10. FORMULATING THE ENERGY CONSERVATION MASTER PLAN AND PROPOSING THE ACTION PLAN AND PRIORITY PROJECTS

10. FORMULATING THE ENERGY CONSERVATION MASTER PLAN AND PROPOSING THE ACTION PLAN AND PRIORITY PROJECTS

10.1 Comprehensive evaluation of policy scenarios

The tasks of section 10.1 are as follows:

---- To analyze the advantages and the disadvantages of each scenario according to some criteria,

and

---- To evaluate them comprehensively,

based upon the evaluations of two scenarios made from two points of views: ---- first, cost / benefit analysis, second, forecast of macro-economy and energy supply / demand ---- in Chapter 8 and 9, respectively, for the purpose of providing decision makers with materials for them to select one of the scenarios as the more desirable one.

10.1.1 Evaluation through the cost / benefit analysis

The following are the results of the evaluations clarified in Chapter 8:

First, the benefits exceed the costs in either the E. C. Scenario or the A. E. C. Scenario. Accordingly, policy measures in both the Scenarios can increase economic welfare in Poland and it is economically reasonable for the government to execute them.

Second, the net benefits (which are the benefits less the costs) are larger in the A.E.C. Scenario than in the E. C. Scenario in either 2000 or 2003.

Looking at the effects of energy conservation achieved only by "direct measures" ---- in other words, the effects of energy conservation achieved by the three components in the Scenarios than the modernization and rationalization ----, however, the differences in net benefits in the A.E.C. Scenario and the E. C. Scenario are smaller in 2000 and 2003, especially in 2000.

Third, the E. C. Scenario is more desirable than the A. E. C. Scenario, if we look at the efficiency of funds put into energy conservation (which means benefits divided by costs). This is particularly clear in 2003.

Looking at only the "direct" measures in the same way as the net benefits above, efficiency is better in the E. C. Scenario than in the A. E. C. Scenario, even in 2000.

In addition to net benefits and efficiency, one of the most important criteria for evaluating the Scenarios is the capability of financing investments in energy conservation.

We examine these concerning costs of energy conservation in factories in Chapters 4 and 5. Then, we examine the possibility of financing the long-term, low-interest rate loans in this section. For this purpose, we try to divide investment costs for energy conservation and loans for economic incentives for manufacturing in 2000 and 2003, shown in Table 8.2, into 1999, 2000, 2001, 2002, 2003, and 2004.

Table 10.1 shows the results of dividing these figures in Table 8.2 at the following ratios: 0.1, 0.3, 0.3, and 0.3 of those in 2000 for 1999, 2000, 2001, and 2002, and 0.4 and 0.3 of those in 2003 for 2003 and 2004, respectively.

Total long-term, low-interest rate loans in 2000, for instance, are 55,049,000 PLN, according to this Table. On the other hand, we can estimate NFEP&WM's revenues from the fee in 2000 to be 1,005,089,618 PLN, using the revenues in 1995 and others. These estimates show that the long-term, low-interest rate loans will account for around 6% of NFEP&WM's revenues from the fee in 2000.

We think that, if the loans have such a ratio, a comprehensive evaluation will have to be made on whether it is possible or desirable for the government to lend companies such funds for energy conservation in manufacturing industries.

In this connection, land preservation, for instance, accounted for around 5% of NFEP&WM's total expenditures, while prevention of air pollution was around 50% in 1995.

In addition, we think that the Polish government should turn its attention to cooperation with foreign governments and international organizations as one of the alternatives for it to finance the fund in such a comprehensive evaluation. We have shown the annual fund if it is financed through such cooperation in Table 10.1.

Table 10.1 Estimated Costs and Expenditures for Energy Conservation in Manufacturing Industries and Assumed Amount to be Financed through International Cooperation

(1,000 PLN)

	1999	2000	2001	2002	2003	2004
< Total costs and expenditures>						
Administration costs						
E.C.Scenario	2,224	3,595	4,845	6,322	5,065	5,065
A.E.C.Scenario	2,526	4,197	5,447	6,994	5,738	5,738
Investment costs for energy conservation						
E.C.Scenario	76,528	229,584	229,584	229,584	576,654	432,491
A.E.C.Scenario	118,102	354,306	354,306	354,306	630,238	472,678
Loans for economic incentives						
E.C.Scenario	0	0	0	0	0	0
A.E.C.Scenario	41,574	124,722	124,722	124,722	53,584	40,188
< Costs which may be financed through international cooperation >						
Administrative costs						
E.C.T.C. (E.C. and A.E.C. Scenarios)*	0	0	10,263	4,217	3,675	3,675
Loans for economic incentives						
A.E.C.Scenario	41,574	124,722	124,722	124,722	53,584	40,188

* ---- Not included in "Administration costs" in above column.

10.1.2 Evaluation through a forecast of macro-economy and energy demand / supply

Based upon the results of the forecast of macro-economy and energy demand / supply, the following can be pointed out with respect to economic, energy, and environmental indicators (Table 10.2):

Table 10.2 Comparison of Three Scenarios on the "Macro- Analysis"

	2000			2003		
	REF	E.C.	A.E.C	REF	E.C.	A.E.C.
(Economic indicators)						
Economic growth per annum	4.0%	4.10%	4.30%	3.9% <3.9%>	4.0% <4.1%>	4.0% <4.2%>
Annual increase in consumer price	10.2%	14.0%	14.0%	4.2% <7.6%>	7.1% <11.0%>	7.3% <11.1%>
Annual increase in wholesale price	9.3%	12.1%	12.1%	0.9% <5.6%>	3.3% <8.2%>	3.5% <8.3%>
Average wage index (1990 = 100)	902	1,116	1,113	1,101	1,370	1,376
(Energy indicators)						
Annual increase in primary energy requirement	1.00%	-1.50%	-1.90%	1.60%	0.20%	0.00%
Energy mix (Coal consumption in 1,000 TOE)	26,261	22,645	22,119	24,747	19,587	18,793
(Environmental indicators)						
GHGs (CO2 in Million ton - carbon)	112	99	97	118	99	95

(Note) (1) Figures in < > are average annual rates for the period of 1996 to 2003.
(2) CO_2 emission in 1990 was 104.0 Million ton - carbon.
(3)Figures in percentage in 2000 and 2003 show annual average increase rates for the period of 1996-2000 and 2000-2003, respectively.

(1) Of the various economic indicators, the economic growth rate is higher in both the E. C. and A.E.C. Scenarios than in the REF Scenario. A comparison of the E. C. with the A.E.C. Scenarios reveals that the average annual growth rate from 1996 to 2003 is higher than in the A. E. C. Scenario than the E. C. Scenario, although by only 0.1 %.

Meanwhile, the rate of price increase, at both wholesale and retail levels, is higher in both the E. C. and A.E.C. Scenarios than in the REF Scenario. Comparison of the two Scenarios discloses that the annual average from 1996 to 2003 is higher by 0.1 % in the A.E.C. Scenario.
Additionally, the average wage levels in both 2000 and 2003 show virtually the same figures in both the Scenarios (more than 20 % higher than in the REF Scenario).

(2) With regard to energy indicators, first, the growth rate of demand for energy is in the plus zone in the REF Scenario, but shows minus growth in the E. C. and A.E.C. Scenarios from 1996 to 2000, and virtually zero growth in the 2000-2003 period.
Moreover, with respect to changes in the structure of energy consumption, the level of coal consumption is considerably lower in both the E. C. and A. E. C. Scenarios than in the REF Scenario.

(3) The following three points should be noted with respect to the need for lower CO_2 emission levels to protect the global environment:
a. CO_2 emission levels in both the E. C. and A.E.C. Scenarios are lower than in the REF Scenario.
b. CO_2 emission level is lower in the A.E.C. Scenario than in the E. C. Scenario.
c. CO_2 emission levels in both Scenarios are lower than the 1990 level, which is equivalent to 104 million tons of carbon.

(4) It should, however, be noted that these estimation results are based upon the assumption of many exogenous variables; with specific regard to prices, the recent trends suggest that the actual rate of increase may probably be lower.

10.1.3 Comprehensive evaluation

We think that we need to adopt the following methodology to evaluate the Scenarios comprehensively, if we ourselves do it, based upon the individual evaluations mentioned above.

First, we need to establish criteria according to which we evaluate the Scenarios to select the better one.

These are established when considering national objectives or goals for Poland. If one of its current objectives is the early accession into the EU, the inflation rate, which the EU requested Poland to keep lower than a certain level, as mentioned later, as one of conditions for the accession, is a criterion for evaluating whether or not the objective is achieved.

Second, we also need to determine the degree of importance (or weight) each objective bears. For instance, we can say that contributions to solving global environmental problems are one of the important objectives for Poland, as mentioned in Chapter 1. This objective, however, will be far behind EU accession in its importance (or weight), at least for a few years into the future.

Thus, we think we can evaluate the two Scenarios comprehensively, first, by establishing the criteria and then determining their weights. Such comprehensive evaluations, however, will be done by Polish policy makers on energy conservation, utilizing this study report as one reference. The following is only one example which has been prepared to show how to proceed with such evaluations:

(1) Establishing criteria for evaluation

Important criteria for Poland at the present time are thought to be the following, if the purpose of this study is take into account:

a. Early accession into the EU
b. Contributions to the global environmental problems (and solving local environmental problems)
c. Improving people's living standards
d. Improving the structure of energy demand and supply

With respect to item a., the so-called Maastricht criteria, which were imposed by the EU in December 1991, are concrete (More precisely, these are conditions for participating in the European Monetary Union).

They include two conditions in the financial area and three in the monetary area.

---- In the financial area

a. For budget deficits not to exceed 3% of GDP.

b. For public debts not to exceed 60% of GDP.

---- In the monetary area

a. For inflation rates not to exceed the level which is 1.5% higher than the average of those in three member countries with the lowest rates.

b. For the interest rates of long-term loan not to exceed the level which is 2.0% higher than the average of those in three member countries with the lowest rates.

c. For exchange rates not to exceed the level of plus and minus 15% from the average in the fluctuations during two years before participating in the EU.

