

## Summary of Terminal Evaluation

<b>I. Outline of the Project</b>	
Country: Islamic Republic of Iran	Project title: The Project on Energy Management Promotion in Islamic Republic of Iran
Issue/Sector: Energy conservation	Cooperation scheme: Technical cooperation project
Division in charge: Group II (Natural Resources and Energy Conservation Team), Economic Development Department	Total cost (as of November 2006): Approx. 653 million yen
Period of Cooperation (4 years)	(R/D): 2003.3-2007.3
	Partner Country's Implementing Organization: Energy Efficiency Office (EEO), Azerbaijan Higher Education and Research Complex (AHERC), National Training Centre for Energy Management (NTCEM), Iran Energy Efficiency Organization (SABA)
	Supporting Organization in Japan: The Energy Conservation Center, Japan
Related Cooperation Organization:	
<p>1. Background of the Project</p> <p>The Islamic Republic of Iran (hereinafter referred to as Iran) is one of the world's largest oil-producing countries and has 90 billion barrels of oil reserves, which accounts for 9% of the total oil reserves in the world.</p> <p>In recent year, domestic energy consumption in Iran has been growing rapidly and reached 44% of the total energy production. As 36% of the total population is 15 years old or younger, oil consumption in the country will continue to grow. A study predicted that, in case energy consumption should grow at 6% annually, the country would have to start importing oil by 2018.</p> <p>Iran depends on petroleum products for about 80% of its foreign currency earnings, and, if the country fails to secure enough oil for export, a significant impact will be brought up on the national economy and the society. Therefore, it is important for Iran to secure oil export through efficient energy utilization.</p> <p>In the 3<sup>rd</sup> five-year national development plan (2000-2004), the Iranian government is considering the following countermeasures for more efficient energy utilization.</p> <ol style="list-style-type: none"> <li>(1) Introduction of energy pricing system by market prices</li> <li>(2) Enlightenment activities and advice on energy conservation</li> <li>(3) Implementation of demonstration projects for energy conservation</li> <li>(4) Financial assistance to energy conservation projects</li> <li>(5) Enhancement of a legal system related to energy management</li> <li>(6) Increase of the share of renewable energy in electricity basket</li> </ol> <p>Under such circumstances, on September 18<sup>th</sup>, 2000, the Iranian government requested the Japanese government to provide international cooperation to improve energy efficiency in the industrial sector in Iran.</p>	

Upon receiving this request, the Japanese side conducted a total of four rounds of preliminary studies and had discussion with Iranian officials. On November 16<sup>th</sup>, 2002, the two governments signed the Record of Discussion for the Project implementation. Since March 2003, the Project has been carried out with four year cooperation period and four Japanese long-term experts have been dispatched by the time of the terminal evaluation.

## 2. Project Overview

(1) Overall Goal: Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.

(2) Project Purpose: The National Training Center for Energy Management (NTCEM) contributes to the energy management of the industrial sector.

(3) Outputs:

Output 1: The Project is operated to contribute effectively coordinating with the policies and administration for the industrial energy conservation target designed by I.R. Iran.

Output 2: Counterparts are able to operate and maintain the training facilities and equipment.

Output 3: Both theoretical and practical training for energy related engineers are maintained and managed.

(4) Inputs: (Actual status at the time of evaluation in November 2006)

Japanese Side:

Long-term Experts	4	Equipment	approx. 144 million yen
Short-term Experts	19	Local cost	approx. 25 million yen
Trainees received	11		

Iranian Side:

Counterparts	11
--------------	----

Local Cost (Total costs including costs for facilities and equipment and other local costs)

Local currency 9.9 billion IRR (approx. 127 million yen)

