinance concerned which will be enacted in April 2005, preliminary and detailed audits are not required before submitting the Target & Plan and the procedure becomes simple. Therefore, it is foreseen that the submission rate will increase from now on. In addition, the outcome of the project will also contribute to increase it. [Other] - On Questionnaire Survey, there are many opinions that subsidy for the investment from the government is needed to promote more energy conservation in Thailand in addition to the outcome of the Project.	N
2) Will Senior PRE and Conventional PRE become the main actors to promote energy conservation in Thailand?	[Legislative factor] - From the viewpoint of the quantity, assignment rate of PRE was 37% on the designated factories and 77% on the designated buildings respectively in 2001, which were the base line before starting the project. The latest data as of 2005 shows the assignment rate is 77% on factories and 84% on buildings. However, from the viewpoint of the quality, the required technical level of PRE does not change compare to before the implementation of the Project. Person who fulfills designated conditions in ENCON ACT such as the qualification of bachelor for industrial technology and 3 years experience in the factory can become PRE easily. There has not been the regulation about Senior PRE and Conventional PRE Training Course. - On the other hand, if Ministry of Energy permitted, DEDE/TD could make Senior PRE and Conventional PRE Training Courses compulsory one for PRE without changing the law. It depends on further evaluation for both the capability of Senior PRE and Conventional PRE and the quality of their Training Courses. - From April, 2005, the ministerial ordinance regarding energy conservation	N

	will be changed. In this new ordinance, everyone will be permitted to conduct energy audit in respective factories. It also means PRE has a possibility to become the auditor. The audit report may require an endorsement by a qualified person. [Technical Factor] - PRE can gain practical energy management technology through participating Training Courses & Examinations established by the Project. However for conducting energy audit prescribed in ENCON ACT, Training Courses and Examinations are not enough for PRE. Auditors must have enough experience and technology regarding energy conservation, and these are not gained by only 5 days Training Course. Senior PRE or Conventional PRE has to gain these by practice in respective factories after participating Training Courses. - Aftercare system and/or supporting system for Senior PRE and Conventional PRE has been proposed, but not released yet. - In the present situation, the positions of PRE in designated factories are generally not high enough to recommend promotion of energy conservation toward owner and/or managers.	
3) Is there any other impacts except overall goal?	- On Questionnaire Survey, 89% of PRE answered that they got more motive to promote energy conservation through participating Pilot Implementation of Training Courses and Examinations. - Many kinds of seminars were conducted in the Project. In total, the 1600 people participated. In addition, the pamphlet of the Project was made and distributed among people concerning energy conservation. These activities made the Project famous and raised awareness on energy conservation in industrial sector in Thailand. - On hearing survey, the text of Senior PRE Training Course is used to find energy conservation items in hearing target factory. - No negative impacts are observed.	++

3-5. Sustainability

Evaluation Questions	Result of the Surveys	Remarks
1) Will there be needs for Training Courses & Examinations and PRE support system from now on?	- On Questionnaire Survey, 79% of PRE expected business sectors in Thailand will accept Examinations & Training Courses. 94% of them expected the number of participants will increase more in future.73% of them answered that Training Courses & Examinations are essential for energy conservation promotion in Thailand. - On Questionnaire Survey, 86% of Owners & Managers answered that their factory will be able to promote energy conservation more in future. - Most of the Thai C/Ps agreed on Senior PRE should be approved as national qualification.	+
2) Will DEDE be able to continue to manage Training Courses & Examinations and PRE support system?	[Financial and Administrative Sustainability] - DEDE/TD has a plan to train 5,000 Conventional PRE and 600 Senior PRE in the next 5 years. The budget has already been secured. [Technical Sustainability (Trainer, Curriculum, Text, Examination)] - DEDE/TD is managing many kinds of training courses, and training about 4,000 people per year in respective fields. Senior PRE and Conventional PRE Training Course are one of them. DEDE/TD has already had many connections to reliable universities, consultant, and so on. Training Courses & Examinations will be implemented by these organizations. They can assign candidates of lecturers for Training Courses and the persons who have ability to revise its curriculums, texts, and examinations. - Regarding Mini-Plant Training, instructors have had ability to operate Mini-Plant, due to the trainers trainings implemented by JICA Experts in the Project. All of them are DEDE/TD technical staff, so they will continue the present job for a long time from now on. Even if the staff changed, it seems that DEDE/TD could train new technical staff. Because, Instructors manuals have already been prepared and implementing structure of trainers training have also been established. [Technical Sustainability (Machinery and Equipment)] - There are 4 technical staffs (heat:2, electricity:2) to maintain Mini-Plant. These staffs have enough ability to conduct small scale maintenance and have sufficient knowledge to contract out about large scale maintenance. - There are spare parts of Mini-Plant provided by JICA at present. For future, DEDE/TD considered to get a budget for them from 2006.	+

V. CONCLUSION

1. Overall Conclusion

In conclusion, the project has been successfully implemented and will achieve its Project Purpose by the end of the Project period. Although some small problems were observed, the Project has tried to solve them by taking flexible measures. Thai side has shown strong ownership on the Project and appears to have capability to pursue the outcome of the Project from now on.

Though the Project is ended, Thai side should continue to improve the training program and enhance the roles of Senior PRE and Conventional PRE to meet the long term objective of energy conservation promotion in Thailand. The Project is only the first step of this long term goal. As the first step, the outcome of the Project is evaluated as "successful".

2. Completion of the Project

As it is described above, though this project itself is just the primary stage of overall energy conservation program of Thailand, it was concluded that the project has been successfully implemented. Based on this recognition, both Japanese and Thai sides confirmed that this project will be completed in April, 2005 as scheduled. Through the questionnaire survey and interview survey and so on, big contribution made by the Japanese experts and strenuous effort made by the Thai C/Ps and related persons were confirmed.

VI. RECOMMENDATION

1. Recommendation for Achievement of the Overall Goal

From the result of the Evaluation, it is deemed that there will be many participants to Senior PRE Training Course and Conventional PRE Training Course constantly because of the needs to improve energy management skills through the Training Courses are quite substantial from industrial sector. Therefore to operate Training Courses many times per year with full participants could be done.

However, the overall goal of establishment of Training Courses is not only to continue to operate but to contribute to the promotion of energy conservation in Thailand. That means, trained PRE have to become main actor on energy conservation promotion in respective factories. Moreover, they have to get ability to conduct energy audits and submit the reports including six month report and Target & Plan to the government.

To achieve the overall goal, more efforts of Thai government will be required from now on. From the technical aspect, contents regarding energy audits should be added to present curricula of Training Courses. PRE Supporting system should be developed and implemented as soon as possible to support PRE conducting energy conservation activities in respective factories. From a legislative aspect, Senior PRE Training Course and Conventional PRE Training Course should become official training courses for PRE instead of 3 Block Training by the ministerial ordinance.

The Evaluation Team confirmed that DEDE/TD and other Thai agencies have already had a plan in above mentioned direction. The Evaluation Team recommended them to continue the plan to achieve the overall goal.

2. Recommendation for Sustainability of the Project

- To ensure the continued operation of Mini-Plant, efficient management system regarding spare parts and additional equipment of Mini-Plant needs to be established.
- Implementation of Trainers Training should be continued.
- Effort should be made to minimize the occurrence of equipment troubles and breakdowns by carrying out regular maintenance, according to the completed manuals of Mini-Plant.
- Communication between DEDE and JICA should be continued to update information. This will help expedite the process, if DEDE is requesting a new project.

3. Recommendation for Upgrading of Practical Knowledge and Skill for PRE

(1) Energy Efficiency Standards and Energy Conservation Manual (Handbook)

It is recommended to develop and release energy efficiency standards for energy consuming equipment commonly used in factories and buildings such as boiler, furnace, transformer, motor, electric heater. In addition, it is recommended to prepare energy conservation manual (or handbook) explaining good energy management practices and methods. The handbook shall incorporate practical data, figures, tables and tools for heat/ electricity management to use at factories or buildings. These standard and manual not only help PRE take appropriate actions for energy conservation at factories or buildings but also improve the quality of Target & Plan as well as increase submission rate in future.

(2) Training Curricula and Textbooks

From the surveyed results, it can be concluded that the curricula and textbook are appropriate and detail enough. However, current successful case studies should be added to the materials to make them more beneficial. Moreover, indices of important keywords should be added as references for PRE.

VII. LESSONS LEARNED

Following lessons are derived from the Project.

- Energy conservation policy in Thailand should be carried out by Japanese side prior to the project implementation rather than within the Project. It is important that both sides reach the mutual understanding regarding the policy around the Project.
- The strong ownership of C/P organization is essential for the successful implementation of the project.
- Securing necessary and suitable JICA Experts, C/Ps as well as supporting staff and funding, is essential to achieve efficient project implementation.
- The sustainability of the project could be secured even if the C/Ps were not government staff but outside consultants. This approach needs the establishment of permanent and continuous system in addition to the technology transfer from JICA Experts to C/Ps.

LIST OF ANNEXES

PDM (Project Design Matrix)

ANNEX-1

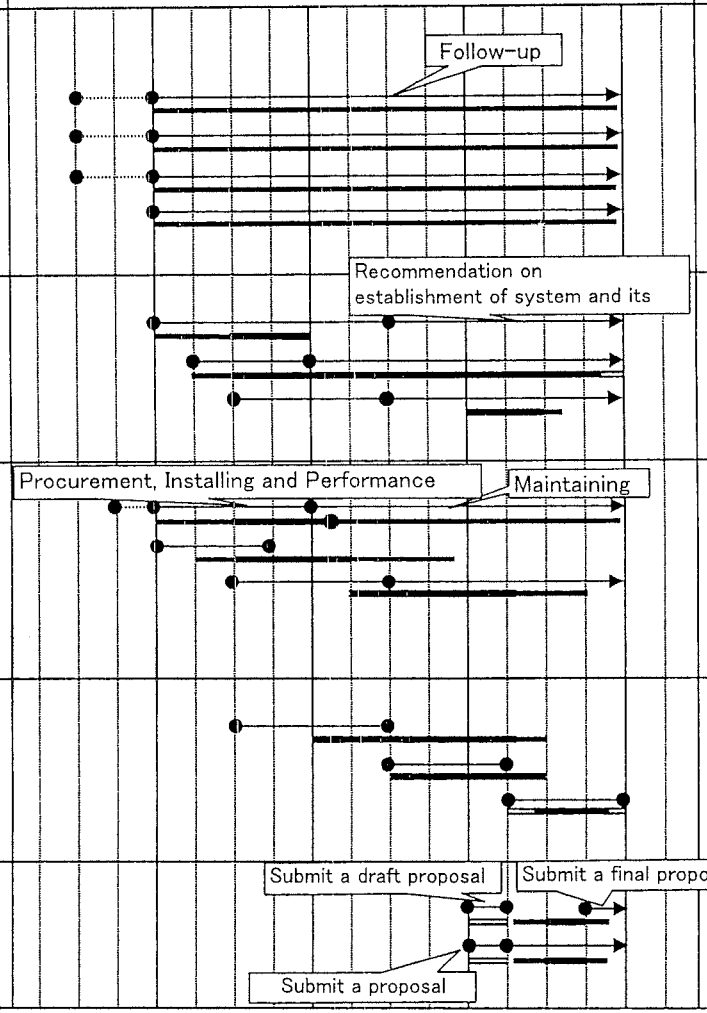
Project Title: "The Project on Practical Energy Management Training Center" Project Period: April 15, 2002 – April 14, 2005)