Among these conditions, we forecast only the inflation rates in Chapter 9. Other conditions are dealt with as exogenous variables, or are not considered in this study. But the conditions in the financial area have been satisfied already.

Accordingly, we may adopt inflation rates as a criterion for the EU accession.

In addition, the capability of financing long-term, low-interest rate loans is an important condition, which the evaluation of the Scenarios depends upon in the cost / benefit analysis, although we cannot conclude if it is capable or not, as examined in Chapter 8. It also relates to the condition of keeping the government budget healthy, the concrete figure for which is shown in item a. in the financial area above. Therefore, we may adopt the capability of financing the loans as another criterion for EU accession, although it is an indirect one.

Next, we may adopt the following as criteria for items b., c., and d..

For item b. ---- Total emissions of CO_2 in Poland, which we estimate in Chapter 9. The emissions in the A.E.C. Scenario are estimated to be smaller than in the E. C. Scenario.

On the other hand, emissions of CO_2, SOx, and Nox, which we estimate in Chapter 7, are thought to be criteria for evaluating the Scenarios of local environmental problems, which are closely

related to EU accession. No quantitative conditions, however, have ever been shown for these criteria by the EU.

For item c. ---- Economic indictors forecast in Chapter 9, excluding inflation rates, which has been already adopted as a criterion for the EU accession.

For item d. ---- Energy indicators forecast in Chapter 9.

In summary, we have adopted five criteria for us to evaluate the Scenarios.

(2) Determining the weights of criteria

Here, we try tentatively to determine the following weights of criteria:

First, we may put the biggest weight on inflation rates, which represent the objective of EU accession.

Second, the inflation rates may be followed by the capability of financing long-term, low-interest rate loans, although the latter's degree of importance may be a little less than the former's. For this criterion, we must take into account that if financing is available, the A.E.C. Scenario will be justified, but that if not, it will not be justified, because the long-term, low-interest rate loans is a component contained only in the Scenario.

Third, we assume here that contributions to global environmental problems have much less importance, as one of the policy objectives for the time being, than the two above, because international negotiations on the problems are underway with around 2010 as the target year. Accordingly, the criterion of CO_2 emissions may be weighed much lower than the other two.

Fourth, we can see that improving people's standards of living is included in the objective of the EU accession. Accordingly, we assume the former is subject to the latter.

Finally, the results of this study, we may conclude, clarify that energy conservation will contribute to achieving the objective of improving the structure of energy demand and supply, because ensuring energy supply, the growth of which will be reduced by energy conservation, will be easily achieved, and the quality of energy carriers, including less coal, thanks to the energy conservation, will be improved from the environmental point of view.

On the other hand, there may be the view that decreased coal consumption, if it is below a certain

level, will make energy supply unstable, because Poland will have to continue to depend upon oil and gas supplies from foreign countries.

We assume here that this criterion does not bear a large weight, similar to the reduction of CO_2 emissions, whether one of the two above is adopted or not.

Assuming such a weighting for the criteria shown above, the following are the cases in which one of the Scenarios will be adopted, although needless to say the Scenario is adopted depends upon establishment and weighting of criteria made by Polish policy makers.

a. Cases in which the E. C. Scenario is adopted:

---- Case that financing long-term, low-interest loans is not available. In this case, the A. E. C. Scenario cannot be adopted, because no financing is available for the economic incentives. As already mentioned, the performance of inflation rates is also better in the E. C. Scenario than in the A. E. C. Scenario.

---- Case that the government regards the efficiency of fund put into energy conservation as more important, even if financing with loans is available. The same as above can be said for inflation rates.

---- Case that the government regards the "interest rates" as the most important.

b. Case in which the A. E. C. Scenario is adopted:

We can find only one case in which the A.E.C. Scenario will be adopted.

It is the case that when financing with loans is available, the government foresees, at a certain time approaching EU accession of Poland, inflation rates in the A.E.C. Scenario would be lower than the conditions imposed by the EU. In this case, performance of CO_2 emissions and other criteria are expected to be better in the A.E.C. Scenario than in the E. C. Scenario.

10.2 Considerations Regarding Formulating the Energy Conservation Master Plan

In conjunction with formulating the energy conservation master plan in Poland, it is vitally important to enhance understanding of the current situation of energy conservation measures in Japan as well as the present situation of Poland where it has not been long since it shifted to a market economy system, and where a major political and economic reform is also under way in preparation of its admission to the EU close at hand. Meanwhile due consideration should be given to the master plan based on the situation in Poland and actual results so far achieved in energy conservation.

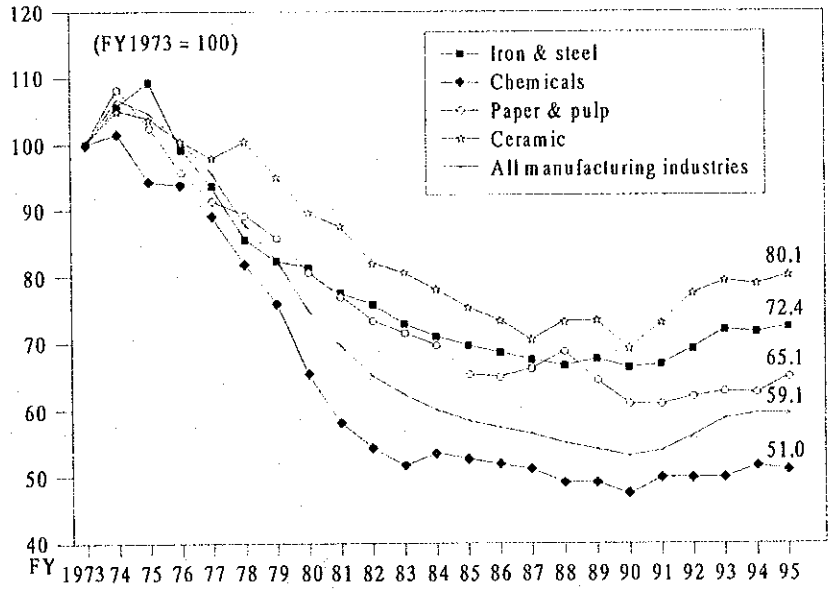
In the following sections, first, we will review experiences on energy conservation in Japan to draw lessons for formulating the energy master plan in Poland. Second, we will examine problems, which Poland is now facing concerning energy conservation, and will make them prerequisites for formulating the master plan.

10. 2.1 Experiences in Japan

a. Energy intensity in Japan in the period after the oil crisis

As can be seen in Figure 10.1, the trend of the energy intensity (IIP) of Japanese industry, based on the Mining & Manufacturing Production Index, showed a decline of approximately 40 % (annual average of approximately 3.5 %) in the manufacturing sector in the period 1973~1985.

Figure 10.1 Breakdown of Trends of Indices of Industrial Production (IIP) by Industry

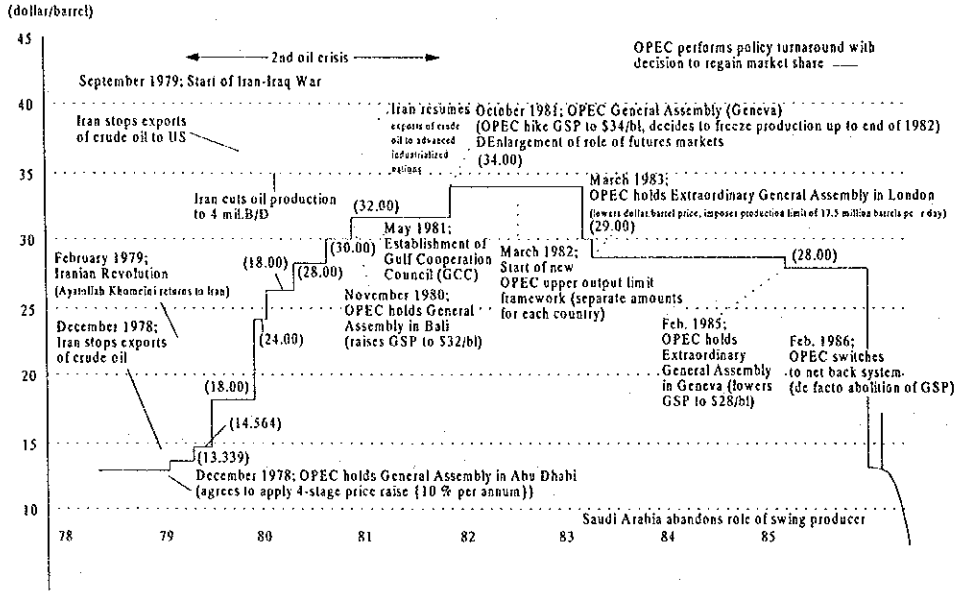


Note: IIP means indices of industrial production.

b. Energy prices

At that time, oil accounted for around 75 % of Japan 1 s total primary energy resources, and thus overall energy prices were determined by crude oil prices. The price of crude oil rose from $10 to $35 per barrel in the period 1979~1985 (compared with approximately $3/bl prior to 1973). The maximum price in the 1980~85 period was thus over 10 times the pre-crisis level, and this created a considerable potential for the promotion of energy conservation.

Figure 10.2 Crude Oil Spot Price Trends



c. Legal / Institutional framework

In 1951 the Heat Management Law (the forerunner of the current Energy Conservation Law) was enacted, and at the time of the oil crisis, a system was in effect, under which designation of some factories as energy management factories, promotion of methods of effective utilization of heat, and the assignment of heat managers were available. Thus, high energy-intensive companies had already established a fairly extensive energy management system.