## II. Evaluation Team

Members of Evaluation Team	Specialized field	Name	Title
	Leader	Hiromi CHIHARA	Senior Advisor, Institute for International Cooperation, Japan International Cooperation Agency (JICA)
	Energy Conservation Policy	Akira ISHIHARA	Managing Director, The Energy Conservation Center, Japan
	Evaluation Analysis	Hideaki HIGASHINO	Senior Consultant/Environmental Specialist, RECS International Inc.
	Cooperation Planning	Yukinari TANAKA	Natural Resources and Energy Conservation Team, Group 2, Economic Development Department, Japan International Cooperation Agency (JICA)
Period of Evaluation: November 7 <sup>th</sup> to 22 <sup>nd</sup> , 2006			Type of Evaluation: Terminal

### **III. Results of Evaluation**

#### 1. Summary of Evaluation Results

##### 1-1 Relevance

The relevance of the Project is considered high at the time of terminal evaluation for the following reasons.

##### (1) Consistency with the National Policies of the Iranian Government

As one of the world's largest oil producing countries with 132 billion barrels of oil deposits, Iran depends on export of oil and related products for 80% of its foreign currency earnings.

Meanwhile, Iran's domestic energy consumption has been growing rapidly in recent years and there is a study that estimates Iran would have to start importing oil by 2018 if this trend should continue.

Inefficient energy consumption in the industrial sector has long been recognized in Iran and it received attention as a serious issue as soon as the country got out from economic slump in the 1990s.

In Article 121 of the Law of the 3<sup>rd</sup> Five-year Development Plan (2000- 2004), the Iranian government declared policies for energy and environmental conservation that comprised of four pillars -- standardization of equipment and labelling, dispersion of peak hours of energy utilization, promotion of factory operation during off-peak months of energy consumption, and energy conservation measures for buildings.

The concept of Article 121 has been taken over in Article 20 of the Law of the 4<sup>th</sup> Five-year Development Plan (2005-2009). Based on this law, a bill concerning energy conservation (the Bill of National Energy Efficiency Management), including a policy to shift from petroleum to natural gas, time sharing of factory operation, and introduction of a dual pricing system for the factories consuming large amounts of energy, was submitted to the Cabinet.

##### (2) Consistency with the Policies of the Japanese Government

The Japanese government has long been providing technical cooperation to Iran in the field of energy conservation to solve environmental issues including global warming.

As the purpose of the Project is to realize sustainable development in Iran through the promotion of energy conservation, it is highly consistent with the policies of the Japanese government.

##### (3) Technical Advantages of Japan

Japan has acquired world's highest-level technologies in energy conservation from experience with two oil crises. Japan's TOE (tonne of oil equivalent) per GDP (million dollars) is as good as 96, less than 10% of that of Iran, 1,037.

Japan's energy conservation technologies and their application have great advantage especially in the industrial sector. Therefore, it is highly relevant that Japan provides technical cooperation in the field of energy conservation.

##### (4) Consistency with the Needs of the Target Groups

Compared with above (1)-(3), the consistency with the needs of the target groups is considered

slightly lower. Currently, the prices of fuel and electricity are comparatively low in Iran, and factory owners do not seem to have good understanding of or a great need for energy conservation. Although project carried out enlightenment activities including creation of a website, there was no effective enlightenment activities for factory owners.

#### 1-2 Effectiveness (Achievement Level of the Project Purpose)

The effectiveness of the Project is considered moderate.

Since the mid-term evaluation, the progress of the Project seems to have been significantly accelerated. However, the initial delay in activities caused by the issue of mini-plant equipment was not completely made up for by the time of the terminal evaluation and it affected the achievement of the Project purpose.

##### (1) Achievement of Outputs

The achievement level of outputs is considered moderate. Although the technology transfer to the counterparts was conducted in a generally appropriate manner, outputs were not fully achieved because the issue of mini-plant equipment delayed the start of training at NTCEM/AHERC.

##### (2) Achievement of Project Purpose

The achievement level of the project purpose is considered moderate because not all the five indicators were achieved.