Target Places: Bangkok Target Group: PRE and Energy Consultants

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
(Overall Goal) Energy management in designated factories and buildings is effectively executed to meet the objective of the ENCON Act.	• By 2008, more than 80% of designated factories and buildings assigns PRE. • By 2008, more than 70% of designated factories and buildings submits six-month energy consumption reports on their energy consumption and conservation.	• Reports of DEDP • Six-month energy consumption reports submitted by designated factories and buildings	a.Related factories and buildings comply with the new regulations.
(Project Purpose) High-quality PRE education system is set up.	• By 2005, state examination system for PRE is available and accepted by the business sectors.	• Reports of DEDP • Interviews and questionnaires to designated factories and buildings	b.Governmental policy is not changed drastically. c.Related factories and buildings as well as Energy Consultants do not protest.
(Outputs) 0. Management system for Practical Energy Management Training Center is established. 1.State Examination system for PRE is prepared. 2.PRE-exam training courses are established. 3.Implementing structure of PRE-exam training is established. 4.Follow-up system for PRE is proposed.	By 2005: 0-1Personnel, budgets and facilities for the Center are secured. 1-1A guideline for state PRE-examination is established and disseminated. 1-2A state examination committee is organized and functioned. 1-3Draft(s) of state PRE-examination is made and revised to meet objectives and situations. 2-1C/P is able to operate the machinery and equipment without assistance by Japanese experts. 2-2Curricula for PRE-exam training courses are established. 2-3Training materials for PRE-exam training courses are prepared. 3-1Curriculum for an instructor's training course is established. 3-2Training materials for instructor's training courses are prepared. 3-3PRE-exam training courses and state PRE-examination for PRE are implemented at least once on trial base. 4-1A plan for continuously updating the knowledge of PRE is proposed. 4-2A plan for disseminating the latest information of energy conservation is proposed.	0Annual reports of Practical Energy Management Training Center 1A guideline for PRE-state examination, a regulation for national examination committee, draft(s) of examination 2Project reports, list equipment and maintenance record, curricula and training materials for PRE-training courses 3Project reports, curricula and training materials for instructor's training courses. Reports of implementation of training courses 4Proposals to DEDP	d.National budget is properly allocated. e.Personnel who participated in the training courses work as PRE.
(Activities) 0-1Allocating personnel 0-2Clarifying each task and function. 0-3Elaborating annual working and budgetary plan. 0-4Setting-up and conducting public relations of the Project. 1-1Establishing the framework of state examination system for PRE. 1-2Organizing an examination committee.(pilot phase) 1-3Preparing of draft(s) of the contents of examination. 2-1Installing and maintaining practical training facilities. 2-2Preparing demand-reflected curricula of PRE-exam training courses. 2-3Preparing training materials for training courses (Lecture and Practice) based on the state PRE-examination system. 3-1Developing and preparing a training course for instructors. 3-2Implementing a training course for instructors. 3-3Implementing PRE-exam training courses and a state PRE examination on trial base. 4-1Proposing a plan for continuously updating the knowledge of PREs 4-2Proposing of a plan for disseminating the latest information of energy conservation.	**Inputs** JAPAN **Personnel** Long-term Expert - One Chief Advisor - One Project Coordinator - One State Examination System Expert - One Training Course Expert Short-term Expert Dispatched to complement when needed. **Training of C/P in Japan** Approx. three (3) personnel per year **Machinery and Equipment** Training Equipment	THAILAND **Personnel** DEDP Officials ECCT Staff **Land, Building and Facilities** - Office space and necessary facilities for the Japanese experts - Office space and necessary facilities for the Thai counterparts personnel - Buildings, facilities and space necessary for the installation and operation of the machinery, equipment and materials to be provided by the Government of Japan - Warehouse for equipment - Lecturer rooms and meeting rooms necessary for the transfer of technology - Others facilities mutually agreed upon as necessary for the implementation of the project Local Cost - Adequate budget for operation of the Project - House-expense, petrol and vehicle for the experts (up to 400,000bahts)	f.Personnel who participated in the training courses work as PRE. g.Provided equipment and machinery pass the customs without delay. (Pre-conditions) ・DEDP maintains prestige as the leading department for energy conservation. ・High interests are shown in energy conservation.

Plan of Operation (2002.4-2005.3) **Project on Energy Management Training Center in the Kingdom of Thailand**

Calendar Year	2002	2003	2004	2005		
Japanese Fiscal Year	2001	2002	2003	2004	2005	Responsible Person	Input
Quarter	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2		Japanese Side / Thai Side
Activities							
0. Management system for Practical Energy Management Training Center is established							
0-1 Allocating personnel						PM	LE / CP
0-2 Clarifying each task and function						PM	LE / CP
0-3 Elaborating annual working and budgetary plan						PM	LE / CP
0-4 Setting-up and conducting public relations of the Project						PM	CA, LE / CP
1. State examination system for PRE is prepared							
1-1 Establishing the framework of state examination system for PRE						PD	LE / CP
1-2 Organizing an examination committee (pilot phase) <to be reorganized>						PD	CA, LE / CP
1-3 Preparing draft(s) of the contents of examination						PD	LE, SE / CP
2. Pre-exam training courses are established							
2-1 Installing and maintaining practical training facilities						PM	LE, SE / CP
2-2 Preparing demand-reflected curricula of pre-exam training courses						PM	LE / CP
2-3 Preparing the training materials for the training courses (Lecture and Practice) based on the state examination system						PM	LE, SE / CP
3. Implementing structure of pre-exam training is established							
3-1 Developing and preparing a training course for instructors						PM	LE, SE / CP
3-2 Implementing a training course for instructors						PM	LE, SE / CP
3-3 Implementing pre-exam training courses and an examination for PREs on trial base						PM	LE, SE / CP
4. Follow-up system for PRE is proposed							
4-1 Proposig a plan for continuously updating the knowledge of PREs						PM	LE / CP
4-2 Proposing a plan for disseminating the latest information of energy conservation						PM	LE, SE / CP



Thai Side : PD-Project Director, PM-Project Manager, CP-Counterpart personnel

Japanese Side : CA-Chief Advisor, PC-Project Coordinator, LE-Long Term Expert, SE-Short Term Expert

Original Schedule
Achieved
Revised Schedule

Chronological Review of the Project

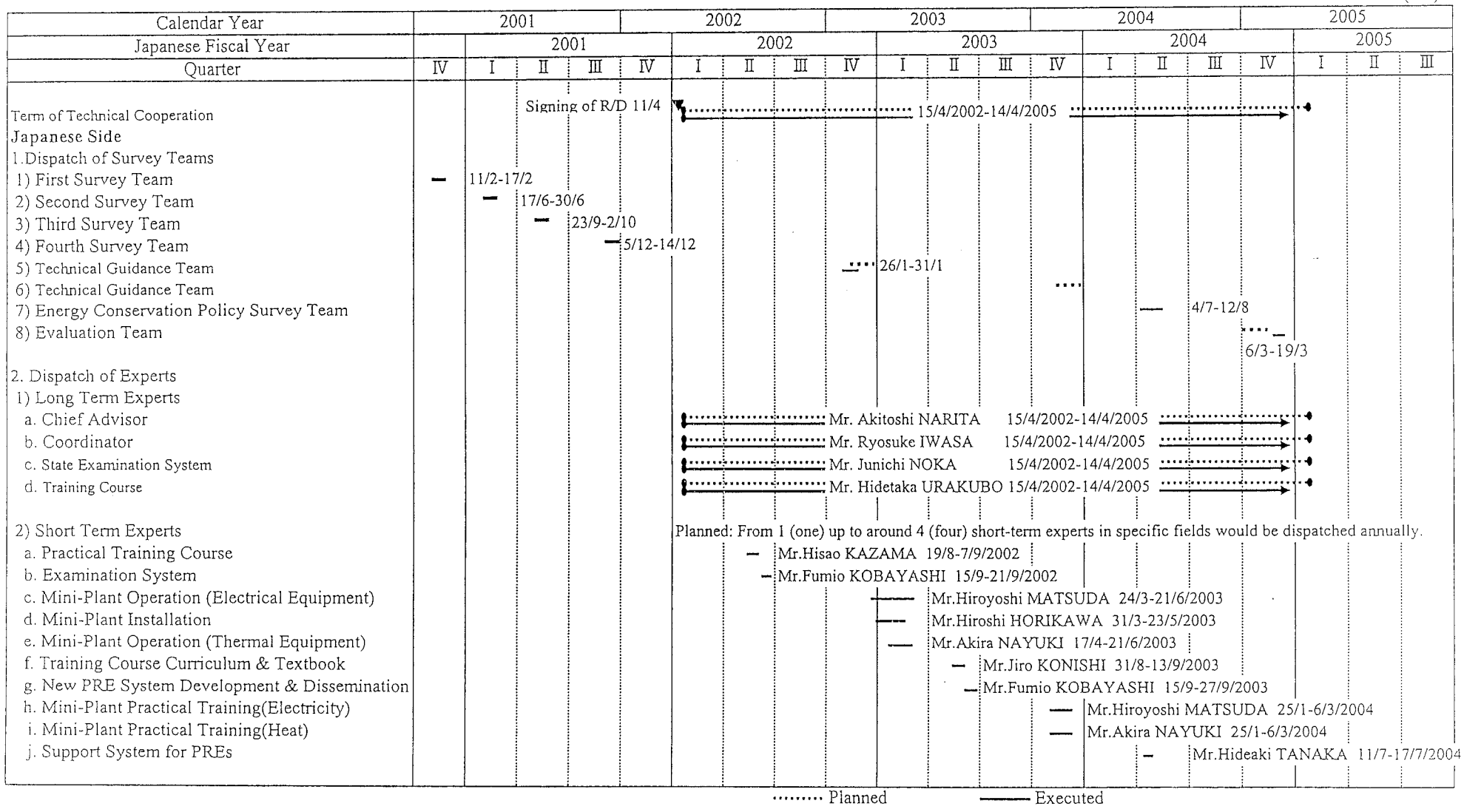
As of March 2005

Year	Date/Period	Event
2001	February 11- 17	Dispatch of Fist Survey Team
	June 17 - 30	Dispatch of Second Survey Team
	Sep. 23 - 2 Oct.	Dispatch of Third Survey Team
	December 5 - 14	Dispatch of Fourth Survey Team
2002	April 11	Signing of R/D
	April 15	Start of Project-type Technical Cooperation
		Dispatch of 4 Japanese Long-term Experts
	July 22	Press Briefing on PEMTC Project
	Aug. 19 - Sep. 7	Dispatch of Short-term Expert (Mr. H KAZAMA)
	September 15 - 21	Dispatch of Short-term Expert (Mr. F KOBAYASHI)
	October	Completion of Energy Conservation Building(EC Building)
		Start of Mini-Plant Building Construction
	Oct. 20 - Nov. 30	C/P Training in Japan (3 Thai C/P)
	Feb. 16 - Mar. 1	C/P Training in Japan (3 Thai C/P)
	March 9 - 15	C/P Training in Japan (2 Thai C/P)
2003	January 26 – 31	Dispatch of Technical Guidance Team
	February	Removal of TD and Project Office to EC Building
	February 7	1st JCC Meeting
	March	Production of PEMTC Project Pamphlet (5,000 copies)
	March 21	1st Seminar (Introduction to New PRE System)
	Mar. 24 - Jun. 21	Dispatch of Short-term Expert (Mr. H MATSUDA)
	Mar. 31 – May 23	Dispatch of Short-term Expert (Mr. H HORIKAWA)
	April	Signing of Contract with ECCT for Project Management
		Completion of Mini-Plant Building
		Installation of Machinery and Equipment Provided by JICA
	Apr. 17 - Jun. 21	Dispatch of Short-term Expert (Mr. A NAYUKI)
	May 19 – Jun. 19	1st Mini-Plant Training Course Trainer's Training
	Jul. 13 - Aug. 9	C/P Training in Japan (3 Thai C/P)
	July 18	2nd Seminar (Introduction to New PRE System)
	Jul. 21 - Aug. 2	C/P Training in Japan (1 Thai C/P)
	Aug. 31 - Sep. 13	Dispatch of Short-term Expert (Mr. J KONISHI)
	September	Production of CD for Introduction to PEMTC (1,000 copies)
	September 15 -27	Dispatch of Short-term Expert (Mr. F KOBAYASHI)
	September 22 - 24	Workshop on Establishment of PEMTC Organization
	September 26	3rd Seminar (Introduction to New PRE System)
	October 29 – 31	1st Supplementary Training in Mini-Plant Operation
	November 26 - 28	2nd Supplementary Training in Mini-Plant Operation