In 1979 the Heat Management Law was further strengthened in legal terms with the inclusion of electric power, and was reborn as the newly-enacted Energy Conservation Law, thereby completing the legal and institutional framework for the promotion of energy conservation,

d. Establishment of the energy conservation center

With the support both of the Ministry of International Trade and Industry and of industrial circles, the Energy Conservation Center was set up in 1978 to serve as the core institution for the promotion of energy conservation in Japanese industry, thus significantly contributing to the promotion of energy conservation in the industrial field (The Center's head office is in Tokyo

<staff number: 40>, and it has 8 branches <staff number; 90>).

e. In-house energy managers

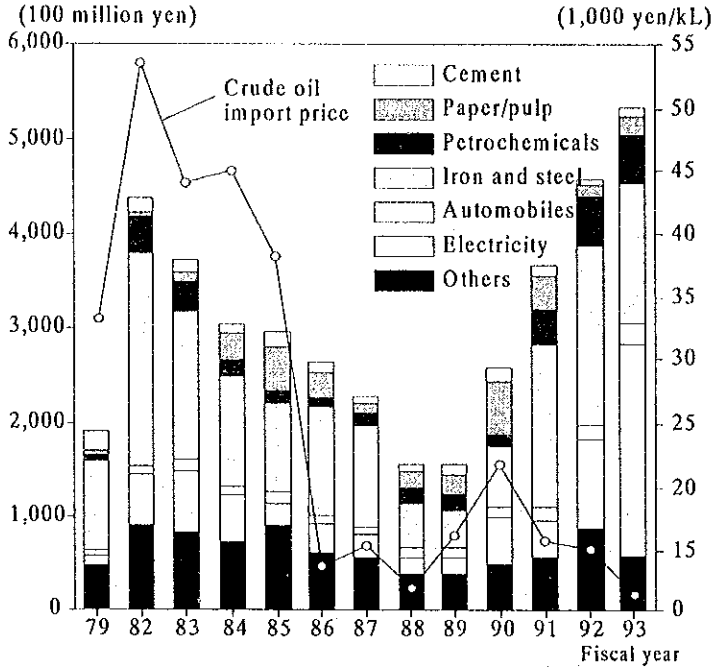
The heat managers defined under the Heat Management Law hold qualifications awarded by the central government under a system dating from 1948, and by the time of the oil crisis there were already 25,600 persons holding such qualifications working in private companies. In 1979, the name of the qualification was changed to energy managers, and the number of such qualified specialists including both heat and electricity managers was increasing at a rate of 1,000~2,000 per year. The nation thus possessed a considerable number of engineers capable of promoting energy conservation.

f. Investment in equipment

With the enactment of the Energy Conservation Law in 1979, a system of tax allowances or incentives and a system for providing financial support for energy conservation measures were simultaneously set up. As Figure 7.4 shows, investment of 2 trillion yen in energy-saving equipment was implemented between 1979 and 1989 (an annual average of approximately 200 billion). This investment was directed towards the promotion of energy conservation through improvements in equipment and processes.

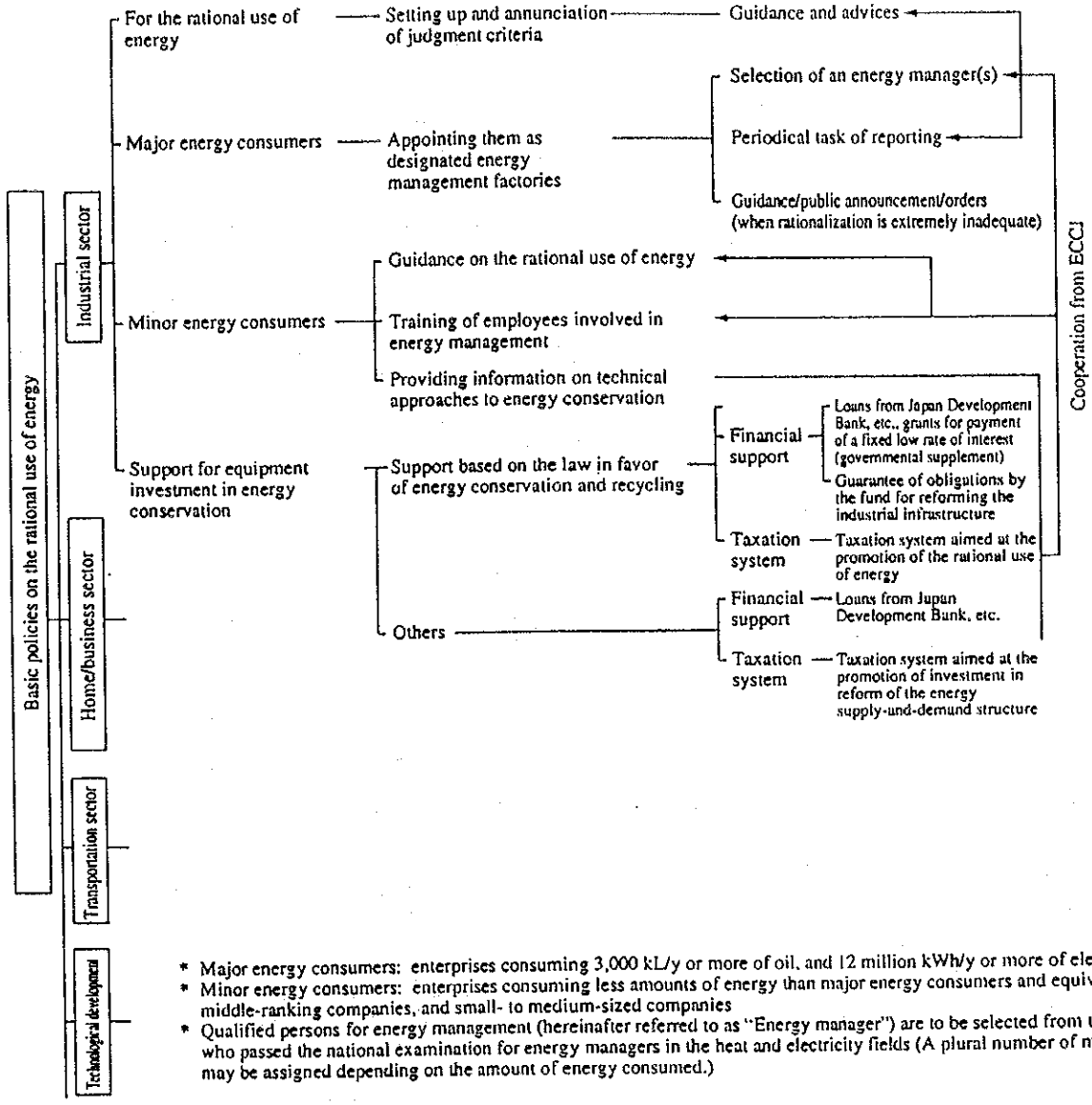
Meanwhile, the energy conservation targets proposed for Poland under the Master Plan are approximately equal to the rate of energy conservation achieved in Japan following the oil crisis. Poland is currently at the initial phase of promoting energy conservation in industry. Although they are making the effort to bring energy prices to those in real terms, the incentives seem to be considerably weak compared with those during the oil crises in Japan. Its achievements regarding the matters discussed in b, c, d, and e. above are as yet zero. The successful accomplishment of the Action Plan described later is thus a prerequisite for the attainment of the targets set under the Master Plan.

Figure 10.3 Trends of Investment in Energy-saving Equipment and Crude Oil Prices



Sources: Equipment Investment Research (Ministry of International Trade and Industry), Japan Export and Import (Ministry of Finance)

10.2.2 Overview of Energy Conservation Activities under the Framework for Energy Conservation in Japan



* Major energy consumers: enterprises consuming 3,000 kL/y or more of oil, and 12 million kWh/y or more of electricity
* Minor energy consumers: enterprises consuming less amounts of energy than major energy consumers and equivalent to middle-ranking companies, and small- to medium-sized companies
* Qualified persons for energy management (hereinafter referred to as "Energy manager") are to be selected from those who passed the national examination for energy managers in the heat and electricity fields (A plural number of managers may be assigned depending on the amount of energy consumed.)

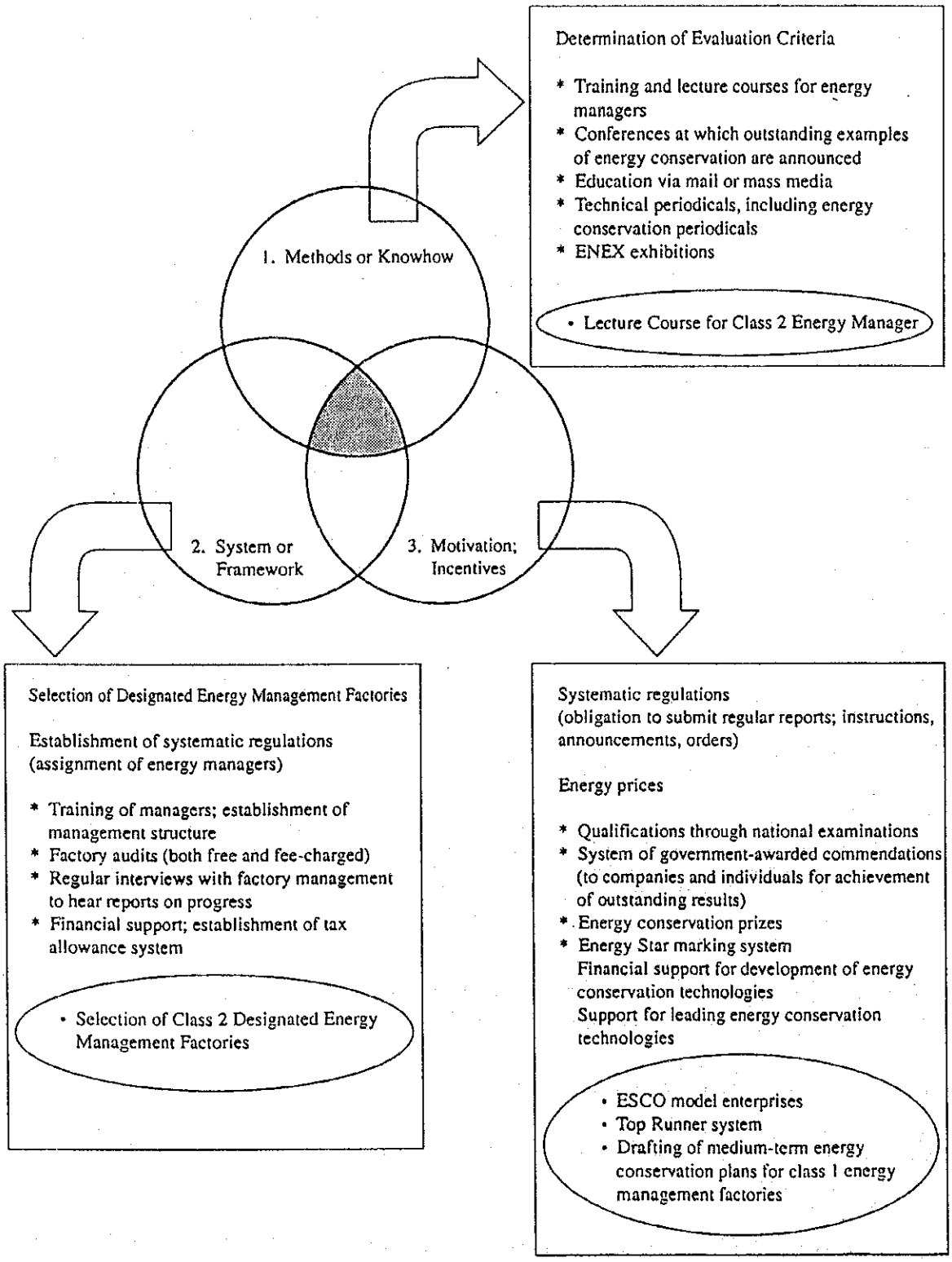
The following shows a conceptual representation of energy conservation activities carried out by the various industries within the policy framework shown above.