The training started in December 2005, eight months behind the original schedule, due to failure of mini-plant equipment. However, thanks to the efforts of the Project members, the training was actively conducted and the total number of trainees reached approximately 600 at the time of terminal evaluation. The number is going to be close to the target number of 800 by March 2007. (Indicator 3 and Indicator 4)

Currently the Iranian side is conducting the training on its own. It is judged that basic system of the training has been established at NTCEM/AHERC with the cooperation of SABA.

As of November 2006, 78 proposals have been accepted by the factories. [156 trainees who completed the heat and electrical courses before April 2006, 6 months before (Electricity: 67, Heat: 89)] However, it is unlikely that the target number of 400 cases of proposal acceptance by 2007 will be achieved. (Indicator 1)

As of November 2006, a total of 41 reports (22 from the electrical course and 19 from the heat course) have been submitted to SABA and 32 reports have been accepted. Although the acceptance rate is as high as 78%, the number of reports is only 11% of the target number of 300 and it seems extremely difficult to achieve the target number of 300 for 2007. (Indicator 5)

According to SABA and EEO, no-cost and low-cost measures have been implemented at almost all the factories surveyed. If there is a similar situation at the factories where 589 ex-trainees belong, the target to implement 600 no-cost or low-cost measures by March 2007 is likely to be mostly achieved. (Indicator 2. However, it is not clear whether the implementation of such measures is the result of the Project implementation.)

### 1-3 Efficiency

Based on the result of analysis between inputs and outputs, the efficiency of the Project is considered moderate.

#### (1) Achievement of Inputs

Both the Japanese and the Iranian sides input necessary resources to implement the Project successfully. However, there were issues with both sides.

- Japanese side: Short-term experts were dispatched many times to deal with problems with mini-plant equipment and the resource requirement became large. Resources that should have been allocated to technology transfer were used for problem resolution.
- Iranian side: The number of technical counterparts did not reach 8, the number specified in R/D, by the time of terminal evaluation. The current number of 6 is the minimum to conduct training.

#### (2) Achievement of Outputs

Although the activities were accelerated and achievement of outputs were promoted in the latter half of the cooperation period, the initial delay was not completely made up for. As a whole, the achievement of outputs was not adequate.

### 1-4 Impact (including the prospect of the Overall Goal achievement)

Some positive impacts are observed.

Overall Goal: Through promotion of rational use of energy, enhancement of energy management in the industrial sector is achieved.

Indicator: Specific Energy Consumption (SEC) of each industrial sub-sector is improved to the extent defined separately by 2010. (10% reduction)

#### (1) Prospects of Overall Goal Achievement

As PDM does not include sufficient SEC data of each sub-sector, it is difficult to accurately judge the prospect of the overall goal achievement at this point.

However, according to external evaluation by SABA, at some factories with ex-trainees, knowledge about energy saving learned in the training courses at NTCEM/AHERC was applied to actual energy saving activities and SEC was reduced by 10% or more (e.g., Automobile: 11.5%, automobile parts: 21%, pharmaceutical: 32%, ceramic and tile: 15%).

On the assumption that the training by NTCEM/AHERC continues at the present pace (around 25 trainees per month), the total number of trainees will be over 1,500 by 2010. As this number is enough to cover all the large factories in Iran, there is a good chance that SEC will be reduced by 10% in all the sub-sectors.

#### (2) Impacts on Policies

It is considered that the Project had impacts on the following political movements.

During the cooperation period, the Committee for Promoting Energy Conservation in Iran was organized jointly by MOE, MOO, MPO, MOI, etc. to have cross-organizational discussion about such topics as operational management of the NTCEM/AHERC training courses and the certification exam for energy management engineers.

In the recent committee meetings, the possibility of establishing an energy conservation system referring to that of Japan has also been discussed.

### (3) Institutional Impacts

As the current training courses continue, NTCEM/AHERCA will gain a good reputation as a training institution that offers training courses for energy saving technologies both in theoretical and practical subjects.