Year	Date/Period	Event
	December 19	4th Seminar (Introduction to New PRE System)
2004	January	Installation of Boiler Water Treatment System Provided by JICA
	Jan. 25 - Mar. 6	Dispatch of 2 Short-term Experts (Mr. MATSUDA/ Mr. NAYUKI)
	February 2 - 27	2nd Mini-Plant Training Course Trainer's Training
	March 5	5th Seminar (Introduction to New PRE System)
	May 21	2nd JCC Meeting
	May 28	6th Seminar(Introduction to New PRE System)
	Jul. 4 - Aug. 12	Dispatch of Energy Conservation Policy Survey Team
	July 11 – 17	Dispatch of Short-term Expert (Mr. H TANAKA)
	July 13 - 14	1st Workshop on PRE Supporting System
	September 6 – 10	Senior PRE Training Course Trainer's Training
	September 20 - 25	1st Mini-Plant Training Course (Heat & Electricity)
	October 4 - 8	Conventional PRE Training Course Trainer's Training
	October 11 - 16	1st Senior PRE Training Course (Heat & Electricity)
		1st Conventional PRE Training Course (Factory & Building)
	November 1 - 6	2nd Mini-Plant Training Course (Heat & Electricity)
		2nd Senior PRE Training Course (Electricity)
		2nd Conventional PRE Training Course (Factory)
	November 8 - 13	3rd Mini-Plant Training Course (Heat & Electricity)
		3rd Senior PRE Training Course (Heat)
		3rd Conventional PRE Training Course (Factory)
	November 15 - 20	4th Mini-Plant Training Course (Heat & Electricity)
		4th Senior PRE Training Course (Electricity)
		4th Conventional PRE Training Course (Building)
	November 22 - 27	5th Mini-Plant Training Course (Heat & Electricity)
	December 16	7th Seminar (PRE Development in 2005 for Sustainable Energy Conservation)
2005	January 13 - 14	2nd Workshop on PRE Supporting System
	January 14	1st Senior PRE Examination(Heat & Electricity)
	February 2	2nd Senior PRE Examination(Heat)
	February 14 – 19	6th Mini-Plant Training Course (Heat & Electricity)
		5th Senior PRE Training Course(Electricity)
		5th Conventional PRE Training Course (Factory)
	March 6 - 19	Dispatch of Evaluation Team
	March 16	3rd JCC Meeting
		-The following are scheduled.-
	March 18	8th Seminar (PRE Development in 2005 for Sustainable Energy Conservation)
	April 14	Completion of Project-type Technical Cooperation

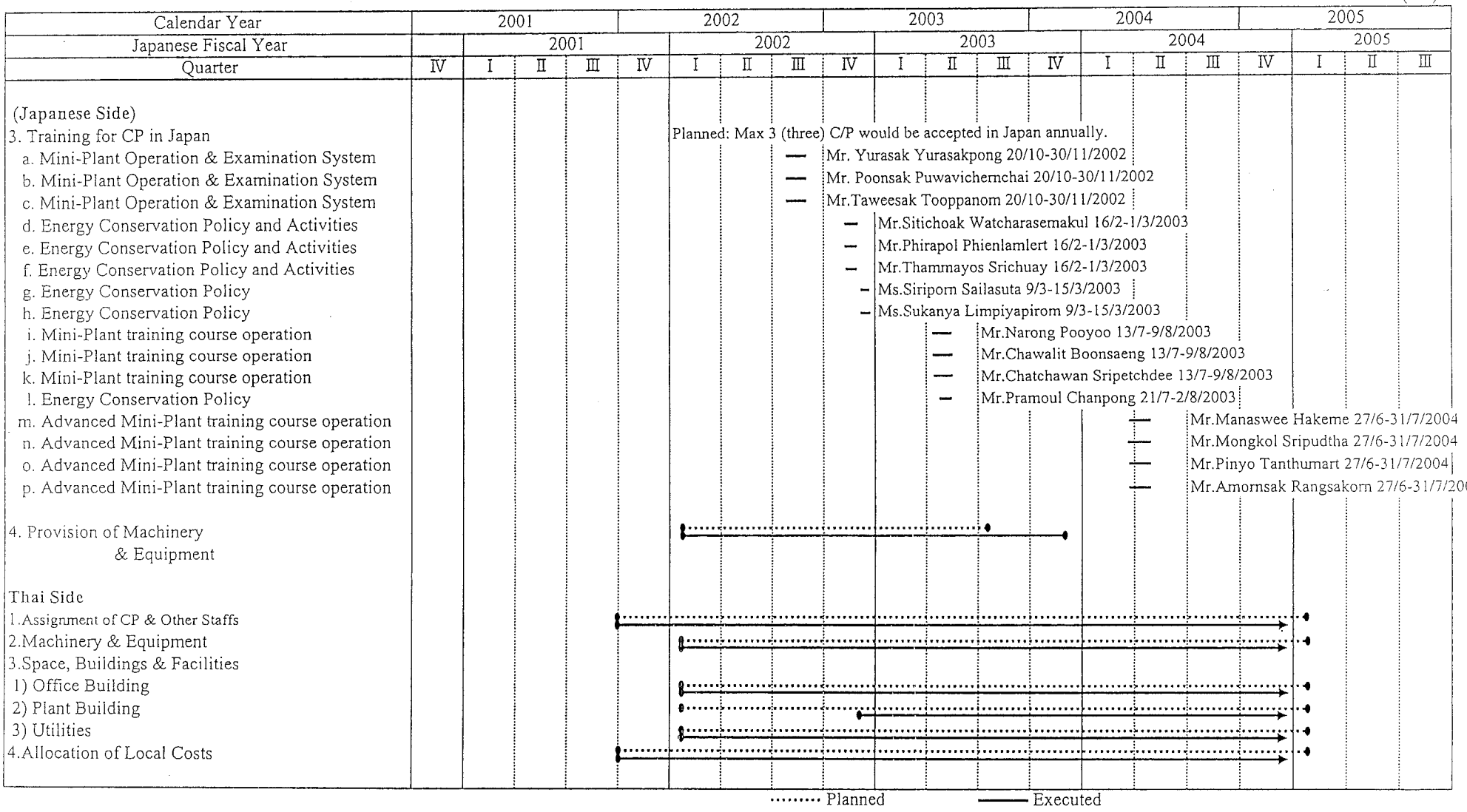
Tentative Schedule of Implementation (TSI) & Results

(1/2)



Notes:

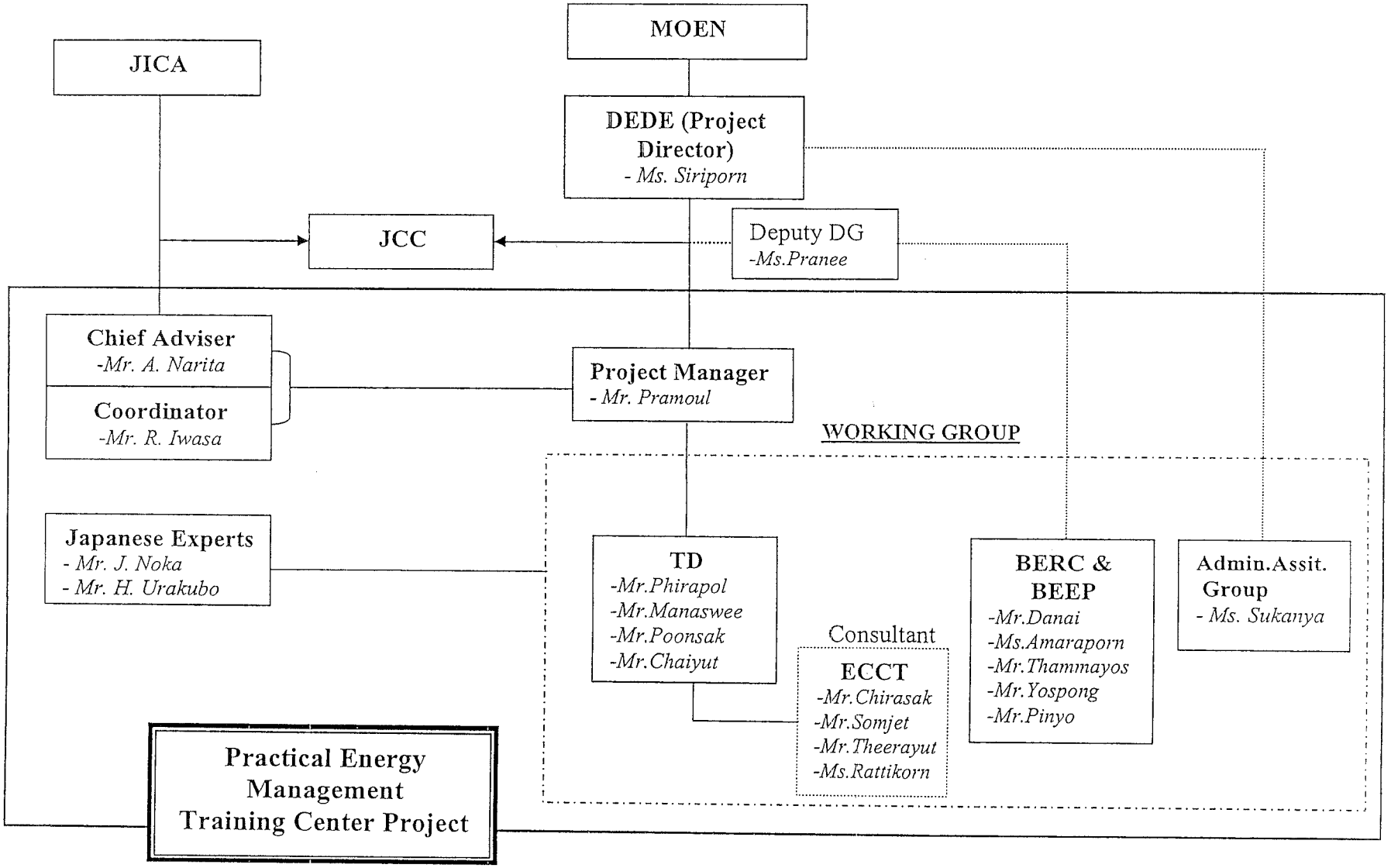
1. Japanese fiscal year starts in April and ends in March.
2. Thai fiscal year starts in October and ends in September.



