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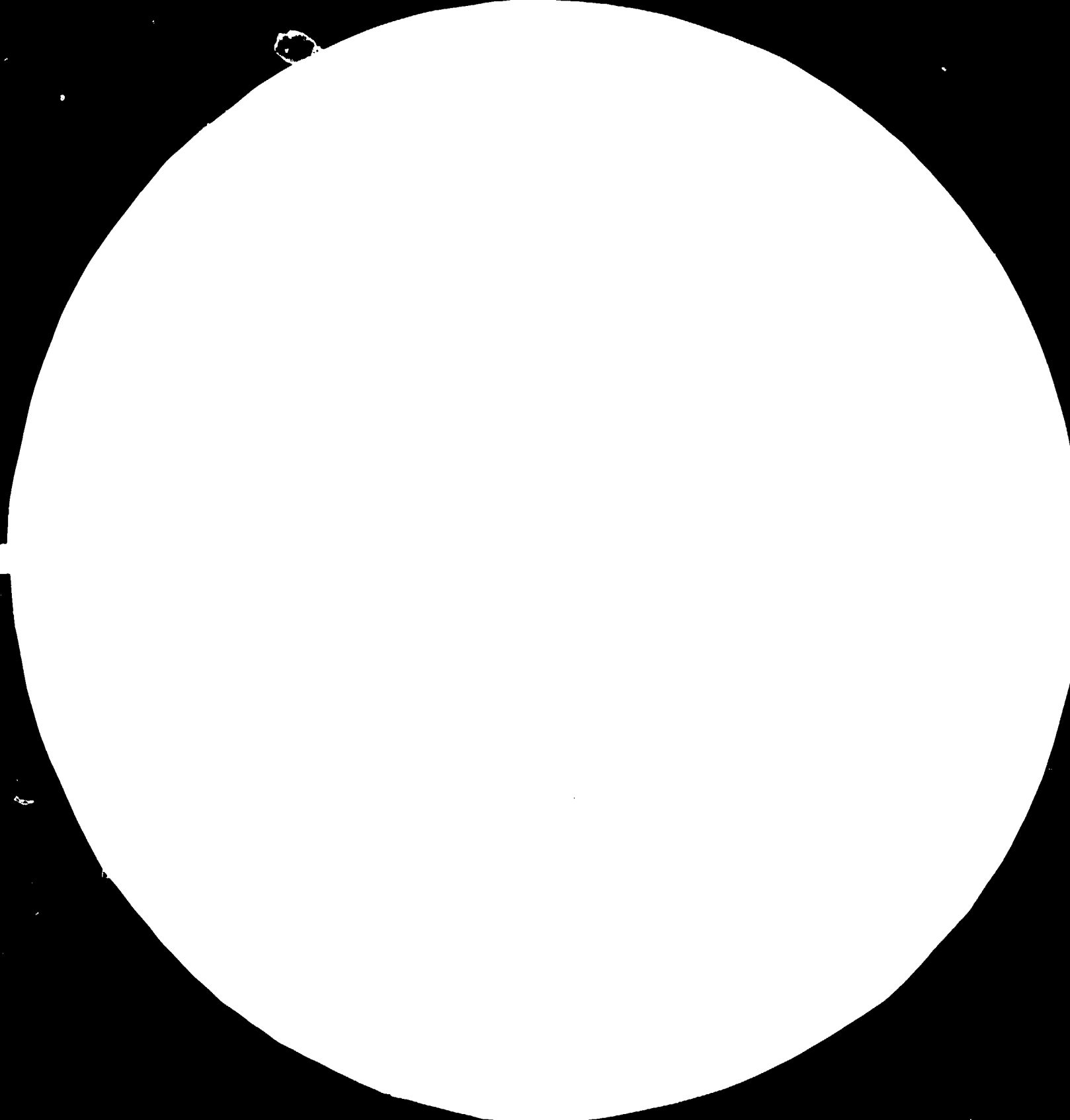

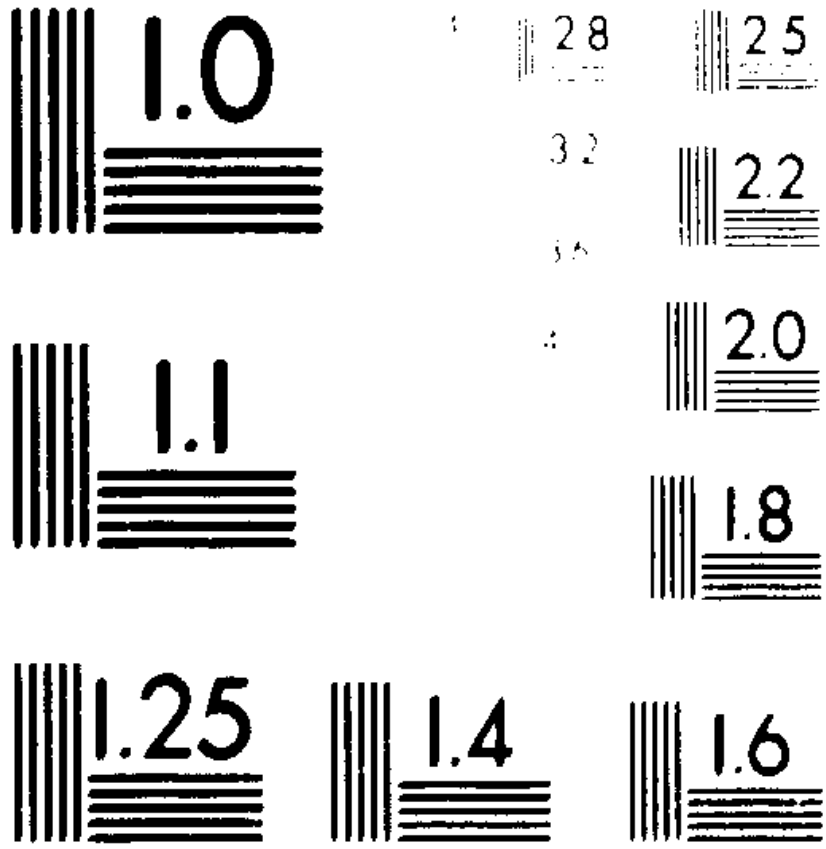

Office of the Executive Director /
Special Advisory Group on Energy

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COMPARATIVE STUDY OF POLICY INCENTIVES FOR INDUSTRIAL ENERGY CONSERVATION

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1. INTRODUCTION

The awareness among the developing countries of the need for policy incentives in fostering industrial energy conservation has recently increased sharply. Considerations of using such incentives have taken place on the regional level, eg ESCAP and OLADE seminars, as well as on the countries' governmental level.

During the past decade industrialized countries have developed considerable experience in stimulating industrial energy management, that could be useful for the DCs.

The aim of this report is to highlight known policy incentives used to foster industrial energy management and conservation.

The intention is to present a comparative study of means available and applied to date that may be useful to decision makers in developing countries in formulating their respective alternative policy measures.

This report may also be useful as a basis for further exchange of opinion and experience among developing countries.

The main types of policy incentives considered hereafter are :

1. Appropriate industrial energy pricing and taxation as a basis for consistent energy policies ;
2. Fiscal and financial incentives to encourage research, development and demonstration (RD&D), implementation of and investment in energy saving techniques ;
3. Incentives by providing institutional and logistical support, eg creation of legislative and institutional framework , information exchange, audit, technical assistance and training programs, etc.

In this report examples of existing practices are quoted mainly from countries members of the International Energy Agency (IEA), but some cases of applied policy incentives for developing countries are given as well .

2. BACKGROUND

Recent experience has confirmed that a considerable potential exists in the developing countries for increasing industrial energy efficiency, for reducing energy intensity of industrial production and for substitution of indigenous energy for imported.

The Energy Sector Assessment studies, performed by the World Bank for about 30 developing countries, have exposed the potential and the attractive economics of a broad set of technical options for energy conservation in industry. Table 1 illustrates the feasibility of considerable energy savings that can be achieved (in certain industries up to 28%) if adequate capital investments are made in retrofiting existing plants and replacement of inefficient equipment .

