

THE FINAL REPORT
OF
THE STUDY
ON
THE RATIONAL USE OF ENERGY
IN
INDUSTRY
IN
THE ARGENTINE REPUBLIC
(I)

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PREFACE

In response to a request from the Government of the Argentine Republic, the Japanese Government decided to conduct a study on the Rational Use of Energy in Industry, and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Argentina a study team headed by Mr. Takashi Niikura of the Energy Conservation Center on two occasions; from December 8 to December 23, 1987 and from February 22 to March 31, 1988, and then headed by Mr. Mitsuo Iguchi of the Energy Conservation Center on one occasion, from September 26 to December 3, 1988.

The team held discussions with concerned officials of the Government of the Argentine Republic, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the rational use of energy in industry and to the promotion of friendly relations between our two countries.

I wish to express my sincerest appreciation to the officials concerned of the Government of the Argentine Republic for their close cooperation extended to the team.

October, 1989



Kensuke Yanagiya
President
Japan International Cooperation Agency

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1. Introduction

1. Introduction

(1) Background of the Study

(1) The Argentine Republic is potentially a rich country blessed with fertile land, petroleum, natural gas, hydraulic power, marine product, and other natural resources. However, the republic has problems of its own. In the aspect of energy supply, petroleum which accounts for 51% of the primary energy will last only about 15 years in terms of oil reserves. The problems related to energy consumption include consistently growing trends of energy consumption in recent years, and the low efficiency of use of energy in industry due to a low operating rates in a stagnant economy, and the superannuated equipment.

(2) Because the Argentine Government has enormous foreign liabilities, presidential decrees were issued in 1979 and 1985 to promote rational use of energy, substitution to natural gas, and research and development of new energy sources for the purposes of promoting petroleum export while suppressing domestic petroleum consumption and thus improving the country's balance of international payments. The Energy Conservation and New Energy Department (DNC y NFE) was organized in 1981. The presidential decree (2247/85), anticipating that energy demand would increase from 41 million tons equivalent petroleum (TEP) to 48 million TEP per annum over the period of 1985 to 1989, called for an energy saving amounting to a total of 12 million TEP for that period.

In answer to the presidential decree, the National Institute of Industrial Technology (INTI) began developing of techniques for rational use of energy in industry and providing advice on factory operations, while the groups of the National University of Technology started the survey of factory energy consumption.

(3) Therefore, the Argentine Government, with the aim of transfer of technical know-how of energy conservation diagnosis to INTI, requested the Japanese Government to conduct a feasibility study on the application of concrete techniques to the rational use of energy (involving plans for rational use of energy in industry and proposals for improvements). In response, JICA conducted a preliminary study, and an agreement was concluded on the Scope of Work (S/W) between INTI (the Argentine Counterpart on this study) and the Ministry for Foreign and Religious Affairs and JICA on March 25, 1987. JICA assigned the Energy Conservation Center to conduct the study.

(4) Japan is scant of energy resources and depends nearly 80% of its primary energy needs on imports. The first oil crisis and the subsequent soar of oil prices dealt a heavy blow to the Japanese economy. The government and industry got together to develop ways of energy conservation and substitute energy sources, and achieved amazing results.

It is believed certainly useful to introduce the applicable part of the measures taken by the government and the energy conservation and diagnostic techniques accumulated in the manufacturing industries for the promotion of rational use of energy in the Argentine Republic.

(2) Purposes of the Study

The study was intended to undertake the following surveys for the purpose of promoting and strengthening plans for rational use of energy in the medium and small-scale manufacturing industries of the Argentine Republic.

- (a) A survey on the possibility of energy conservation by improving the technical and management aspects of model factories.
- (b) To prepare data for promoting rational use of energy in the manufacturing industries

The scope of the study was as follows:

- (a) A survey of the energy situation in the Argentine Republic
 - (1) A survey of energy demand and supply in the Argentine Republic
 - (2) A survey of energy consumption in Argentine industry
- (b) A survey of activities for promotion of rational use of energy in the manufacturing industries of the Argentine Republic
 - (1) A survey of the energy conservation measures taken
 - (2) A survey of INTI activities for energy conservation
 - a. A survey of the current activities for energy conservation
 - b. Past activities
 - c. Future plans
- (c) A survey of use of energy in model factories in each field of industry
 - (1) A survey of use of energy in individual factories
 - a. Summary of factory
 - b. Energy management
 - c. Energy flowchart
 - d. Facilities that use energy
 - e. Problems on use of energy and measures to be taken without changing the present processes
 - f. Expected effects produced by such measures
 - (2) To prepare data to draw up a technical guideline for the promotion of energy conservation
- (d) Proposals for the promotion of energy conservation in the Argentine Republic
 - (1) Proposal on energy conservation measures in the medium and small-scale manufacturing industries of the Argentine Republic
 - (2) Proposal regarding INTI activities for energy conservation

(3) Organizations and Factories Covered by Field Work

Organizations

INTI	Instituto Nacional de Tecnologia Industrial
Bureau of Energy	
YPF	Yacimientos Petroliferos Fiscales
UTN	Universidad Tecnológica Nacional
Esso	
Shell	
Gas del Estado	
SEGBA	Servicios Electricos del Gran Buenos Aires S.A.
National Development Bank	
Agua y Energia	
IACRE	Instituto Argentino de Capacitacion en la Rama Electrica
JETRO	
Japanese Chamber of Commerce and Industry	
Bureau of Budget	
CNEA	Comision Nacional de Energia Atomica
El Cronista Comercial	
AAPURE	Asociacion Argentina Para el Uso Racional de la Energia

Factories

JUGOS, S.A.	(food)
Ventura Mar del Plata (DARSENA)	(food)
Wells S.A.	(textile)
Ansabo S.C.A.	(paper)
Ventura Hermanos	(leather)
Noren Plast S.A.C.I.F.	(chemical)
Plastimet S.A.I.C.	(plastics)
Cadafe S.R.L.	(cast steel)
Tifec S.A.I.C.y F.	(machining)
Rayen Cura S.A.	(glass)

(4) Survey Methods

The outline of the overall study is as shown in Figure 1.

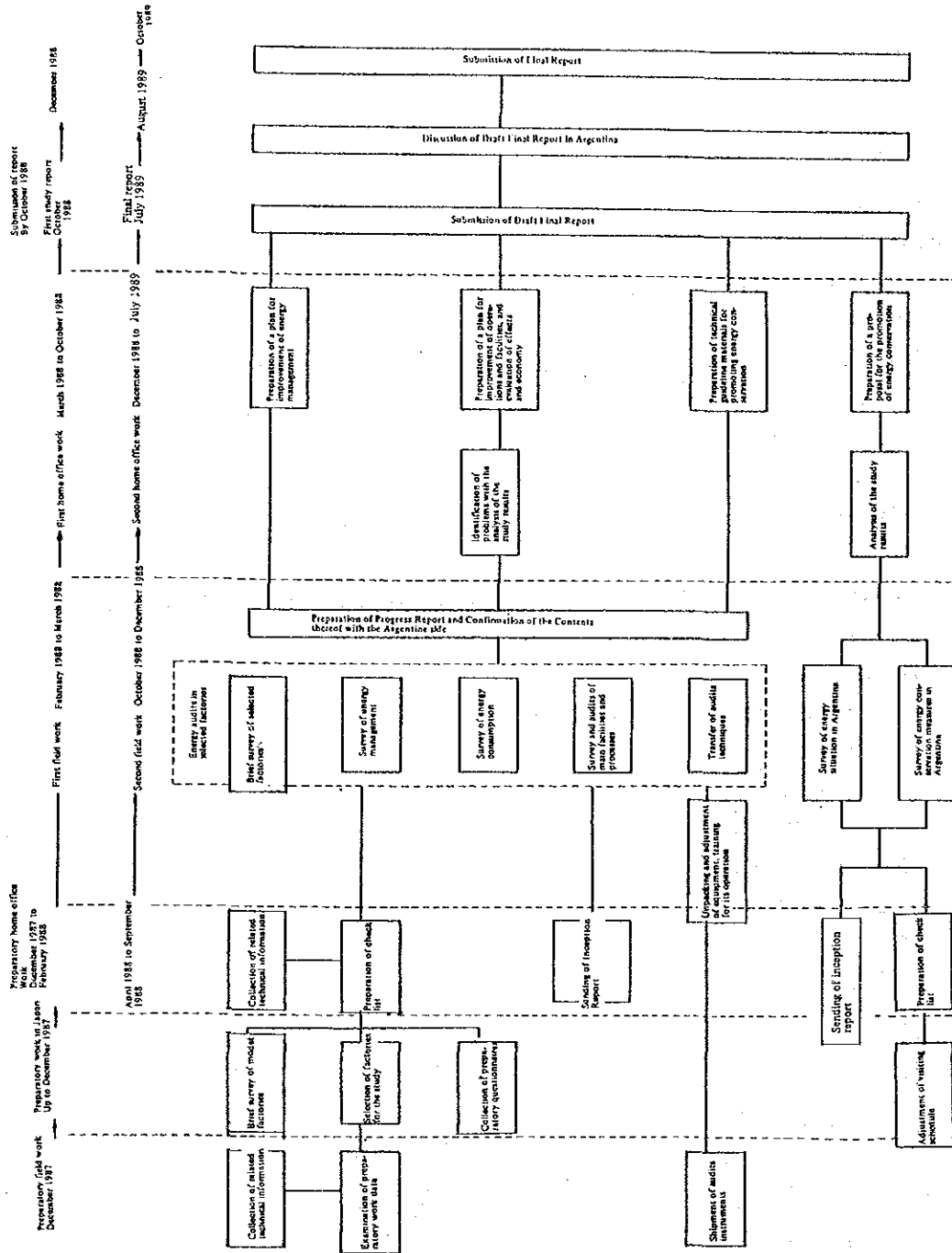


Figure 1 Outline of the Study on the Rational Use of Energy in Industry in the Argentine Republic

1) Field survey

- (1) The energy situation of the Argentine Republic, the execution of its energy policy and measures, and future plans were surveyed by interviews with INTI, DNC y NFE, and collecting data.
- (2) The object factories were surveyed for energy diagnosis as follows:
 - a. Prior to the factory survey, training on the use of instruments for diagnosis was

provided for the counter-part organization (INTI) and the factory survey method was explained to INTI based on the check list.