Notes:

1. Japanese fiscal year starts in April and ends in March.
2. Thai fiscal year starts in October and ends in September.

Organization Chart of the Administration of the Project



List of Dispatched Japanese Experts

1.Long-term Experts (4)

Name	Field	Period
1.Mr.Akitoshi NARITA	Chief Advisor	15/04/2002---14/04/2005
2.Mr.Ryosuke IWASA	Coordinator	15/04/2002---14/04/2005
3.Mr.Junichi NOKA	State Examination System	15/04/2002---14/04/2005
4.Mr.Hidetaka URAKUBO	Training Course	15/04/2002---14/04/2005

2.Short-term Experts (10)

Name	Field	Period
1.Mr.Hisao KAZAMA	Proctical Training Course	19/08/2002---17/09/2002
2.Mr.Fumio KOBAYASHI	Examination System	15/09/2002---21/09/2002
3.Mr. Hiroyoshi MATSUDA	Mini-Plant Operation (Electrical Equipment)	24/03/2003---21/06/2003
4.Mr. Hiroshi HORIKAWA	Mini-Plant Installation	31/03/2003---21/05/2003
5.Mr.Akira NAYUKI	Mini-Plant Operation (Thermal Equipment)	17/04/2003---21/06/2003
6.Mr.Jiro KONISHI	Training Course Curriculum & Textbook	31/08/2003---13/09/2003
7.Mr.F KOBAYASHI	New PRE System Development & Dissemination	15/09/2003---27/09/2003
8.Mr.Hiroyoshi MATSUDA	Mini-Plant Practical Training (Electricity)	25/01/2004---06/03/2004
9.Mr.Akira NAYUKI	Mini-Plant Practical Training (Heat)	25/01/2004---06/03/2004
10.Mr.Hideaki TANAKA	Support System for PREs	11/06/2004---17/07/2004

List of Dispatched Japanese Study Teams

1) Fist Survey Team

Name	Field	Period
1. Mr. Masaaki KATO	Leader	11/02/2001 --- 17/02/2001
2. Mr. Mitsutoshi ORIYAMA	Technical Cooperation Planning	11/02/2001 --- 17/02/2001
3. Mr. Yasufumi SERIZAWA	Energy Management	11/02/2001 --- 17/02/2001
4. Mr. Motoo TAKI	Cooperation Planning	11/02/2001 --- 17/02/2001

2) Second Survey Team (Project Formulation Advisory Team)

Name	Field	Period
1. Mr.Kenji TOBITA	Leader	24/06/2001 --- 30/06/2001
2. Mr.Mitsutoshi ORIYAMA	Technical Cooperation Planning	24/06/2001 --- 29/06/2001
3. Mr.Junichi NOKA	Energy Management	24/06/2001 --- 30/06/2001
4. Mr.Satoshi MURAKAMI	Cooperation Planning	24/06/2001 --- 30/06/2001
5. Mr.Ryosuke SASAKI	Planning Analysis / PCM	17/06/2001 --- 30/06/2001

3) Third Survey Team (Project Formulation Advisory Team)

Name	Field	Period
1. Mr.Junichi NOKA	Leader	23/09/2001 --- 29/09/2001
2. Mr.Motoo TAKI	Cooperation Planning	23/09/2001 --- 29/09/2001
3. Mr.Kazuhiro SHIRASE	Procurement Planning	23/09/2001 --- 02/10/2001

4) Fourth Survey Team

Name	Field	Period
1. Mr.Junichi NOKA	Training Planning	05/12/2001 --- 14/12/2001
2. Mr. Yokichi UCHISHIBA	Machinery & Equipment Installation Planning	05/12/2001 --- 14/12/2001

5) Technical Guidance Team (Project Consultation Team)

Name	Field	Period
1. Mr. Masami FUWA	Leader	16/01/2003 --- 01/02/2003
2. Mr. Hiroshi SHIBUYA	Energy Conservation	16/01/2003 --- 01/02/2003
3. Ms. Masayo TERAKADO	Cooperation Planning	16/01/2003 --- 01/02/2003

6) Energy Conservation Policy Survey Team

Name	Field	Period
1. Mr. Akira ISHIYAMA	Energy Efficiency / Conservation	04/07/2004 --- 12/08/2004

7) Evaluation Team

Name	Field	Period
1. Mr. Toshio SUGIHARA	Leader	06/03/2005 --- 19/03/2005
2. Mr. Hiroshi SHIBUYA	Energy Conservation Technology	06/03/2005 --- 19/03/2005
3. Mr. Hitoshi AOYAGI	Evaluation Planning	06/03/2005 --- 19/03/2005

List of Machinery & Equipment Provided by JICA

1. Fiscal Year 2002

Description	Amount (Japanese Yen)
1. Mini-Plant for Practical Training (Steam Boiler with Soft Water System, Industrial Furnace, Steam Trap, etc.)	
2. Audio Visual Aids for Lectures (TVs, Photocopier, Multimedia Projectors, Digital Camera, Computers, Visualizers, etc.)	
3. Measuring Instruments (Ultrasonic Liquid Flow Meter, Ultrasonic Liquid Flow Meter, Air Velocity Meter, etc.)	
Yearly Total	**190,000,000**

2. Fiscal Year 2003

Description	Amount (Thai Baht)
1. Additional Soft Water System for the Boiler in the Mini-Plant	1,365,000
Yearly Total	**1,365,000**
(Exchange rate in February 2004 : 1Bhat=¥2.765)	**(= ¥3,800,000)**

Grand Total : ¥ 193,800,000

Note: The details of the above are as per attached "Machinery & Equipment List".

MACHINERY & EQUIPMENT LIST

YEAR	CODE NO.	NAME OF EQUIPMENT	MAKER	MODEL	JPN¥ VALUE	Q'TY	PLACE OF USE /STORAGE	FREQUENCY IN USE / MAINTENANCE		REMARKS
02/03	02PE401M	Furnace Facilities	SMC	Horizontal water cooling jacket	27,050,000	1	Mini-Plant Building	A	A	Including Furnace,Refractory
02/03	02PE402M	Cooling Water System	SMC		6,850,000	1	Mini-Plant Building	A	A	Including Recovery Equipment of Cooling
02/03	02PE403M	Air Pre-heater (including By-pass Duct)	SMC	Double-pipe counterflow heat	11,050,000	1	Mini-Plant Building	A	A	Including Exhaust Gas Duct & Damper (Flue)
02/03	02PE404M	Burner Training Unit (Open burner)	SMC	SSC100	2,250,000	1	Mini-Plant Building	A	A	for Furnace Traing Facilities
02/03	02PE405M	Exhaust Gas Analyzer	SHIMADZU	CGT-7000	2,300,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE406M	Oxygen Analyzer	SHIMADZU	POT-101	610,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE407M	Digital Hygrothermometer	SHINYEI KAISHA	TRH-CA	75,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE408M	Furnace Pressure Gas (Digital micromanometer)	SEIRITSU ENGINEERING	DLM1-10 Portable type	240,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE409M	Fuel Supply Unit	SMC		5,700,000	1	Mini-Plant Building	A	A	for Furnace Facilities and Boiler
02/03	02PE410M	Electric Control Panel	SMC		3,500,000	1	Mini-Plant Building	A	A	including Inverter, Rely Sequence, Meter, Switch
02/03	02PE411-412M	Tool Set	SMC		200,000	2	Mini-Plant Building	A	A	for All Equipment
02/03	02PE413-416M	Notebook Computer	IBM	No.1171-71J ThinkPad 130	495,000	4	Mini-Plant Building	A	A	for All Equipment
02/03	02PE417M	In-house Piping and Flow Meter Unit	SMC		6,540,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE418-419M	Power Cables			175,000	2	Mini-Plant Building	A	A	for Furnace and Fan Training Facilities
02/03	02PE420-423M	Data Collection System, Data Signal Connector	Kyense, Sato parts	NR-1000 and T-3025	535,000	4	Mini-Plant Building	A	A	for All Equipment
02/03	02PE424M	Blower	EBARA	No.5SMP5L(E)	1,300,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE425M	Air Compressor (Self-unload Control)	ANEST IWATA	CLD223H85D-S2 2	430,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE426M	Pre-treatment Device for Analysis	SHIMADZU	CFP8000	950,000	1	Mini-Plant Building	A	A	Including Exhaust Gas Sampling Tube for
02/03	02PE427M	Thermo Couple	YOKOGAWA	K Probes	320,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE428M	Air Pump	IWAKI CO.,LTD	APN-215NV-1	35,000	1	Mini-Plant Building	A	A	for Measuring Instrument of Furnace

N.B. PE: Provision of Equipment **EE**: Equipment for Expert **LP** : Local Purchase Equipmet with Local Cost Share
TG: Procurement with Thai Government Budget **A**: Administration **M**: Mini-plant Building

MACHINERY & EQUIPMENT LIST

YEAR	CODE NO.	NAME OF EQUIPMENT	MAKER	MODEL	JPN¥ VALUE	Q'TY	PLACE OF USE /STORAGE	FREQUENCY IN USE / MAINTENANCE		REMARKS
02/03	02PE429-430M	Surface Thermometer	YOKOGAWA	TX10-01	95,000	2	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE431-440M	Pressure Indicator			22,000	10	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE441M	Portable Calibrator	YOKOGAWA	CA100 compact cal	200,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE442M	Explosion Experiment Unit with Ignition Device			1,100,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE443M	Instrument Box	SMC		600,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE444-445M	FM Receiver	PANASONIC	RD-9522Z, RD-550Z,	900,000	2	Mini-Plant Building	A	A	for Furnace and Fan Training Facilities
02/03	02PE446M	Flow Chart	SMC		90,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE447M	Spare Parts1	SMC		60,000	1	Mini-Plant Building	A	A	for Furnace Training Facilities
02/03	02PE448M	Steam Trap Training Facilities	TLV	Steam Trap Operation	5,760,000	1	Mini-Plant Building	A	A	Including Steam Trap Testing Device,Control
02/03	02PE449M	Drain Recovery Equipment	SMC		2,600,000	1	Mini-Plant Building	A	A	for Steam Trap Training Facilities
02/03	02PE450-454M	Steam Trap Management System	TLV	TM5	900,000	5	Mini-Plant Building	A	A	for Steam Trap Training Facilities
02/03	02PE455M	Cutting Sample	TLV	A3N, SS1N, HM10, L21S	180,000	1	Mini-Plant Building	A	A	for Steam Trap Training Facilities
02/03	02PE456M	Piping and Hose	SMC		280,000	1	Mini-Plant Building	A	A	for Steam Trap Training Facilities
02/03	02PE457M	Spare Parts 2	TLV	T8N, GS(3/8″), GS(1″), J3XS, Ball	60,000	1	Mini-Plant Building	A	A	for Steam trap Training Facilities
02/03	02PE458M	Boiler Unit	MIURA	EH-500FK	3,832,000	1	Mini-Plant Building	A	A	Including Activated Cabon Filter, Water
02/03	02PE459M	Fan Training Facilities	SMC		9,330,000	1	Mini-Plant Building	A	A	Including Air Line,Various Outlet
02/03	02PE460M	Blower and Motor	EBARA, TOSHIBA	No.5SMP5L(E),HN-440-025	1,420,000	1	Mini-Plant Building	A	A	Including Thermometer for Fan Training
02/03	02PE461M	Electric Measuring Device	HIOKI	3165	740,000	1	Mini-Plant Building	A	A	for Fan Training Facilities
02/03	02PE462M	Hot-wire Anemometer	KANOMAX	6162	430,000	1	Mini-Plant Building	A	A	for Fan Training Facilities
02/03	02PE463M	Power Control Panel	SMC		3,900,000	1	Mini-Plant Building	A	A	Including Inverter for Fan Training Facilities

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TG: Procurement with Thai Government Budget **A:** Administration **M:** Mini-plant Building

MACHINERY & EQUIPMENT LIST

YEAR	CODE NO.	NAME OF EQUIPMENT	MAKER	MODEL	JPN¥ VALUE	Q'TY	PLACE OF USE /STORAGE	FREQUENCY IN USE / MAINTENANCE		REMARKS
02/03	02PE464M	Instrument Box	SMC		300,000	1	Mini-Plant Building	A	A	for Fan Training Facilities
02/03	02PE465M	Flow Chart	SMC		90,000	1	Mini-Plant Building	A	A	for Fan Training Facilities
02/03	02PE466M	Water Circulation Pump Training Facilities	SMC		10,050,000	1	Mini-Plant Building	A	A	Including Pump,Motor,Water
02/03	02PE467M	Electric Measuring Device	HIOKI	3165	1,480,000	1	Mini-Plant Building	A	A	for Pump Training Facilities (Including
02/03	02PE468M	Protable Ultra Sonic FLow Meter	FUJI	FLC-2, FLD-1	1,250,000	1	Mini-Plant Building	A	A	for Pump Training Facilities
02/03	02PE469M	Instrument Box	SMC		300,000	1	Mini-Plant Building	A	A	for Pump Training Facilities
02/03	02PE470M	Electric Control Panel	SMC		3,900,000	1	Mini-Plant Building	A	A	Including Inverter for Pump Training Facilities
02/03	02PE471M	Flow Chart	SMC		90,000	1	Mini-Plant Building	A	A	for Pump Training Facilities
02/03	02PE472M	Compressed Air Training Facilities	SMC		17,540,000	1	Mini-Plant Building	A	A	Including Compressor,Large
02/03	02PE473M	Piping (three line)	SMC		3,400,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE474M	Electric Measuring Device	HIOKI E.E. CORPORATION	3165 CLamp on Power HiTester	740,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE475M	Noise Meter (Integrating Sound Level Meter)	YOKOGAWA	LY10/LY20	200,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE476M	Silencer	SMC		900,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE477M	Instrument Box	SMC		300,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE478M	Power Control Panel	SMC		3,400,000	1	Mini-Plant Building	A	A	for Compressor Training Facilities
02/03	02PE479M	Flow Chart	SMC		90,000	1	Mini-Plant Building	A	A	for Compressed Air Training Facilities
02/03	02PE480M	Power Source Box	SMC		4,400,000	1	Mini-Plant Building	A	A	for All Equipment
02/03	02PEB4001-4002 M	Book	Operation and Training Manuals	SMC	240,000	2	Mini-Plant Building	A	A	for Furnace Training Facilities (5 Books/set)
02/03	02PEB4003-4004 M	Book	Operation Manuals (Japanese, English)	SMC	60,000	2	Mini-Plant Building	A	A	for Steam Trap Training Facilities (2 Books/set)
02/03	02PEB4005-4006 M	Book	Operation and Training Manuals	SMC	240,000	2	Mini-Plant Building	A	A	for Fan Training Facilities (3 Books/set)