To promote energy conservation, the following should be considered:

① How can energy conservation be achieved? (knowledge regarding methods of energy conservation)

② How can significant results be achieved swiftly ? (ways or system for effectively promoting energy conservation activities)

③ What are the merits of energy conservation ? (motivation, incentives)



: Items circled started to be implemented in April 1999 (Energy Conservation Law amended).

* : Items marked with an asterisk are to be implemented by ECCJ either on its own initiative or at the direction of, and on behalf of, the government.

10.2.3 Considerations Regarding the Current Situation in Poland

(1) Positioning of an energy conservation law

Although Energy Law, which took effect in January 1999, partially contains provisions related to energy conservation, they do not seem sufficient. With its admission to the European Union near at hand, the country faces a host of important tasks to be tackled, including environmental regulations, reform of the energy situation, particularly deregulation of the electric power market, drastic restructuring of the coal industry and agricultural problems. In the view of the Polish authorities, it is likely to take at least 5 years to enforce an energy conservation law equivalent to that in Japan. For the time being, therefore, Poland will presumably need to base its energy policy on the existing Environmental Protection Law (containing the stipulations relating to energy conservation).

(2) Financial support by the government

The Polish Ministry of Economy, which is strongly in favor of the principle of free market competition, is not expected to grant much financial support for the restructuring of enterprises. Under the present circumstances, the Environmental Protection Fund, which will be mentioned later in Section 10.3.3, is regarded as the only means to rely on. From such aspects as systems and organizations, however, there is every reason to expect that the ministry will provide sufficient lateral cooperation for KAPE to operate efficiently.

(3) Promotion of decentralization

New Prime Minister Buzek places first priority on decentralization. The current 48 provinces are scheduled to be integrated into 16 provinces, thus positively proceeding with further decentralization. Hence, environmental and energy conservation issues will most probably be transferred to the jurisdiction of local governments and thus in terms of implementing the foregoing matters, consideration should be given to the establishment of cooperation between the central and local governments and the necessity to divide up the tasks between them.

(4) Governmental support for the industrial sectors

The Polish industrial world will probably shift to the structure composed of three categories of enterprises, i.e., newly-emerging enterprises affiliated with foreign funds, joint venture of existing companies and overseas corporations, and wholly Polish companies. The former two groups will naturally proceed with energy conservation supported by foreign funds and technological know-how, whereas Polish domestic industries lacks both sufficient funds and technical know-how. It will thus be necessary to develop routes by which capital can be made available to such companies, and to train technical staff.

(5) Strengthening public institutions for the promotion of energy conservation

KAPE operating under the direct authority of the central administrative government is engaged in energy conservation tasks related to international cooperation, buildings and the industrial field; NAPE--an independent organ--is involved mainly in energy-related surveys; and RAPE (Regional Energy Conservation Agencies) are operating in regions: These three organs are individually or jointly pushing forward with energy conservation policies. However, no definite guidelines are made regarding the division of their tasks. Thus, clear demarcations between the tasks by each organ must be implemented; for KAPE, in particular, staff must be allocated in such a way as to allow KAPE to

efficiently pursue the master plans under the central government, while due consideration for budgeting of the required funds and support from the system as a whole are also a prerequisite.

(6) Management concept of executives/plant supervisors

Since Polish companies for many years were all state-owned (there are still many state-owned enterprises), both management and supervisory staff at factories lack sufficient understanding of the principles of management and supervision in a free market economy. These groups should therefore be educated in modern management methods.

(7) Energy conservation is an important management index.

During the era when enterprises were state-owned, they needed only to apply to the relevant authorities for the energy supply which they required. The state supplied to them without any conditions attached. Owing to this historical background, few Polish managers fully understand the relationship between energy consumption and the efficient operation of a business. Hence their experience of investment in energy conservation as part of a management strategy, as well as their understanding of this concept, seem to be both extremely limited.

(8) Lack of technical information

Plant managers (including energy engineers) have a considerable amount of knowledge of the equipment in their own factories, while on the other hand they are less knowledgeable about the way in which things are handled in other factories and about the situation in other countries. Thus, they do not seem to be able to assess the degree of competitiveness of their own factories. This may be partly attributable to their insufficient ability in foreign languages, particularly English, but in any event, there is clearly a pressing need for publicity and dissemination of technical information.

10.3 Formulating the Master Plan

10.3.1 Setting the Targets

To increase the degree of precision of economic forecasts in estimating energy conservation potential, two comparatively short time frames were utilized -- to fiscal 2000 and to fiscal 2003. In drafting a master plan, the result is regarded as more realistic if the following two points are borne in mind.

(1) The full-scale promotion of a master plan would be carried out by the central Energy Conservation Technical Center (ECTC) and the actual activities would commence around the middle of 1999. This would start to produce a benefit in individual companies after the year 2000.

(2) In order to achieve sufficient results from energy conservation efforts mainly by "energy management" based on energy conservation potential estimated for the year 2000, we must allow a period of around three years from the year 2000, when energy conservation activity at the corporate level is scheduled to start, so as to provide a maturation period during which the movement can permeate companies and spread from one company to another.

(3) In the EC and AEC scenarios, according to our estimate of energy conservation potential for the year 2003, 11 to 14 % of energy conservation potential (2 to 3 % of the energy conservation rate) would arise from capital investment in modernization and rationalization.

The achievement of energy conservation of 2 to 3 % over three years by equipment investment is, however, somewhat unfeasible in terms of capital investment planning, and the period may have to be extended by about another three years.

In master plans, in due consideration of the foregoing points, the time for the start of reaping the energy conservation fruit is set to the beginning of 2000, the time for the completion of reaping the fruit of energy conservation potential for the 2000 to the end of 2003, and the time for the completion of reaping the fruit of potential for 2003 to the end of 2006.

Thus, it is advisable to set the targets of the master plans as follows. Figure 10.4 shows the process in the master plans.

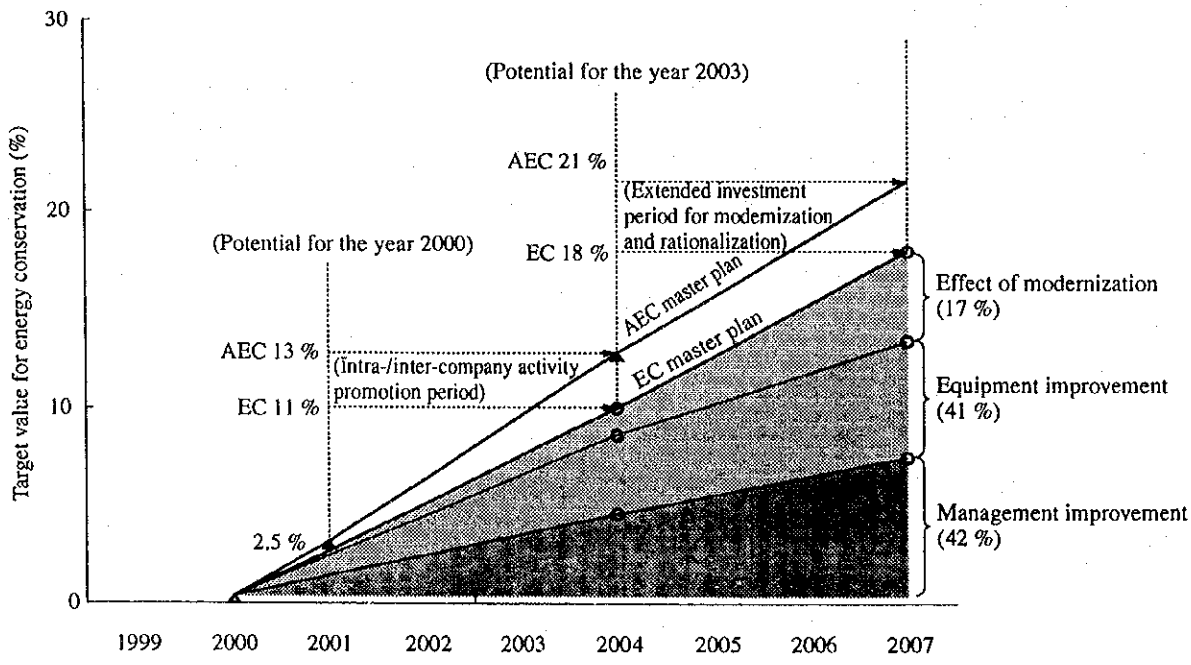
Target Values of Energy Conservation in Master Plans (%)

Scenarios	Year 2000	Year 2003	Year 2006
E. C. scenario	2.5	11.0	18.0
A. E. C. scenario	3.0	13.0	23.0

Target Values of Environmental Improvement Effect in Master Plans

Scenarios	Gas	Year 2000	Year 2003	Year 2006
E. C. scenario	NO_x	0.5	2.1	6.2
	SO_2	0.5	2.1	9.9
	CO_2	1.1	4.4	7.1
A. E. C. scenario	NO_x	1.5	5.8	11.4
	SO_2	1.4	5.6	14.2
	CO_2	2.1	8.2	12.1

Figure 10.4 Trends in Energy Conservation Target in the Master Plan



10.3.2 Proposing the Technical Measures for Energy Conservation

Comprehensive measures are required to enable Poland to attain the targets outlined above. These comprehensive measures must center on the measures for the improvement of energy management and the improvement of equipment for which costs are comparatively low in view of the fact that: a) the time frame for implementation of the measures must be comparatively short, i.e., to 2000 and to 2003; and b) that not many factories have yet begun to thoroughly tackle the task of energy conservation.