- b. Each factory was surveyed for five days, which were normally devoted to collecting factory data. If time was left depending on the factory scale, it would be used for the transfer of analysis techniques to the counterpart.
- c. Diagnostic procedure and method for each factory

As regards the surveys of "Summary of Factory" and "Energy Management" pertaining to the use of energy, the present state, problems, and future plans were grasped by interviews based on the check list, data acquisition, checking the books, and inspection.

As regards "Facilities that Use Energy" and "Problems on Use of Energy," the facts about operations and equipment performance were determined by actual measurement using the diagnostic instruments and materials brought from Japan, checking the drawings and past data, and data acquisition.

2) Work in Japan

- a. Regarding "Proposal on Energy Conservation Measures in the Medium and Small-scale Manufacturing Industries of the Argentine Republic" and "Proposal Regarding INTI Activities for Energy Conservation," proposals for measures which were believed to be useful for the Argentine Republic were prepared on the basis of the data acquired in the field work and the results of factory surveys, and referring to the energy conservation measures taken by Japan and other countries.
- b. Problems with the processes and facilities of the factories surveyed and their improvement measures

Regarding "Problems with Energy Management and Remedial Measures," the energy management organizations, recorded energy consumption data and its study, the set targets and management standards, equipment management, quality control, process control, employee education, and other main areas of management were studied referring to the energy management procedures employed in the corresponding factories in Japan which had proved effective; and remedial measures believed applicable to the Argentine factories were proposed, considering the peculiar local conditions.

Regarding "Problems with Energy Consumption, Remedial Measures for Operations and Equipment, Approximate Expenses Required for the Proposed Improvements, and Expected Effects," remedial measures for energy conservation by modification or addition of auxiliary equipment without changing the existing processes, which were believed to be most appropriate to the Argentine factories were prepared.

At the same time, the approximate expenses required for the proposed improvements and the expected effects were calculated; economic evaluation was made on the basis thereof; and the feasibility of the measures and their priority were set forth.

The effects which would be produced as a result of implementing the remedial measures were studied, and the points to be borne in mind in executing the measures were presented.

- c. Regarding "Preparing Data for Technical Guideline for the Promotion of Energy Conservation," the important points to remember in the management and use of energy for each type of factory were sorted out of the factory survey findings; main technical measures for energy conservation were listed to enable INTI to prepare a technical guideline.

(5) Execution of Field Work

- 1) Field work on the energy situation and the execution of energy policy and measures in Argentina could be carried out normally as originally planned. The factory diagnosis was made as planned with expected results thanks to the cooperation of the factories and INTI though the textile factory was left to the second survey because the delivery of the diagnostic equipment and materials was delayed owing to the harbor strike.
- 2) The field work schedule and the members of the Japanese and INTI survey teams are as shown in the attached data (1) to (3).
- 3) In the factory energy diagnosis, operating conditions and equipment performance were determined by actual measurements using the instruments shown in attached data (6). The operating techniques of these instruments were transferred to the INTI team members at the INTI Research Institute and the factory sites, it became possible to collect the necessary data only by the members in the last half of the survey. These instruments were granted to INTI by JICA.
- 4) After finishing the field work, a Progress Report that covers the survey details, the problems found, and remedial measures was prepared and submitted to INTI.

2. Energy Situation in the Argentine Republic

- 2. Energy Situation of the Argentine Republic
- 2.1 Demand and Supply of Energy in the Argentine Republic
- 2.1.1 Demand and Supply of Energy by Year

Table 2-1 shows a summary of main data on energy in 1973 and for the period of 1979 through 1985.

The supply of primary energy has steadily increased except in 1980, 1981, which a decrease was registered over the year before.

In contrast, the gross national product (GNP) of Argentina (in U.S. dollars of 1970 value) has been rather on the decrease, though unevenly, while energy consumption per unit GNP has been on the increase. Energy consumption per capita has also increased.

Table 2-1 Data on Main Energies

Year	1973	1979	1980	1981	1982	1983	1984	1985
Population (10 ⁶)	24.9	27.8	28.2	28.7	29.2	29.6	30.1	30.7
GNP (Billions of dollars)	32.5	37.4	37.7	35.3	33.5	34.5	35.4	33.8
Per-capita GNP (dollars)	1305	1345	1356	1251	1147	1166	1176	1101
Primary energies								
Total (PJ)	1554	1981	1951	1875	1932	1970	2040	2300
Total (MTOE)	37	46	47	45	46	47	49	50
Per-capita GJ	62	71	69	65	66	67	68	75
PJ/GNP (10 ⁹ US\$)	48	51	52	53	58	57	58	68

(Source: Bureau of Energy)

A breakdown of supply of primary energy and electric power supply are as shown in Table 2-2. The increase of energy supply within the past five years was supported mainly by natural gas and hydro-electric power. Of the increase of 207 PJ (petajoule: 10¹⁵) of primary energy supply (domestic) in 1985 over 1980, natural gas accounted for 85% and hydraulically generated electric power for 13%. Although petroleum supply has been more or less at the same level, it was still the largest energy source in 1985, accounting for 51% of the total supply of primary energies. However, dependence on petroleum has sharply dropped compared with 58% in 1980.

Electric power demand has been steadily growing, averaging an annual increase of 2.7% for the period of 1980 through 1985. With the expansion of the power distribution network and the resultant improvement of the standard of living, electric power demand is expected to increase at a rate higher than in the past. Electric power supply has greatly changed in terms of the type of power generation as shown in Table 2-3. Hydraulic power generation has markedly increased with atomic power generation to reduce the percentage of petroleum burning thermal power generation to a large extent.

Table 2-2 Breakdown of Energy Supply (Unit: PJ)

Year	1973	1979	1980	1981	1982	1983	1984	1985
Coal	11	18	10	12	13	12	13	10
Oil · NGL	904	1,015	1,057	1,067	1,053	1,053	1,030	1,031
Natural gas	320	467	500	504	560	609	674	675
Nuclear power	—	32	27	33	22	40	54	60
Hydroelectric power	35	118	155	149	168	166	177	182
Wood	29	23	26	22	21	22	22	24
Others	49	53	56	51	55	55	55	53
Total production	1,348	1,722	1,828	1,643	1,888	1,957	2,025	2,035
Electricity supply total (TWh)	26.7	37.6	39.7	38.8	39.9	43.0	44.9	45.3
Per capita KWh	1,072	1,353	1,408	1,352	1,366	1,453	1,492	1,475

(Source: Bureau of Energy)

Table 2-3 Breakdown of Electric Power Supply by Source

Installed electric capacity by sources (%)			Public electricity supply by sources (%)		
Year	1970	1985	Year	1970	1985
Coal	10	5	Coal	7	2
Oil & Gas	81	53	Oil	66	16
Nuclear power	—	7	Gas	18	22
Hydroelectric power	9	36	Nuclear power	—	11
			Hydro power	9	49

(Source: Bureau of Energy)

2.1.2 Primary Energy Supply

Argentina is blessed with all natural resources except coal such as water power, natural gas, petroleum and uranium, and has established a system of self-sufficiency in energy, and has no possibility of being an energy importing country in the near future. In Argentina, the development of domestic energy and the changeover of petroleum to other energy sources are the bases of its national energy policy, and great importance is attached to the development of energy resources required to meet the growing energy demand at home. Moreover, the possibility to export energy for the purpose of earning dollars is considered. Petroleum is the most possible object of energy export, and the export of electric power and natural gas to Brazil and other countries is also being studied.

The petroleum development plan of Argentina requests private development companies for active participation in petroleum development, while the government plans to raise the domestic sales prices of petroleum that is exclusively purchased by YPF (the National Petroleum Corporation). Exploring activities are being carried on more than ever. The possibility of exporting petroleum will become a reality if three factors — petroleum development, use of substitute energies in place of petroleum, and conservation of energy — have shown progress.

2.1.3 Secondary Energy Supply

1) Petroleum products

YPF has the exclusive right of purchasing crude oil, so foreign-based corporations that refine and sell oil such as Shell and Esso, and other oil companies purchase crude oil from YPF. Nearly all petroleum products are supplied by the three, that is, the National Petroleum Corporation (about 65%), Shell (about 20%), and Esso (about 15%). Petroleum product prices are fully under the control of the Government. The domestic sales prices of crude oil have been raised to about 80% of international prices, and petroleum product prices are about one half to one-third of the prices in Japan. Because gas oil is relatively cheaper than gasoline, it has been rather short in supply, and increase of alcohol-mixed gasoline and compressed natural gas use is planned for ordinary engines.

2) Electric power

Many national and public corporations, including Hidronor, Agua y Energia, and SEGBA, are involved in the generation, transmission and distribution of electric power in a complex way, but marginal supply capability is nearly 40%. The national network of electric power transmission that is planned on the basis of 500,000 volts has been completed only partially, and branch lines from the network are still far from enough to cover the vast territory of the Republic. However, the power transmission lines linking densely populated areas have been improved, and the Bureau of Energy plans to increase the spread of electricity from the present 79% to 85% by 2000. If electric power demand grows to such an extent that marginal supply capability will lower in the future, more accurate estimation of electric power demand will be required than in the past.

3) Natural gas

The Gas del Estado monopolizes the transportation, shipping, and sales of natural gas, while YPF has the exclusive right to purchase domestic natural gas. The Gas del Estado buys domestic natural gas from YPE, which accounts for 90% of the natural gas the Gas del Estado handles. The remainder of 10% is imported from Bolivia. The confirmed reserves of natural gas are about twice as much as the petroleum reserves, but the problem is that the natural gas fields are so remote from the consuming areas that the pipelines are yet insufficient in supply capacity. Natural gas is used as main fuel for household space heating and cooking and is controlled at a low price so that it is difficult to raise enough fund to construct pipelines. However, natural gas is expected as the main fuel to change over from petroleum and its increased use as compressed natural gas for transportation purposes is under way. The Bureau of Energy plans to increase the spread of city gas from the present 35% to 50% by the year 2000, and a greater care will have to be exercised in terms of supply and demand.

2.2 Energy Consumption in the Industry of the Argentine Republic

2.2.1 Percentage of Energy Consumption by Industry

Energy consumption in Argentina by sector is shown in Table 2-4. In 1985, the industrial sector accounts for 31.5%; the private sector (residence, commerce, public) for 28.1% of the energy consumption of the country; the transportation sector for 32.5%; the agricultural sector for 7.7%. Except agriculture, all the three major sectors account for a similar percentage of energy consumption. This breakdown is in close to that of the OECD on the average. Since breakdown has been stably, there is little possibility of a

sudden increase in energy demand for a certain use. Argentine industry has accounted for a nearly constant percentage (about 31%) of Argentina's energy consumption except in 1981, when its percentage slightly dropped.