The exploration of this potential depends crucially on the committment of governments, institutions and enterprises to anticipate necessary structural adjustments leading to efficiency increase in industrial energy utilization. That is calling for an emphasis on industrial energy management, including policy and institutional changes and the development of incentives for allocation of appropriate investment as well as for conducting the necessary reseach, development and demonstration (RD&D) .

Those changes could be brought about by the implementation of rational energy management and planning on regional, national and plant levels in existing industries, as well as in new industries .

The aim of government intervention is to overcome existing barriers, to accelerate the rate of technological change and to tip the economic bias in favor of energy conservation .

As stated at the joint IAE/Latin American Energy Organization (OLADE) Seminar on Rational Use of Energy in Industry, the barriers to the rapid adoption of energy efficiency efforts in some DCs' may be categotized as follows :

(i) Lack of awareness: government , officials, managers, technicians, workers, etc. are frequently unaware of the importance of and the opportunities for energy conservation, or that energy efficiency may be significantly affected by their own decisons or behaviour; people may simply be unaware of the absolute and relative cost of energy in their occupational activities, and the impact that energy savings could have on the profitability of the enterprise;

Table 1. Potential Energy Savings in Selected Industries in Developing Countries

Industry	Total developing countries commercial energy consumption (million toe/annum)	Potential savings (percent)	
		Category A	Category B
Iron and steel	109	3	15-20
Petroleum refining	54	7	15-25
Cement	52	11	18-28
Chemicals (ammonia)	19	2	20-25
Pulp and Paper	15	11	12-15
Aluminum	13	2	10-15

Note: Category A refers to small investment consisting mostly of combustion efficiency improvement, insulation, steam system efficiency improvements, and other housekeeping measures; payback within 10 to 20 months.

Category B refers to large investment in retrofitting existing plants and additions to facilities, including waste heat recovery, combined heat and power production, increased use of waste fuels, simple process changes and controls, and replacement of inefficient equipment ; payback in 2 to 5 years. Savings in category A and B are not necessarily additive in specific plants.

Source : World Bank, The Energy Transition in Developing Countries

(ii) Attitudinal: officials and professionals may not feel that energy efficiency considerations deserve significant priority in their business affairs; they may perceive that the benefits of energy efficiency measures may not exceed their cost sufficiently; indeed the lack of favorable attitudes towards energy savings may just be part of an overall lack of cost consciousness or profit orientation;

(iii) Institutional : governments may have no departments or other institutional entities with clear responsibility for designing and implementing energy efficiency policies or programs; there may be little legislative or regulatory framework addressing energy management responsibilities; and capable cost consious managers, technicians and operators may be in short supply;

(iv) Technical: the technical know-how may be inadequate within governments and enterprises to take on the task of designing and implementing energy conservation measures or investments; appropriate technology, equipment or services may not be available to assist individuals and enterprises to improve their energy efficiency;

(v) Economic : national economies and markets within them may not respond rationally or quickly enough to price and other stimuli either for some of the reasons mentioned above or due to certain distortions between the price of energy charged to consumers versus its economic opportunity cost, or because tariffs, taxes, interest rates or other fiscal and financial policy variables restrict the availability of energy efficient goods and services, or more efficient energy alternatives; In addition the impact of higher energy prices may be diluted in an economy where industrial consumers of energy can easily pass on the cost through increased prices for their goods or services, either through lack of competition or because the price of energy-intensive goods and services is regulated on a primarily cost-plus basis;

(vi) Financial: enterprises or governments may have insufficient financial resources to readily devote to cutting energy cost or making investments that will improve energy efficiency. They may prefer to spent the available funds for other purposes, eg expansion of production.

An energy management strategy needs to be designed to address these obstacles. It should be targeted to the relevant industrial energy consuming sectors of the economy.

Due to differences in underlying philosophies and socioeconomic climates, in developing energy management strategies some countries place the major emphasis on voluntary measures for the promotion of the needed actions whereas others employ primarily regulatory measures. In any case, a combination of "sticks and carrots" is the main future of a workable policy. In this sense, policy incentives, as well as policy disincentives, are central to any attempt at practical implementation of industrial energy conservation programs.

The potential of the policy incentive options varies across the industrial sectors and by type and size of the user at whom the incentives are directed. Figure 1 offers an illustration of the policy incentives at the national level applicable for each stage of the working sequence for energy conservation projects in industrial enterprises. The selection of appropriate sets of policy incentives would be largely determined by the particular political, economic, social and institutional conditions of each country.

Since energy pervades all aspects of economic activity and its demand is derived from the structure and growth of the whole economy, the energy conservation policies should be supported by adequate planning for demand management in all main consuming sectors of the economy (industry, transportation and agriculture). It is, therefore, essential that the energy implications of alternative development policies in all these sectors be properly apprised, and also that effective trade-offs be made between energy efficiency and additional capital expenditures in the technologies which differ in energy intensity and capital cost.

Restructuring development strategies with due consideration for energy intensity of goods and services has thus become a challenging task for the planners in the developing countries. Meeting the "energy challenge" entails a large-scale reallocation of resources and thus calls for bold policy changes covering prices, tariffs, subsidies, tax incentive schemes and financial policies.

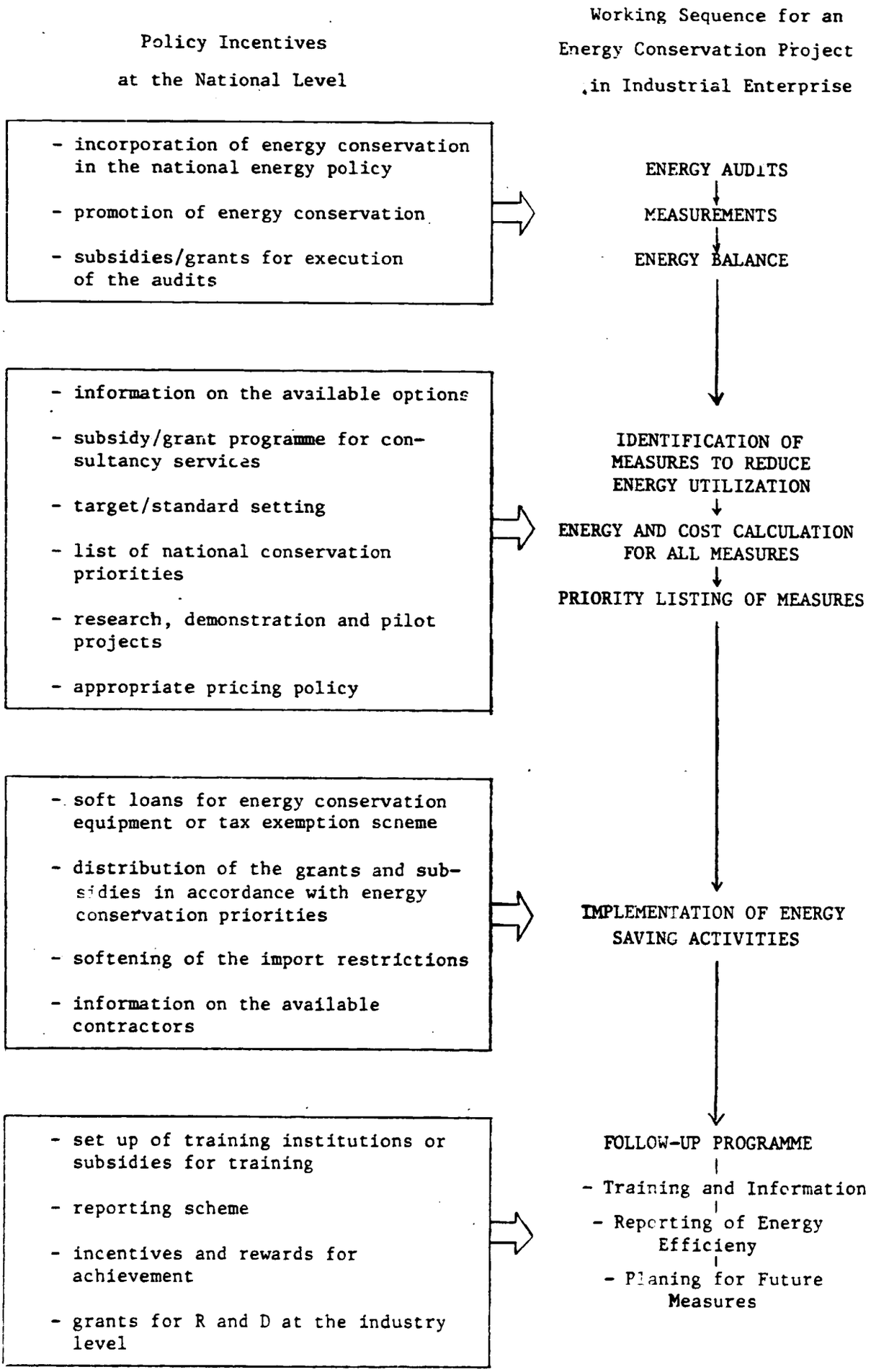

Figure 1: Policy incentives aimed at supporting energy conservation projects in the existing enterprises

