Summary of Evaluation Results

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<tr><td colspan="2">Country name: Turkey</td><td>Project name: The Project on Energy Conservation in the Republic of Turkey</td></tr>
<tr><td colspan="2">Fields: Energy conservation</td><td>Assistance type: Technical cooperation project</td></tr>
<tr><td colspan="2">Supervising office: Turkey office, Natural Resources and Energy Conservation Team, Second Group, Economic Development Department, JICA</td><td>Monetary amount of cooperation (at time of evaluation): Approx. 670 million yen</td></tr>
<tr><td>Period of cooperation</td><td>August 1, 2000 to July 31, 2005</td><td>Counterpart organization: Electrical Power Resources Survey and Development Administration/National Energy Conservation Center (EIE/NECC), Ministry of Energy and Natural Resources</td></tr>
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<tr><td colspan="3">1-1 Background of the Project
The Government of the Republic of Turkey depends heavily upon imports for its energy, as is evidenced by the fact that its self-supply rate of energy was less than 50% in 1997. This rate has been declining year-on-year in line with a rapid increase in energy consumption (20% increase over the last five years). Consequently, the government has been working to promote energy conservation. This effort has been coupled with the need for global warming countermeasures and to reinforce the international competitiveness of Turkish enterprises in Europe.

The National Energy Conservation Center (NECC) has established an energy managers system to promote energy conservation, targeting more than 500 factories with large-scale plants that consume 2,000 TOE or more of energy. Based on the “Energy Efficiency Regulation for Industrial Establishments” (established in 1995), this system obligates major plant enterprises to assign energy managers for the purpose of energy conservation. Moreover, NECC is engaged in diagnostic activities that make</td></tr>
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energy-conservation proposals to factories and public relations activities for energy-conserving technologies, etc. However, inadequacies in implementation frameworks and technical capacity have meant that the results of these efforts have not reached energy-conservation targets.

Under these circumstances, the Turkish government submitted a request to the Japanese government for project-type technical cooperation for the purpose of further promoting energy conservation through reinforcement of EIE/NECC capacities.

1-2 Description of cooperation

(1) Overall Goal

The energy intensity of selected factories is reduced.

(2) Project Purpose

NECC's overall capacities in training, audit, policy-making, and promotion activities are strengthened.

(3) Outputs of the project

0) Management and administration of NECC are established for implementing energy conservation activities
1) C/Ps overall skills in operation and maintenance of the training facilities and measuring equipment are strengthened.
2) C/Ps acquire the knowledge and skills necessary for implementing energy manager training.
3) C/Ps acquire knowledge and skills to implement energy audit and consultation in industrial factories.
4) NECC's capacity in providing energy-saving information to industries, building public awareness on energy saving, and preparing policy recommendations will be strengthened.

(4) Inputs (actual)

Japanese side

Dispatch of long-term experts:	Total of 5 experts Total: 240.5 M/M
Provision of machinery and equipment:	207,598,000 yen
Dispatch of short-term experts:	Total of 25 experts
Assumption of local costs:	32,287,000 yen (up to FY2004)

C/P training in Japan: Total of 19 C/Ps

Turkish side

Allocation of C/Ps: Total of 31 C/Ps

Purchase of machinery and equipment (primarily provided actually owned measuring equipment)

Provision of land and facilities (office space, land for training facilities, buildings, electricity, water, fuel, etc.)

Assumption of local cost: 2,175,000 US dollars

(5) Countries participating in third-country training (implemented by schemes)

Afghanistan, Albania, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Georgia, Hungary, Iran, Kazakhstan, Kyrgyzstan, Macedonia, Moldova, Pakistan, Poland, Romania, Slovenia, Syria, Tajikistan, Turkmenistan, Ukraine, Uzbekistan (total of 37 participants from 17 countries)

2. Outline of the Evaluation Team

	Responsibility	Name	Employment position
Members	Team leader	Hiromi Chihara	Senior Advisor Institute for International Cooperation JICA
	Energy conservation technology	Tsuzuru Nuibe	Senior General manager International Energy and Environment Cooperation Center Energy Conservation Center, Japan
	Evaluation planning	Hitoshi Aoyagi	Staff member Natural Resources and Energy Conservation Team Second Group Economic Development Department JICA
	Evaluation Analysis	Masato Onozawa	Consultant RECS International Inc.