Table 2-4 Energy Consumption by Sector (%)

Year	74	75	76	77	78	79	80	81	82	83	84	85
Industry	34.1	33.9	34.0	31.9	32.7	32.2	31.1	27.1	30.4	31.0	31.8	31.5
Residential commercial public	23.2	24.0	25.2	25.3	24.9	23.4	24.2	26.1	24.4	26.1	27.4	28.1
Transport	36.8	35.8	34.6	36.4	35.9	37.4	38.3	40.0	38.6	36.6	35.0	32.5
Farming	4.4	5.0	4.9	5.2	5.2	5.4	5.3	5.6	5.6	5.4	5.5	7.7
Others	1.4	1.4	1.4	1.2	1.6	1.6	1.1	1.3	1.1	0.9	0.4	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Source: Bureau of Energy)

2.2.2 Energy Consumption by Industry

A breakdown of energy consumption in Argentine industry by type of energy for the period of 1974 through 1985 is shown in Table 2-5. In 1985, natural gas accounted for the highest percentage of 42.6%, followed by electric power (19.9%). Fuel oil accounted for only 12.3%, even less than vegetable waste and firewood which accounted for 14.3%.

The trends over the year indicate a shift of fuel from fuel oil to natural gas due to the expansion of pipeline network and an increase in electric power consumption.

Vegetable waste and firewood are used mainly in areas not covered by the pipeline network and areas where sugar cane waste is available as fuel for self consumption. These maintain a specific percentage of fuel consumption according to the amount of material processing.

Table 2-5 Energy Consumption in Industry by Type of Fuel (%)

Year	74	75	76	77	78	79	80	81	82	83	84	85
Intermediate products	3.0	1.4	1.0	0.4	2.1	2.2	4.1	3.8	2.5	2.1	1.8	1.8
Vegetable waste - Firewood	14.0	13.6	12.4	14.4	13.2	13.0	14.6	16.2	14.2	14.0	13.9	14.3
Electricity	12.9	13.9	13.7	15.8	14.8	17.4	17.7	17.5	18.2	19.4	18.4	19.9
Natural gas	29.7	31.0	32.4	34.7	31.2	32.8	33.4	34.2	34.8	40.7	38.8	42.6
Fuel oil	31.1	28.2	29.3	23.5	25.2	24.8	21.7	20.1	20.1	15.3	19.0	12.3
Others	10.4	11.9	11.3	11.3	13.5	9.9	9.5	8.3	10.0	9.3	9.1	9.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Source: Bureau of Energy)

Of the main energy sources, natural gas and electricity were surveyed for consumption by industrial sector in 1985.

A breakdown of natural gas consumption by sector is shown in Table 2-6. Such energy consuming industries as metal, cement, petrochemical, sugar, steel, glass, and paper and pulp rank high in the list as industries require large amounts of fuel for heating. A breakdown of electric power consumption by industrial sector is shown in Table 2-7, in which the aluminum, metal, chemical, petroleum, and food industries rank high as energy consumers.

Table 2-6 and 2-7 are statistical data from the energy suppliers. It is difficult to obtain accurate information on petroleum consumption, electric power generation by independent generators, and other energy consumption. The energy statistics are not available in the form of a data book on a yearly basis for easy reference.

Table 2-6 Natural Gas Consumption by Industrial Sector

	Consumption (10 ³ m ³)	Approximate Percent Over Total Consumption (%)
Metal manufacture	683,904	17.3
Concrete	607,583	15.4
Petrochemicals	425,827	10.8
Sugar mills	384,653	9.8
Iron & Steel	382,138	9.7
Glassware	344,764	8.8
Papers & related products	309,262	7.9
Foodstuff	247,544	6.3
Chemicals	161,209	4.1
Textile & related products	126,352	3.2
Pottery	98,143	2.5
Rubber	56,324	1.4
Car manufacture	45,975	1.2
Frozen meats	27,164	0.7
Wood	20,978	0.5
Electric & electronic equipments	12,237	0.3
Leather & related products	5,538	0.1
Total	3,939,595	100.0

(Source: Bureau of Energy)

Table 2-7 Electric Power Consumption by Industrial Sector

	Approximate Percent Over Total Consumption (%)
Aluminium production	25.5
Metals & ferro alloys	18.1
Chemicals	10.7
Oil	8.8
Foodstuff	8.1
Paper & related products	6.7
Iron & steel	6.5
Concrete	5.7
Textile & related products	4.1
Metalmechanics, machinery and transport equipment	1.8
Car manufacture	0.89
Glassware	0.86
Electric & electronic equipment	0.84
Pottery	0.82
Leathers & related products	0.35
Wood	0.24
Total	100.0

(Source: Bureau of Energy)

3. Activities for the Promotion of Energy
Conservation in the Manufacturing Industries
of the Argentine Republic

3. Activities for the Promotion of Energy Conservation in the Manufacturing Industries of the Argentina Republic

3.1. Measures Taken for Energy Conservation

3.1.1 Base of Energy Policy

(1) As stated above, Argentina is blessed with energy resources, has established a system of self sufficiency in energy, and possesses a large amount of various resources not yet developed. However, the country tried to powerfully execute its energy policy for the following reasons.

- A) Energy consumption per GNP is on the increase.
- B) The possible amount of supply of petroleum that occupies the half of primary energy supply is not so large.
- C) It is desired to restrict the domestic consumption of petroleum and export it for increasing the foreign currency holdings.
- D) As the present condition of energy use is not effective, it is desired to strengthen the international competitive power of industries and to achieve the economic development by improving the energy consumption.

Therefore, as the bases of the energy policy (1) the first presidential Decree was established in 1979, (2) the Bureau of Energy Conservation and New Energies (DNC y NFE) was set up in the Energy Agency in 1981, and (3) the second Presidential Decree was established in 1985.

(2) The present energy policy of Argentina

Energy policy is based on the "presidential Decree 2247/85" and "the national energy plan for 1986 – 2000" established in 1985 by President Alfonsín. It is outline as stated below.

A) Promotion of energy conservation

The target of the energy conservation of the presidential Decreto aims at a total energy saving of 12,000,000 tons for the five years of 1985 – 1989, making the elastic value of GDP for energy demand about 0.8 in the future.

The following are the concrete energy conservation measures provided in the presidential Decree.

- 1) The influence of energy on daily life and the necessity of energy conservation are continuously publicized to the users of energy in various fields.
- 2) The basic measures of the price policy are taken as a signal to urge the users of energy to effectively use energy.
- 3) An economic incentive system is established to facilitate the effective use of energy.
- 4) A department that will offer necessary information to consumers and promote the rational use of energy is provided in the state enterprises.
- 5) Instruction on the execution of energy conservation is given to the state enterprises.
- 6) Recycling of paper, glass, metal and plastics is strengthened.
- 7) Industrial field
 - a) A department in charge of energy conservation is established in the factories that use energy more than a certain limit in a year for saving the energy used there.
 - b) Factory survey groups for medium- and small-sized enterprises is provided at UNT (National University of Technology).

- c) A course to train experts on energy conservation is provided at national universities.
- d) The actual conditions of industries and the items of possible improvement are summarized in cooperation with the associations of industries.
- e) In case there is a thermal potential in factories, the recommendation on the independent power plant is made.

B) Changeover from petroleum to other energy sources

The self-sufficient system for petroleum is substantially established. It is expected that the demand for gasoline and gas oil for traffic use will grow in the future. However, the reserves of petroleum is less than those of natural gas, and the Argentine Republic desires to export petroleum for obtaining more foreign currency. Therefore, it is planned to expand the use of alcohol-mixed gasoline and compressed natural gas and electrify railways and buses, and the use of natural gas for heating and thermal-power generation is being promoted.

C) Promotion of the development of domestic energies

The Argentine Republic is blessed with energy resources except coal such as hydro-electricity, natural gas and uranium, its biggest problem lies in the shortage of development funds. The government is carrying out the development plan (Houston Plan) to introduce private funds and techniques including those obtainable from abroad. Recently, a huge gas field was found in the sea area at the southern end of Argentine (Tierra del Fuego) that is considered as a prospective reserve area of oil and natural gas. Hydro-electricity resources are estimated to be the largest energy source. Therefore, the development of hydro-electricity resources is conducted centering around Yacyreta near the Paraguay border.

D) Development of new energies

New energies are considered from the standpoint of the development of power resources mainly for remote places, laying stress on photogenic generation, wind power generation, medium- and small-scale hydro-electricity generation and geothermal power generation. The Argentine Republic expects much from the technical cooperation of Japan.

3.1.2 Target and Possibility of Energy Conservation

Energy demand predictions and energy conservation target set forth in the national long-range energy plan are shown in Table 3-1, 3-2, and 3-3.

Energy conservation is one of the major policy targets of the presidential Decree 2247/85 and the long-range energy plan, which aims at a total energy saving of 12,483,000 tons in terms of petroleum for the period of 1985 ~ 1989.

It also aims at an energy conservation of 10% by industry by 1990. According to the estimates calculated by the Bureau of Energy in 1985 considering data on foreign countries, there was room for 15% to 18% more energy conservation by industry. The investigation on the actual conditions of energy consumption of about 300 factories of small enterprises conducted by groups of the UTN (national university technology) drew the conclusion that about 14% of energy conservation would be possible.

In view of the above, it can be said that there is large room for the conservation of industrial energy in the Argentine Republic.