These measures are explained below.

(1) Improvement of energy management

a. Establishment of corporate in-house systems for the promotion of energy conservation activities

Many companies in Poland are still state-owned, or have not been long privatized, and thus the number of their management staff who are including energy conservation within their management strategies is small. Firstly, corporate management staff must be more fully acquainted with the examples of successful energy conservation results as found in the factory audits recently carried out by the JICA's teams (Training for Management Staff).

Secondly, each company must set up a system for the promotion of energy conservation activity, consisting of the energy managers from each section of the company with higher management staff in charge of the PDCA (Plan, Do, Check, Action) for facilitating the management of progress in achieving energy conservation targets, as the top.

b. Establishment of a self-auditing system

A mere theoretical understanding of the principles of the use of heat, electric power, etc., is not enough for the actual promotion of energy conservation; it must be supplemented by skills or know-how in the application of the necessary techniques. For this purpose, company staff must be fully acquainted with the experience accumulated by the pioneers in this field. The absorption of such knowledge is the most effective method of achieving success. Energy-related engineers within companies, who will form the core of each company's energy conservation promotion activities, should be trained to approach their jobs from the standpoint of energy conservation (Training for Energy Managers), and employees must be trained to improve in the techniques needed to conduct self-audits.

On the other hand, those actually handling energy-consuming equipment are front-line workers (employees) on the job-site at factories. The attitude of these employees toward energy conservation, and their cooperation and advice regarding the various energy conservation measures promoted by energy managers responsible for promoting energy conservation, will be crucial factors in the overall process of promoting energy conservation. Consequently, the training of employees (On-the-Job Training) is absolutely essential. With regard to cooperation with workers on the job site, the "HOPP" activities being implemented by the tool manufacturing plant of URSUS provide a valuable example. It is essential for labor union leaders and corporate

management staff to hold extensive discussions with regard to cooperation between management and workforce in the implementation of energy conservation measures (for example, concerning the distribution of the benefits from energy saving, and methods of evaluating the performance of employees). It is equally important to train factory auditing specialists (Auditing Experts) capable of making specific proposals for the rational use of energy within factories through factory audits (Training for Experts).

c. Proposing energy conservation methods and disseminating results

The most effective means of making energy conservation methods available is for experts to propose specific methods of achieving energy conservation at particular factories after conducting factory audits (Factory Auditing Activities).

Additionally, if energy service companies possess sufficient technical know-how regarding energy conservation, it would be effective as well to have these service companies carry out factory audits to undertake energy service businesses (Introduction of ESCO Enterprises and their Development).

When companies provide training in new work procedures, the most effective method is on-the-job training. In view of this, certain factories should be selected as energy conservation model factories from each industrial sector or sub-sector to intensively carry out energy conservation measures at the said factories. Following this, staff at other companies in the same industry who are involved in energy conservation should be allowed to observe the results for themselves. By this means, the results of energy conservation measures will be made widely available (Model Factory System).

From here onward, if many companies actively engage in energy conservation operations, a large number of successful examples will surely emerge. Thus, the announcement of examples of the successful application of energy conservation methods once a year for the publicity and dissemination of the results of energy conservation would be a useful guide for energy engineers in particular. This method, which has been in use in Japan for almost 20 years, is regarded as significantly useful and effective, and has greatly contributed to lateral application of energy conservation technologies (Conferences at which Successful Examples of Energy Conservation are Announced).

d. Providing information relating to energy conservation

In order to effectively promote energy conservation activities in Poland from here on, it is important that corporate management and energy specialists are made aware, as quickly as possible, of overseas developments in this field, such as new technologies and examples of the successful examples of energy conservation. Channels for making such information available include magazines, the Internet, and exhibitions (Providing Overseas Information on Energy Conservation).

Regarding energy utilization equipment that is widely used in the private sector, it would be extremely useful from the standpoint of equipment user if such equipment were to carry labels indicating its comparative energy utilization efficiency, or Energy Star marking system (Energy

Efficiency Indication System).

e. Providing incentives for energy conservation activities

The direct means of offering incentives to persons engaged in energy conservation activities is by awarding monetary rewards or honors. Regarding monetary rewards, Japanese companies generally adopt a system in which employees who have made proposals that are accepted and put into practice receive lump-sum payments in reward, while employees who have made a large number of successful proposals, thereby contributing to the company's profits, are rewarded by promotion or salary increases. This kind of in-house system of rewards is highly effective in providing an incentive for employees to use their expertise and imagination to improve work processes (In-house Personnel Promotion and Commendation System)

Examples of honors that might be awarded to persons who have contributed to energy conservation include official commendations from the government awarded to employees who have made a significant contribution to energy conservation at their companies, or who are responsible for particularly excellent examples of the successful application of energy conservation measures (Governmental Commendation System).

The establishment of a national system of qualifications for energy-related engineers would serve to raise the average level of expertise among such staff: this is a matter worthy of serious consideration (System of Qualifications).

(2) Specific measures for each industrial sector and sub-sector

The following are specific technical measures for each industrial sector and sub-sector, which should be implemented to achieve targets established in 10.3.1 above (See more details in Chapter 4).

	Heat	Electricity	Process
Iron and steel making	• Scrap heating furnace for electric furnace	• Renovation of pumps, blowers, etc. in the processes involving a coke oven to a rolling mill, and modification of dust collectors	
Ammonia	• Installation of an air preheater in the water vapor reforming process		• Installation of a device for recovering ammonia and hydrogen in the purge gas
Truck	• Modification of the drying oven	• Improvement of air leakage/air pressure in air compressor	
Tractor	• Improvement of the casting process	• Improvement of air leakage/air pressure in each process • Rotational speed control of motors	
Glass	• Reinforcement of the heat insulation of the melting furnace • Improvement of excess air of the melting furnace		
S.L.B	• Heat recovery from the autoclave	• Modification of related equipment including weigher, mixer, etc.	
Vegetable oil	• Heat recovery in the decoloring process • Reinforcement of the heat insulation of steam valves		• Modification of the hydrogenation device
Meat processing	• Enhancement of condensate recovery • Reinforcement of the heat insulation of steam and valves	• Modification of the compressor for refrigeration	
Dairy products	• Reinforcement of the heat insulation of steam valves	• Modification of the compressor for refrigeration • Modification of fans for drying	• Increasing of concentration in the concentration process

10.3.3 Proposing the Governmental Measures for Energy Conservation

(1) Necessity for Enactment of Energy Conservation Law

It would be advisable to enact an Energy Conservation Law so as to orientate the basic policies for energy conservation. Based on the said Law, energy conservation should be promoted through the "governmental measures" as described below.

(2) Categories of "Governmental Measures"

As a means of supporting and promoting the various measures proposed in section 10.3.2, the following proposals are recommended, which are broadly divided into the three categories -- improvement of management, recovery of investment costs, and others.

a. Improvement of management

Three principal governmental measures should be adopted in order to implement the above-mentioned improvement in energy management. The following governmental measures are necessary in both the EC and AEC scenarios.

1) Consideration of feasibility of establishing a core Energy Conservation Technical Center

From the standpoints both of number of staff and of the scale of its budget, the present setup of KAPE, an organization actively promoting energy conservation, is insufficient for the implementation of the above-described "measures" in accordance with the government's policy. The Polish authorities should establish a core Energy Conservation Promotion Center (ECTC) capable of comprehensively promoting training programs, factory audits, dissemination of successful examples, providing of information, and the operation of a system of awards and qualifications so as to help achieve the targets set out under the Master Plan. They need also to consider the near-term economic activities required for the operation and the future independence of the said center from the institutional aspect.

2) Budgetary support for energy conservation policies

In carrying out the various measures mentioned above, such as training programs, factory audits, and the establishment of model factories, the costs should naturally be borne by the companies themselves, as it is they who will reap the benefits in the future. Unfortunately, the management of many companies are still insufficiently aware of the beneficial economic effects of energy conservation. In regard of this situation, the government will have to provide budgetary support for a certain period, or offer loans at low interest rates until reform of awareness among corporate management staff spreads widely throughout Poland.

The results of the factory audits carried out in this study show that if the factories included in the survey were to implement energy conservation measures, they would be able to achieve reductions of 25 % in emissions of CO_2, SO_2, NO_2, and dust (equal to approximately 5 % of total national emissions). This would reduce companies' payments of "Emission Fee", which is air pollutant fee levied on companies that emit CO_2 etc. However, as shown in Table 8.2 and the

factory survey figures, the amount of reduction in Emission Fees resulting from energy conservation would be only 1~2 %, which would make little contribution to shortening the pay back period of the necessary investment. Consequently, this degree of reduction in Emission Fees would not act as a significant incentive for factory managers to push ahead with energy conservation measures. In our view, the Polish government should recognize that energy conservation measures taken by companies would make a major contribution to protecting the environment, and in order to encourage energy conservation in factories, it is recommended that they should provide support for such activities by widening the scope of application of the Environmental Protection Fund.