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MACHINERY & EQUIPMENT LIST

YEAR	CODE NO.	NAME OF EQUIPMENT	MAKER	MODEL	JPN¥ VALUE	Q'TY	PLACE OF USE /STORAGE	FREQUENCY IN USE / MAINTENANCE		REMARKS
02/03	02PEB4007-4008 M	Book	Operation and Training Manuals	SMC	240,000	2	Mini-Plant Building	A	A	for Pump Training Facilities (4 Books/set)
02/03	02PEB4009-4010 M	Book	Operation and Training Manuals	SMC	240,000	2	Mini-Plant Building	A	A	for Compressor Facilities (3 Books/set)
02/03	02PE501-502M	Color TV 29	JVC	AV-29W83	55,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE503-504M	Video Player/Recorder	PANASONIC	NVSJ-630A	23,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE505-506M	Visualizer	VEGA	V-810	100,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE507-508M	Multi-media Projector	PANASONIC	PT-LC55E	346,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE509M	Flatbed Scanner	Hewlett Packard	4570C	37,000	1	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE510M	Digital Camera	SONY	MVC-CD300	78,000	1	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE511M	Digital 8 Video Camera	SONY	TRV740E	90,000	1	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE512-513M	Electronic Board	PANASONIC	KX-BP535G	155,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE514-515M	Projection Screen	GRANVIEW	SCP84 84X84"	29,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE516M	Digital Copier	KYOCERA MITA	KM-2530	783,000	1	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE517-518M	Notebook Computer	Hewlett Packard	EVO N1020V	271,000	2	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE519M	Color Laser Printer	Hewlett Packard	Laserjet 8550	782,000	1	Mini-Plant Building	A	A	or lecture (local purchase)
02/03	02PE520M	UPS 5000VA	LEONICS	NB5K25	266,000	1	Mini-Plant Building	A	A	for lecture (local purchase)
02/03	02PE521M	Ultrasonic Liquid Flow Meter	MICRONICS	PORTAFLOW300	943,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE522M	Air Velocity Meter with Pitot Tube	OKANO WORKS	DP-20A	2,235,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE523M	Infrared Thermometer -32c to 600c	COMARK	KM-846	88,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE524M	Infrared Thermometer 600c to 2000c	COMARK	KM-2000	201,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE525M	Thermometer -50c to 1000c	TESCO	925	51,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)

N.B. PE: Provision of Equipment **EE:** Equipment for Expert **LP :** Local Purchase Equipmet with Local Cost Share
TG: Procurement with Thai Government Budget **A:** Administration **M:** Mini-plant Building

MACHINERY & EQUIPMENT LIST

YEAR	CODE NO.	NAME OF EQUIPMENT	MAKER	MODEL	JPN¥ VALUE	Q'TY	PLACE OF USE /STORAGE	FREQUENCY IN USE / MAINTENANCE		REMARKS
02/03	02PE526M	AC Power Meter	YOKOGAWA	CW140-F/PM2/C6	521,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE527M	Exhaust Gas Analyzer	TESCO	350XL	1,211,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE528M	Air Velocity Meter with Hot	TESCO	445	326,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE529M	Data Acquisition Unit	YOKOGAWA	DA100-13-1F	745,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE530M	Tachometer	TESCO	470	32,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
02/03	02PE531M	Portable Lux Meter	TESCO	545	50,000	1	Mini-Plant Building	A	A	Measuring instrument (local purchase)
03/04	03PE481M	Automatic RO System	MIURA	MRO-403A	3,775,000	1	Mini-Plant Building	A	A	Soft Water System (local purchase)

N.B. PE: Provision of Equipment **EE:** Equipment for Expert **LP :** Local Purchase Equipmet with Local Cost Share
TG: Procurement with Thai Government Budget **A:** Administration **M:** Mini-plant Building

ANNEX-9

Expenses by JICA

1. Fiscal Year 2002 (April 2002 – March 2003)

Description	Amount(Thai Baht)
1. General Expenses for Experts' Activities	1,517,400
2. Text Book Development / Translation	243,000
3. PR	
a. Production of Project Brochure	152,600
b. Seminars	141,000
Yearly Total	**2,054,000**

2. Fiscal Year 2003 (April 2003 – March 2004)

Description	Amount(Thai Baht)
1. General Expenses for Experts' Activities	1,527,000
2. Text Book Development / Translation	390,000
3. PR	
a. Seminars	795,000
b. Production of PR Video	203,000
Yearly Total	**2,915,000**

3. Fiscal Year 2004 (April 2004 – March 2005)

Description	Amount(Thai Baht)
1. General Expenses for Experts' Activities (including expenses for 2 days' workshop implementation on a quarterly basis)	2,022,000
2. Text Book Development / Translation	
3. PR & Evaluation	203,000
a. Seminars	
	675,000
Yearly Total	
	2,900,000

Grand Total : Baht 7,869,000

Thai Counterpart Personnel and Supporting Staff Allocated to the Project

1. Management and Administration (DEDE, ECCT)

As of March 2005

Name (Title)	Calender Year	2002				2003				2004				2005		Remarks
	Japanese Fiscal Year		2002			2003				2004				2005		
	Quarter	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	
A. DEDE																	
1. Mrs. Siriporn Sailasuta *(Project Director - Director General, DEDE)						9/3-15/3/2003											
2. Ms. Pranee Rintarawitoon (Deputy Director General, DEDE)																	
- Mr. Sawad Hemkamol (Deputy Director General, DEDE)																	Retired in September 2004
- Mr. Panich Pongpirodom (Deputy Director General, DEDE)																	Promoted Inspector General in DEDE
- Mr. Pramote Iamsiri (Deputy Director General, DEDE)																	Retired in September 2003
(TD)																	
3. Mr. Pramoul Chanpong* (Project Manager - Director, TD)							13/7-2/8/2003										
4. Mr. Phirapol Phienlamlert*						16/2-1/3/2003											
5. Mr. Manaswee Hekeme*												27/6-31/7/2004					
6. Mr. Poonsak Puwavichernchai*					20/10-30/11/2002												
7. Mr. Chaiyut Sarapa																	
- Mr. Yurasak Yurasakpong*					20/10/02-30/11/02												Retired in March 2004
- Mr. Sithichoak Watcharasemakul* (Project Manager - Director, TD)						20/10-30/11/2002											Retired in September 2003
B. ECCT																	
1. Mr.Chirasak Boonrawd																	
2. Mr. Somjet Thongkumwong																	
3. Ms. Rattikorn Panichkorn																	
4. Mr. Theerayut Jamjaras																	
- Ms. Nantana Chiangthong																	Resigned in August 2004
- Ms. Amornrat Sripaijit																	Resigned in June 2003
- Ms. Pijarana Samukkan																	Resigned in July 2003

N.B. * Staff trained in Japan ····· Service in the organization —— Assignment to the Project ═══ C/P Training in Japan ▭ Staff who left the service

2. Mini-Plant Training (Technical Counterpart Personnel)

Name	Title / Oganization	Remarks
1. Mr. Amornsak Rungsakorn*	Head of the Demonstration Technology Energy Section,TD /DEDE	C/P Training 27/6-31/7/2004
2. Mr. Chawarit Boonsaeng*	HRD Off. Level 4,TD /DEDE	C/P Training 13/7-9/8/2003
3. Mr. Narong Pooyoo*	HRD Off. Level 4,TD /DEDE	C/P Training 13/7-9/8/2003
4. Mr. Poonsak Puwavichienchai*	HRD Off. Level 8,TD /DEDE	C/P Training 20/10/-30/11/2002
5. Mr. Manasawee Hakeme*	HRD Off. Level 8,TD /DEDE	C/P Training 27/6-31/7/2004
6. Mr. Mongkol Sripudtha*	Technician Level 5 ,TD/DEDE	C/P Training 27/6-31/7/2004
7. Ms. Suwanna Tanthumart	Engineer,BERC /DEDE	
8. Mr. Pinyo Tanthumart*	Technical Management Officer,BEEP/DEDE	C/P Training 27/6-31/7/2004
9. Mr. Teerayut Chaemchamrus	Project Engineer,ECCT	
10. Mr. Somjet Thongkhamwong	Manager of Acadamic Affiars,ECCT	
11. Mr. Pornraphipat Phatsabut	Electrical Expert,Research and Consultanty Institute/Thammasat University	
12. Dr. Chatchawarn Chaichana	Deputy Director,EMAC/Chiangmai University	
13. Mr. Chaichan Ritkrerkkrai	Head of PR,EMAC/Chiangmai University	
14. Mr. Adul Kwansoo	Bureau of Energy in Pathumtanee	
15. Mr. Yuenyoung Kaewking	Enner Consultant Co., Ltd.	
16. Mr. Kriangkrai Tarnsamak	Senior Energy Engineering,Team Energy Management Co.,Ltd.	
17. Mr. Somphot Wiboonkiat	Mechhanical Engineer,Team Energy Management Co.,Ltd.	
18. Mr. Amorn Wongsawat	Energy Engineer,EEC Construction Management Co.,Ltd.	
19. Mr. Chonnaphan Tanadchang	Energy Engineer,EEC Construction Management Co.,Ltd.	
20. Mr.Prapan Thanapiyakul	Deputy Head of Energy Section,Mitr Technical Consultant Co.,Ltd.	
21. Mr. Weerasak Sangchai	Division Head,Mitr Technical Consultant Co.,Ltd.	
22. Mr. AdisakWattanaphan	Energy Business Manager,Powergrid Co.,Ltd.	

Notes:

1. * shows staff trained in Japan.
2. HRD Off. stands for " Human Resources Department Officer."

3. Steering Committee Members

Name	Title / Oganization	Remarks
3-1 Before October 2003		
1. Mrs. Siriporn Sailasuta*	Director General,DEDE	Chairman / C/P Training 9/3-15/3/2003
2. Mr. Prawit Teetakaew	Director,BERC /DEDE	
3. Mr. Akitoshi NARITA	Chief Advisor,JICA	
4. Mr. Yurasak Yurasakpong*	Head of Energy Conservation Training Group,TD/DEDE	C/P Training 20/10-30/11/2002
5. Ms. Sukanya Limpiyapirom*	Chief, Admin. Asst.to the DG,DEDE	C/P Training 9/3-15/3/2003
6. Ms. Tamtip Settacharnwit	Senior Policy & Plan Analysis,OEC	
- Mr. Sawad Hemakamol	Duputy Director General,DEDE	Vice Chairman /Retired in September 2004
- Mr. Pramote Ieamsiri	Duputy Director General,DEDE	Vice Chairman /Retired in September 2003
- Mr. Sitichoak Watcharasemakul*	Director,BEEP /DEDE	C/P Training 20/10-30/11/2002 /Retired in September 2003
3-2 After October 2003		
1. Mrs. Siriporn Sailasuta*	Director General, DEDE	Chairman / C/P Training 9/3-15/3/2003
2. Mr. Prawit Teetakaew	Director,BERC /DEDE	
3. Mr. Mana Nitikul	Director,BEEP /DEDE	
4. Mr. Pramaul Chanpong*	Director,TD /DEDE	C/P Training 13/7-2/8/2003
5. Mr.Akitoshi NARITA	Chief Advisor,JICA	
6. Mr. Ryosuke IWASA	Project Coordinator,JICA	
7. Mr. Junichi NOKA	Expert,JICA	
8. Mr. Hidetaka URAKUBO	Expert,JICA	
9. Mr. Phirapol Phienlamlert*	HRD Off. Level 8,TD/DEDE	C/P Training 16/2-1/3/2003
10. Ms. Sukanya Limpiyapirom*	Chief, Admin. Asst.to the DG,DEDE	C/P Training 9/3-15/3/2003
11. Mr. Worrathep Yoddee	HRD Off. Level 7,TD/DEDE	
- Mr. Sawad Hemkamol	Duputy Director General,DEDE	Vice Chairman/Retired in September 2004
- Mr. Yurasak Yurasakpong*	Head of Energy Consevation Training Group,TD/DEDE	C/P Training 20/10-30/11/2002 /Retired in March 2004

Notes:

1. * shows staff trained in Japan.
2. HRD Off. stands for " Human Resources Department Officer."
3. ☐ shows staff who left the service.