Table 3-1 Required Quantity of Domestic Supply of Primary Energies

tep: Tons of oil equivalent

Year	1986		1990		1995		2000	
	10 ³ tep	%	10 ³ tep	%	10 ³ tep	%	10 ³ tep	%
Petroleum	20,570	43.9	20,600	36.9	21,913	33.3	24,650	31.1
Natural gas	16,765	35.8	25,405	45.5	29,199	44.4	33,150	41.9
Coal	1,219	2.6	1,804	3.2	1,760	2.7	1,783	2.3
Hydroelectric power	4,460	9.5	4,077	7.3	7,649	11.6	13,294	16.8
Nuclear power	1,643	3.5	1,678	3.0	2,895	4.4	3,793	4.8
FarmWast	2,191	4.7	2,297	4.1	2,366	3.6	2,471	3.1
Total	46,848	100.0	55,861	100.0	65,782	100.0	79,141	100.0

(Source: Plan Energetico Nacional 1986-2000)

Table 3-2 Final Energy Consumption

(10³ tep)

Year	Gasoline	Gas oil	Fuel oil	Coal-pitch	Electricity	Gas	Liquefied gas	Vegetable waste	Firewood	Others
1986	4,939	7,662	1,515	386	3,404	7,887	1,186	1,120	771	1,485
1987	4,878	7,938	1,443	385	3,575	8,436	1,180	1,150	757	1,565
1988	4,839	8,223	1,288	385	3,744	9,163	1,353	1,170	741	1,645
1989	4,853	8,521	1,286	385	3,945	10,919	1,375	1,190	727	1,679
1990	4,836	8,759	1,244	390	4,179	12,020	1,378	1,210	713	1,714
1991	3,835	9,009	1,179	392	4,422	12,637	1,378	1,230	700	1,752
1992	4,851	9,267	1,173	394	4,708	13,201	1,392	1,250	689	1,791
1993	4,860	9,521	1,162	396	4,993	13,755	1,405	1,275	678	1,830
1994	4,891	9,784	1,152	398	5,295	14,341	1,418	1,300	667	1,872
1995	4,906	10,059	1,134	402	5,620	14,881	1,430	1,325	656	1,916
1996	5,001	10,372	1,097	406	5,972	15,498	1,441	1,350	646	1,966
1997	5,098	10,697	1,054	410	6,347	16,111	1,453	1,380	637	2,020
1998	5,207	11,046	1,078	414	6,748	16,655	1,464	1,405	627	2,072
1999	5,318	11,405	1,027	420	7,178	17,239	1,474	1,435	620	2,129
2000	5,432	11,778	1,052	427	7,639	17,825	1,484	1,465	613	2,189
Growth rate										(%)
1986-1990	▲ (0.5)	3.4	▲ (5)	0.3	5.3	11.1	3.8	2.0	▲ (2.0)	3.6
1990-1995	0.3	2.8	▲ (1.9)	0.6	6.1	4.4	0.7	1.8	▲ (1.7)	2.3
1995-2000	2.1	3.2	▲ (1.5)	1.2	6.3	3.7	0.7	2.0	▲ (1.4)	2.7
1986-2000	0.7	3.1	▲ (2.6)	0.7	5.9	6.0	1.6	1.9	▲ (1.7)	2.8

(Source: Plan Energetico Nacional 1986-2000)

Table 3-3 Target Quantity of Energy Conservation

Year	Consumption Before energy conservation	Consumption After energy conservation	Quantity of energy conservation
1985	40,885	40,272	613
1986	42,520	41,171	1,349
1987	44,221	42,004	2,217
1988	45,990	42,417	3,573
1989	47,830	43,099	4,731
Cumulative total of energy conservation			12,483

(Source) Decreto No.2247/85

Programa de Uso Racional de la Energia

Aneko I. Subprograma de Conservacion de Energia

3.1.3 Execution of the Concrete Energy Conservation Measures

The importance of energy conservation is fully recognized in the Argentine Republic, too. The government has started to carry out the full-scale energy conservation activities. The outline of the concrete activities included in the programs based on the presidential Decree is as explained below.

(1) Organizations for promotion

The Bureau of Energy Conservation and New Energies (DEC y NFE) was established in the Energy Agency of the Public Enterprise Department in 1981 for the purpose of executing the energy conservation measures.

In 1986, CIPURE (Energy Conservation Research Center) was established at INTI (National Institute of Industrial Technology) on the basis of the agreement between the Energy Agency and INTI for measurement and improvement of equipment efficiency.

Besides, publicity activities are conducted mainly for people's livelihood field by the private organizations such as IACRE (Argentine Electric Power Utilization Research Laboratory) and AAPURE (Argentine Energy Conservation Association).

(2) Energy conservation activities by public organizations

Seminars designed to promote energy conservation have been increasingly held in recent years, thus spreading information on energy conservation some of the seminars that have been held to date are as follows:

(a) Seminar on "Energy Conservation in the Petroleum Industry and Petrochemical Industry"

In Buenos Aires in November 1979

Held by the Bureau of Energy

with the cooperation of the Petroleum Research Institute of Argentina and the Petrochemical Research Institute of Argentina

- (b) Seminar on "Energy Conservation in Industrial Sectors"
In Buenos Aires in December 1981
Held by the Bureau of Energy
with the cooperation of the Gillette Foundation
- (c) "Pan-American and Argentine Energy Conservation Conference"
In Buenos Aires in 1984
Held with the cooperation of the Argentine Society of Engineers
- (d) "AAPURE Conference"
In Buenos Aires in November 1985 and November 1986
Held with the cooperation of the Bureau of Energy
- (e) "First Meeting of Energy Conservation Specialists"
In Rosario in September 1985
Held by the Rosario National Technological University and the Rosario Society of Chemical Engineers
with the cooperation of the Bureau of Energy
- (f) Seminar on "First conference for Policy and Activity of Energy Conservation and New Energy"
In Buenos Aires in March 1988
Held by the Bureau of Energy
with the cooperation of INTI and other Agencies

(B) Diagnosis of energy conservation

Diagnosis of energy conservation for factories is made for small enterprises mainly by the energy department of INTI.

Activities were started in 1981, but the diagnosis was made only for six industries (seven factories) until 1985 because of the insufficient diagnostic equipment.

INTI now plans to intensify the factory diagnosis activities on the basis of the survey on the model factory for each industry with this study as momentum.

In addition, UTN is conducting a research on the use of energy at the factories of small enterprises through the factory diagnosis partly for the education of students.

(C) Establishment of standards

Setting standard or criteria which objectively expresses the energy efficiency of all sorts of equipment ranging from large-sized industrial boilers to home energy units and automobiles is an important subject which will be the basis of promoting energy conservation.

The importance of such standards is fully understood in Argentina, and a study already began for that purpose.

As regards home appliances, INTI is building test facilities for the measurement of equipment efficiency and preparing to establish standards with the aim of developing a so-called quality market, in which consumer preference of products of high energy efficiency will promote efficient use of energy in a natural way.

(3) Energy conservation by private enterprises

(A) Energy conservation by large enterprises

Large national corporations, such as YPF, and large private corporations, such as Esso

and Shell, are promoting energy conservation on their own along the national energy plan. Their energy conservation programs are going well. For example, YPF accomplished an energy conservation of 4% in 1987 over 1985 by improving the boilers and cracking equipment in its oil refineries. Esso Oil has brought the energy efficiency of its refineries close to the international level. (Each Esso facility has reached about 80% of the international standard specified by Exxon headquarter.)

(B) Energy conservation activities in other sectors

Apart from the measures for energy conservation in the manufacturing sector of industry, many measures have been studied or implemented for energy conservation in residential & commercial and the transportation sectors of Argentina.

IACRE (Argentine Institute for Use of Electric Power), an organization jointly established by energy suppliers, is undertaking an energy conservation program for elementary school children in Buenos Aires. In addition, AAPURE (the Argentine Society of Energy Conservation) has its own energy education program for children as well as adults. Esso is giving energy conservation education at meetings in rural areas or factories along the programs of the Exxon group.

In the transportation sector, energy conservation measures are actively studied, covering research on efficient transportation systems, establishing mileage standard, and formulating guidelines for the repair of personal cars. Beside, AAPURE is studying control plans referring to foreign standards. The Law School of the National University at Buenos Aires is examining the legal aspect of energy conservation at a request of the Bureau of Energy.

3.2 Energy Conservation Activities of INTI

INTI is an organization established in 1957 as an independent organization belonging to the Industry and Trade Agency of the Department of Economy for the purpose of giving assistance to the technical and economic development of industries. It has a staff of about 1,600 persons. Because it has the central research laboratory for basic studies and professional research centers for respective industry which are closely related to many factories, INTI is the organization most suitable for the guidance on energy conservation.

INTI has excellent human resources and an extensive capability of collecting information. It cooperates with the Bureau of Energy, mainly in the technical aspect, in studying and implementing measures for energy conservation in the Argentine Republic. The main activities of INTI for energy conservation are as follows:

3.2.1 Factory Diagnosis and Technical Guidance

For the purpose of improving the efficiency of energy use in factories, INTI measures boiler efficiency, conducts performance tests on heat exchangers and cooling towers, inspects industrial waste heat recovery measures, and diagnoses factories for energy conservation. INTI is trying to improve its diagnostic capabilities and intensify its diagnostic activities by acquiring the latest diagnostic equipment through cooperation from Japan, jointly conducting factory diagnosis for energy conservation with Japanese specialists, and sending INTI engineers to Japan for training.

3.2.2 Collecting and Accumulating and Offering Energy Conservation Information

INTI has an information center connected to an information bank in the United

States, and makes effective use of its excellent capability of collecting information, mainly technical, on energy conservation, and stores it in the data bank. The information thus collected and stored will be utilized online at INTI. INTI also provides information (fee charging) in the form of answering inquiries from the outside.

3.2.3 Establishment of standards

INTI plays the leading role in studying to formulate the aforementioned standards for energy equipment.

The objects covered by the INTI study are a wide variety of energy devices ranging from lights to air conditioners, heaters, boilers, freezers, stoves, refrigerators, and other home and industrial products, not to mention automobile engines.

INTI improving and expanding test facilities and laboratories to measure the efficiency of devices, and its activities in this regard are progressing well.

3.2.4 Better Use of Energy for Transportation

INTI is carrying on multi-faceted activities for energy conservation in the field of transportation to help promote energy conservation along the line set forth in the national energy plan. INTI has improved and expanded the facilities to test the fuel efficiency of automobile engine and their exhaust gas, and is studying to formulate a method of showing an efficiency standard in a form which would be easily understood by the users in general.

4. Recommendation on the Measures for the Promotion of Energy Conservation in the Argentine Republic

4. Recommendation on the measures for the promotion of Energy Conservation in the Argentine Republic

4.1 Recommendation Regarding Energy Conservation Measures in Small and Medium Size Manufacturers of the Argentine Republic

In the Argentine Republic, the basic policy and promotion system of the Government regarding of energy conservation have already been established, and concrete advancement program has been included in the presidential Decree. The activity is being promoted, and future results are greatly anticipated.