3) Establishment of systems for awarding of commendations and the examination of qualifications

Official systems must be set up for the commendations and qualifications to be awarded by the government mentioned above, and efforts must be made to deepen the understanding of the objectives and details of these systems among company staff involved in such matters.

b. Recovery of Investment Costs

1) Energy prices

As stated in the discussion of the scenario in Chapter 3, the Polish government has drawn up a policy under which it will use its influence to move energy prices to levels that reflect the costs involved, reduce the difference with international prices and introduce domestic competitive pricing. It is recommended that this policy be maintained. Such a pricing policy is expected to encourage the implementation of energy conservation measures.

2) Economic Incentives

In our opinion, a certain amount of government intervention during the periods of transition to a market economy, up to the year 2000 or 2003, would be a logical means of improving the efficiency of the Polish economy.

Generally speaking, it is our view that, in the type of market economy that the Polish government is attempting to foster, a complete reliance on the regulatory forces of the market will inevitably result in a failure to allocate resources efficiently. Therefore, government intervention in the economic system is necessary to rectify such imbalances. This is regarded as equally applicable in the field of energy conservation.

It is crucial to stress the fact that such government intervention is particularly important for economic nations in a transition period, and for the economies of developing nations.

That being the case, as stated in our proposal in the discussion of the scenarios, the provision of long-term financing at low interest rates would be advisable from the standpoint of promoting energy conservation.

Additionally, in our view, the funds needed for such loans could be obtained from the following organizations.

1) The Industrial Development Agency (ARP)
2) National Fund for Environmental Protection and Water Management (NFEP & WM)
3) Regional Funds for Environmental Protection and Water Management
4) The Environmental Protection Bank
5) Other state-run financial institutions

In the Japanese system, as of Dec. 16, 1998, low-interest loans (annual rate of 1.3 %) were available from the Japan Development Bank for the purchase of equipment that contributes to energy conservation up to a limit of 40 % of the cost (For the purpose of comparison, the market interest rate on long-term loans in December 1998 was 2.2 %, giving a differential of 0.9 %).

c. Other Policies

1) Setting of standards for energy-related equipment

Under the "Energy Law", the Polish government has already announced its basic policy relating to the establishment of equipment standards.

This should be followed up by immediate consideration of the establishment of a system of specific standards for efficiency of energy utilization equipment.

2) Introduction and development of high-efficiency energy-related equipment

One important point regarding the promotion of the wider use of highly energy-efficient equipment by Polish companies, particularly over the short term, is the need to keep companies precisely and promptly informed about new developments in those types of equipment available abroad, as well as about newly developed technologies.

Over the short-to-medium term, the introduction of advanced equipment and techniques through various forms of business tie-ups with foreign companies would also make a valuable contribution to the energy conservation movement. For this purpose, too, the ECTC, which will act as a pivotal organization for the promotion of energy conservation, and other such organizations, would play an important role.

In addition, over the long term, it is most advisable for Polish companies to make efforts to develop more energy-efficient equipment and new technologies themselves. It is therefore recommended that the Polish government examine the possibility of providing some sort of support for companies own efforts towards this end during the period of transition to a market economy (Such support could consist of, for example, the examination of development methods by advisory committees composed of experts, and assistance for the systematic organization by companies of joint research and development bodies).

(2) Drafting of Program for Policy Implementation and Cost Plan

Depending on the way in which Polish companies tackle the task of energy conservation, it is important to move the various policies outlined above into the implementation stage.

We have therefore examined the program shown in Table 10.3. This table proposes various "governmental measures" for the government depending on the "level" which particular factories have reached in their energy conservation activities. In addition, each corresponding "institutions and organizations" have been proposed to support each policy measure.

Taking the example of the short term (1999~2000), with regard to those factories which have not yet initiated energy conservation measures (referred to as the NY ["not yet"] group), it will firstly be necessary to start with the provision of the most basic information and data. For this purpose, existing organizations, including the Ministry of Economy and KAPE, must operate to the best of their ability, while at the same time the establishment of an organization such as the aforementioned ECTC, will surely be a prerequisite.

Secondly, with regard to those factories which have already implemented energy conservation measures (referred to as the "AI" group), the implementation of a wide variety of governmental measures is needed. These include the development of trained staff (training of factory managers and other employees, and courses for training factory audit specialists), the implementation of priority projects, the setting up of a proper system of regulations for energy management (the legal obligation of the assignment of qualified energy managers at factories, and the systematic designation of energy intensive factories), and the introduction of a system of economic incentives, among other measures.
To this end, the Polish government must establish and strengthen related organizations and institutions, including the establishment of the above-mentioned ECTC, as well as rearrangement or establishment of an institution in charge of the granting of economic incentives.

Additionally, Table 10.4 summarizes the possibilities of Poland receiving cooperation from foreign governments and international organizations in the event that the country embarks on the foregoing programs as mentioned above.

This table lists governmental measures and institutions/organizations, with the short term as an example, which could be more effectively implemented in cooperation with foreign governments and international organizations: These governmental measures and organizations include projects related to the establishment of ECTC, implementation of priority projects, funding for economic incentives, etc.

In addition, AIJ (Activities Implemented Jointly), JI (Joint Implementation) and Emissions Trading, all of which have been discussed in international negotiations on the global environmental problems, can be regarded by the recipient countries of these systems.

Finally, Table 10.3 summarizes the funds required for implementation of various policies, by policy item and by international cooperation item. An option for raising the funds for economic incentives is cooperation with foreign governments and international organizations. At the bottom in Table 10.3, the amount of the total economic incentive fund that will be procured through such cooperation is shown.

Table 10.3 A Program on Implementing Governmental Measures and Preparing Institutions and Organizations by Term

Terms	Governmental measures to be provided by the Government	Institutions or organizations necessary for the governmental measures
Short term (1999 - 2000)	< For Group NY * >	
	Improved public relations on basic direction of the Gov.'s policy	Ministry of Economy; KAPE; NAPE; other related agencies & organizations **Ene. Conser. Tech. Ctr. (ECTC)**
	Primary data & information on energy conservation in factories	Same as above
	< For Group AI * >	
	Economic incentives	ARP;NFEP&WM;Loc.funds;BOS;Ecofund
	Pricing of energy carriers	Ministry of Finance; Energy Regulatory Authority (ERA)
	D.I. on energy conservation programs (For 9 industries)	This JICA Study (Factory audits;guidelines)
	Implementing priority projects (For 9 industries)	Ministry of Economy (M.o.E.); This JICA Study (Priority projects) Cooperation with f. c. and i. o.
	Regulations on energy management	**Designating energy intensive factories Allocating energy managers**
	Human resource development *(1) Training experts or consultants* *(2) Training managers & employees*	KAPE; Universities; **ECTC** (1) Qualifications (2) Improvements
	Information on improving coordination systems & incentive mechanisms	M.o. E; Cooperation with labor union; **Cooperation at business associations; Deliberative councils; ECTC; ESCO**
	Supply of energy efficient equipmennt (Introduction of foreign technologies)	**ECTC**
Middle term (2001 - 2003)	D.I. on energy conservation programs (For all industries)	**ECTC; Development of ESCO; Business Assn.; Others** (Factory audits; guidelines)
	Starting model factory projects (For all industries)	Same as above (Selection of model factories)
	Supply of energy efficient equipment (Joint production of energy efficient equipment with foreign companies)	**ECTC**
Long term (2004 -)	D.I. on energy conservation programs (For all industries)	**ECTC; Business Assn.; others** (Disclosing activities of model fac.) **ESCO** (Starting operations)
	Implementing model factory projects (For all industries)	Same as above Cooperation with f. c. and i. o.
	Supply of energy efficient equipment (Own development and production)	**ECTC; Government agencies**

(Note) Italics mean the measures implemented also in other terms and bold letters mean new instructions or otganizations.
(*) NY ---- Factories which have not yet implemented energy conservation measures.
AI ---- Factories which have already implemented the measures.

Table 10.4 Possible Cooperation with Foreign Governments and International Organizations

Terms	Governmental measures/Institutions and organizations/Priority projects	Cooperation with foreign governments and international organizations
Short term (1999 - 2000)	Energy Conservation Technology Center (ECTC) (1) Training (1) - 1. Consultants, experts (1) - 2. Managers, employees (2) Others (2) - 1. Energy conservation programs (2) - 2. Technology information (2) - 3. Others	Technical cooperation with foreign countries and international organizations
	ARP NFEP&WM Local funds for environmental protection Environment Protection Bank (BOS) Ecofund	Loans and other financial assistance from foreign countries and inter. organizations Others (EBRD*; IBRD-IFC*; EIB*, PHARE*; GEF*; PPC*; others)
	Priority projects for energy conservation	AIJ ("Activities Implemented Jointly")** Others
Middle term (2001 - 2003)	ECTC (Continued)	Technical cooperation with f. c. and i. o.
	ARP; NFEP&WM; Local funds; BOS; Ecofund (Continued)	Loans and other financial assistance from foreign countries and inter. organizations
	Priority projects for energy conservation Model factories for energy conservation	JI ("Joint Implementation")**
Long term (2004 -)	ECTC (Continued)	Technical cooperation with f.c. and i.o.
	ARP; NFEP&WM; Local funds; BOS; Ecofund (Continued)	Loans and other financial assistance from foreign countries and inter. organizations "Emissions Trading"**
	Model factories (Continued)	JI (Continued)**

(*) EBRD : The European Bank for Reconstruction and Development
IBRD-IFC : The International Bank for Reconstruction and Development (The World Bank)
- The International Finance Corporation
EIB : The European Investment Bank
PHARE : EU Financial and Technical Assistance to Central and Eastern Europe
GEF : Global Environment Facility
PPC : The Project Preparation Committee
(All these banks, agencies and others have already been cooperating with the Polish government.)
(**) They can be provided as a sort of the "economic cooperation" in adition to usual ones
(For more details, see page II-10-27).

10.4 Proposing the Action Plan

As an essential requirement for effective and continuous implementation of the said program, an action plan in Table 10.5 containing arrangement of the institutions and organizations is proposed.

Table 10.5 (1/2) shows the schedule for the items to be implemented and details of such items based on the energy conservation goal and activity period in the Action Plan.