4. Sub-committee Members

Name	Title / Oganization	Remarks
4-1 Before October 2003		
A. Examination System Sub Committee		
1. Ms. Sukanya Limpiyapirom*	Chief,Admin.Asst. to the DG,DEDE	C/P Training 9/3-15/3/2003
2. Ms. Amaraporn Achawangkool	Chief of Energy Conservation Regulation,Section3,BERC/DEDE	
3. Ms. Tarntip Settacharnwit	Senior Policy and plan Analyst, OEC	
4. Mr. Chirasak Boonrowd	Deputy Executive Director,Technical Service,ECCT	
5. Dr. Apichit Toedyothin	Asso.Prof.,TEC-KMUTT	
6. Mr. Jaroon Mahittafongkul	Asso.Prof.,Chulalongkorn University	
7. Dr. Prapat Wangskarn	Prof.,Thammasart University	
8. Mr. Poonsak Puwavichrenchai*	HRD Off. Level 8,TD/DEDE	C/P Training 20/10-30/11/2002
9. Mr. Worrathep Yoddee	HRD Off. Level 8,TD/DEDE	
- Mr. Sithichoak Watcharasemakul*	Director,TD/DEDE	Group Head/ C/P Training 20/10-30/11/2002 /Retired in September 2003
B.Training Course Sub Committee		
1. Mr. Phirapol Phienlamlert*	HRD Off. Level 8,TD/DEDE	Group Head / C/P Training 16/2-1/3/2003
2. Mr. Danai Ekkamol	Senior Engineer,BERC/DEDE	
3. Dr. Ruji Pusara	Consultant	
4. Mr. Kamol Tanpipat	EEC Energetic Engineering Consultant Co.,Ltd	
5. Mr. Nares Wanaworakul	Thai-German Institute	
6. Mr. Rungreung Saipawan	Industrial Council	
7. Mr. Manasawee Hakeme*	HRD Off. Level 8,TD/DEDE	C/P Training 27/6-31/7/2004
8. Ms. Siwalee Ratanaphansak	HRD Off. Level 7,TD/DEDE	
- Ms. Amornrat Sripaijit	Technical Section Manager,ECCT	Resigned in June 2003
C. Practical Training Course (Mini Plant) Sub Committee		
1. Mr. Somchai Satakulcharoen	Engineer,BESRD / DEDE	
2. Mr.Pongpat Mangkang	Engineer,BERC /DEDE	
3. Mr. Pinyo Tantumart*	Technical Management Officer,BEEP/DEDE	C/P Training 27/6-31/7/2004
4. Mr. Surachai Bawornsettanan	Assit.Prof., TEC-KMUTT	
5. FTI Representative	FTI	
6. Mr. Chaiyut Sarapa	Technician of Audio -Visual Level 7,TD/ DEDE	
7. Mr. Thaweesak Tooppanom*	HRD Off. Level 5,TD/DEDE	C/P Training 20/10-30/11/2002
- Mr. Yurasak Yurasakpong*	Head of Energy Conservation Training Group,TD/DEDE	Group Head/ C/P Training 20/10-30/11/2002 / Retired in March 2004
- Ms. Pijarana Samukkan	Curriculumm Development's staff,ECCT	Resigned in July 2003

Notes:

1. * shows staff trained in Japan.
2. HRD Off. stands for " Human Resources Department Officer."
3. ▭ shows staff who left the service.

(4. Sub-committee Members)

Name	Title / Oganization	Remarks
4-2 After October 2003		
1. Ms.Pranee Rintarawitoon	Duputy Director General,DEDE	Chairman
2. Mr.Pramaul Chanpong*	Director,TD/DEDE	Vice chairman / C/P Training 13/7-2/8/2003
3. Mr. Phirapol Phienlamlert*	HRD Off. Level 8,TD/DEDE	C/P Training 16/2-/1/3/2003
4. Mr. Manasawee Hakeme*	HRD Off. Level 8,TD/DEDE	C/P Training 27/6-31/7/2004
5. Mr. Danai Ekkamol	Engineer Level 9,BERC /DEDE	
6. Mr. Thammayos Srichuay*	Engineer Level 8,BERC /DEDE	C/P Training 16/2-1/3/2003
7. Mr. Yosapong Kuptabutr	Engineer Level 8,BERC /DEDE	
8. Mr. Pongjaroon Srisowanna	Project Manager,ECCT	
9. Dr. Apichit Teodyothin	Asso.Prof.,TEC-KMUTT	
10. Dr. Prapat Wongsakarn	Prof.,Thammasart University	
11. Mr. Rungrueng Saipawan	Industrial Council	
12. Mr. Poonsak Puwavichrenchai*	HRD Off. Level 8,TD/DEDE	C/P Training 20/10/-30/11/2002
13. Mr. Narong Pooyoo*	HRD Off. Level 4,TD/DEDE	C/P Training 13/7-9/8/2003
- Mr. Sawad Hemkamol	Duputy Director General,DEDE	Retired in September 2004
- Mr. Yurasak Yurasakpong*	Head of Energy Conservation Training Group,TD/DEDE	C/P Training 20/10-30/11/2002 / Retired in March 2004

Notes:

1. * shows staff trained in Japan.
2. HRD Off. stands for " Human Resources Department Officer."
3. [ ] shows staff who left the service.

ANNEX-11

List of Thai Counterpart Personnel Trained in Japan

1. Fiscal Year 2002 (8)

Name (Title)	Field / Course Title	Period
1. Mr.Yurasak Yurasakpong (Sen.HRD Off. TD)	Mini-Plant Operation & Examination System	20/10/2002 --- 30/11/2002
2. Mr.Poolsak Puwavichernchai (Sen.HRD Off. TD)	Mini-Plant Operation & Examination System	20/10/2002 --- 30/11/2002
3. Mr.Thaweesak Tuppanom (HRD Off. TD)	Mini-Plant Operation & Examination System	20/10/2002 --- 30/11/2002
4. Mr.Sitichoak Watcharasemakul (Director, TD)	Energy Conservation Policy and Activities	16/02/2003 --- 01/03/2003
5. Mr.Phirapol Phienlamlert (Sen.HRD Off. TD)	Energy Conservation Policy and Activities	16/02/2003 --- 01/03/2003
6. Mr.Tammayos Srichuay (Director,BERC)	Energy Conservation Policy and Activities	16/02/2003 --- 01/03/2003
7. Ms.Siriporn Sailasuta (Director G.,DEDE)	Energy Conservation Policy	09/03/2003 --- 15/03/2003
8. Ms.Sukanya Limpiyapirom (Chief,Asst.to DG, DEDE)	Energy Conservation Policy	09/03/2003 --- 15/03/2003

2. Fiscal Year 2003 (4)

Name (Title)	Field / Course Title	Period
1. Mr.Narong Pooyoo (HRD Off. TD)	Mini-Plant training course operation	13/07/2003 --- 09/08/2003
2. Mr.Chawalit Boonsaeng (HRD Off. TD)	Mini-Plant training course operation	13/07/2003 --- 09/08/2003
3. Mr.Chatchawan Sripetchdee (Engineer BERC,DEDE)	Mini-Plant training course operation	13/07/2003 --- 09/08/2003
4. Mr.Pramoul Chanpong (Director, TD)	Energy Conservation Policy	21/07/2003 --- 02/08/2003

3. Fiscal Year 2004 (4)

Name (Title)	Field / Course Title	Period
1. Mr. Manaswee Hakeme (Sen.HRD Off. TD)	Advanced Mini-Plant training course operation	27/06/2004 --- 31/07/2004
2. Mr. Mongkol Sripudtha (Tech. TD)	Advanced Mini-Plant training course operation	27/06/2004 --- 31/07/2004
3. Mr. Pinyo Tanthumart (Tech. Mgt. Off. TD)	Advanced Mini-Plant training course operation	27/06/2004 --- 31/07/2004
4. Mr. Amornsak Rangsakorn (Head of DTES. TD)	Advanced Mini-Plant training course operation	27/06/2004 --- 31/07/2004

Expenses by DEDE

Unit: Thai Baht

Discription	Year 2002	Year 2003	Year 2004	Year 2005	Total
1. Mini-Plant Building Construction		9,990,000			9,990,000
2. Project Operation (Consultant Contract)		<---	9,980,787	--->	9,980,787
1)Curriculum Development		<---	3,979,347	--->	3,979,347
-Translation /Handbook Preparation					
-Trainer's Handbook/Training Media					
-Examination System Development					
-Examination analysis and evaluation					
-Inception Report					
2)Public Relations		<---	636,360	--->	636,360
-Lunch					
-Snacks & Baverages					
-Private Instructor's Fees					
-Regional Accomodation Fees					
-Transportation					
-Document Printing & Handouts, etc.					
3)Trainig Implementation		<---	4,765,080	--->	4,765,080
-Trainer's Training					
-PRE Training					
4)Project Administration & Evaluation		<---	600,000	--->	600,000
3. Construction of Access Road to Mini-Plant			**3,480,000**		**3,480,000**
Total					**23,450,787**

Developed Training Course Curricula & Training Materials

1. Training Course Curricula

- Mini-Plant Training Course Curriculum - Heat & Electricity
- Senior PRE Training Course Curriculum - Heat & Electricity
- Conventional PRE Training Course Curriculum - Factory & Building

2. Training Materials

1) Textbooks for:

- Mini-Plant Training Course - Heat
- Mini-Plant Training Course - Electricity
- Senior PRE Training Course - Heat
- Senior PRE Training Course - Electricity
- Conventional PRE Training Course - Factory & Building

2) Instruction Manuals for:

- Mini-Plant Training Course Trainers - Heat
- Mini-Plant Training Course Trainers - Electricity
- Senior PRE Training Course Trainers - Heat
- Senior PRE Training Course Trainers - Electricity
- Conventional PRE Training Course Trainers - Factory
- Conventional PRE Training Course Trainers - Building

3) Training Media (PowerPoint Files) for:

- Mini-Plant Training Course Trainers - Heat
- Mini-Plant Training Course Trainers - Electricity
- Senior PRE Training Course Trainers - Heat
- Senior PRE Training Course Trainers - Electricity
- Conventional PRE Training Course Trainers - Factory
- Conventional PRE Training Course Trainers - Building