However, in the industrial sector, in particular, the medium and small size manufacturers, there are many problems. In order to make energy saving in the industrial sector where an increase in energy consumption is forecasted, problems related to the policy and recommendations to improve the situation are described below.

4.1.1 The basic concept on the Energy Conservation Policy

(1) Basic concept

The role of the Government and the Government related agencies in advancing energy conservation, is to plan the basic policy of energy conservation, and to prepare the system and environment for promoting the energy conservation activities. The main means for achieving this is to arouse the energy conservation mind, and to supply information. In particular, in the initial stage of energy conservation advancement, it may be said that the suitability of the policy and support of the Government and Government related Agencies will greatly influence the results of the energy conservation.

The Government will plan and determine the basic policy of energy conservation, however, in the execution stage of the policy, it will not necessarily be involved in all matters directly, and in most cases a neutral organization will be responsible for executing the policy.

Energy conservation will have merits for both the Government and the enterprises, but the purpose of attaining energy conservation is not always the same. The objective of the Government is in the development and stabilization of the economy, and the improvement of international trade balance, whereas the objective of the enterprises is to reduce the energy cost, and expand the profit of the enterprises.

Thus, the recognition of the importance of energy conservation and the priorities between the Government and the enterprises, will not always coincide with each other. Consequently, in the planning, determining, and executing of the energy conservation policies, the mutual understanding and cooperation among the Government and the enterprises will be indispensable. Unless there is the understanding and cooperation of the enterprises which will mainly execute the energy conservation, sufficient results cannot be anticipated.

For reference, in Figure 4-1, the overall energy conservation promotion system in Japan is shown.

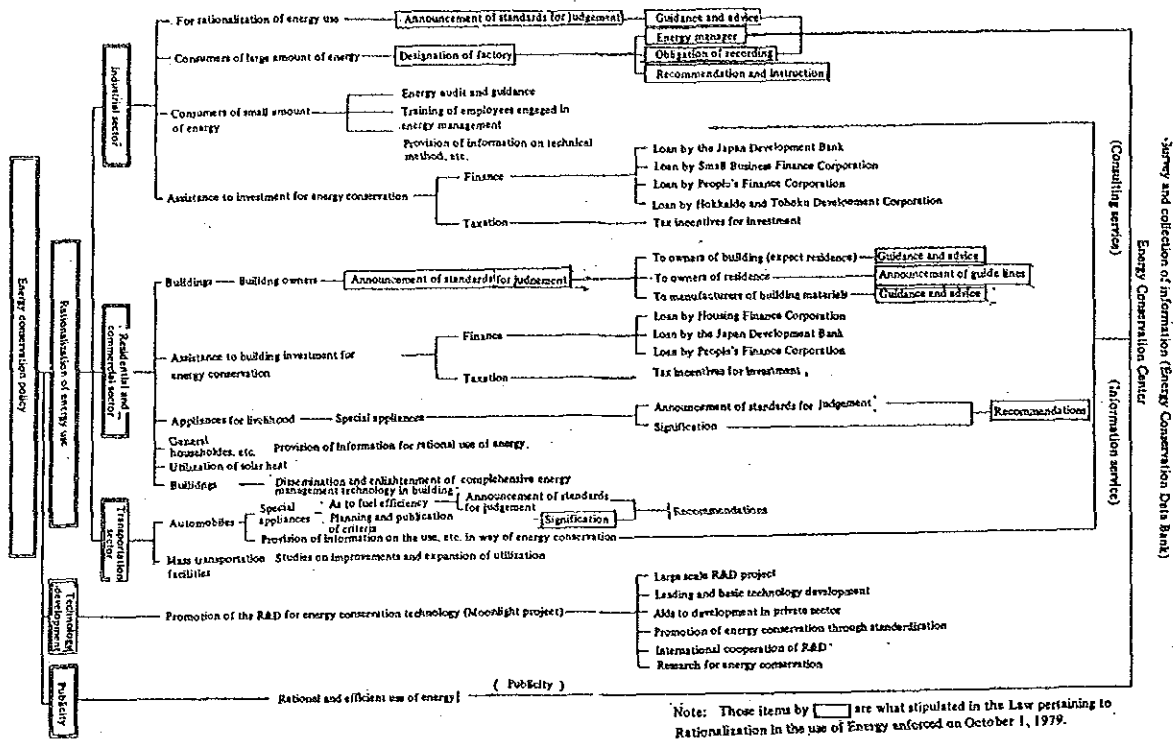


Figure 4-1 System of the energy conservation policy in Japan

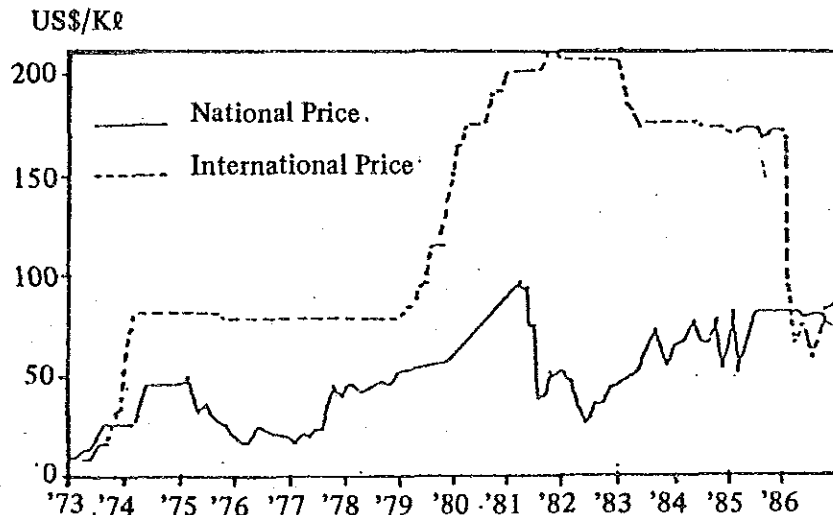
(2) Price of energy

The direction in which the energy conservation policy should aim at is to pursue energy utilization which will realize the development of economy and the improvement of national life to the maximum level while considering the desirable direction of energy supply as well as planning the balance between life in society and problems of environment.

In many countries including Japan, by the skyrocketing of oil prices owing to the two "oil shocks", the energy conservation countermeasures have made great progress. In particular, by the high price of oil which came into effect at the time of the second oil shock, many energy conservation countermeasures which required capital investment became economically feasible, and energy conservation in industry was strongly advanced. In addition, the consciousness of the whole nation to conserve energy became very high, and the development of many energy conservation equipment for the homes was promoted. During this period, the role played by the Government and the Government related Agencies in each country was very big. Currently, the supply and demand of the energy is alleviated in a worldwide scale, and the price of crude oil is about half of the peak price. Each country is seeking the direction for new energy conservation in response to such a trend.

However, in the case of the Argentine Republic, the current situation was reached by a different background from the energy situation mentioned above. When we consider the energy problem in the Argentine Republic, the most characteristic point is that

the Republic never experienced the so-called "oil shocks". So far, it has never experienced a period in which energy conservation was pursued thoroughly. In this country, the international trade of energy is comparatively small, and the national control over the energy supplying enterprises is extremely strong. In particular, as far as prices are concerned, not only for the public utilities such as electric power and municipal gas, but also for petroleum, the Government decides the crude price at the oil wells, as well as retail prices of oil products. As for the oil prices in the Argentine Republic, as shown in Figure 4-2, it has shown a different trend from those of the international oil prices. Apart from the sudden rise and sudden drop in the international prices, it has consistently shown a mild increase. As far as oil prices are concerned, since the international prices fell abruptly, the oil product prices in the Argentine Republic have become close to the international prices. However, because of the policy for promoting natural gas usage, the prices of the natural gas is held below the international price level.



(Source: Bureau of Energy)

Figure. 4-2 Trend of international price and domestic price of crude oil

In general, the introduction of market mechanism for the energy price is considered as a very effective means for promoting energy conservation in the industrial sector for enterprises that are sensitive to energy price, particularly giving the motive for energy conservation to the management people of such enterprises.

In the Argentine Republic also, it would perhaps be necessary to match the international price levels for the primary energy prices such as crude oil and natural gas, and let all costs from the production to the supply reflect on the secondary energy prices such as electric power, municipal gas, and petroleum products.

However, the increase of energy prices will have great impact on the whole economic society, and in the industrial sector, there is danger of lowering the international competitiveness of the enterprises. Consequently, the energy prices will have to be

decided after carefully studying the industrial policy, trade policy, and commodity price policy, collectively.

4.1.2 Improvement Measures and Proposals Regarding the Energy Conservation Policy

In regard to the energy conservation policies in the medium and small manufacturing sectors in the Argentine Republic, the following three items are proposed.

- (1) Motivation of energy conservation
- (2) Offer of technical information on energy conservation
- (3) Preparation of conditions for promotion of energy conservation

The outline is as follows:

Recommendations for Promotion of Energy Conservation in Medium and Small Size Manufacturing Industries

I. Motivation of energy conservation

Item	Actual circumstances	Problems and analysis	Proposals	Responsible entity		Hardness
				INTI	Government	
1. Request of collaboration to top management	<ul style="list-style-type: none"> ○ Concrete appeal to top management of medium and small sized factories is not done. 	<ul style="list-style-type: none"> ○ There is not systematic and continuous information delivery route. ○ Perspective of management is difficult as the government measures have often changed. ○ The fuel occupies lower weight in the production cost as the energy price has remained at lower level. 	Necessity, merit and government policy on energy conservation should be transmitted to top management by the meetings of economic associations and industrial representatives to request their collaboration.		○	A
2. Nomination of energy administrators	<ul style="list-style-type: none"> ○ The nomination is established in the presidential Decreto, but not effected yet. ○ Special departments in charge of energy conservation have been set up in national and large size enterprises. 	<ul style="list-style-type: none"> ○ The execution of the nomination is difficult, as its economic merit and role of administrators are not understood by top management. 	(1) Nomination of specialists who will be the core of promotion of energy conservation when more than a determined volume of energy is used (provision of legal capacity to secure determined ability of the person).		○	A
			(2) Organization of energy administrators, offer of technical information and execution of education of administrators.	○	○	A
3. Commendation of excellent factories and equipment on energy conservation	<ul style="list-style-type: none"> ○ There is not any system. 	<ul style="list-style-type: none"> ○ There is not any expectation for the system due to insufficiency of motivation for energy conservation to the managers and engineers. ○ Raising of reliability of enterprises by commendation through public organization can be expected. 	Establishment and execution of commendation system <ul style="list-style-type: none"> ○ Periodical execution (annually) ○ Appeal for public subscription ○ In selecting, equitable examination should be intended. ○ Common knowledge of results should be aimed. 	○	○	A