3. APPROPRIATE INDUSTRIAL ENERGY PRICING

One of the most important incentives for managing industrial energy demand is a realistic energy pricing policy. It conveys a message to users for eliminating energy wastes and for improvement of energy utilisation practices and processes. In addition, the energy pricing policy affects the choice of new industrial technologies and processes. If energy prices are set below the economic cost of supply, wrong priorities for investment in energy intensive industrial activities may be set and technologies may be chosen whose use is not in the nation's economic interest. Subsidized electricity prices have, for example induced the development of energy intensive industries such as aluminum smelting in some countries while hampering efficency improvement of industrial energy use.

Governmental intervention can influence energy pricing both directly and indirectly.

Direct intervention comes in the form of price controls of specific resources (eg crude oil, natural gas, etc.) or of specific final energy forms (eg diesel oil, kerosene, electricity).

The indirect intervention may take the form of: (i) various levies (including import duties, value added taxes, etc.); (ii) a wide range of royalty schemes, profit-sharing schemes and exploration agreements; (iii) various tax and subsidy schemes; and (iv) general fiscal policies affecting all products. Examples for indirect intervention can be found in Ireland where electricity, turf, coal and town gas are not subject to direct taxes whereas oil products are subject to excise duty and value added taxes, and in Norway where energy produced by energy recovery plants and back pressure turbines are exempt from the industrial electricity fee.

Within the socio-economic context of the developing countries several main constraints influence the scope of governmental activities in the formation of energy prices, or affect the signals brought to the individual consumers :

1. In most of the DCs, particularly in the low income ones, the consumption of energy is viewed as part of the strategy for providing society's "basic needs". On that basis certain users deemed to be "essential", eg some feedstocks delivered to fertilizer industry, coke for iron and steel industry, etc. receive favorable price treatment ;

2. The conventional practice is to allow the country's population to take advantage of the lower price differential that its indigenous energy resources provide during the initial and most energy intensive stage of the industrialization process, so as not to be prematurely burdened with higher international market prices. Little consideration is given to the criterion of price setting in accordance with which the price should cover the marginal cost of production, including "normal profit" for the producer;
3. The rate of inflation makes it difficult for market participants to interpret the signals of isolated price changes: the individual consumer does not, or at least not quickly enough, know whether an observed price change reflects a new scarcity, a demand change or whether it only reflects yet another round of general inflation.

Under the pressure of rising international energy prices, however, in recent years developing countries have increasingly recognized the importance of appropriate pricing in managing both industrial energy demands and the energy sector production structure. In most of the oil importing DCs, increases in costs of oil have been generally passed on to final users. The real domestic price increase of petroleum products in terms of local currency between 1975 and 1981, according to the World Bank report "The Energy Transition in Developing Countries", was about 40% in Republic of Korea; about 60% in Brasil, Pakistan, the Philippines and Turkey; and over 200% in Colombia and Yugoslavia.

The situation is not so uniform in the electricity sector of oil importing countries. Of the 33 countries surveyed by the World Bank staff, 18 have increased their tariffs in real terms since 1974 and some, eg Pakistan, Sri Lanka and Thailand, by as much as 50 to 100% . Nevertheless, only seven of these countries have electricity tariffs that are equal to or exceed the long-run marginal cost of power supply. Basing electicity tariffs on the long-run marginal cost of production ensures that both the level and the structure of tariffs reflect the cost of expanding the power system. An increasing number of countries, eg Bangladesh, Indonesia, Kenya, Nigeria, etc., have already decided to consider the economic cost of supply in setting tariffs. The Republic of Korea went even further by intro-

ducing a restrictive electricity pricing system that involves peak load pricing and increased block schedules .

In the energy exporting DCs, domestic prices of different energy forms are generally still well below the international level and in a number of cases have fallen in real terms since the mid 1970s. Relative price distortions are also more pronounced in these countries . For example in 1979, prices of diesel fuel were only about 40% of those of gasoline, as compared to about 60% in the oil importing countries, and 90% on the international market.

The main limitation to raising prices, not considering the equity question, is the concern about the rise of inflation as a result of energy price increase. Although the exact circumstances vary from country to country, the World Bank study argues that generally this concern is exaggerated. In most industries, energy accounts for a relatively small proportion of the production cost: the exceptions such as cement fertilizer or aluminum are either not a large part of the industrial production of the DCs, or the specific energy prices for such enterprises could be discussed on a case by case basis. Adjusting energy prices to their economic cost, therefore, is thought to have a limited effect on the total industrial production cost. For example, a recent World Bank study for Egypt has indicated that the inflationary effect of a large and continuing energy price increase is likely to be small; an increase of 30 % per annum in petroleum product prices between 1980 and 1990 would translate into a less than 4 % per annum average increase in the consumer price index over the same period.

In summary, it is important to recognize that changes in the energy price formation may have substantial social and political impact and hence decisions must be taken after careful analysis of all related issues, eg about the international competetiveness of the countries' industrial production, energy availability for the small and agroindustrial enterprises, equity problems, etc.

3.1. COMPONENTS OF ENERGY TAXES AND THEIR RATIONALE

Very few developing countries have applied energy taxation policies designed as an incentive for increasing energy efficiency in industry. The potential impact of a coherent system of energy taxes and subsidies on industrial energy use ,however, deserves a thorough consideration for a possible application. The positive results achieved after the introduction of differential energy tax systems in some IEA member countries, eg Austria, the Netherlands, Ireland, etc serve as good example.

Generally, the rationale for tax and subsidy price interventions is to provide for an economic framework, within which market forces can induce results that are in line with a country's overall socio-economic objectives . Therefore, the tax system should be designed in such way as to offset defects in the market price system. Thus, by allocating tax revenue to subsidize energy conservation activities, the desired structural adjustment can be accelerated.

Taxation rates depend on the objectives of the country's energy policy. Tax rates are to be levied differentially according to the type of final energy form, energy technology used and the energy end-use.

Tax revenues are to be used for financing of an active policy of energy conservation, eg by subsidising research, development and demonstration of energy conservation systems or of investment in improvement of industrial energy use.

In general, two targets for energy taxation may be perceived :

(i) all final energy forms, eg refined products, coal, electricity, centrally produced heat, natural and liquified gases, etc. All of these are non-renewable, high exergy forms of energy ;

(ii) the invisible energy: this implies that imported goods should be taxed at the border according to their estimated energy content, ie on the basis of the energy that was invested to produce the product abroad. Conversely, this tax may be refunded on exported items.

In addition, the tax on thermally produced electricity should be based on the primary thermal (or nuclear) energy. This implies that waste heat produced in thermal or nuclear power stations is also subject to the energy tax, thus the waste heat utilization and the combined heat and power (CHP) production will be stimulated.

Within the industrial sector the energy tax load would vary widely because of different energy intensities in the subsectors, eg in computer production and in aluminum fabrication. The accepted taxation and subsidy policies should allow for a large portion of the energy tax, especially in energy intensive industries, to be compensated for by subsidies in energy conservation investment.

Therefore, in most cases the energy tax would lead to minimal, or zero, increases in production cost .

