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

OCTOBER, 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

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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).

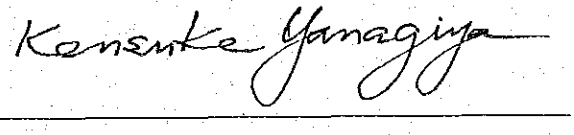
JICA sent to Argentina a study team headed by Mr. Takashi Niikura of the Energy Conservation Center on two occasions; from December 8 to December 23, 1987 and from February 22 to March 31, 1988, and then headed by Mr. Mitsuo Iguchi of the Energy Conservation Center on one occasion, from September 26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

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(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 FNE) 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 the Study

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	Comsion Nacional de Energia Atomica
El Cronista Comercial	
AAPURE	Asociacion Argentina Para el Uso Racional de la Energia

Factories

JUGOS, S.A.	
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.

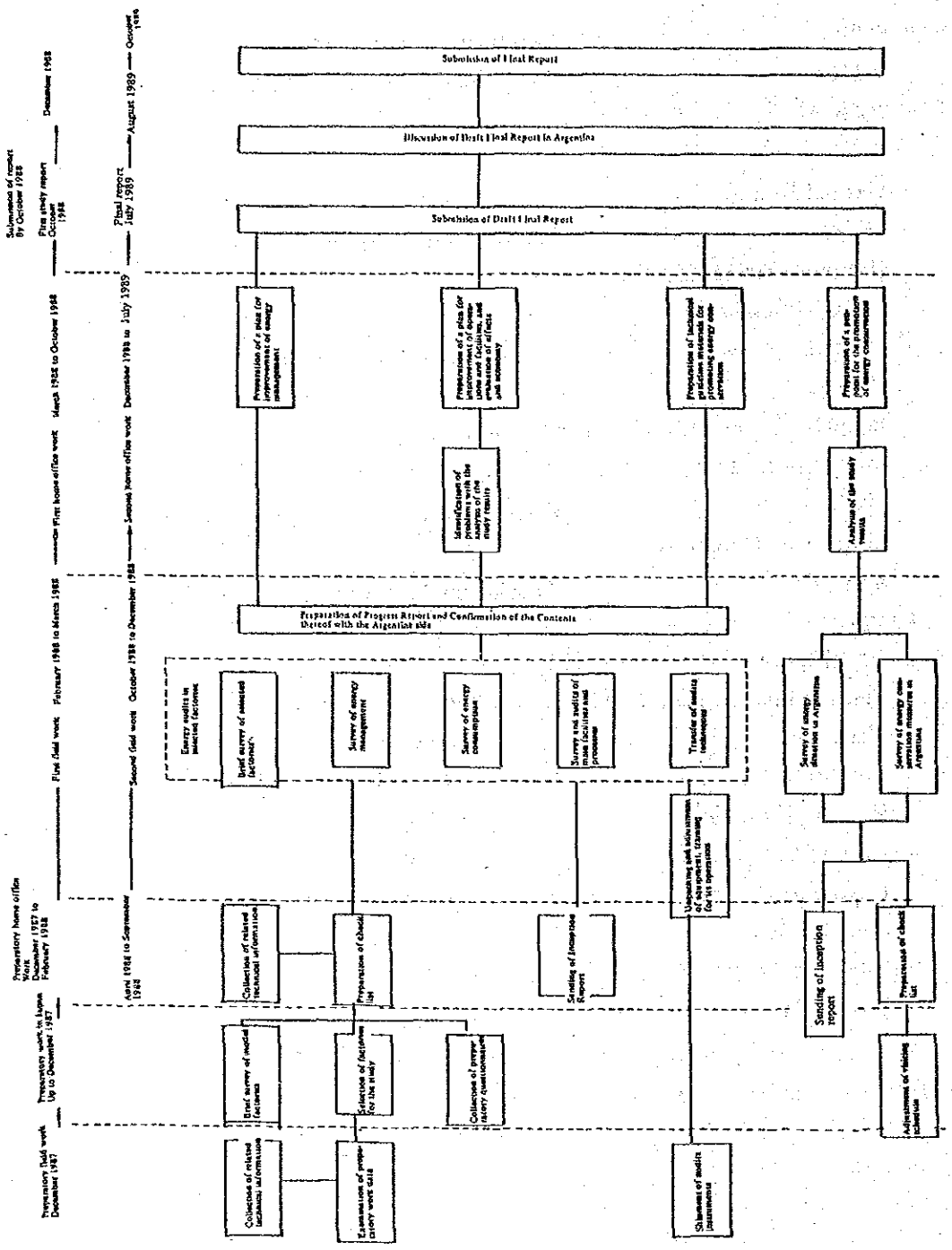

Figure 1 Outline of the Study on the Rational Use of Energy in Industry in the Argentine Republic

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.

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 faotory energy diagnosis, operating conditions and equipment performance were determined by actual measurements using the instruments shown in attached data (4). 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 of the Argentine Republic

2. Energy Situation in the Argentine Republic

The energy use since 1973 in the Argentine Republic is shown in Tables 2–1 and 2–2. It has the following characteristics:

1 The enrgy supply has been increasing slightly.

2 The enrgy consumption per capita and the energy consumption per unitary GNP have had tendency to increase.

3 Of the present primary energy supply, petroleum occupies the biggest share of 51%, followed by natural gas of 33% and hydro-power of 9%. The energy supply is characterized by the comparatively great share of nuclear energy (3% of primary energy and 11% of electricity), minor share of coal of 0.5% and comparatively large share of wood and others of 4%.

4 In the transition of primary energy supply, the share of petroleum has been decreasing, and the share of natural gas and hydro-electricity has been increasing instead. This reflects the policy of introducing the energy demand corresponding to endowed capacity of resources.

5 Energy self-sufficiency system has been established from the beginning of 1970s.

6 Regarding the energy supply, electricity, natural gas and petroleum are totally controlled by the Bureau of Energy of the Ministry of Public Works, and the Government has a decisive power on the prices from at production to at retail.