II. Offer of technical information on energy conservation

Item	Actual circumstances	Problems and analysis	Proposals	Responsible entity		Hardness
				INTI	Government	
1. Traveling energy audits and advice to factories	<ul style="list-style-type: none"> ○ INTI effects energy audits to factories (charged) (by request) ○ UTN surveys actual conditions of energy consumption aiming at energy conservation (about 300 cases). 	<ul style="list-style-type: none"> ○ Activity is insufficient due to lack of audits technics, equipment and charge (by request). ○ Generalization and following up of audit results are not effected. 	(1) Execution of free audits (by commission of Energy Agency)	○	○	A
			(2) Expansion and reinforcement of charged audits	○		A
			(3) Utilization of data acquired through audits	○		A
2. Execution of technical lecture meetings (education of engineers)	<ul style="list-style-type: none"> ○ Lecture meetings are seldom held for engineers. ○ There is no chance for technical leveling up. 	<ul style="list-style-type: none"> ○ Top management's understanding of the merit of investment for ability development of engineers on energy conservation technics is insufficient. 	(1) Periodical execution of lecture meetings for engineers of medium and small size enterprises	○	○	B
			(2) Study of establishment of the energy conservation training center for education and improvement of technical level of engineers (future)	○	○	C
3. Holding of exhibitions		<ul style="list-style-type: none"> ○ Neither makers nor users have chance of exhibiting or knowing energy conservation technics. 	(1) Government or its relative organizations should support the exhibitions sponsored by industrial entities.	○	○	B
			(2) Exhibition of government publicity panels in the above exhibitions	○	○	B
4. Presentation of Energy conservation successful cases	<ul style="list-style-type: none"> ○ Seminars on energy conservation are held irregularly. 	<ul style="list-style-type: none"> ○ Offer of information on examples of concrete energy conservation in process of factories is insufficient. 	Periodical holding of national mass meetings (sponsored by INTI)	○	○	B
5. Publication of technical magazines on energy conservation	<ul style="list-style-type: none"> ○ INTI publishes technical magazines on energy conservation in some fields (several times yearly). 	<ul style="list-style-type: none"> ○ Offer of information on energy conservation for factory engineers is insufficient. ○ Dependence on information is low because its offer is irregular. 	Periodical publication of integral technical magazines on energy conservation (charged)	○		A
6. Collection and offer of technical information on energy conservation	<ul style="list-style-type: none"> ○ Information center is established in INTI. (Information is given to external users with charge) ○ Exchange of technical information in the trade is inactive. 	<ul style="list-style-type: none"> ○ Acquisition route of information is not fully established. ○ Data compilation of information is insufficient (under study). 	(1) Reinforcement of information collection	○		A
			(2) Expansion of data base	○		A
			(3) Expansion of on-line offer of information	○		C
			(4) Establishment of information service windows	○		C

III. Preparation of conditions for promotion of energy conservation

Item	Actual circumstances	Problems and analysis	Proposals	Responsible entity		Hardness
				INTI	Government	
1. Favorable treatment for investment for energy conservation	<ul style="list-style-type: none"> Prescribed in the presidential Decreto, but not executed yet. (There is a favorable treatment on tax for development of south area) 	<ul style="list-style-type: none"> Many medium and small size enterprises claim monetary shortage for investment in equipment. The favorable treatment must be what awakes investing will even in inflation. Such measures should be taken to clarify the effect of tax reduction to enterprises. 	<ul style="list-style-type: none"> (1) Planning and execution of favorable treatment such as tax reduction or special loan (Special financing with government guarantee or reduction or omission of property tax will be effective under the present circumstances). (2) Appraisal and examination of performance of equipment 		<ul style="list-style-type: none"> 	C
				<ul style="list-style-type: none"> (application examination) 		C
2. Establishment of standards	<ul style="list-style-type: none"> Establishment of standards of energy equipment efficiency is under study. 	<ul style="list-style-type: none"> Makers' desire on development and offer of energy conservation equipment is insufficient. Users have no special interest in energy efficiency of equipment. 	<ul style="list-style-type: none"> (1) Establishment of standards (2) Measurement of efficiency of equipment (performance test) (3) Publicity to the public (4) Establishment of each target of efficiency of equipment 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	A
				<ul style="list-style-type: none"> (test) 	<ul style="list-style-type: none"> 	A
				<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	A
				<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	C
3. Grasp of actual conditions and compilation of data on energy consumption	<ul style="list-style-type: none"> Data summarizing all energy consumption in Argentina is not published. Energy consumption of medium and small size enterprises is grasped partially by the survey and audits of UTN and INTI. 	<ul style="list-style-type: none"> Conventional energy policy has centered on energy supply capacity. In future, the data on energy consumption must be prepared and its tendency must be grasped to arrange basic data for execution of adequate policy. 	<ul style="list-style-type: none"> (1) The government should appoint the factories which consume more energy than a determined volume, and collect periodical reports from these factories. (Items and frequency of report must be limited to lessen the reporters' burden at first) (2) Publication of collected data 		<ul style="list-style-type: none"> 	A
					<ul style="list-style-type: none"> 	A
4. Promotion of technical development of energy conservation	<ul style="list-style-type: none"> Research and development of biomass energy, photogenic generation, wind power generation and geothermal generation are under promotion. 	<ul style="list-style-type: none"> Interest and facing in technical development of energy conservation are insufficient in comparison with those of new energy. 	<ul style="list-style-type: none"> Development and inducement of applied technics of energy conservation such as cogeneration, heat pump, fuel cell, etc. 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	C

(Note) Hardness

A: Proposal whose execution is easy without major cost or which is under execution

B: Proposal whose execution requires some preparatory time or budgetary process

C: Proposal whose execution requires considerable preparatory time and budgetary process, or whose execution is expected to be scheduled in future

1. Motivation of Energy Conservation

(1) Request of collaboration to top management

The main bodies for executing energy conservation in the manufacturing industry sector are the energy consuming enterprises (factories), and the enterprises aim at increasing the enterprise profit by reducing energy cost, and execute the energy conservation based on their own responsibility and judgement. Thus, the interest and the will among the management people to save energy will become an important point in promoting energy conservation.

In the Argentine Republic, in the case of large enterprises or foreign-based enterprises, a systematic energy conservation activity is promoted. In the case of medium and small manufacturers such as the model factories that were the survey subject on this occasion, generally speaking, the interest and will of saving energy were high among the management people, and the necessity of energy conservation was well recognized. However, it seems that the management level has never been asked to do so, and the priority degree for the enterprises executing energy conservation is rather low. Concrete energy conservation activities were hardly executed at the factories.

Even in the questionnaires returned from the diagnostic factories which were the target of this survey, the following points were given as factors which are obstacles for promoting the energy conservation activity:

- a) Lack of special technical information and engineer
- b) Lack of knowledge concerning energy conservation methods
- c) Prospects for the energy prices are vague, and the profit which will be obtained by energy conservation is not clear.
- d) It is difficult to procure funds for the capital investment required for energy conservation.
- e) Lack of information regarding the Government energy policies

Thus, it would be necessary for the Government to convey the necessity of energy conservation as well as its policies to the management people, and ask for their cooperation. At the same time it would be necessary to listen to the opinions of the enterprise side.

The main contents of the information that should be supplied to the management level are as follows:

- A) The energy situation and its influence on the economics of the Argentine Republic
- B) Prospects for the supply and demand of energy and the energy prices
- C) The Government policies such as subsidies to the enterprises
- D) The energy conservation methods in factories
- E) Cases of success in energy conservation, and the profits gained by energy conservation
- F) The fact that the promotion of energy conservation will be useful in the general advancement of technology.

In order to obtain the understanding and cooperation of busy management level, it will be necessary to summarize such information briefly and clearly. It is desirable to convey the message by utilizing all opportunities such as at the meetings of economic organizations and meetings of the industries where the management people gather.

Nomination of energy administrators

(2) Nomination of energy administrators

In order to advance the energy conservation activities in the factory both smoothly and effectively, it will be necessary to have engineers who thoroughly understand energy conservation. In the Argentine Republic, in the Presidential Decree, it is stipulated that a factory having energy consumption above a certain level must establish a division in charge of energy conservation, but it has not yet been enforced.

In the Argentine Republic, there is a shortage in the number of engineers who are familiar with energy conservation technology, and education to field employees and periodical training are almost nil. Furthermore, under present circumstances, nobody is assigned to control the energy usage of the whole factory. Consequently, the consciousness of employees towards energy conservation is very low, and employees participating positively in energy conservation activities were limited.

Judging from the above situation, in order to promote energy conservation in the factories, for a factory that uses more than a certain level of energy, it would be an effective means to assign a personnel to manage the energy of the whole factory, and let the person play the role of acting as the nucleus for energy conservation promotion work.

In the energy management, it is anticipated that the assigned personnel will play the following roles.

1. To take records of the energy consumption in the factory, accumulate the data, and conduct data analysis study
2. To become the supplier of the energy data of the factory
3. To become the receiver of the energy conservation information as the representative of the factory
4. To study the energy conservation measures in the factory, and act as the central figure in their execution, and give guidance

In order that the energy administrator plays its role sufficiently, it shall be a qualification based on law so that they will possess certain abilities, and it is desirable that the Government or a corresponding Agency will organize them.

A number of merits can be anticipated in the improvement of energy administrator not only in the lowering of energy cost but also in the improvement of quality control. If we take reduction of energy cost as an example, in the case of a factory consuming 5,000 kiloliters (heavy oil conversion) per annum, if we assume that about 1% of the energy can be saved yearly, it will bring forth an economic merit which will sufficiently cover the personnel expenses.

It is very important that the management level sufficiently understands and recognizes the role of such energy administrator, and the merits of energy conservation brought forth by them.

(3) Commendation of excellent factories and equipment on energy conservation

If the Government or corresponding Agencies select perhaps once a year, some factories that made great promotion in energy conservation or some excellent equipment that had energy conservation effect, and award them in a way that they will be broadly known, it will heighten the morale of the parties engaged in energy conservation, and also be effective as a means to heighten the interest of enterprises to energy conservation.