4. FISCAL AND FINANCIAL INCENTIVES

In many developing countries capital shortages and imperfections in the financial markets, or in the allocation of public and private capital, may obstruct the financing of economically attractive and socially advantageous projects that improve the efficiency of industrial energy use. In addition, industry, by and large, requires greater rates of return on energy conservation investment .

The role of granting fiscal and financial incentives in industry is, therefore, to correct the existing imperfections in the financial markets or in the allocation mechanism, to reduce the cost of investment and thereby the risk involved, and to increase the rate of return on the investment made .

Several aims are expected to be realized thereby: (i) aided investment in energy conservation facilities by the industry itself; (ii) re-direction of other marginal investments towards this priority area; (iii) facilitating research, development, demonstration and marketing of new energy saving techniques and products. In addition it is possible through these incentives to accelerate structural changes in the industry towards lower energy intensity and to improve the longer term competitiveness of industrial products.

4.1. FISCAL INCENTIVES

There are five major types of fiscal incentives that can be used to encourage increased industrial energy efficiency. They are :

(i) investment tax credit and deduction

An investment tax credit permits a company to borrow a given percentage of an energy related investment as a credit on its income tax. Tax deduction programmes permit a company to deduct all or part of its energy conservation investment from its taxable income ;

(ii) tax exemption

Under a tax exemption programme, a company that has implemented certain specific energy efficiency improvements would be freed from obligation to pay certain taxes for a set period of time. The exemption can run up to the end of life span of the industrial equipment involved and it can be conditioned on compliance with efficiency targets;

(iii) accelerated depreciation

With accelerated depreciation a company is permited to deduct the cost of an energy conservation capital investment in a shorter period of time than is normally allowed

(iv) property tax exemption

A property tax exemption excludes the value of the specified energy conservation equipment from the assessed value of property for property tax purposes;

(v) relief from import duties

One of the most important for DCs and easiest to administer fiscal incentives is the relief from import duties. It applies to especially designated items from the list of energy saving equipment, eg those which are not domestically produced.

The major industrial fiscal incentives enacted to date in the IEA countries are within the framework of each country's specific policy objectives (for detailed description of the incentives applied see Table 2). The method of trial and error has been used in order that proper incentives for each case of application be developed. For example taxation concessions (introduced 1979) for converting oil using equipment to other fuels in Australia were changed in 1981 to accelerated depreciation of that type of equipment.

Accelerated depreciation of specified equipment is the favored fiscal incentive also in Austria, Japan, New Zealand and Switzerland

For stimulating projects that need high capital outlays, eg Combined Heat and Power (CHP) schemes, tax deduction is prefered in Germany and Japan.

Two of the developing countries members of IEA, namely Turkey and Portugal, apply customs duties exemption schemes on import of energy conservation equipment.

Fiscal incentives are widely used among the DCs for stimulating their industrialization, a feature enhancing their appropriateness as a stimulus for industrial energy conservation investment. For example, the majority of DCs recognize and practice exoneration from customs duties on machinery and equipment. Brasil and Peru recognise accelerated depreciation for industrial equipment. One of the criteria to which the above incentive is tied in Peru is the replacement

of old machinery by more efficient one. Pakistan, India, Guiana and Nigeria recognize that initial investment allowances can begin after the tax exemption period has ended. Tanzania, Ecuador and Sudan also recognize different forms of investment allowances .

Some of the disadvantages of the fiscal measures for the developing countries are that :

a) they give the greatest benefit to the companies that need it least, since the greater the profit the greater is the saving out of tax payments ;

b) create a highly complex and burocratic machinery, which the exemption offering countries are unable to administer because of shortage of trained personnel ;

c) in cases of expatriation of profits, the foreign investors in some DCs could become subject to taxes back home ;

d) their impact on energy conservation investment could be difficult to assess as it could be impossible to separate fiscal incentives granted to the energy conservation investment from those granted to other industrial investment.

Table 2. FISCAL INCENTIVES IN THE IEA COUNTRIES

Australia	Taxation concessions were introduced in 1979 to assist industry to replace oil fired equipment or to convert such equipment to other fuels (100% deduction for conversion, a 40% for replacement). These incentives were extended to LPG-fired equipment in 1980. In 1981 incentives for the conversion of equipment were changed to 50% deductibility in the first year and 50% in the second year.
Austria	Income Tax Law (1979): accelerated depreciation of energy saving investment: the new Income Tax Law (1980) extended that possibility to switching from oil to coal burners in power stations, small hydropower plants, cogeneration plants, for district heating and to production, distribution and storage of gas: there are also fiscal incentives for investment in heat pumps, solar, total energy module systems and facilities for heat recovery, CHP plants and the use of biomass as well as for additional insulation measures .
Belgium	Companies may claim up to 35% of the cost of certain conservation and conversion investments as a tax reduction: BF 1750 million available in 1983.
Canada	Accelerated Capital Cost Allowance: allows fast tax write-offs of 2-3 years on eligible equipment and facilities which increase efficiency, decrease oil use and encourage renewable energy use, also on equipment which uses waste - municipal, industrial, wood - to produce heat and to generate electricity. Assistance for heat recovery systems, solar heating systems, small scale hydro-electric projects and certain district heating systems is included.
Denmark	Not applied
Germany	7.5 % allowance for investment in combined heat and power plants, industrial waste heat systems and district heating systems.
Ireland	Not applied
Italy	Not applied
Japan	A national tax credit system for promotion of energy conservation (1981) provides for either a special depreciation (30% in initial year) or a tax deduction of 7% of the investment cost. In 1982, there was an increase in the number of types of facilities which can apply. For local taxes, there is a one third reduction in fixed property tax for three years after acquisition of conservation equipment.

(continued)

Table 2. (continued)

Netherlands	Under the Investment Account Act (1980): (i) premium (as tax refund) has been raised from 10% to 20% of the investment cost retroactively for a period of 18 months to accelerate conservation investment: (ii) permanent investment allowance has been introduced.
New Zealand	An immediate 100% write off on conservation equipment to use indigenous fuel rather than imported fuel. Tax incentive scheme available for the installation of cogeneration equipment.
Norway	Since 1978, industry has been allowed to set aside tax free funds for investing in waste heat recovery equipment and equipment to utilise refuse or waste products as a fuel for the production of heat: investment in equipment for production of steam and warm water and back pressure tubines has been exempted from the general investment tax of 10%.
Portugal	August 1982: fiscal and customs duty incentive scheme for individuals or collective bodies investing in new equipment for conservation or use of renewables.
Sweden	Not applied
Switzerland	Since 1979, 14 Cantons (out of 26) provide accelerated depreciation for energy saving and fuel switching investments. Tax allowances at the federal level and in 15 Cantons.
Turkey	Since January 1981, tax reduction and customs duty exemptions on equipment for switching from oil to solid fuels, on equipment retrofiting and replacement for energy conservation, on equipment provided for utilisation of waste heat and industrial and urban waste for electricity generation.
United Kingdom	Not applied
USA	Not applied

4.2. FINANCIAL INCENTIVES

Grants, subsidies and loans are the main types of financial measures that are used for stimulating energy conservation in industry.

Financial incentives are, normally, administered by the agencies involved in the formulation of a country's energy policy, and thus such schemes may provide more information, in comparison with fiscal measures, about actual energy conservation projects. They also can be more open, flexible and accountable, since their cost appears in the governmental budget, and they are subject to legislative review and attention during each budget cycle. In addition, they can more readily, than fiscal incentives, be used to enhance financing of energy conservation projects that involve more than one participant, eg industrial cogeneration projects, joint ventures for recovering energy from wastes, etc.