Other Products for the Establishment of PEMTC

1. Proposal for New Two-Class PRE System

2. Proposal for the Organization of PEMTC - (Workshop Report on the Establishment of PEMTC Organization)

3. Organization and Management Guidelines for the Examination Committee

4. Proposal for PRE Support System – (Workshop Report on PRE Supporting System)

5. Operation Manuals for Mini-Plant Facilities - for each Facility

6. Maintenance Manuals for Mini-Plant Facilities - Heat & Electricity

7. PR Pamphlet (5,000 copies) – DEDE's Roles & Activities including PEMTC Project

8. PR CD (1,000 copies) - Introduction to PEMTC

Summary of Trainer's Training during 2002-2005

1. Mini-Plant Training

Date / Period	Course Title	No. of Participants	Target Groups (Participating Groups)	Remarks
19 May 2003 -19 June 2003 (1 month)	Mini-Plant Operation (Heat & Electricity)	17	TD Staff, Consultants	Instructed by JICA Short-term Experts
29 October 2003 -31 October 2003 (3 days)	1st Supplementary Training in Mini-Plant Operation (Heat & Electricity)	23	TD Staff, Consultants	Instructed by JICA Long-term Experts
26 November 2003 -28 November 2003 (3 days)	2nd Supplementary Training in Mini-Plant Operation (Heat & Electricity)	21	TD Staff, Consultants	Instructed by JICA Long-term Experts
2 February 2004 - 27 February 2004 (1 month)	Mini-Plant Operation & Practical Training Course Operation	22	TD Staff, Consultants	Instructed by JICA Short-term & Long-term Experts
20 September 2004 - 25 September 2004 (6 days)	1st Mini-Plant Training Course for PREs (Heat & Electricity)	24 (Heat 11, Electricity 13)	PREs-to-be from Designated Factories & Buildings	Instructed by Trained Trainers (This course was curried out as part of the pilot training and trainer's training)

2. Senior PRE Training

Date / Period	Course Title	No. of Participants	Target Groups (Participating Groups)	Remarks
6 September 2004 - 10 September 2004 (5 days)	Senior PRE Training Course Operation (Heat & Electricity)	24 (Heat 13, Electricity 11)	Professors, Consultants	Instructed by Textbook Development Team (Professors)

3. Conventional PRE Training

Date / Period	Course Title	No. of Participants	Target Groups (Participating Groups)	Remarks
4 October 2004 - 8 October 2004 (5 days)	Conventional PRE Training Course Operation (Factory & Building)	39 (Factory 23, Building 16)	Professors, Consultants	Instructed by Textbook Development Team (Professors)

List of Trained Trainers for PRE Training Courses

1. Mini-Plant Training Course (1/4)

Name	Title / Organization	Remarks
1. Mr. Amornsak Rungsakorn*	Head of the Demonstration Technology Energy Section,TD /DEDE	C/P Training 27/6-31/7/2004
2. Mr. Chawarit Boonsaeng*	HRD Off. Level 4,TD /DEDE	C/P Training 13/7-9/8/2003
3. Mr. Narong Pooyoo*	HRD Off. Level 4,TD /DEDE	C/P Training 13/7-9/8/2003
4. Mr. Poonsak Puwavichienchai*	HRD Off. Level 8,TD /DEDE	C/PTraining20/10/-30/11/2002
5. Mr. Manasawee Hakeme*	HRD Off. Level 8,TD /DEDE	C/P Training 27/6-31/7/2004
6. Mr. Mongkol Sripudtha*	Technician Level 5 ,TD/DEDE	C/P Training 27/6-31/7/2004
7. Ms. Suwanna Tanthumart	Engineer,BERC /DEDE	
8. Mr. Pinyo Tanthumart*	Technical Management Officer,BEEP/DEDE	C/P Training 27/6-31/7/2004
9. Mr. Teerayut Chaemchamrus	Project Engineer,ECCT	
10. Mr. Somjet Thongkhamwong	Manager of Acadamic Affiars,ECCT	
11. Mr. Pornraphipat Phatsabut	Electrical Expert,Research and Consultanty Institute/Thammasat University	
12. Dr. Chatchawarn Chaichana	Deputy Director,EMAC/Chiangmai University	
13. Mr. Chaichan Ritkrerkkrai	Head of PR,EMAC/Chiangmai University	
14. Mr. Adul Kwansoo	Bureau of Energy in Pathumtanee	
15. Mr. Yuenyoung Kaewking	Enner Consultant Co., Ltd.	
16. Mr. Kriangkrai Tarnsamak	Senior Energy Engineering,Team Energy Management Co.,Ltd.	
17. Mr. Somphot Wiboonkiat	Mechhanical Engineer,Team Energy Management Co.,Ltd.	
18. Mr. Amorn Wongsawat	Energy Engineer,EEC Construction Management Co.,Ltd.	
19. Mr. Chonnaphan Tanadchang	Energy Engineer,EEC Construction Management Co.,Ltd.	
20. Mr.Prapan Thanapiyakul	Deputy Head of Energy Section,Mitr Technical Consultant Co.,Ltd.	
21. Mr. Weerasak Sangchai	Division Head,Mitr Technical Consultant Co.,Ltd.	
22. Mr. AdisakWattanaphan	Energy Business Manager,Powergrid Co.,Ltd.	

Notes: 1. * shows staff trained in Japan.

2. HRD Off. stands for " Human Resources Department Officer."

2. Senior PRE Training Course (2/4)

Name	Title / Organization	Remarks / Educational Background
1. Commander Chop Laythong	Head of Department of Material of RTAFA	MBA. (Energy Technology)
2. Mr. Damrong Buayome	Engineer of Engineering & Tech. Part of King's Mongkut University of Technology Thonburi	MBA. (Electrical Engineering)
3. Mr. Supachai Panyavee	Managing Director of Energy Conservation Technology Co.,Ltd.	MBA. (Energy Management)
4. Mr. Somjet Thongkamwong	ECCT's Manager of Academic Affairs	MBA. (Energy Technology)
5. Mr. Jinda Kaewkheaw	Department of Physic's instructor of Silpakorn University	MBA. (Energy Technology)
6. Dr.Paisarn Kongchunchay	Deputy Director for Consultant of Energy Conservation	Doctorate (Chemical Engineering)
7. Mr.Weerasak Sangchai	Division Head of Mitr Technical Consultant Co., Ltd.	BBA. (Electrical Engineering)
8. Mr.Keangkrai Tarnsamak	Senior Energy Engineer of Team Energy Management Co.,Ltd.	BBA. (Electrical Engineering)
9. Mr.Chanaphan Tanadchang	Energy Engineer of EEC-Energetic Co.,Ltd.	MBA. (Electrical Engineering)
10. Mr.Paisarn Sudwilai	Department of Electrical engineering's instructor of Asia Arkane University	MBA. (Electrical Engineering)
11. Mr.Kitipong Temeyapradith	Manager of Office of Corporate Policy and Planning of TOT	MBA. (Mechanical Engineering)
12. Mr.Pisith Pongrapeeporn	Director of Air Power Cooperation Co., Ltd.	BBA. (Mechanical Engineering)
13. Mr.Suppawat Tadajarumongkol	Mechanical Engineer Level 7 of Department of Industrial Works	MBA.(Education of Industrial Mechanical)
14. Mr.Chana Tansuwit	Manager of Engineering Department of ECCT	BBA. (Mechanical Engineering)
15. Mr.Sanchai Sujintammasarn	Engineer of ECCT	BBA. (Mechanical Engineering)
16. Mr. Narong Pooyoo	HRD off. Level 4, TD/DEDE	
17. Dr. Chutarat Krucharoen	University Ongkarak Campus, Dept. of Mech. Engineering's instructor of Srinakarinwirot	Doctorate (Mechanical Engineering)
18. Assoc.Prof.Wichit Buakeaw	University Ongkarak Campus, Dept. of Mech. Engineering's instructor of Srinakarinwirot	Doctorate (Mechanical Engineering
19. Mr. Sitiporn Yaitanayos	University Ongkarak Campus	MBA. (Mechanical Engineering)
20. Dr. Prakob Surawattanawan	Dept. of Mech. Engineering's instructor of KMITNB	Doctorate (Mechanical Engineering)
21. Mr. Chawalitr Boonsaeng	HRD off. Level 4, TD/DEDE	
22. Mr.Preyakamon Lertwattanapaisarn	Head of Energy Engineering of Mgt. Place and Energy Conservation of Khon Kaen University	
23. Mr. Natchayaphon Lonewan	EEC-Energetic Co.,Ltd.'s staff	MBA. (Mechanical Engineering)
24. Mr. Pongsakorn Kerdchang	Dept. of Mech. Engineering's instructor of Asia Arkane University	MBA. (Mechanical Engineering)

3.-1 Conventional PRE Training Course (3/4)

Name	Title / Organization	Remarks / Educational Background
1. Mr. Prakorn Chaiyot	Industrial Engineer, ECCT	BBA. (Industrial engineering)
2. Ms. Rattilorn Phanichayakorn	Industrial Engineer, ECCT	BBA. (Industrial engineering)
3. Mrs. Aungkana Ruangchai	Dept. of Electrical Engineer's instructor, KMITNB	MBA. (Electrical engineering)
4. Mr. Soopphin Leeprethanon	Dept. of Electrical Engineer's instructor, KMITNB	MBA. (Electrical engineering)
5. Mr. Rawich Thaweesap	Vice Mgr. of implementing engineer section, Energy engineering institute, KU	MBA. (Environmental engineering)
6. Ms. Jiraporn Srimanta	Assistant of energy engineer, Institution of mgt. and energy conservation KhonKhan University	BBA. (Electrical engineering)
7. Mr. Paagpoom Sriromruen	Dept. of mechanical engineer's instructor, Srinakharinwirot university,	MBA. (Mechanical engineering)
8. Mr. Denchai Suwanpreug	Dept. of mechanical engineer's instructor, Srinakharinwirot university	MBA. (Mechanical engineering)
9. Ms. Ammaraporn Boonprathathong	Dept. of mechanical engineer's instructor, Srinakharinwirot university	MBA. (Mechanical engineering)
10. Ms.Siriwarin Petcharat	Instructor of engineering, Ramkhamhaeng university	MBA. (Energy management technology)
11. Mr. Dusit Buranachockpaisan	Vice mgr. of engineering, Energy quality service co., ltd.	BBA. (Mechanical engineering)
12. Mr. Kritsana Atsuwan	Project Mgr., Energy conservation technology	BBA. (Mechanical engineering)
13. Mr. Ekkapab Sriatsadaporn	Energy engineer, Team energy management co., ltd.	MBA. (Mechanical engineering)
14. Mr. Soopphakit Samootpongtorn	Energy Engineer, ECC-Energetic Co., Ltd	MBA. (Chemical engineering)
15. Mr. Bundit Ampornsrisupab	Operation dept. of electrical consumption, Electricity Authority of Thailand	BBA. (Electrical engineering)
16. Prof. Dr. Tika Boonnak	Chief of Consultant & Energy Development Center	Doctorate (Physique Energerque)
17. Mr. Suwit Muengram	Engineer, Institute of research and consultant, THU	BBA. (Electrical engineering)
18. Mr. Soopachock Sapprasri	Engineer of planning and development, Dept. of mgt. & energy conservation Chiangmai University	
19. Mr. Udon Wongsawad	Engineer of auditing consultant, Dept. of mgt. & energy conservation Chiangmai University	
20. Mr. Theerayuth Jamjumrat	Industrial Engineer, ECCT	BBA. (Mechanical engineering)

3.·2 Conventional PRE Training Course (4/4)