As a method of selecting excellent factories and excellent equipment, it is recommendable to invite candidates publicly, and select from among the candidates that made application. Moreover, it is very important to maintain fairness and authority of examination in the selection.

2. Offer of Technical Information on Energy Conservation

The penetration of energy conservation information is especially important in the promotion of energy conservation in the industrial sector. In the case of large enterprises, they possess very high technology themselves, and generally speaking, collection of technical information is done quite actively, but in the case of the medium and small enterprises, in most cases they have not yet reached that level.

In the Argentine Republic, various seminars regarding energy conservation have been held up to now. Furthermore, through the publication of energy information magazines for a certain field by INTI, the penetration of technical information is being aimed at. Besides the above, some positive information exchange activities are observed, such as juice factories where technical information exchanged voluntarily among people of the same industry can be seen with coordination of CIATI (Branch of INTI).

However, the seminars are in most cases not serial and there is no publishing of technical journals or gathering for training by the trades. Examples such as exchange of technical information in the industry and execution of joint research are also very limited.

In the medium and small enterprises in the Argentine Republic, it cannot be said that a very strong need for energy conservation technical information is. Thus, all the more, it is an urgent necessity for the Government to plan measures such as those shown below and convey effectively the information and know-how related to energy conservation and energy management to factory engineers.

(1) Traveling energy audits and advice to factories

With the objective of improving the energy utilization efficiency in the factories, INTI is giving technical assistance for renewing boilers, measuring the equipment efficiency and at the same time conducting energy saving audits of the medium and small enterprises. The audit guidance of factories is one of the most effective means for offering information to the medium and small enterprises, but partly because the current factory audit involves fee-charging, the actual records for INTI's diagnosis remain at

6 business lines, 7 factories, and the audit activity is not so active.

At INTI, on this occasion of survey conducted on 9 lines of business, 10 factories, they plan to expand and reinforce the factory audit activity and prepare audit equipment as well as improve audit technology. Thus, its future activities are anticipated.

As one of the methods for expanding and reinforcing the audit activities of the factories, to make part of the traveling audits and guidance for the factories free-of-charge can be considered. In other words, by giving advice free-of-charge on how to make improvements in general, and when the possibility for the next step is found, adopt the fee-charging method for audit guidance services which will be rendered such as the concrete plans for equipment and operation guidance. In this way, depending on the requirement degree of the enterprises, the enterprises are given a chance to make selection in stages. In order to execute free-of-charge audits, it would be needed for the Government (Bureau of Energy) to consider the necessary budget measures.

It is recommendable to conduct the audits very broadly to include factories of various business lines as the subject. By doing so, the spreading effect of energy conservation to other companies in the same line of business can be expected.

(2) Execution of technical lecture meetings

In order to spread technical information required for the promotion of energy conservation to the medium and small enterprises, it is important to hold periodical seminars for the engineers in charge of energy.

In the Argentine Republic where there is a shortage in the number of technical people in the factories, it will be especially effective from the standpoint of fostering human resources.

The seminars should be sponsored by Government or Government related agencies such as INTI, or take the form of supporting the private organizations. It is necessary for the contents of the seminar to be something which can utilized in efficiency improvement of energy usage in actual production activity, or something aimed at heightening the technological level.

(3) Holding of exhibitions

The merit of holding exhibitions is that for the people making the display, they will be able to convey the information to a large number of people, and for the people who have come to see the exhibits, they will be able to gain the knowledge that they desired in a concrete form. Exhibitions will be effective not only for the propagation of technical information, but also as a place for the Government's information propagation activities. It is desirable to hold as many exhibitions as possible. Furthermore, in order to raise the authority and reliability of the exhibition, it is desirable for the Government or Government related agencies to support the exhibition.

It seems that in the Argentine Republic, such exhibitions are not held. However, even if it is difficult for the Government to sponsor such events immediately, it will be possible for the Government or Government related agencies to support the exhibitions which are sponsored by industrial organizations. At the exhibition, it will be possible by displaying PR panels, furnish Government information and enlighten the people on energy conservation consciousness.

In addition, if the holding of exhibition becomes established, a special period can be fixed as an energy conservation month or an energy conservation week, and by simultaneously holding lecture meetings, awarding of excellent factories and excellent equipment manufacturers, presentation of successful experience, etc., it will be a good change for broadly enhancing the energy conservation consciousness.

(4) Presentation of energy conservation successful cases

A nationwide presentation meeting should be held periodically, and when there is a very successful case in achieving remarkable energy conservation in a certain factory, the responsible person of the factory should make presentation.

The presentation of energy conservation successful examples will be very effective not only from the point of propagating energy conservation technology in a concrete way to the enterprises, but also arousing the energy conservation consciousness in the engineers.

(5) Publications of a technical magazine on energy conservation

The publication of magazines related to the energy conservation technical information, and the preparation and distribution of pamphlets will be very useful in penetrating the information into the factories. In particular, it is necessary to foster an overall energy conservation technical information magazine, and by publishing this periodically, to make it play the role of information channel which directly connects the Government and Government related agencies with the engineers of the factories.

The necessary parts of the content will be information related to the energy conservation technology, but besides that it would be very effective to give articles related to energy conservation such as explanation of the Government's energy policy, and programs for various technical seminars, lectures, and events.

(6) Collection and offer of technical information on energy conservation

In order to promote the energy conservation technical information service effectively, it will be necessary to grasp accurately the current condition of various energy conservation technology and future trends, and to establish a system to utilize such information.

INTI has already established Information Center, and collection, accumulation, and supply of energy conservation information is conducted. However, it is still insufficient from the standpoint of information collection and formation of data base. In order to reinforce the data collecting activities, the following methods will be effective.

- a) Collect, arrange, analyze, and accumulate both domestic and overseas energy conservation information, comprehensively and systematically.
- b) In order to gather overseas technical information, make an information receiving route by establishing a long term cooperative relation with the overseas organization for promoting energy conservation.
- c) Make a mechanism in which the information and knowhow possessed by domestic specialists will be combined with the Government Information Service.

In addition, in order to perfect the information supplying system, it is necessary to advance the formation of information data base all the more.

3. Preparation of Conditions for Promotion of Energy Conservation

(1) Favorable treatment for investment for energy conservation

As for the promotion stages of energy conservation measures in the manufacturing industry sector, in Stage 1, changing of equipment is not done, and it is centered on eliminating waste by contriving methods for improving the operation or production process. In Stage 2, installation of additional equipment which requires rather small funds, and of which the recovery of investment can be made in a short period, is put into consideration. In Stage 3, fundamental improvements which would involve changes in production facilities or production processes, and require large capital investments are considered.

In the case of Stage 1, by indicating the improvement points at the time of making an audit tour to the factory, it is possible to execute it without involving hardly any expenses. It is necessary for the majority of factories in the Argentine Republic to execute Stage 1. However, in future as the energy conservation advances in the manufacturing sector, it is estimated that Stage 2 and Stage 3 which have larger energy conservation effect will become necessary. In this case, as one of the economic incentives of the system stipulated in the Presidential Decree, in order to

promote capital investment, it is desirable for the Government to consider some kind of preferential measure from the standpoint of financing.

In cases where the economic efficiency of energy conservation is vague due to the uncertain future energy prices and economic situations, if effective preferential measures are considered for investments on energy conservation equipment, it will be possible to advance the energy conservation a step further.

In this survey, many factories mentioned the shortage of funds for equipment improvement as one of their problems for promoting energy conservation in their factories.

Many methods can be considered for the preferential measures such as subsidies, tax exemption, special financing, accelerated depreciation, etc., but in case of the Argentine Republic, there are problems such as the rate of inflation being high or collection of tax not always being sufficient, so something to give investment incentive even under inflation, or a method in which the tax reduction would be very obvious would be necessary. As to what method would be effective, and what method would be feasible, they would have to be judged after thoroughly studying the economic situation, taxation system, financing situation, budget circumstances of the Government, etc. If the financial preferential measures that are very effective in the Patagonia District in inviting factories to be built in that area such as reduction in added value tax and special financing system are considered, the financial preferential measures of the Government for energy conservation will be very effective. And it will also appeal the people the high priority that the Government is considering for energy conservation. This is one of the policies that should be realized.

Under current conditions, we believe that the Government's guaranteed special financing and reduction measures for the property tax for energy conservation equipment investment would be effective.

For your reference, data outlining the preferential measures that were taken in Japan in fiscal 1988 are attached.

(2) Establishment of Standards

Study has begun in the Argentine Republic to standardize the energy consuming industrial equipment and household appliances.

To announce publicly their energy efficiencies under the actual usage conditions in a form that the consumers will be able to understand easily will be of great reference to the consumers when selecting the equipment.

By adding energy conservation economics to the current product price oriented selection, it will be very effective in heightening the energy conservation consciousness also. In addition, it will act as an incentive to the equipment manufacturer to develop energy saving equipment.

By doing so, a very desirable cycle of "Selection of high efficiency equipment by the consumer" → "Technical development by the manufacturer for energy saving equipment" → "Promotion of energy conservation" can be anticipated.

In the standardization, it is desirable to make it so that both the manufacturer and the consumer will be convinced.

In addition, it is also possible to set future target efficiencies, and promote the technical development of the manufacturer.

In order to have the consumers widely know the equipment energy efficiency, it will be effective to have the mass media such as the newspapers take this up as a general article such as introduction as a new product. Thus, it is important to gain the cooperation of the mass media also. Furthermore, as mentioned before, actual display of energy conservation equipment at exhibitions will be very effective.

INTI should complete the present study on the standardization of energy consuming equipment as soon as possible, and supply information to the general public on the current energy efficiency, and aim at so-called "Quality Market" which will be useful for giving direction in which the manufacturers should advance their technical development. If this is realized, a remarkable development in the energy consumption improvement in the Argentine Republic can be anticipated.

(3) Grasp of actual conditions and compilation of data on energy consumption

As for the energy usage situation in the medium and small manufacturers, there are the actual investigation results of energy consumption based on the UTN Group (GESE) survey which were made on factories having an annual energy consumption of less than 6,000 TEP (tons of oil equivalent), and the figures grasped by the audit activities performed by INTI on the factories, but the whole picture of the small and medium manufacturers has not yet been grasped.