The positive results achieved so far in the IEA member-countries (for description of applied incentives see Table 3) shows the potential that exists in that area. On the basis of the experience accumulated, financial incentives are applied for the following main purposes :

a) <u>for energy conservation projects with longer pay-back periods or for conversion of oil-using equipment to other fuels</u>; Some ten IEA member countries are using different incentives schemes for that purpose. For example in Canada taxable grants (up to 60% of costs) are provided for energy conservation projects with 3 to 5 years pay back period. The same applies for the conversion of process heaters from oil to natural gas. In Denmark, depending on the characteristics of the individual case, the projects are granted from 25 to 40% of costs, while in Ireland long-term subsidized (so called soft) loans are used as well. In Japan loans, partly at concessional, partly at commercial rates are the prefered form.

b) <u>for support of research, development and demonstration of energy conservation equipment</u>: Examples are : (i) Canada-contribution of up to 50% of the cost of approved projects to develop more energy efficient processes; (ii) Germany- governmentally sponsored RD&D programme for energy conservation (1982- US$ 57 million); (iii) Ireland-Demonstration Grant scheme; (iv) Japan- the Moonlight project (see also Appendix B); (v) Portugal-grants for feasibility studies; and (vi) Sweden-loans totalling 75% of investment cost for equipment and demonstration plants.

c) for auditing and consultancy services:

Examples of subsidised consultancy fees are : Austria-first five days paid; Netherlands-refund of 50% of the fee; Turkey-financial aid for foreign consultancy in energy intensive industries; and the UK- £75 grant for one day survey.

d) for support of joint ventures in Combined Heat and Power (CHP) production or in utilization of waste heat.

Examples are : Denmark-grant covering 25-40% of costs; Germany-up to 35% of investment is funded; Ireland-grants for CHP , grants and subsidised testing facilities for waste heat utilization systems

With increased pressure on capital availability and interest rates still high in real terms, priorities for investment in energy conservation equipment need even greater scrutiny. A strict set of criteria and standards for the selection of applicants for granting tax exemptions, subsidies and loans are needed. On the example of the Sao Paolo's CONSERVE programme, a list of criteria for granting financial aid to industrial and agroindustrial firms is offered bellow. The applicants are selected after considering :

- the best technological and economic uses of energy inputs ;
- the applicant's technical, financial and economic business capabilities ;
- the smallest ratio between investment and energy input reduction or substitution, especially for imported energy ;
- the lowest cost of adapting the infrastructure and external economics and for making the energy flow adequate in the case of oil derivatives substitution ;
- the project's contribution to the balance of trade .

The CONSERVE standards also suggest that financial agents :

- emphasize financial aid to small and medium-sized companies in order to help as many as possible ;
- foster the transfer and development of industrial technology ;
- stress programs, projects and studies which can aid energy input regionalization .

The CONSERVE program grants financial aid only for financing fixed assets, aimed at changing the production units already in operation. The loan conditions are : 5% annual interest rates, funding limit of 80 % of the investment value, three-years grace period and loan maturity up to 8 years after disbursement.

The cases quoted above are not meant to be seen as a pattern for setting up criteria but rather as a demonstration of the need for strict conditions and control of financial interactions in order to ensure the success of the energy conservation efforts.

In summary, designs and types of intervention which provide a clear message and transparency and allow the general public to assess the intentions and the probable consequences of the particular policy measure can make an important contribution to positive indusrial energy adjustment.

Table 3. FINANCIAL INCENTIVES IN THE IEA COUNTRIES

Australia	Under the National Industrial Energy Management Scheme subsidies for energy audits in small and medium size businesses are granted.
Austria	Grants for the purchase of measuring equipment; consultancy service with subsidised five days consultancy fees.
Belgium	Companies which have recently not been profitable may receive direct subsidies of up to 10.9% of the cost of certain conservation equipment.
Canada	Atlantic Energy Conservation Investment Programme is providing taxable grants for energy conservation projects with 3-5 year payback period, 50% of capital cost covered; the Industrial Conversion Assistance Programme provides up to 50% of the capital cost for the conversion of process heaters from fuel oil to pipeline gas; the Forest Industry Renewable Energy Programme (FIRE II) provides grants for projects which replace petroleum products with peat, agricultural and municipal wastes and forest biomass; under the National Energy Program, grants will be available to firms that undertake cogeneration of electricity; the Industrial Energy Development Programme will contribute up to 50% of the cost of approved projects to develop more energy efficient processes.
Denmark	Industrial Energy Bill supports a grant scheme for investments in conservation, switching away from oil, and the use of waste heat in industrial processes and crafts. Normally a project is granted 25-40% (depending on the characteristics of the individual case). In 1982 introduced investment grants for renewable energy equipment of up to 30% of instalment costs; grants for heat pumps reduced from 20 to 10%; during 1979 government granted 250 MDkr for installation of District Heating (DH) transmission networks.
Germany	Grant Programme (Investment Allowance Act) - 7.5% allowance on energy generating and saving investment grants for energy auditing leading to energy conservation; in July 1981, a programme was installed in order to promote the installation of coal-fired Combined Heat and Power (CHP) plants and to increase the industrial use of waste heat providing grants of up to 35% of investment and is funded with total of DM 1.2 billion for the period 1981-1985 ; amendment to the Investment Allowance Act of 1975 to provide a 7.5% allowance for investment in combined heat and power plants, industial waste heat systems and DH .

(continued)

Table 3 (continued)

Ireland	From the Industrial Development Authority grants up to 25% for investment directed at energy conservation are available; the Industrial Credit Corporation runs a loan scheme for conservation projects in industry. Loans at interest rate of 9% and a repayment period of 10 years, up to 50% of the fixed cost of the project are available; Demonstration Grant Scheme: for demonstration projects relating to the adaptation of boilers to non-oil fuels; subsidies may be given for the instalation of Combined Power and Heat (CPH) systems; grants for several projects involving use of waste heat; subsidised testing facility for proposed waste heat projects by firms.
Italy	National Energy Plan (May 1982) includes: (i) interest bonuses or capital grants (maximum of 5 billion lires on 10 years loan or 25% of the estimated cost) aimed at saving at least 15% of the initial hydrocarbon or electricity consumption; (ii) utilities are offering financial incentives (contribution to service line connection) for changing gasoil heating plants over to use of gas; (iii) funds for feasibility studies into heat distribution networks connected with CHP plants or power plants using renewable sources - grant up to 30% of estimated costs of the project.
Japan	loans, partly at concessional, partly at commercial rates, are available for industry to finance investment in energy conservation and in equipment using coal and LNG (main sources Japan Development Bank and Small Finance Corporation); loans also available from Small Business Corporation and National Finance Corporation; financial assistance to the projects for utilization of the waste heat.
Netherlands	March 1982: National Investment Bank began to provide bank-credits guaranteed by the State for energy saving investment; repayment and interest payment scedules are based on payback time of the investment. Since 1977, industry can also get a refund of 50% on advisory charges. Over 800 firms have received this grant.
New Zealand	Energy Conservation Loan Scheme (replaces former tax incentive scheme): low interest loans for industries organisations and private individuals to invest in fuel substitution and energy conservation; special payback criteria; programme will be monitored to gauge effectiveness.
Norway	Loans and loan guarantiees are available.
Portugal	Under the "Scheme of Technical and Financial Support to Industrial Consumers of Fuels": grants (up to 50% of cost) for energy investment projects and feasibility studies. The allowance can be applied to the acquisition of equipment for switching from fuel oil to alternative sources, as long as such equipment improves total efficency.

(continued)

Table 3 (continued)

Sweden	Oil Substitution Fund: loans of up to 50% of investment cost are available for conversion to other fuels than oil and for waste heat utilisation: grants up to 50% of investment costs, and loans totalling 75% of investment cost are available for prototypes and demonstration plants; 25% investment subsidy for peat-fired boilers (1983)
Switzerland	financial incentives not available at the national level.
Turkey	financial aid for foreign consultancy in energy intensive industries and soft loans for energy saving investment in textile industry are available
United Kingdom	"Energy Survey Scheme" provides £75 grant for a one-day survey. A 50% grant, subject to a maximum of £100000, can be obtained for a large survey; "Coal fired boiler scheme" from 1981 to 1983 aims to encourage coal burning by means of a 25% grant towards eligible capital expenses in the purchase and installation of coal fired boiler plan (conversion of the existent plant from oil to coal is also eligible)
United States	subsidies for co-generation and other community energy systems have been approved by the Congress although the Administration did not request them because energy systems projects have already proven that they can be commercially viable without federal subsidies.