Evaluation period	May 15, 2005, to May 29, 2005	Evaluation type: Final evaluation

3. Outline of Evaluation Results

3-1 Confirmation of achievements

The purpose of the Project is to strengthen NECC's overall capacities in training, audit, policy-making, and promotion activities. It is determined that the Project has been successful in reaching these goals, with achievements provided below. Moreover, beyond reinforcing NECC's functions, it is estimated that the Project promoted energy savings of as much as 5% against the total amount of energy consumed by Turkey's industrial sector.

(1) Training

Through the Project, practical training using plant machinery and equipment was added to classroom lecture-only training that NECC was implementing prior to commencement of the Project. As a result, training content was substantially enhanced and participants' appreciation of training increased dramatically. Since the Project began, 345 people have participated in energy manager training provided by EIE/NECC, and 168 of these participants have been granted certification. If the number of people who participated in pre-Project energy manager training is also considered, the number of people who have received certification thus far reaches 333. The number of factories that have assigned certified energy managers currently stands at 410. Thus, the number of training participants is equivalent to 78% of all factories that are required to assign energy managers under the Energy Efficiency Regulation for Industrial Establishments.

(2) Energy audit

NECC was capable of implementing simple energy audits even before the Project began. However, through the Project, NECC received technical transfer that gave it the capability to conduct more detailed audits in five important industrial sectors (iron, ceramics, textiles, food, and paper/pulp). In textiles and other field, NECC has become capable of implementing high-quality energy audits on its own; it is feasible that such audits can become paid services. Thus far, NECC has conducted a total of 118 audits, including 19 detailed audits. It is reported that the amount of energy saved through energy-conservation measures at these factories totals 46,295 TOE per year. This is equivalent to 9.52% of all energy consumed at selected factories.

(3) Policy-making and promotion activities

The project strengthened NECC's policy-making capabilities by presenting Japan's framework for promoting energy conservation, the roles that policy plays in this framework, and other items through training for Turkish policymakers in Japan and dispatch of ECCJ experts. As Turkey moves toward joining the EU, it is anticipated that the country will enact an Energy Efficiency Law. NECC is playing a central role in work to formulate a draft of this law.

As for strengthening promotion activities, through the Project, NECC has participated in various events, held regional seminars, and enhanced its public-relations media (videos, pamphlets, and websites). These actions have worked to promote a climate for promoting energy conservation in Turkey and to raise recognition of NECC in industry.

3-2 Outline of evaluation results

(1) Relevance

The Project Purpose is in accordance with government global warming countermeasures and energy-conservation approaches toward EU membership, and is positioned as one of the Turkish government's priority policies. Moreover, it is in accordance with the need for each factory of the industrial sector, which is the beneficiary of the Project, to promote energy conservation, and thus the Project's implementation is highly relevant. The Project is also in line with Japan's aid policy, which emphasize tackling of global issues. Furthermore, because Japan is one of the world's leading countries in the area of energy conservation and has sufficient technical advantages and experience here, its engaging in technical transfer to Turkey is highly relevant.

(2) Effectiveness

Based on NECC's situation at the time of Project evaluation, it is recognized that NECC's functions have been strengthened in the areas of training, auditing, policy-making, and promotion activities. As was mentioned in "3-1 Confirmation of achievements," NECC's systems have been appropriately strengthened and are already producing results. According to monitoring sheets that have been used since Project implementation, the ability of each C/P to execute his or her duties in training, improvement auditing, policy-making, and promotion activities has improved steadily.

(3) Efficiency

All of the inputs to the Project are efficiently utilized, and the five outputs defined in the PDM are being attained according to plan. In examining Project outputs, the fact that a variety of monitoring methods were employed from the time of Project implementation raised efficiency in manifesting outcomes. In particular, a post-training evaluation survey that was conducted using local consultants in September 2003, and progress management using monitoring sheets that defined ability to execute duties necessary in all technical fields, proved effective in raising efficiency.