Furthermore, as for the total energy consumption of the whole nation, although there are data compiled by the energy supplying companies regarding their own supply, no data have been publicly announced on the total energy consumed as a nation, chronologically.

In order that the Government plans and determines the energy conservation policies effectively, it is indispensable for it to grasp the actual energy usage conditions and their trends in the industrial sector. In order to accomplish this, as an effective means, the Government should designate factories which use more than a certain level of energy, and make it an obligation for them to report on the usage, periodically. This method is adopted by Japan as well as several other countries. In the execution of this method, it is necessary to pay attention to the following points.

- a) The information obtained shall not be used for purposes other than energy conservation. That is, the figures shall not be used for other purposes such as taxation investigation under any circumstances.
 - b) At the beginning, the items to be reported, and the frequency of reporting shall be kept at a minimum so as not to burden the enterprises for the time being. In addition, it is important for the Government to publicly announce the analysis results of the data summation, and show that the reports submitted by the enterprises are being utilized effectively.
- (4) Promotion of technical development of energy conservation

The center of the energy conservation activity in the Argentine Republic at present is focussed on the judgement of technology such as performance inspection of the boilers installed in the factories or energy audits of the factories by INTI, but in the future, based on the accumulated technical information and technology, it will be necessary to advance into development of energy conservation technology.

Under current situation where the energy conservation technology development of the enterprises is still insufficient, for basic matters which will be difficult for the enterprise to execute independently, or for common energy conservation technology, it would be suitable for either the Government or public agencies such as INTI to execute such matters. For instance, in the development of application system such as co-generation, heat pump, far infrared heating, etc., its results can be anticipated rather soon.

4.2 Recommendations on the INTI activities on energy conservation

INTI is an independent agency, and naturally there will be restrictions on its activities which neglect profits. However, as mentioned above, it possesses sufficient technical power, and it has very strong ties with the factories. In addition, owing to its characteristics of being public and neutral, it will be suitable for conducting the following activities as an agency in charge of the execution of policies entrusted by the Government.

4.2.1 Organization of energy administrators

The necessity of placing energy administrators at factories exceeding a certain scale as outlined previously. In order to reinforce cooperation among the above mentioned energy administrators, it is desirable to organize the energy administrators. As the core of such operation, INTI would be suitable. The organization shall be set up to form each group of heat, electricity, or something smaller specialties. According to the respective specialties, INTI can supply information obtained by factory audits, and energy conservation technical information from abroad, and Governmental policies, and improve administrator's abilities by periodical seminars and special technical education.

4.2.2 Commendation of Excellent Factory and Excellent Equipment for Energy Conservation

In the selection of awarding subjects based on this system, the actual condition of energy usage of the factory will have to be grasped and very high technology for accurately determining the energy efficiency of the equipment will be necessary. With this as the background, it will have to be something in which the enterprise people will be broadly convinced.

If INTI which possesses experience in energy audits of the factories and measurement of equipment efficiency participates in the awarding system, it will assure the fairness, and this is an indispensable factor in making the system effective.

In case this awarding system is executed, INTI can either be the main body for sponsoring the award or it may be Cooperator in charge of the examination with its technical power.

For reference, the outline of the awarding system in Japan for excellent factories and excellent equipment is shown as attached data.

4.2.3 Reinforcement of Traveling Energy Audits to Factories

(1) At INTI, factory touring audits are already being executed for small and medium enterprises, and as mentioned previously, in order to make these touring audits more sophisticated, INTI is preparing its audit equipment and improving its audit technology.

In the factory survey made in this project, the viewpoint for general energy conservation for each line of business, and data for preparing technical guidelines for improvement measures will be supplied, and based on them, if a guidebook for energy conservation measure is prepared, and a plan to utilize it is put into action, it can be anticipated that they will be extremely useful in sophisticated audit guidance, improvement of technical level of the enterprises, and advancement of energy conservation.

On this opportunity of visiting 9 lines of business, 10 factories, INTI is expected to improve travelling energy audits with its excellent technical power and know-how.

(2) AT the time of making factory touring audits and guidance, it is necessary to cover each line of business broadly and execute the audits systematically. In order to do so, it is desirable that the preparation of audit equipment, improvement of audit technology and replenishment and reinforcement of personnels be promoted, and an audit guidance system be established.

Although the current factory audits of INTI is fee-charging (based on request), it is desirable to adopt a two tier system, free-of-charge audit guidance which is made by executing the entrustment from the Government (Energy Agency), and the fee-charging audit guidance that INTI does on its own.

The general energy audits shall be free of charge, and as a result of the free of charge audits, if further possibility is found, the audit guidance service including an engineering consultant for equipment countermeasures shall be done by fee-charging.

It will necessary for the Government to take budget measures to execute free-of-charge audits.

(3) To the factories that were diagnosed, points which should be improved would be indicated. There are many points which could be done without spending hardly any money. Furthermore, most of the improvement points are common to all factories.

Thus, it is desirable for INTI to make an analysis of the results of the factory audits, and distribute the improvement points in the form of a manual to all factories as energy conservation technical information.

By doing so, the factories which were not diagnosed can promote self-inspection. By this action, promotion of energy conservation will be possible for all factories including those which were not diagnosed. In order to accomplish this, it will be necessary to be a responsible energy administrator who possesses technical knowledge to take measures for energy conservation at the factory when receiving such information.

4.2.4 Execution of Energy Conservation Technical Lecture Meetings

The touring audit guidance of the factories is one of the effective means of conveying information, but there is a limit to the scope of technical information service that can be supplied to the enterprise by the Government or Government related Agencies by the direct method. In order to propagate the information required for energy conservation promotion in a rather short period to the medium and small enterprises broadly, collective education is the most certain and effective method.

In the Argentine Republic, it seems that seminars related to energy conservation technology aiming at personnels in charge of energy at the small and medium enterprises are not done, but it is important to hold seminars periodically and convey technical information as well as know-how, and to improve the technical level. We believe that it would be suitable for INTI which possesses excellent technical power and information collecting power to act as the core of such seminars. The energy conservation technology is closely related to the manufacturing technology, and it is necessary to advance the improvement of product quality and the efficient usage of energy in parallel.

Since INTI has Technical Research Laboratory for each line of business, it would be effective if the Energy Division and each Research Laboratory cooperate and conduct factory audits and seminars. In the seminars, not only lectures but also visits of excellent energy saving plants and actual diagnostic training shall be included in the course, and practical contents which can be actually utilized in the production activities should be adopted.

In addition, it is necessary to conduct this seminar deliberately, systematically, and continuously, but if the seminar activities get going, in order to train the technicians and to improve the technical level all the more, it is desirable to establish an Energy Conservation Training Center which is equipped with training equipment related to the effective utilization of energy at the CIPURE of INTI.

4.2.5 Holding of Exhibition

It is desirable for INTI which has broadly grasped the current situation of energy conservation technology as well as future trends, to suggest the holding of exhibitions with the aim of propagating and promoting energy conservation technology, equipment, and facilities, and cooperate in its realization by its technology. In certain cases, INTI may even back up such exhibitions.

In the case of displaying energy conservation equipment, facility, and products, it is also possible for INTI to cooperate in the form of evaluating the energy conservation effect, safety, economics, etc. of the energy conservation equipment, facility, products, etc.

4.2.6 Presentation of Energy Conservation Successful Cases

In the Argentine Republic, various seminars related to energy conservation have been held up to now. It is recommendable that INTI becomes the sponsor and holds a seminar periodically, and have the people who made remarkable success in energy conservation in the factory make a presentation at such seminars. The presentation of energy conservation successful cases will have effect such as propagation of energy conservation technology in a concrete form to the enterprises, but besides that, to a factory engineer, to know concrete successful cases of other factories will give them hints for energy conservation measures in their own factories.

4.2.7 Publication of a Technical Magazine or Energy Conservation

Currently at INTI, an energy information journal is issued in certain fields, but the number of issues is limited to a few times a year.

In order that it plays the role of energy conservation information channel, it will be necessary to aim at the following:

- a) Make the report monthly or bimonthly.
- b) Foster and replenish it so that it will become an overall energy conservation information journal which will be centered on information related to energy conservation technology, but also include explanation of the Government's energy policies as well as energy conservation related information such as programs for various technical seminars, lectures, events, etc.

4.2.8 Collection and Offer of Technical Information on Energy Conservation

INTI has already established an Information Center, and is conducting collection, accumulation, and offer of energy conservation information, but it would be necessary to take measures to expand the overseas technical information obtaining routes, to form data base on domestic information and information and information possessed by INTI itself. At the same time, it would be necessary to prepare an information supplying method in a form in which outsiders will have easy access to the information.

It is desirable to study replenishment of data base and replenishment of "on-line" systematization of information supplying.

In future this can be a service window for information inquiries from the outside by utilizing toll free calls.

4.2.9 Favorable Treatment for Investment for Energy Conservation

In the matter of favorable treatment for investment for energy conservation, the role that is anticipated for INTI is to press the Government authorities for promotion of the measures, and if this is realized, to give advice on what kind of equipment is suitable for such treatment, and in case there is already a concrete application for a certain equipment, judge whether treatment should be approved for its or not.

The establishment of performance evaluation method of the subject equipment and the inspection system should be prepared.

4.2.10 Establishment of Standards

At the present time, INTI is advancing the study on the standards of energy consuming equipment, but when setting standards, it is necessary to reach a consensus among the equipment manufacturer, the user, and a man of learning and experience from the standpoint of third party.

In setting the standards, the performance test of the equipment and establishment of the testing method would be the most suitable role for INTI. In addition to its characteristics of being a neutral, public organization, it will be necessary for INTI to establish a testing method which will convince both the manufacturer and the user.

4.3 Requests in Relation to the Execution of Recommendations

As for the contents described here, they are based on the energy usage condition, current situation of energy conservation, and the National Energy Plan in the Argentine Republic. While referring to the energy conservation countermeasures already executed in Japan as well as other countries, the scope of measures in which INTI, the counterpart, can be involved is mainly considered.

In the recommendations, there are some measures which have already been started, or which will not need lots of expense and preparation. First of all, it would be practical to execute such items with priority, then in turn advance to items which will require budget measures or which will require preparation of laws and systems as well as preparation time. It is important that energy conservation measures should be executed flexibly and consistently while corresponding to social economic conditions, energy conditions, technical progress, etc. Even in a gradual form, it is desirable that concrete policies for promoting energy conservation are executed steadily.