5. CREATING AN INFRUSTRUCTURE FOR PROMOTING POLICY INCENTIVES

Experience in the Developed as well as in some Developing Countries has shown that for a comprehensive energy management policy, the fiscal, financial and price incentives need an institutional, informational and organisational support both on the enterprise and on the national levels. This infrustructure should be tailored to the specific conditions and can include a combination of the following :

5.1. Legislative Framework

Practically all industrialized countries have some form of legislation dealing with energy conservation. Some DCs have also enacted such legislation. These laws vary in scope, and may designate government organizational responsibilities and powers for various conservation policies and programmes; may demand certain practices, eg reporting, audits, energy managers, etc., on the part of enterprises, and may set the framework for regulatory measures to be developed by various agencies or levels of Government that deal with a particular sector of the economy. Examples of inacted regulatory measures can be found in: (i) Austria-Distric Heating Law ; (ii) Japan - the Law for Rationalization of Energy Consumption; (iii) Portugal - the Law for Energy Consumption Management; (iv) Republic of Korea - the Heat Management Law, etc. (for more details see Table 4 and Appendix A).

5.2. Institutional Framework

Most industrialized countries have officially established agencies or departments with the special responsibility for national energy conservation policies and programmes. These are normally branches of the Ministry or Department of Energy or of the Ministry or Department of Industry. Energy Coordination Committies, under the chairmanship of high level officials are established in some countries for formulating and implementing an integral national policy, eg in the Republic of Korea, under the chairmanship of the President.

Few DC Governments have esteblished such functions: some have established only representative bodies without a real decision-making power.

Table 4. Governmental Control and Regulatory Activies

Australia	A technical committee of the Standards Association to prepare standards for energy auditing and management
Austria	Distric Heating Promotion Law in force: public funds to promote new investment in district heat and CHP
Belguim	Government provides support for commercialisation of new energy conserving or renewable products
Canada	The coordination committee for the 18 voluntary industrial conservation task forces produces an annual report on the achievements in conserving energy
Ireland	Department of Industry and Energy carried out a survey on the effects of the energy conservation publicity programme; assessment made of the National Boiler Testing Service; Draft specifications and Codes of Practice for DH/CHP installations
Italy	National Energy Plan (1982) includes: (i) appointment of an "energy manager" in all plants, having over 1000 workers or with an annual consumption of more than 10000 toe; (ii) removal of restrictions on private generation of electrical energy and CHP of up to 3000 KW if renewable sources are used; (iii) several CHP and DH network system projects are implemented or being considered.
Japan	Under the Energy Conservation Act (1979): (i) the factories which are large energy consumers are classified as energy management factories. Duties include appointing energy managers and recording energy consumption. Analysis of these records will result in detailed guidelines to industry; (ii) allows the government to inspect industry, to give guidelines on conservation, etc.; In 1980, a New Energy Development Organisation was established to promote the development of coal use technologies, geothermal, solar and other new energy technologies.
Netherlands	Energy conservation effects are being monitored by the Central Planning Bureau : energy saved in 1980 compared to 1979 in industry is 2%; Legislation in the field of waste heat use is in preparation.
New Zealand	A number of standards for effective energy use in industry have been introduced.
Portugal	Under the law for Energy Consumption Management : (i) energy utilization patterns of firms are examined every five years; (ii) mandatory is the completion of an approved five year energy rationalisation plan. In 1981, a decree on cogeneration was published in order to solve problems between co-generators and utilities.

(continued)

Table 4 (continued)

Sweden	Evaluation made of grant programme 1974-80, and grant and loan programme 1974-79; energy conservation committee is at present evaluating its work accomplished since 1974; oil substitution committee is evaluating the work of the oil substitution fund ; January 1982: law specifies that all new or exchanged boilers with fuel consumption over 50 GWh must use solid fuels; Plant owners with a certain level of consumption must consult the National Board of Industry regarding the design of their boilers; Energy technology commission to help municipalities proceed with oil substitution plans.
Turkey	Energy Management Groups and Energy Control Centers have been set up in several of the State Economic Enterprises: in the textile, petrochemical and electricity generation sectors.
United Kingdom	In accordance with the Energy Conservation Act -1981, government will set efficiency and safety standards for all types of heating appliances used in industrial, commercial and residential sectors; "Industrial Energy Thrift Scheme" started in 1976 to analyse energy use and conservation potential in industry. It works through visits to companies. The information generated is used for preparation of government policy, sectoral publications and seminars and for monitoring and target setting; "Regional Energy Conservation Officiers" and the National Energy Managers' Advisory Committee - establish. - and maintain. - links with energy managers in industry and the public sector (the Department of Energy).
United States	The federal regulatory process will be reformed with the aim of reducing costs and lead-time for building coal-fired industrial facilities. Environmental constraints imposed by the Clean Air Act are also under review; the government intends to encourage utility rates which promote greater use of co-generation.

Normally, the established governmental bodies develop and administer various informational and promotional programmes aimed at the different energy consuming sectors, eg the energy intensive industries, the small and rural enterprises, etc. These agencies sometimes have the responsibility for the allocation of sizable budgets, used as subsidies, grants or loans for the support of industrial energy audit programmes, technical assistance for medium and small enterprises, RD&D projects, etc. (see also Table 4).

A few countries, eg Japan and the Republic of Korea, have established also Energy Conservation Centers or Energy Management Associations, supported by both government and industry, for providing technical assistance, information and training to a variety of energy users. Another approach to the fulfillment of the above activities is to leave them to private consulting firms or other types of private institutions with accompanying subsidy/grant schemes for some of the users. Some countries have established energy audit or technical assistance branches within, or linked to, energy supply enterprises, eg utilities, petroleum companies.

5.3. Audit, Technical Assistance and Training Programs

Many countries have introduced or promoted the development of national programs and capabilities to provide industrial, agricultural and commercial eneterprises with a variety of technical services helping them to analyze and improve their energy consumption and management. Varying mechanisms are used for providing these services through government agencies, commercial or industrial associations, private consultants, academic or research institutions and energy supply enterprises. (for details see also Table 5).

The aim of energy audits is to help industries understand more about the way energy is used and consequently to identify areas where waste can occur and where a scope for improvement may lie. In some countries energy auditing is used as a means of controlling the relative energy consumption in a specific branch of industry. Energy audit schemes now exist in most of the developed and in some of the developing countries, eg the Philippines, India, China, etc., but the case of Canada deserves special attention. Canada has established a National Energy Audit Programme that provides also energy audits in industry (the Energy Bus Programme), grants for consulting advice and educational workshops and seminars for employees.

In most countries, information obtained from the auditing scheme is used also to enable governments to formulate an energy conservation strategy.

In many countries, eg the IEA member countries, the West African countries, etc., the creation of advice services for small and medium sized industries is viewed, as a form of technical assistance , among the key factors underlining government strategy in the industrial sector. That accounts for the fact that many small and medium sized companies have neither the manpower nor the technical expertise to improve their performance unaided. The need for research and development services to the above enterprises must also be emphasized .

Most of the IEA member countries have established energy advisory services for small and medium sized industries, but there is a wide variation in organizational form of services offered (for details see Table 5). For example, in the United Kingdom two services have been very popular: the Energy Survey Scheme and the free Energy Quick Advice Service. In some countries, such as Austria, Canada and Germany, industrial organizations (assossiations) are playing an important role in the implementation of these advisory services also by organising seminars, exibitions, workshops and training courses. Most of the above activities are subsidised by the governments. In other countries, eg the Netherlands, Sweden and Switzerland, subsidised energy audits, handbooks on energy conservation and some other forms of consultancy services are the predominant forms .