(4) Impact

A number of factories that have received energy audits by NECC are making partial achievements toward the Overall Goal. These factories are beginning to implement proposed energy-conservation measures. Furthermore, as awareness of energy conservation rises, there are indications that factories are pursuing independent endeavors even in areas that have not been proposed. According to a post-energy audit follow-up survey of 23 factories, 19 factories have implemented some kind of energy-saving measure. It is reported that the amount of energy saved through energy-conservation measures at these factories totals 46,295 TOE per year. This is equivalent to 9.52% of all energy consumed at selected factories. It is expected that demand for energy audits by NECC will continue to grow into the future. As an impact that is outside the scope of the Overall Goal, efforts to raise awareness of energy conservation were conducted through, among other approaches, campaigns that targeted the public at large.

(5) Sustainability

Given the on-going process toward formulation of an Energy Efficiency Law, it is expected that NECC's responsibilities in energy conservation in Turkey will grow. It is further expected that the industrial sector will do even more to advance energy conservation as the legal system becomes established and international competitiveness among companies intensifies. It is therefore likely that NECC's functions—which include the training, auditing, policy-making, and promotion activities that were reinforced as a result of the Project—will not only be fully utilized but will also develop in a sustainable manner going forward. The fact that energy manager training is mandated for factories whose energy consumption meets or exceeds 2,000 TOE is an

important factor that guarantees the sustainability of training. Moreover, if the energy law currently being deliberated indeed takes effect, many more factories will be required to receive energy manager training. At the same time, it is expected that demand for NECC factory energy audits will grow as regulations and incentives for energy conservation are reinforced and awareness improves. As for energy audits, NECC intends to spread such audits using private-sector strengths (with focus on ESCO), and thus it is expected that technology will be passed on to the private sector in a developmental manner. On the other hand, because EIE/NECC will undertake even greater duties pertaining to energy conservation as the Energy Efficiency Law is enacted, it is thought that maintaining activities pertaining to training, audits, etc., at their current sizes and strengths will be difficult. Thus, among other measures, personnel increases and outsourcing of operations will be required.

3-3 Factors contributing to emergence of effects

(1) Factors pertaining to planning content

1) Long-term, continuous support

Beginning in 1989, Japan implemented the energy-conservation cooperation projects described below in Turkey in a long-term and continuous manner. The Project was executed based on the results of these projects. Long-term and continuous support forms the foundation upon which the effects of this Project were manifested.

- Group training: 13 times from 1990 to 2001
- Development surveys: 1 time from 1995 to 1996
- Individual expert dispatch: 1 expert from 1995 to 1997
  1 expert from 1997 to 2000
- Third-country training: 3 times from 2004 to 2006
- Other cooperation from ECCJ, etc.: Energy conservation seminar in 1989, etc.

2) Selection of an appropriate counterpart organization (NECC)

NECC, which was the counterpart organization of the Project, is serving excellently as a partner in implementing the Project with JICA in the areas mentioned below. The selection of this appropriate counterpart organization and the fact that NECC became an excellent counterpart organization were largely influenced by the abovementioned long-term and continuous support.

a. Strong ownership

NECC has an extremely strong sense of mission when it comes to promotion of energy conservation in Turkey. With regard to the Project, as well, it was the Turkish side that took the lead in controlling everything from planning to operation. Thus, from the beginning energy, manager training was implemented based on the initiative of the Turkish side. In energy audits, the work of developing and passing on learned capacities was based on Turkish initiative. This work included horizontal transfer of technologies among C/Ps to advance study of learned technologies within EIE/NECC.

b. Comprehensive fields of responsibility

Ordinarily, it is often the case in developing countries that the agency in charge of energy conservation is divided into an implementing department and a legal system department. However, in Turkey, NECC was in charge of all areas of energy-conservation promotion—from policy-making to implementation. Consequently, all policies required for promoting energy conservation in Turkey were within the responsibilities of NECC. Furthermore, because NECC is organized as a part of the Ministry of Energy and Natural Resources, making it therefore part of the government itself, it is firmly established in terms of finances and personnel.

c. Pro-Japanese sentiment

Generally speaking, Turkey is a country whose population has strong feelings of affinity toward Japan. Beyond this, however, nearly all NECC staff members have particularly strong feelings of friendship with Japan because of the long Japan-NECC relationship. On top of this is the fact that many key staff members have worked for NECC for many years and had experience visiting Japan for training even before the Project commenced. This allowed for smooth communication with the Japanese side during the Project's implementation.

d. Firm establishment of human resources

NECC is an organization that has few personnel transfers, and some veteran staff members have been working at NECC for more than 20 years. This kind of fixed human resources in the NECC system guaranteed the sustainability of transferred technologies.