Name	Title / Organization	Remarks / Educational Background
21. Mr. Chayapas Thabthong	Dept. of mechanical engineer's instructor, Srinakharinwirot university	MBA. (Mechanical engineering)
22. Mr. Wasinee Pariyawonkorn	Vice Mgr. Assistance of engineering academic, Energy engineering institute, KU	BBA. (Mechanical engineering)
23. Mr. Panyawat Gomootbuth	Vice Mgr. of engineer section, Energy engineering institute, KU	MBA. (Energy Mgt. Tech.)
24. Mr. Jamikorn Taiwan	Dept. of electrical engineer's instructor, KMITNB	MBA. (Electrical engineering)
25. Mr. Sakda Somkul	Dept. of electrical engineer's instructor, KMITNB	MBA. (Electrical engineering)
26. Mr. Pinpong Yodsakhun	Dept. of electrical engineer's instructor, KMITNB	MBA. (Electrical engineering)
27. Mr. Kraiwoot Lakkham	Dept. of electrical engineer's instructor, KMITNB	MBA. (Electrical engineering)
28. Mr. Weerapong Polsak	Electrical Engineer, Dept. of Management & energy conservation	BBA. (Electrical engineering)
29. Mr. Chatchai Aeampornsin	Chief of mechanical engineering, Asia Akkane university	MBA. (Mechanical engineering)
30. Mr. Thakornpol Cheevasit	Mechanical engineer, Energy quality service Co., Ltd.	BBA. (Mechanical engineering)
31. Mr. Udom Jantha	Project Mgr., Energy conservation technology	BBA. (Mechanical engineering)
32. Mr. Praphan Thanapiyakul	Deputy chief of energy, Mitr Technical Consultant Co., Ltd.	BBA. (Mechanical engineering)
33. Mr. Passakorn Laddayam	Energy engineer, Team energy mgt. Co., Ltd.	BBA. (Chemical engineering)
34. Mr. Preecha Yingsuthiphan	Energy engineer, Team energy mgt. Co., Ltd.	
35. Mr. Kanit Kongpittaya	Energy engineer, Phillipe electronics (Thailand)	
36. Mr. Sompong Boonthamjinda	Deputy Mgr. of product promotion, The Sosugo group industry, Co.,Ltd.	
37. Mr. Soopachock Sapprasri	Engineer of planning and development, Department of mgt. & energy conservation , Chiangmai university	
38. Mr. Praritat Aramwanit	Dept. of energy engineer's instructor, Ramkhamhaeng University	MBA. (Energy Mgt. Tech.)
39. Mr. Kritsada Pisonyabuth	Dept. of energy engineer's instructor, Ramkhamhaeng University	MBA. (Industrial engineering)

Summary of Pilot Training Courses for PREs

I. Overall Results for All Courses

Course	Number of Participants		Examination Results		Pass Rate	Remarks
	Course	Examination	Pass	---	%	
1. Senior PRE Training Course						
Heat	62	57	11		19	
	--	47	13		28	examinees without course participation
Subtotal	62	104	24		23	
Electricity	231	227	126		56	
	--	79	20		25	examinees without course participation
Subtotal	231	306	146		48	
Total	**293**	**284**	**137**		**48**	
	--	**126**	**33**		**26**	examinees without course participation
	293	**410**	**170**		**41**	
2. Conventional PRE Training Course						
Factory	224	221	129		58	
Building	71	71	35		49	
Total	**295**	**292**	**164**		**56**	
3. Mini-Plant Training Course						
Heat	63	63	41		65	
Electricity	87	85	60		71	
Total	**150**	**148**	**101**		**68**	

II. Results for Each Course

1. Senior PRE Training Course

A. Heat

Date / Period	Number of Participants		Examination Results		Pass Rate	Remarks
	Course	Examination	Pass	---	%	
1st 11-16 Oct. 2004	41	39	6		15	
	--	1	0		0	examiniees without course participation
2nd 8-13 Nov. 2004	21	18	5		28	
	--	10	6		60	examiniees without course participation
1st 14 Jan. 2005	--	20	3		15	examiniees without course participation
2nd 2 Feb. 2005	--	16	4		25	examiniees without course participation
Total	**62**	**57**	**11**		**19**	
	--	**47**	**13**		**28**	examiniees without course participation
Grand Total	**62**	**104**	**24**		**23**	

B. Electricity

Date / Period	Number of Participants		Examination Results		Pass Rate	Remarks
	Course	Examination	Pass	---	%	
1st 11-16 Oct. 2004	59	59	34		58	
	--	2	2		100	examiniees without course participation
2nd 1-6 Nov. 2004	53	53	26		49	
	--	2	2		100	examiniees without course participation
3rd 15-20 Nov. 2004	58	57	31		54	
	--	18	4		22	examiniees without course participation
1st 14 Jan. 2005	--	57	12		21	examiniees without course participation
4th 14-19 Feb. 2005	61	58	35		60	
	--	0	0		--	examiniees without course participation
Total	231	227	126		56	
	--	79	20		25	examiniees without course participation
Grand Total	231	306	146		48	

2. Conventional PRE Training Course (2/2)

A. Factory

Date / Period	Number of Participants		Examination Results		Pass Rate %	Remarks
	Course	Examination	Pass	---		
1st 11-16 Oct. 2004	59	58	41		71	
2nd 1-6 Nov. 2004	46	46	28		61	
3rd 8-13 Nov. 2004	39	39	20		51	
4th 14-19 Feb. 2005	80	78	40		51	
Total	**224**	**221**	**129**		**58**	

B. Building

Date / Period	Number of Participants		Examination Results		Pass Rate %	Remarks
	Course	Examination	Pass	---		
1st 11-16 Oct. 2004	22	22	8		36	
2nd 15-20 Nov. 2004	49	49	27		55	
Total	**71**	**71**	**35**		**49**	

3. Mini-Plant Training Course

A. Heat

Date / Period	Number of Participants		Examination Results		Pass Rate %	Remarks
	Course	Examination	Pass	---		
1st 20-25 Sep. 2004	10	10	10		100	for Conventional PREs
2nd 1-6 Nov. 2004	12	12	1		8	
3rd 8-13 Nov. 2004	8	8	7		88	
4th 15-20 Nov. 2004	6	5	4		80	
5th 22-27 Nov. 2004	15	16	12		75	
6th 14-19 Feb. 2005	12	12	7		58	
Total	**63**	**63**	**41**		**65**	

B. Electricity

Date / Period	Number of Participants		Examination Results		Pass Rate %	Remarks
	Course	Examination	Pass	---		
1st 20-25 Sep. 2004	13	12	5		42	for Conventional PREs
2nd 1-6 Nov. 2004	8	8	4		50	
3rd 8-13 Nov. 2004	15	15	14		93	
4th 15-20 Nov. 2004	19	19	14		74	
5th 22-27 Nov. 2004	18	17	10		59	
6th 14-19 Feb. 2005	14	14	13		93	
Total	**87**	**85**	**60**		**71**	

Summary of Seminars &Workshops Held during 2002-2005

1. Workshops

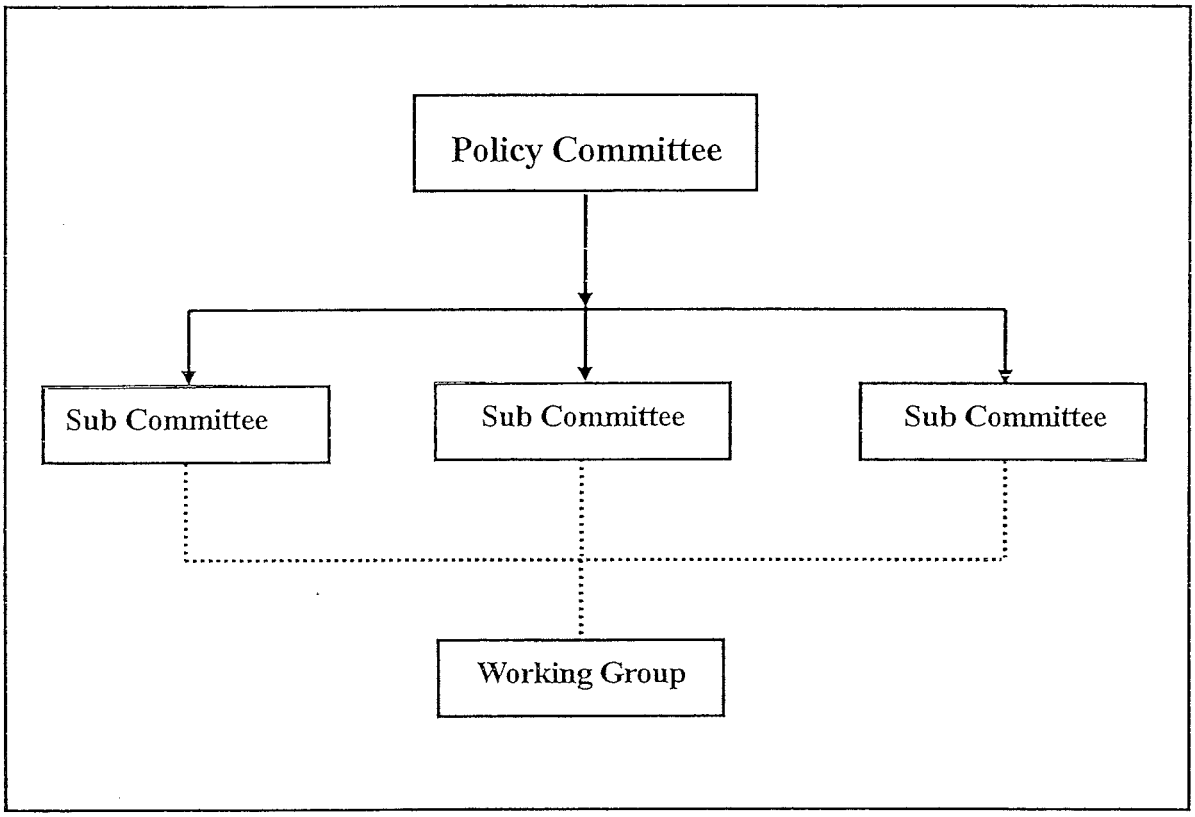
Date	Topic	No. of Participants	Participating Institutions	Output
22 September 2003 -24 September 2003 (3 days)	Establishment of PEMTC Organization	40	DEDE, ECCT, JICA(Expert Team), TFT, Registered Consultants (EEC-Energetic, Mitr-Technical Consultant), Ministry of Labor and Social Welfare and Chulalongkorn University	Draft Proposal for Establishment of PEMTC Organization
13 July 2004 -14 July 2004 (2 days)	PRE Supporting System	29	DEDE, ECCT, JICA (Expert Team), Industrial Council, Thammasart University and Private Sector (Thaiautowork Co., Industrial Siamsynthetictextile Co., Kultornkerby Co. and Sosuko Group Industry Co.)	Outline of PRE Supporting System in Thailand
13 January 2005 - 14 January 2005 (2 days)	PRE Supporting System	25	DEDE, ECT, JICA(Expert Team) and Private Sector (Topfeed Mill, Part., Ltd., Sengchawd Manufacturing, Part., Ltd., Pongparacodone Rubber Co., Ltd. etc.)	Draft Proposal for Establishment of PRE Supporting System in Thailand

2. Seminars

Date	Topic	No. of Participants	Target Groups (Participating Groups)	Venue
21 March 2003	(1st) Introduction to New PRE System	200	Owners and/or Managers, Existing PREs, Potential PREs in Designated Factories / Buildings	Energy Conservation Building Rangsit, Klong 5, Bangkok
18 July 2003	(2nd) Introduction to New PRE System	182	-ditto-	Montien Hotel Pattaya, Cholburi
26 September 2003	(3rd) Introduction to New PRE System	228	-ditto-	Chaopraya Park Hotel Bangkok (Central Part)
19 December 2003	(4th) Introduction to New PRE System	162	-ditto-	Lotus Pang Suan Kaew Hotel Chiang Mai (Northern Part)
19 March 2004	(5th) Introduction to New PRE System	189	-ditto-	Sofitel Raja Orchid Hotel Khon Khen (North Eastern Part)
28 May 2004	(6th) Introduction to New PRE System	117	-ditto-	Novotel Central Sukontha Hat Yai, Songkhla (Southern Part)
16 December 2004	(7th) PRE Development in 2005 for Sustainable Energy Conservation	240	-ditto-	Orchid Hotel Chiang Mai (Northern Part)
18 March 2005	(8th) PRE Development in 2005 for Sustainable Energy Conservation	300 (Estimation)	Persons / Parties Concerned with the Project, Owners and/or Managers, Existing PREs, Potential PREs in Designated Factories / Buildings	Rama Gardens Hotel Bangkok

Proposed Organization of PEMTC after the Project

1. Organization of the Examination Committee



PEMTC as implementing Organization
Under supervision of DEDE / TD & BERC

2. Organization for Implementing Examinations and Training courses