7 In the source of electricity supply, hydro-electricity, natural gas and petroleum occupy high share of 49%, 22% and 16%, respectively.

8 The energy consumption consists of industry (32%), residential and commercial (28%), transport (33%) and agriculture (8%). We forecast that each share will remain stable generally in future.

9 The energy price in Argentina has been rather stable as the energy is under self-sufficiency system and its supply is under strong control of the Government, thus it can be said that this country has not experienced oil shocks.

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)

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)

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

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(1) The Energy Policy

The energy policy is based on the "Presidential Decreto 2247/85" issued in 1985 by President Alfonsin and "National Energy Plan 1986 – 2000". Their main points are as follows:

1 Promotion of energy conservation (effective use of energy)

2 Reduction of petroleum consumption

3 Improvement of the balance of international payments by the energy export and reinforcing international competitiveness of the industries favored by effective use of energy.

(2) Energy conservation measures

Energy conservation is the most important subject of energy policy of Argentina, and the following plans have been established according to the Decree:

1 Publicity of necessity of energy conservation

2 Price policy which contributes to effective use of energy

3 Grant of economic incentive for energy conservation

4 Execution of enrgy conservation in national enterprises including public utilities and publicity of energy conservation to the general

5 Reinforcement of recycling of materials

6 Establishment of the division in charge of energy conservation in factories, execution of energy audits, training of energy conservation specialists, grasp of actual circumstances and study of items to be improved per each industry and promotion of private power generation utilizing waste heat

Some of these plans have been already started and the remainders are still under study.

In 1981, the Energy Conservation and New Energy Department has been established in the Burreau of Energy as a central organization for execution of energy conservation. In 1986, the CIPURE (Energy Conservation Study Center) has been established in INTI (National Institute of Industrial Technology) in order to measure and improve the efficiency of equipment in accordance with the agreement between the Bureau of Energy and INTI. Additionally, private associations such as IACRE (Argentine Electricity Utilization Research Institute) and AAPURE (Argentine Energy Conservation Association) execute the publicity mainly with residential and commercial section.