Although the need for advisory services for the medium, small and agroindustrial enterprises in the developing countries is much more pronounced, examples of action taken are scarce. Exceptions are the Republic of Korea, the Philippines and Thailand where the links among the established agencies (eg the Association of Energy Engineers, the Energy Management Association and the Industrial Subcommittee), and the multitude of small and agroindustrial enterprises are properly established and useful (see also Appendix A)

5.4. Energy Information

In all fields of energy conservation, there is a problem of lack of information and knowledge: at the general level, of the importance of energy in the companies balance sheet and the ways to be more efficient and cut costs, and on the technical and operation level, in the following main areas :

(i) statistical, including supply and demand flows and balances,

(ii) technical, including information on scientific, technological, economic and sociological aspects of new ideas;

(iii) institutional information, ie identifying which organisations are doing what in the various areas of energy development and conservation;

(iv) research and development information, including efforts to conserve potential energy resources and potential energy demand, state of the art reports on new technologies, etc

The overall improvement of knowledge concerning energy conservation in all sectors can complement pricing, financial and fiscal incentives in several ways :

- by enabling consumers to respond in a rational way through conservation or substitution in response to changing relative prices, reducing both oil consumption and the hardship caused by increasing prices ;
- by enabling indistry to keep cost down in the face of increased energy cost, and retain its competetive position ; and
- by enabling these responses to occur faster than otherwise.

In fact, the business community may be encouraged to anticipate future trends in energy availability or price if sufficient information is available and if energy specialists can be trained and made aware of the technologies required and available.

OECD country governments have attacked the information problem in various ways, with general motivational, advertising, technical manuals and training courses, seminars and workshops for businesses, auditing programmes, etc. In most cases governmental institutions jointly with industry have created energy data bases and information collection and analysis systems, which particularly at the consumer level are indispensable for the implementation and monitoring of energy conservation measures .

Very few DCs have adequate information on their energy consumption disaggregated by energy form and end-use even of the most energy intensive sectors, eg iron and steel, fertilizers, textiles, etc. Data on the consumption of fuelwood and other traditional fuels are extremely rough, even though in many countries such fuels account for over half of the total energy consumption. Fortunately this situation is changing. Energy audits and reporting programs, in the larger industrial plants, are beginning to build up energy consumption information at the enterprise level. Recently the International Energy Agency (IEA), various UN bodies, the World Bank, regional organisations such as CEPAL, ESCAP and OLADE, along with numerous national administrations and private sources, have been working in co-operation to develop an integrated and co-ordinated energy data base for about 40 developing countries. The results are expected to become available early 1984.

In the field of overall improvement of knowledge concerning energy conservation practices, general acceptance has received the idea of preparing Sectorial Handbooks on Energy Conservation, eg for the glassworks, cement, paper and pulp and ceramics sectors. For example, in accordance with Sao Paolo's CONSERVE program sectorial handbooks may have the following contents :

-Energy diagnosis for the sector under study, with analysis of the most significant factors in determining consumption levels, with emphasis on oil derivatives and special attention to the specific characteristics of each process;

-Information on the targets and the way in which internal groups can develop and implement energy conservation programs;

- Description of energy experiments surveyed in typical installations;

- Presentation of case studies on the reduction of energy consumption in the sector;

On the whole, international exchange of relevant energy information and building up of national experience in developing information systems can be of great use to the DCs in filling up the information shortage.

5.5. Target setting and Reporting

Target setting is considered essential in motivating both governmental bodies and plant management to implement energy saving measures.

Target setting schemes have been established in five OECD countries, namely Canada, Greece, Japan, United Kingdom and the United States. Some developing countries have introduced, or are considering to introduce such schemes. The scope of actions in the DCs can be illustrated on the example of the Republic of Korea, where energy efficiency standards have been introduced by law, and that of India, where the Inter-Ministry Committee is considering setting up a national target for 20% improvement of industrial energy use.

As far as the OECD countries are concerned, voluntary target setting from the industries themselves is a preferred practice. In the USA, energy consuming industries are required to report their energy consumption as a means of comparing progress against established energy efficiency improvement targets. In Canada, a reduction of 12% of energy consumption per unit of output during 1972-1980 has been set as a voluntary target. Conservation targets were also set on a voluntary basis in Japan and Greece : 5-12% savings for the period 1975-1985 in Japan and 2-6 % savings in Greece. All of these schemes focus mainly on the energy intensive sectors of industry.

Reporting schemes require companies to report on a regular basis their energy consumption to governments. Such schemes can be found in five OECD countries (Canada, Italy, Japan, Norway and USA) as well as in the Republic of Korea, the Philippines and China. In Japan, the Republic of Korea and the Philippines, industries are obliged not only to report their fuel consumption but also to formulate annual energy saving plans and to report the results achieved .

Table 5. ADVISORY SERVICES, TRAINING AND INFORMATION

Australia	Under the National Industrial Energy Management Scheme, 32 seminars or workshops (in 1981/1982) were conducted; 1980 "Skills in Demand Projects": total of 34 projects approved, including 3600 trainee positions; in 1980 , the National Energy Conservation Programme focussed on information services for industry.
Austria	Sectoral training programmes and energy management programmes. Conducted 28 training courses. Federally sponsored seminars for energy auditing, energy saving measures, etc. in small industrial and commercial firms.
Canada	National Energy Audit Programme: joint federal-provincial programme provides energy audits in industry (the Energy Bus Programme), grants for consulting advice and educational workshops and seminars for employee awareness and motivation.
Denmark	Energy Management Programme provides seminars and courses, including education of employees; under the Industrial Energy Bill: booklets with information on energy saving potential provided, including standardised solutions for energy conservation in different lines of industry; energy management "clubs"
Germany	Training programmes: adaptation of all relevant craft-curricula; numerous seminars and courses; energy management initiatives by industry; information services managed by Consumers Association for specific consultations for small companies; advisory service for small and medium sized industry (Government contribution of up to 75% of consultancy cost)
Ireland	Comprehensive Energy management training course; "Telephone Advisory Service" provides a national telephone advice service for all non-domestic energy users; advisory and technical information supplied through the Regional Energy Conservation Officers and the Irish Energy Management Association (EMA); 13 booklets on energy conservation have been published.
Italy	Training programmes by industry, public companies and professional associations; under the NAtional Energy Plan five "energy buses" deliver technical assistance to small and medium sized firms.
Japan	The Energy Conservation Centre conducts training programmes for heat managers, provides information and advice on conservation in industry.
Netherlands	Energy management and training programmes, two "energy buses" provide advisory services

(continued)

Table 5 (continued)

New Zealand	The Energy Advisory Service gives free advice to industries in relation to the size of the company's oil bill; more detailed work is carried out on a fee basis.
Portugal	Energy Management Initiative was launched in October 1980 as a publicity campaign for industry; technical guides on energy conservation have been issued.
Sweden	The Swedish education authorities, the Association of Local Authorities, the National Industrial Board and other professional associations implement a wide range of education and training activities; advice services exist for industry and will be further developed.
Switzerland	Government is funding the work of three private associations organising training courses on energy management; the government's 1979 information campaign was centred on the International Energy Conservation Month; the 1980 campaign focussed on the promotion of advisory services at the local and regional level.
Turkey	Not applied
United Kingdom	Training courses for energy managers; the National Energy Conservation Officers and the National Energy Managers' Advisory Committee established and maintain links with energy managers in industry; 74 energy managers groups exist in the UK; a free monthly newspaper "Energy Management"; five "National Energy Management Conferences" have been held.
USA	The Department of Energy distributes information on energy conservation, technical reports, educational materials, pamphlets, etc.

6. CONCLUSIONS

The dramatic changes in the last few years, not only on the World oil markets but also on the international capital markets and on some nations' economic activities, produced direct impact on the demand for oil and on the supply and use of other fuels. At the same time the awareness and perception of Governments, industrialist and induviduals in oil-importing and oil-producing countries alike, about the significance of energy in their day to day matters grew considerably.

The compound effect of these factors pushed world oil demand down by about 20% in three years and, respectively, the price of oil fell down.

A key lesson from the above development is that market forces are very much alive in the energy field, acting during the past years vigorously in support of energy use rationalization.

Another lesson is that the pursuit of a consistent energy conservation policy conveing to society the sense of the true value of energy - not in terms of saving energy by "doing less" but rather by "doing more" with less energy - brings clear rewards.

Government interventions in support of industrial efforts to increase energy use efficiency and fuel substitution have brought about substantional reduction of energy consumption per unit of output in many IEA countries. The strategies of doing this include ensuring an overall climate that encourages energy saving investment and providing advice services as well as of fiscal, financial and legislative means of promoting rapid adoption of energy saving technologies in industry. Appropriate target setting and monitoring of success by industry itself or in cooperation with government bodies, has further accelerated the move towards energy efficient processes and the substitution for oil.