3) Synergetic effect created by implementation of energy manager training and energy audits

The Project seeks simultaneously to implement training so that C/Ps can cultivate

the energy managers that must be assigned to factories and to conduct energy audits that focus on production processes. The Project further seeks to promote capacity development through these activities. Experiencing energy audits that are conducted with the guidance of long-term and short-term experts provides the perfect opportunity for energy administrators to acquire necessary and sufficient knowledge and skills. The results of interviews with concerned personnel indicate that experience with energy audits is useful when implementing training with supplied machinery and equipment. And having highly experienced C/Ps provide guidance to training participants from factories contributes to better training quality because it makes practical lectures possible. Here, a synergetic effect in raising C/P capabilities emerges because energy audits and energy manager training activities are organically tied.

(2) Items pertaining to the implementation process

1) Implementation of monitoring

Objective monitoring of the capacity improvement of those receiving technical transfer at each stage of the Project contributed to the Project implementation process. For example, at various stages, monitoring was conducted after methods were selected from a variety of options. These methods included 1) use of monitoring sheets for the purpose of measuring the progress of technical transfer from experts to C/Ps, 2) implementation of post-training surveys that target participants in energy manager training, and 3) submittal of reports in energy manager tests.

2) Sharing of the Project's logic structure

Throughout the cooperation period, there was clear sharing among Project personnel of the Project Purpose ("NECC's overall capacities in training, audit, policy-making, and promotion activities are strengthened"), the Overall Goal to be achieved through the Project Purpose ("The energy intensity of selected factories is reduced"), and the outputs and activities defined in the PDM to achieve the Project Purpose and Overall Goal.
The fact that the Project's logic structure was shared formed the foundation for mutual understanding among Project personnel, and made the holding of substantive two-way discussions at each turn of the Project possible.

3-4 Problem areas and factors leading to problems

(1) Items pertaining to plan content

Not relevant

(2) Items pertaining to the implementation process

Not relevant

3-5 Conclusion

The Team concludes that the Project has been carried out successfully and produced concrete results. It is confirmed that there is reason to believe that the objectives established at the beginning of the Project will be sufficiently achieved by the end of the Project Period. Among the many outcomes leading to achievement of the Project Purpose, one that deserves particular attention is the fact that C/Ps affiliated with NECC have reached the capacity level necessary for them to execute their duties as defined by the Project. The C/Ps have adopted the skills and knowledge that were newly acquired during the course of technical cooperation and have been able to utilize them in NECC operations. The strengthened capacity of each C/P is being organically integrated into the organizational capacity of NECC.

3-5 Recommendation (specific measures, proposals, and advice pertaining to the Project)

(1) Maintaining the acquired capacities of NECC

The capacities pertaining to promotion of energy conservation that NECC acquired through the Project (energy auditing, training of energy managers, etc.) are an important asset for further promotion of energy conservation. It is therefore necessary to maintain these capacities through continued activities.

Also, NECC's ability to conduct energy audits must be enhanced until the private sector becomes capable of implementing them as a business. For this reason, NECC needs to recruit personnel and work to maintain the capacities it acquired through the Project. This is because, if the proposed bill becomes law, there will be a need to assign energy managers to even more industrial factories. At the same time, capacity development must be continued within NECC through information sharing among C/Ps and in-house training.

(2) Maintaining training facilities

A minimum requirement will be to maintain training facilities in good condition through proper management practices. This will include securing budgetary funding

for spare parts, consumables, and repairs.