According to the chancellor of AHERC, taking the advantage of the mini-plant equipment provided through the Project, a graduate course for energy conservation will be established in February 2007 in collaboration with Tabriz University. AHERC will be the 2<sup>nd</sup> higher education following Teheran and research complex in Iran that has a master's course and the first one to have a master's course in the field of energy conservation.

### (4) Technical Impact

Before the Project implementation, there was no organization in Iran that provided practical training concerning energy conservation. Iranian counterparts have obtained practical knowledge from Japanese experts, including knowledge about the operation and maintenance of mini-plant equipment. As a result, they are now able to conduct training courses on their own that directly contributes to energy conservation in the industrial sector.

## 1-5 Sustainability

Sustainability of the Project is considered high.

### (1) Policy Aspect

The Project is highly consistent with the national policies of Iran as the Project is to develop human resources for energy conservation in the industrial sector. Therefore, we can expect continuous support from the Iranian government through its policies.

### (2) Institutional Aspect

Through the Project activities, NTCEM/AHERC is gaining a reputation as one of the best training institutions in the field of energy conservation and has established a system to carry out training on its own. However, for the continuous implementation of the training system, it is necessary to strengthen the coordination with cooperating organizations including SABA.

For effective use of the mini-plant equipment provided through the Project, the Iranian side has decided to establish a master's course for energy conservation at AHERC in February 2007. This will further consolidate the position of AHERC as an educational institute.

### (3) Financial Aspect

The Iranian government has put priority in human resource development. As the Project aims at developing human resources in the field of energy conservation, it is highly consistent with the national policies of the government. Therefore, it is expected that the government will continue to provide support through its policies and financial measures.

EEO, the organization responsible for the implementation of the Project, has sufficiently covered the Project implementation cost including subsidies for training cost (course fee).

The current policies will probably be maintained and there will be no significant concerns about the financial continuity of the training course at least while the Law of the 4<sup>th</sup> Five-year Development Plan (2005-2009) is effective.

### (4) Technical Aspect

As mentioned in the section of Impacts, before the implementation of the Project, there was no training facilities in Iran that provided practical training concerning energy conservation. Through the technology transfer from Japanese experts in the Project, Iranian counterparts obtained practical knowledge for the operation and maintenance of mini-plant equipment etc. Thus their skills have been improved and they now have sufficient skills and knowledge to conduct training courses on their own.

### (5) Ownership

It is judged that EEO, the organization responsible for the implementation of the Project, NTCEM/AHERC, the organization providing training, and SABA, the organization responsible for recruitment of trainees and external evaluation, have been carried out their tasks from their respective positions with the sense of responsibility and ownership to realize energy conservation in Iran.

## 2. Factors promoting better sustainability and impact

### (1) Factors concerning to Planning

- 1) As the implementation of the Project was relevant and consistent with the actual needs of Iran, it was not difficult to obtain political and financial supports including budget for the training courses.

### (2) Factors concerning to the Implementation Process

- 1) Appointment of counterparts with a high level of expertise and a great deal of experience

### 3. Factors inhibiting better sustainability and impact

#### (1) Factors concerning to Planning

Although the relevance of the Project is high, it was found at the time of terminal evaluation that the Iranian side and the Japanese side had conflict of views even after PDM was modified concerning indicator setting following the mid-term evaluation.

#### (2) Factors concerning to the Implementation Process

- 1) Delay in customs clearing and installation of equipment
- 2) Delay in construction of a training building (rooms for workshop, lectures, etc.) where equipment will be installed
- 3) Problems found at the time of commissioning of equipment after installation
- 4) Existence of multiple organizations concerned: There are multiple organizations involved in the Project, including AHERC/ NTCEM, the implementing organization, EEO, the supervising organization, and SABA, the cooperating organization, who all have been engaged in important tasks for the Project from their respective positions. This made the operational management of the Project a complicated process.

### 4. Conclusion

The performance of the Project is considered moderate.