(3) Target of energy conservation

The "Decree" aims to attain the target of energy conservation per section in 1990 at 10% for industry, 5% for residential and commercial and 10% for transport, respectively. It also fixes the target of energy conservation per year during the period of 1985 to 1989, and the total volume of energy saving amounts to 12,480 thousand tons of oil equivalent.

(4) Recommendations for promotion measures

Standing on the demand and supply of energy, the energy policy and actual circumstances of energy conservation measures in the Argentine Republic, we recommend measures for medium and small sized manufacturing industries classifying them as follows:

(1) Motivation of energy conservation

(2) Offer of technical information on energy conservation

(3) Preparation of conditions for promotion of energy conservation

The summary of these recommendation is shown in the following tables.

I. Motivation of energy conservation

Item	Actual circumstances	Problems and analysis	Proposals	Responsible entity		Hardness
				INTI	Government	
1. Request of collaboration to top management	o Concrete appeal to top management of medium and small sized factories is not done.	o There is not systematic and continuous information delivery route. o Perspective of management is difficult as the government measures have often changed. o 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.		o	A
2. Nomination of energy administrators	o The nomination is established in the presidential Decreto, but not effected yet. o Special departments in charge of energy conservation have been set up in national and large size enterprises.	o 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). (2) Organization of energy administrators, offer of technical information and execution of education of administrators.	o	o o	A A
3. Commendation of excellent factories and equipment on energy conservation	o There is not any system.	o Thre is not any expectation for the system due to insufficiency of motivation for energy conservation to the managers and engineers. o Raising of reliability of enterprises by commendation through public organization can be expected.	Establishment and execution of commendation system o Periodical execution (annually) o Appeal for public subscription o In selecting, equitable examination should be intended. o Common knowledge of results should be aimed.	o (examination)	o	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	○ INTI effects energy audits to factories (charged) (by request) ○ UTN surveys actual conditions of energy consumption aiming at energy conservation (about 300 cases).	○ 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) (2) Expansion and reinforcement of charged audits (3) Utilization of data acquired through audits	○ ○ ○	○	A A A
2. Execution of technical lecture meetings (education of engineers)	○ Lecture meetings are seldom held for engineers. ○ There is no chance for technical leveling up.	○ 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 (2) Study of establishment of the energy conservation training center for education and improvement of technical level of engineers (future)	○ ○	○ ○	B C
3. Holding of exhibitions		○ 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. (2) Exhibition of government publicity panels in the above exhibitions	○ ○	○ ○	B B
4. Presentation of Energy conservation successful cases	○ Seminars on energy conservation are held irregularly.	○ 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	○ INTI publishes technical magazines on energy conservation in some fields (several times yearly).	○ 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	○ Information center is established in INTI. (Information is given to external users with charge) ○ Exchange of technical information in the trade is inactive.	○ Acquisition route of information is not fully established. ○ Data compilation of information is insufficient (under study).	(1) Reinforcement of information collection (2) Expansion of data base (3) Expansion of on-line offer of information (4) Establishment of information service windows	○ ○ ○ ○		A A C 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	○ Prescribed in the presidential Decreto, but not executed yet. (There is a favorable treatment on tax for development of south area)	○ 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.	(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	○ (application examination)	○	C C
2. Establishment of standards	○ Establishment of standards of energy equipment efficiency is under study.	○ Makers' desire on development and offer of energy conservation equipment is insufficient. ○ Users have no special interest in energy efficiency of equipment.	(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	○ ○ (test) ○	○ ○ ○	A A A C
3. Grasp of actual conditions and compilation of data on energy consumption	○ 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.	○ 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.	(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		○ ○	A A
4. Promotion of technical development of energy conservation	○ Research and development of biomass energy, photogenic generation, wind power generation and geothermal generation are under promotion.	○ Interest and facing in technical development of energy conservation are insufficient in comparison with those of new energy.	Development and inducement of applied technics of energy conservation such as cogeneration, heat pump, fuel cell, etc.	○	○	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