Table 10.5 (2/2) shows the details for which the core Energy Conservation Technical Center (ECTC) should bear the expenses, policies to be implemented by the government, and finally, the organization reform plan.

The Polish government should urgently tackle the task of examining and discussing plans for the setting up of a preparatory organization at the earliest possible time for the establishment of a core energy conservation promotion institution, as well as the details of matters to be implemented under an Action Plan, such as: industrial sectors to be targeted; employees to be included into the training program, and the number; the nature and frequency of the training courses; the overall schedule under which the Action Plan is to be put into practice; the number of staff required; and the cost.

Here we discuss how ministries and agencies of the Government of Poland are expected to support and cooperate with ECTC. Their support will be indispensable to the effective implementation of the Action Plan by the ECTC. The areas in which the ministries and agencies concerned should offer support are described below.

(1) The Ministry of Economy

For the Ministry which is responsible for industry-wide energy conservation, the Master Plan estimates a conservation effect of enormous dimensions: reduction of crude oil consumption by about 7 million tons/year or about 2.1 billion PLN/year (AEC-2006 Scenario). For Poland, which intends to join the EU in early 21st century, it is imperative to achieve sustainable economic growth and to improve the competitive edge of its domestic industries. Energy conservation programs can be an answer to this challenge. It is hoped that the Ministry will undertake to establish the ECTC, lay down an institutional and regulatory groundwork for the ECTC so that it can stand on its own in the future, see necessary technical cooperation from other nations, and offer support to individual businesses through more favorable interest rates and tax policies.

(2) The Ministry of Environmental Protection, Natural Resources and Forestry

Projected environmental improvement effects through energy conservation are also enormous (AEC-2006 Scenario). About 22 million tons in CO_2 and about 162,000 tons in SO_2.

Those enterprises that were privatized only recently do not have sufficient funds to renovate their equipment and facilities. It is expected that the Ministry will channel some of the resources it manages, such as NFEP&WM, in order to help these businesses.

(3) The Ministry of Finance

It is expected that the Ministry will provide enterprises with financial assistance: subsidies as an

incentive to investment in the renovation of energy-saving facilities and equipment, preferential interest rates and tax incentives, and official guarantee of foreign government loans. Further development of domestic industries, in the long run, will generate revenues that will contribute to the future well-being of the nation.

(4) The Ministry of Treasury

At present, the process of privatization of state-owned companies is proceeding at quite a brisk pace, but there is nonetheless a rather large number of companies whose sticks are still owned by the Ministry of Treasury. In its capacity as a shareholder, the Ministry is in a position to provide across-the-board cooperation to companies that are making efforts to promote energy conservation and strengthen their management structure. The Ministry is also in a position to request all other ministries and governmental agencies to cooperate with the ECTC and corporations in their efforts to promote energy conservation.

(5) The Committee for European Integration

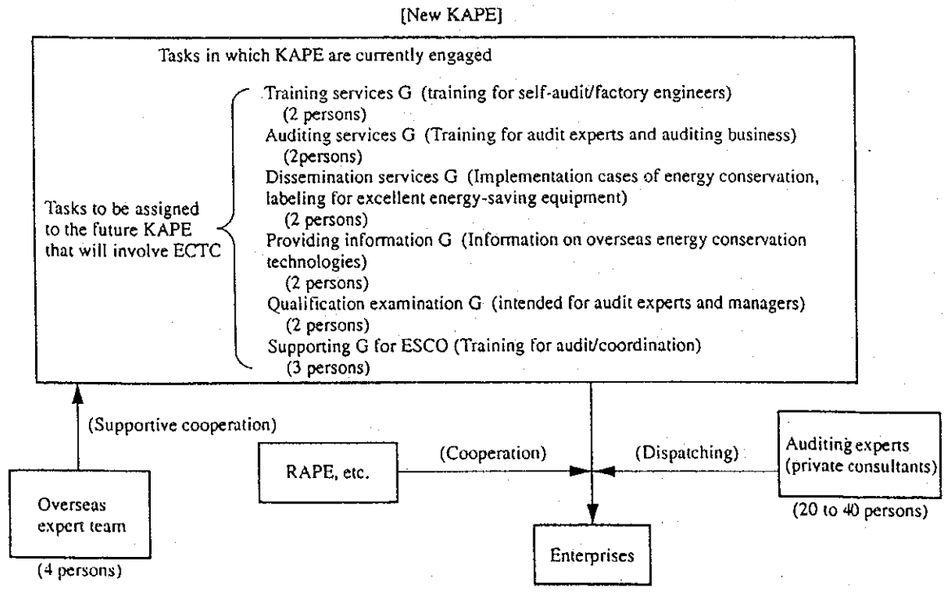
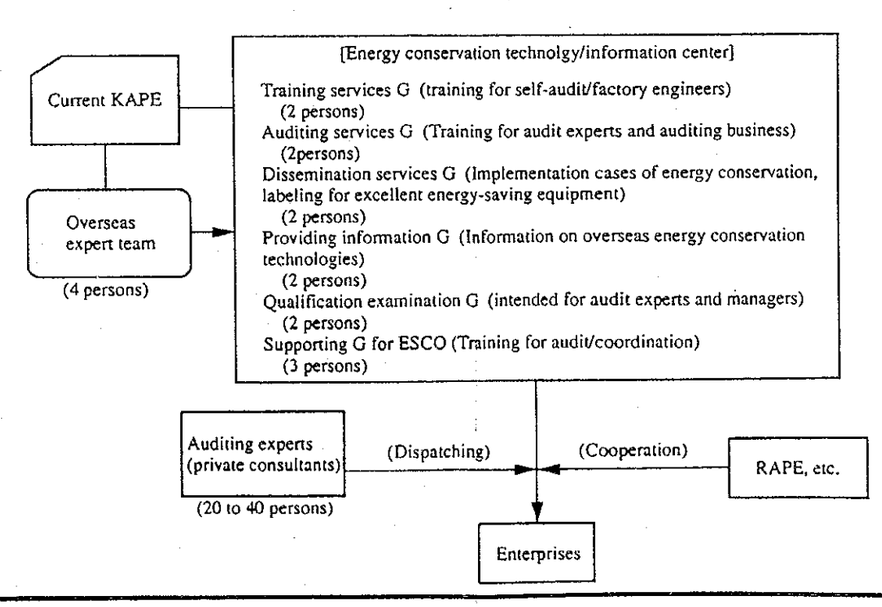
This Committee should cooperate promptly with the ECTC and corporations by stepping up a system for smoothly processing the paperwork and other procedures required to invite foreign engineers who are needed to introduce manufacturing technologies and energy conservation technologies from advanced industrial nations.

Table 10.5 Action Plan Implementation Schedule (1/2)

Fiscal year	1999 (1–12)	2000 (1–12)	2001 (1–12)	2002 (1–12)	2003 (1–12)	2004 (1–12)
Target for energy conservation	To decrease energy intensity by the end of 2003 (11.0 %: in E.C. scenario, 13.0 % in A.E.C. scenario)			Decreasing energy intensity by the end of 2006 (E.C. scenario: 18.0 %, A.E.C. scenario: 21.0 %)		
Basic concept	To improve the management attitude, management system and plant engineers. This period is intended as the period for reaping the benefit or fruit from steps 1 and 2, and the preparatory period for reaping the fruit from step 3. During this period, model factories for energy conservation are to be selected to play a leading role in energy conservation.			To improve the level of auditing experts/plant engineers and apply the effect achieved by model factories to other similar line or equipment. This phase is intended as the period for reaping the fruit from Step 3.		
Items for implementation: Promotion organ	Establishment of ECTC					
Items for implementation: Training services	① Training for self-auditing (courses intended for executives/managers)					
	② Training for factory engineers–1			③ Training of factory engineers--2		
	Establishment of an in-house energy management system (PDCA)			Energy conservation promotion activities involving both employees and engineers/upgrading the management system		
Items for implementation: Auditing services	④ Measurement by audit experts to assist in self-auditing (Preliminary audit)			⑤ Training for upgrading auditing skills provided by auditing experts. (Joint audit/self-audit)	⑥ Students to participate in auditing (practice training in auditing)	
Items for implementation: Dissemination services	⑦ Selecting and starting up model factories	⑧ Publicity/dissemination activities through on-the-job training for model factories regarding energy conservation effect /technologies		⑨ Activities for dissemination of effects achieved by model factories		
Items for implementation: Information providing services	⑩ Publicity/dissemination activities of actual energy conservation cases and excellent energy-saving equipment for industrial use					
	⑪ Providing information on foreign energy conservation equipment and technologies					
Items for implementation: Institutions				⑫ Setting up institutions (Designation of energy-intensive factories, registration, authorization of qualification of auditing experts, energy managers, etc.)		
Items for implementation: Joint development				⑬ Joint development of energy conservation technologies with foreign companies		
Items for implementation: ESCO	⑭ Introduction of ESCO and training of ESCO enterprises in Poland					
Specific details of implementation	① To have the counterparts understand the need for management and the importance of energy measurement based on the study results of JICA, and establish the system for self-audit and energy management, thus making efforts toward the reaping of the fruit from Step 1.					
	② To deepen understanding of the actual situation of energy consumption and energy conservation measures in Poland based on the study results of JICA through case study.			③ To improve knowledge of energy conservation through group training by foreign experts in order to upgrade the technical level		
	④ To have audit experts perform measurement through self-audit using the measuring equipment donated by JICA for the purpose of reaping the fruit from Steps 1 and 2.			⑤ To improve the auditing skills through joint auditing with foreign experts as well as self-auditing by audit experts	⑥ To have students participate in auditing when experts have achieved an adequate level, thus attempting on-the-job training. Also the training practice is to be included in the university credits	
	⑦ To select model factories based on the self-audit results submitted by individual companies and the results of audits by the JICA study team	⑧ To make the model factories available to the general public in order to help executives/plant managers improve understanding of investment/benefit of energy saving equipment, energy conservation technologies and management methods on the worksite, thus preparing for Step 3.		⑨ To provide financial support for model factories in order of self-audit evaluation level, thereby disseminating the achievement results of model factories		
	⑩ To hold a conference for announcement of successful cases of energy conservation, conduct examinations for excellent energy saving equipment for industrial use on a national level, and officially commend excellent applicants. The detailed information of such cases is to be made available on the Internet.					
	⑪ To provide information on foreign energy-saving equipment/technologies on the Internet.					
				⑫ To provide systematic regulation at the phase when company executives seem to have adequate understanding of the necessity for energy conservation and the cost-benefit, for the purpose of consistent promotion of energy conservation.		
				⑬ To implement development of necessary energy conservation technologies in Poland jointly with foreign companies.		
	⑭ To introduce foreign ESCO at the initial phase and eventually develop wholly Polish ESCO enterprises.					