(3) Promotion of energy conservation measures through improvement and upgrade of production lines

Specific methods for promoting energy conservation generally take three forms: 1) operational improvement, 2) facilities improvement, and 3) production processes improvement. However, the Project focused primarily on an approach emphasizing 1) operational improvement that involved energy management and human resources development, as this was the easiest way to produce results. However, if Turkey is to achieve the kind of world-class energy conservation that Japan has, it will also need to reinforces its approaches in the areas of 2) facilities improvement and 3) production processes improvement. As has already been recommended in some activities, including energy audits, it is hoped that the government will implement further promotion policies for 2) facilities improvement and 3) production processes improvement.

(4) Provision of incentives for energy conservation

Preparing regulations based on clear policies and incentives to support tax and financial systems is effective in quickly and efficiently promoting energy conservation. Such items are already incorporated into the Energy Efficiency Law, and preparations are underway toward the enactment of this law in 2005 to promote the rational use of energy in Turkey.

(5) Energy conservation promotion among small and medium-sized enterprises (SMEs)

In order to promote energy conservation among SMEs, it is recommended that the on-going move to seek possible collaborations with KOSGEB (an SME organization) be continued. Based on Japan's experience, energy conservation by SMEs requires support and improved access to financial resources. Another long-term strategy for promoting energy conservation among SMEs may be to incrementally lower requirements that are based on current energy consumption for application to SMEs.

(6) Diversification of training programs

NECC will be able to further respond to various domestic energy-conservation needs by establishing more diverse training courses to promote energy conservation. Through the Project, NECC has established training courses with specific technical content in accordance with the training needs of industries. These courses cover such areas as

furnaces, refrigerating systems, and rotating machines. However, NECC's taking the initiative to add even more devices should prove effective in raising the quality of training.

(7) International training
NECC should continue to provide international training on energy conservation. This is because international training displays NECC's leadership and credentials in energy conservation and global environmental issues to neighboring countries.

(8) Energy efficiency modeling study
NECC should further develop its capacity to establish energy efficiency models, including economic analysis to forecast national energy efficiency projections and to strategize necessary investment policies. This is a task that will be required of NECC under the new law.

3-6 Lessons learned (items drawn from the Project that will prove useful as references when identifying and formulating, implementing, and managing similar projects)
(1) Importance of maintaining long-term and continuous support
EIE/NECC, which is the counterpart organization of the Project, has received bilateral assistance from Japan and other countries as well as multilateral assistance for energy-conservation projects from the World Bank, EU, and others. NECC's relationship with Japan can be traced back to the early 1990s, when ECCJ accepted EIE/NECC staff members for energy-conservation training. In almost all cases, such aid has consistently involved projects to improve EIE/NECC capacities in order to improve and diffuse energy-conservation technologies in Turkey. JICA has continued to provide long-term support to EIE/NECC by utilizing its various assistance schemes. These include acceptance of EIE/NECC personnel in its various training schemes (country-specific training and group training) in 1995, and implementation of development surveys. Such steps have not only helped build a relationship of trust with Turkey and foster firm ownership in Turkey; they have also made it possible for all concerned personnel to comprehensively share understanding and knowledge on actual circumstances surrounding energy conservation in Japan (including technical aspects, systematic aspects, the posture of industries, and all other areas of social systems). Such results are linked to more than on-site transfer of "technology" to individual C/Ps in the narrow sense. They are also connected to efforts to improve the capacities of the counterpart organization and encourage system reform throughout Turkey as a whole.

(2) Importance of consistent monitoring

As was mentioned before, the Project measured progress through systematic monitoring of not only improvements in C/P capacity but also everything up to changes in the capacities of energy managers that participated in training. In a particular area, the Project's approach of defining capacity improvements, which are difficult to express objectively, in terms of technical transfer recipients' "changes in behavior," and then conducting monitoring based on this definition, can be applied to other projects.

3-7 Follow-up situation

Because it has achieved the outputs that were originally set for it, the Project will be concluded on schedule. Although not defined as follow-up in terms of the Project scheme, there are plans to dispatch two Senior Volunteers (energy-conservation heat technology, energy-conservation electricity technology). It can therefore be expected that these Senior Volunteers will, in essence, fulfill follow-up roles. These Senior Volunteers will be assigned to an office within NECC that had previously been the workplace of long-term experts.