- ① The training system (recruitment of trainees by SABA, training course implementation by NTCEM, internal evaluation by EEO, and external evaluation and aftercare by SABA) has been established.
- ② The operation and maintenance system for the mini-plant equipment has basically been established.
- ③ The counterparts have acquired skills and knowledge necessary for the provision of the training courses.
- ④ The Law of the 4<sup>th</sup> Five-year Development Plan (2005-2009) has consolidated the sustainability of the Project.

For the above reasons, the Project will be terminated as planned.

## 5. Recommendations (Specific Measures, Suggestions and Advice Related to the Project)

### (1) Counterpart Allocation

According to R/D, 8 technical counterparts were to be assigned to the project. However, only 6 have been actually assigned. This number is the minimum to conduct training courses. When a lecturer is absent, it will be difficult to conduct training. Moreover, the counterparts are too busy to spend time improving their practical techniques and skills for energy conservation. The Iranian side should increase the number of technical counterparts.

### (2) Internal/External Evaluation

#### 1) Internal Evaluation

Although AHERC is supposed to compile internal evaluation reports and analyze data, it is EEO who actually conducts this assignment. In order to improve the quality of the training, AHERC should be positively involved in internal evaluation as originally planned.

#### 2) External Evaluation

External evaluation plays an important role in following up the activities of ex-trainees and the effects of the training courses and implementing energy conservation at factories. However, the number of the reports submitted by ex-trainees is not adequate. SABA should continue to encourage ex-trainees to submit reports and analyze reports.

### (3) Strengthening of Coordination among EEO, SABA and NTCEM/AHERC

In order to promote energy conservation activities in Iran, the three parties should continue to hold joint meetings on a regular basis to share information and build closer relationship.

### (4) Revisions of the Textbooks for the Training

Although the textbooks have been revised twice, there are still some errors such as lack of necessary calculating formulas. The Iranian side should update the textbooks based on the comments made by the Japanese experts and improve the quality.

### (5) Improvement of the Training Courses

The contents of the training courses should be reviewed and improved based on the feedback from the industrial sector, ex-trainees, EEO and SABA so that the training will meet the needs of the actual operation in factories.

### (6) Aftercare of the Ex-trainees

To promote the cooperation between the training center and the factories that dispatched trainees, SABA and NTCEM should continue aftercare activities such as answering question from ex-trainees. They should also reflect such questions in the courses.

### (7) Completion of the Lighting System

Although the Iranian side was supposed to install a lighting system, it was still under construction at the

time of terminal evaluation. The Iranian side should complete the lighting system by the termination of the Project and the Japanese side will confirm it.

(8) Budget to Procure Spare Parts for Mini-Plant Equipment

The Japanese side is currently preparing a list of spare parts including prices and manufacturers. Based on the list, the Iranian side should allocate a budget to procure spare parts.

(9) Maintenance of the Furnace

The automatic control system for air/fuel ratio of the furnace only works under certain conditions. This problem does not affect the implementation of the training courses. Concerning this problem, the Japanese side will prepare a manual concerning the operation of the system by the termination of the Project.

(10) Cooperation in Energy Management

It is desirable to conduct follow-up activities (e.g., dispatch of short-term experts) concerning factory audit and practical training and check the activities of the counterparts.

(11) Technical Exchange Program

The counterparts of NTCEM/AHERC hope to improve their practical skills to make the training more effective. For the purpose, the Iranian side should take measures such as establishment of a science and technology committee for energy conservation and a technical exchange program.

6. Lessons Learned (Cases from this projects that may be a reference for the discovery, formulation, implementation, and operation for other similar projects)

Formulation of a Project based on Careful Stakeholder Analysis

In the Project, NTCEM was established within AHERC, which is an educational institute. In the light of sustainability, it is considered appropriate that the Project was implemented at an educational institute.

Although the counterparts of AHERC are experts in the field of education, they lack practical experience with energy conservation.

In order to conduct training courses on energy conservation, they are required to have both practical knowledge and experience. However, in the Project, practical activities such as factory audit were not originally planned.

It is important to formulate a project based on thorough understanding of the strong and weak points of the target groups.