(Note) Step 1: Energy conservation by energy management Step 2: Energy conservation by equipment improvement Step 3: Energy conservation by modernization (process improvement)

Table 10.5 Action Plan Implementation Schedule (2/2)

Raising the necessary funds	(1) Companies that take self-audit training are regarded as those registered for energy conservation promotion; thus, training courses ①, ②, and ③ are made chargeable. (2) Information is to be provided on the Internet to energy conservation promotion companies only, who are to pay a specified amount of Internet fee annually. (3) Factory audits ⑤ and ⑥ are to be free of charge, and 10 % of the amount of energy saved is to be paid as charge for auditing. (4) For training at model factories, companies who wish to participate in it are to be recruited publicly; training is chargeable. (5) With regard to the authorization of qualification of audit experts and energy managers, possible methods may include examinations, review of audits, lectures , etc., of which the most suitable one should be selected; however any of them will be made chargeable. (6) Companies who are to be financially supported as model factories by the government in model factory lateral application are to pay the charge for self-audit evaluation.
Governmental support	(1) A key organ for the promotion of energy conservation is to be established in order to implement action plans.(Ministry of Economy and Ministry of Environmental Protection, Natural Resources and Forestry) (2) Institutions for the above-mentioned (1) to (5) are to be established to facilitate their implementation.(Ministry of Economy, Ministry of Environmental Protection, Natural Resources and Forestry, Ministry of Finance and Ministry of Treasury) (3) From the viewpoint that preparatory audit charges are a fundamental means for environmental improvement, auditing is to be supported by the environment protection funds. (Ministry of Environmental Protection, Natural Resources and Forestry) (4) For the purpose of implementing ①, ②, ③, and ⑤, support by overseas experts, such as JICA's long-term or short-term expert dispatching, is to be applied for. (Ministry of Economy, Ministry of Environmental Protection, Natural Resources and Forestry and European Union Committee) (5) ⑦ is to be covered and supported by individual companies' own funds, as well as local government funds, foreign official funds, and the government's low-interest loan. (Ministry of Economy and Ministry of Environmental Protection, Natural Resources and Forestry) (6) ⑨ investment in modernization is to be supported by the government's low-interest loans (Ministry of Finance) (7) When no substantial benefit is expected from the promotion of energy conservation through provision of incentives, a system or institution (described in the above-mentioned item ⑫) suitable for Poland is to be established.(Ministry of Economy) (8) The prospective key organ for the promotion of energy conservation should, in principle, manage to raise the funds for various expenses; however, the governmental and international cooperation funds are to be used to make up the shortfall for the first 5 years. (Ministry of Economy and Ministry of Environmental Protection, Natural Resources and Forestry) (9) Financial support is to be provided for ECTC activities to introduce ESCO enterprises and develop Poland's own ESCO enterprises.(Ministry of Economy and Ministry of Environmental Protection, Natural Resources and Forestry)
System for the promotion of energy conservation	(Plan-1): To implement a drastic structural reform of KAPE to carry out activities involving ECTC. KAPE will cooperate with regional organs for the promotion of energy conservation including RAPE in local governments.  (Plan-2): KAPE is to be positioned as an organ responsible for the management of implementation of action plans under the direct authority of the government, while an energy conservation/information center (ECTC) is to be established as the organ responsible for the implementation of those action plans. 

10.5 Proposing the Priority Projects

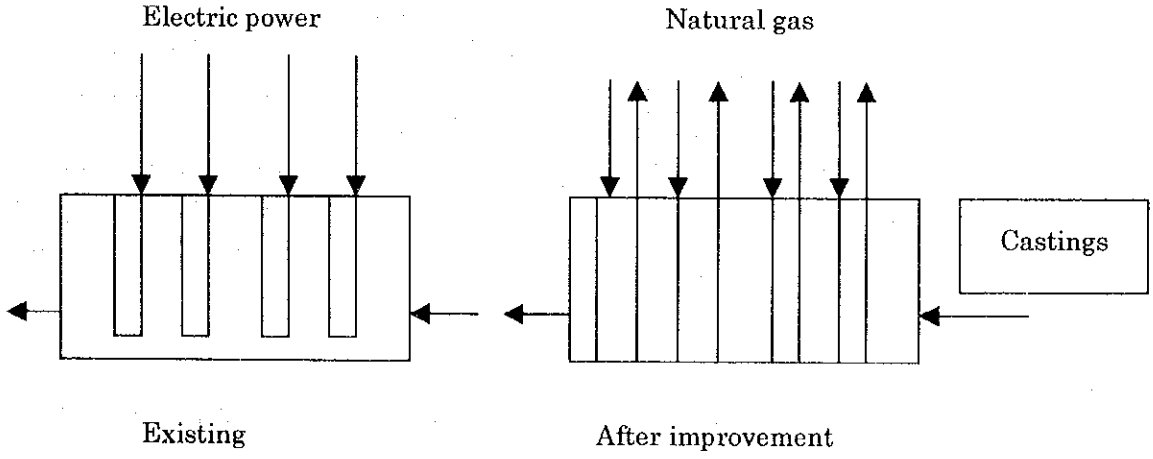
In 1998, 7-day detailed audit was conducted at five factories. Of these, the following factories were selected as model factories that can be recommended for the implementation of the following three energy conservation items proposed as the priority projects in the action plans:

(1) Cast iron pipe fittings manufacturing factory -- Lacznikow: Natural gas-fired regenerative radiant burner type heat treatment furnace
(2) Bottle glass factory -- Wolomin: Full electrical fusion type heat-resistant glass melting furnace
(3) Powder milk factory -- MLECZ: Co-generation utilizing natural gas

The summary of each project is described below.

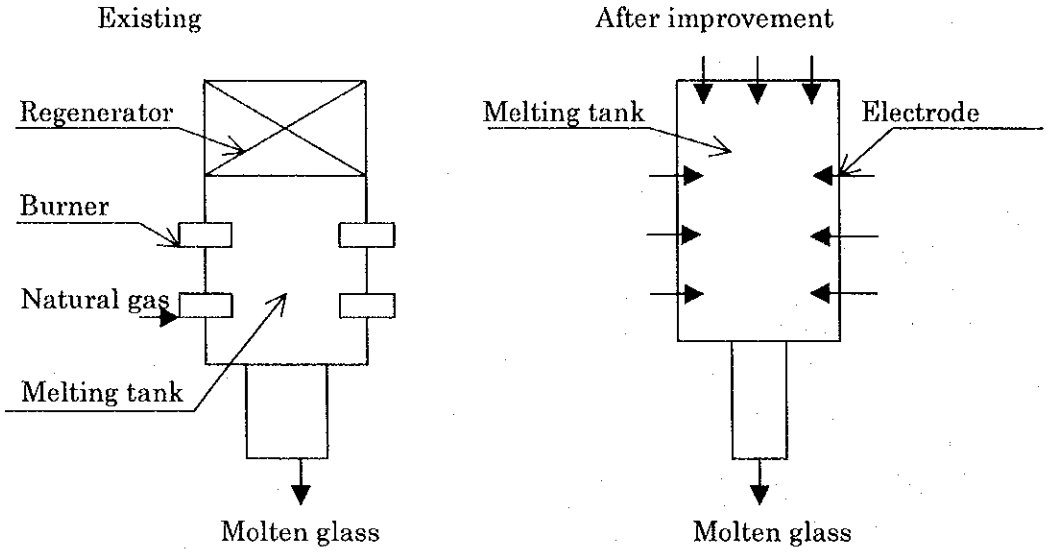
(1) Cast iron pipe fittings manufacturing factory -- Lacznikow: Natural gas-fired regenerative radiant burner type heat treatment furnace

This heat treatment furnace is used for heat treatment of white iron castings at 1,020 。C to create white core malleable iron, and heating is applied by the 360 kW electrical resistance heat. The electricity intensity is 800 kWh/t (8,719 MJ/t), and 7,600 MWh electricity is consumed a year. As a result of changing the heating source to the natural gas-fired regenerative radiant burner, the energy intensity is reduced to 4,115 MJ/t, thus achieving 52 % energy savings. The investment amount is 600,000 PLN/set and the payback period is 5 or 6 years. Natural gas will be supplied to the Lacznikow factory 3 years later.



(2) Bottle glass factory -- Wolomin: Full electrical fusion type heat-resistant glass melting furnace

This glass melting furnace melts glass at 1,300 to 1,500 。C. A full electrical fusion type furnace is suitable for 20-30 t/d small-sized furnaces. By renewing the four existing natural gas tank furnaces for heat-resistant glass to full electrical fusion furnaces, the energy intensity will be improved to 40 %. Although the investment amount is 21,190,000 PLN, it will be 5,930,000 PLN if 15,260,000 PLN as the periodic repair cost for every 9 years is subtracted. The payback period is 5.5 years.



(3) Powder milk factory -- MLECZ: Co-generation utilizing natural gas

This powder milk factory consumes electricity for preserving and cooling milk, steam for dryer and condenser for powder milk. These facilities are run for 24 hours a day. Presently, electricity is purchased, while steam is generated by the coal-fired boiler in the factory.

Since natural gas is to be supplied to this factory three years later, a natural gas-fired boiler and a 400 kW back pressure steam turbine power generator will be newly installed to generate electricity and low-pressure steam in 24-hour operation. The investment amount is 4,000,000 PLN. The payback period is 7 years.