The experience accumulated in the IEA countries can be very useful for the DCs in their effort of overcoming existing economic and social barriers to energy conservation. Some considerable experience of stimulating industrial energy conservation has been accumulated in a few DCs as well. Subject to the differences in underlying philosophies and socio-economic climates in implementing energy management strategies, some countries place more emphasis on voluntary measures of stimulating necessary actions, whereas others apply mainly regulatory measures.

Experience seems to indicate that incentives ("carrots") are more effective than disincentives ("sticks") in governmental efforts to cut industrial energy consumption.

Policy incentives are fundamental to the successful pursuit of an energy conservation policy. Their selection and suitable application, therefore, should be a matter of priority treatment.

The potential of the policy incentives option varies across the country's industrial sectors and by type and size of users at whom the incentives are directed.

The current reduced economic pressure comming as a result of the decreasing oil prices should be viewed as a granted "breathing space" and used to consilidate the energy policy lessons from the past and to put energy future on a consistent rational basis. Furthermore, by employing for policy incentives some of the resources freed by the decrease in oil prices, the risk of longer-term energy constraint can be reduced.

No clear-cut prescription for action can be automatically formulated. The solution is, rather, by presenting the variety of applied measures and practices in industrialized countries, to help decision-makers in developing countries chose appropriate sets of policy incentives in accordance with the structure of their established government-industry relationship as well as their energy conservation priorities.

APPENDIX A

EXAMPLES OF ENERGY CONSERVATION MEASURES IN SOME ASIAN COUNTRIES

JAPAN

By "measures for energy conservation " are meant the various activities seeking to improve energy efficiency to the maximum and to keep the rise in energy consumption to a minimum.

1. Legislative measures.

Enactment and Application of the Law ~~for~~ of Rationalization of Energy Consumption aimed at promotion energy conservation in the industry, electric utilities, household and transportation. The basic standpoint of this law is that the Government shall establish the guidelines for energy conservation measures and may give advices and instruction to the enterprises who do not follow the guidelines

2. Financial and Tax Measures

In order to promote energy conservation measures, preferential treatment is provided for energy conservation equipment such as financial assistance and tax credits. The outline of the presently practiced system is as follows :

(i) Tax measures

a) Alternative choice of special depreciation allowance or investment tax credit for energy conservation equipment. Up to 30 % of acquisition costs are recognizable as special depreciation in the first year or 7 % of investment are deductable from the income tax for 3 years.

b) Reduction of the fixed property tax for energy conservation equipment. For the energy conservation facilities, the fixed property tax is reduced by 1/4 for 3 yrs after acquisition

(ii) Finacial measures

a) . Loans for investment in energy coservation equipment by the Japan Development Bank.

A system of loans, at ordinary interest rates, for 10 types of energy conservation equipment.

b) Loans through the Medium and Small Enterprise Finance Corporation for 21 types of energy conservation equipment at ordinary interest rates.

3. Guidance, Enlightment and Public Relations Activities

The Conference for Promotion of Energy and Resources Conservation (established in the Cabinet with the Director General of the Prime Minister's Ofice as Chairman) has been developing strong public relations activities aimed at promotion of energy conservation.

An Energy Conservation Center was established in 1979 to give consultation and guidance to small and medium businesses which do not have sufficient technological knowledge and personnel to promote energy conservation.

[illegible] was created as the nation's "Energy

Conservation Month" and the public is called upon to review and revise their living patterns and industrial activities from the standpoint of energy conservation with the help of gatherings, exibitions & commendations as well as various mass media public relations.

4. Technical Research and Development (Moonlight Project)

The Moonlight Project was started in 1978 as a national project for the promotion of research and development of energy conservation technology. The principal parts of the Moonlight Project are:

(i) Large scale technology exploitation for energy conservation including research on magneto-hydro-dynamics (MHD), waste heat utilization technology and efficiency gas turbines.

(ii) Research and development of pioneering and basic technology for energy conservation. Since the risk involved is great, it is difficult for private industry to undertake this R&D, which consist of superconductive technology, new type battery, etc.

(iii) Assistance towards promotion of R&D activities in private industries. This is aid through subsidies for important R&D on technology for energy conservation carried out by private industries. The subjects to be studied are the following: energy conservation in the production process, development of energy conservation technology for energy consuming equipment, exploitation of waste energy, research and demonstration of solar equipment.

(iv) Promotion of energy conservation through industrial standardization. This is to promote establishment or revision of present standards so that they will incorporate energy conservation regulations so as to spread energy conserving equipment.

5. Other related activities

(i) Government should set priorities among energy conservation policies and government funds should be distributed according to these priorities. That is relevant for the projects with pay-back time longer than two years. It is felt as important to increase financial tax incentives for energy saving investment and for research and development of new technology for energy conservation.

(ii) It is very important to organize and support new businesses and market related to energy conservation

(iii) It is essential to collect and arrange detailed statistical data concerning energy consumption, which are indispensable for carrying out a concrete and fruitful energy conservation policy. For example the detailed data of end use in each demand sector are necessary to do a cost-benefit analysis of energy saving investments.

REPUBLIC OF KOREA

1. Substential price increases. After long years of charging subsidized rates, the Korean Electric Company recently obtained substantial tariff increase. The Government introduced restrictive price system: this involved peak load pricing in 1977 and increased block schedules in 1979.

2. Legislation and institutional arrangements.

-Heat Management Law (1975), aims at promoting the effective utilization of energy in industry and improving efficiency of fuel-using equipment. Every firm which uses more than 500 tons of coal equivalent per year must annually submit an annual plan for energy conservation and employ a "heat manager" to oversee its execution. The Law provides for the establishment of energy consumption standards and for the creation of the Korea Energy Management Association (KEMA). KEMA makes "heat audits", trains energy managers, inspects fuel-using equipment, provides technical assistance to large energy users and recommends methods for improving efficiency to conserve energy, under the supervision of the Ministry of Commerce and Industry. The administration has exceptional power to enforce energy users and energy equipment business to comply with such regulations.
The Korean Energy Conservation Institute (KIEC), established in 1977 conducts research on various aspects of conservation, with special emphasis on maximizing the efficiency of fuel-using equipment in industry.
KEMA held energy conservation meetings, seminars and training workshops for energy managers, engineers and technicians. For the period 1974-1980 total attendance was 90000 persons.
"National Convention on Energy Conservation Promotion" and "Energy Conservation Exibition" were promoted in 1975. Commendations are announced for successful conservation cases and prizes are presented at the national convention. An exibition of energy saving systems, new developments and models of new concepts is held each year simultaneously with the National Convention.

3. Fiscal and financial incentives have been introduced to encourage investment in energy saving techniques and equipment. Preferential loans for industrial energy saving investment, insulation of buildings and solar system installation are provided by an "Energy Rationalization Fund", an "Energy Savings Facility Fund" and a "Solar Promotion Fund".

The Government also provides tax incentives on energy saving investment such as special depreciation allowance (100% of investment in the first year and 5-10% exemption of investment from corporate or income tax. Reduced import tariff rate on mach-

INDIA

A Petroleum Conservation Research Association (PCRA) was set up in 1978 to initiate specific petroleum conservation programs in Industrial, Domestic, Agricultural and Transport sectors. One of its founding members, the National Productivity Council (NPC), has been entrusted with the task of spearheading Fuel Efficiency and Energy Management Programs. Along that line Fuel Efficiency (FE) cells have been set up in Ahmedabad, Bangalore, Bhopal, Bombay, Calcuta, Chandigarh, Delhi, Hyderbad, Jaipur, Kanpur, Madras and Patna. Through these cells NPC offers consultancy and training services both at the unit level for the advantage of individual industries and also at the state and national levels for corporate decision makers. Roughly 70% of the NPC activities are devoted to industry while the balance is concerned with energy conservation in transportation and agriculture.

NPC/PCRA operations to date have touched over 1200 industrial organisations through Consultancy Programs. These include prominently - Chemical Processing industries, Textile mills, Pulp and Paper mills, Glass and Ceramic factories, Engineering viz. rerolling , forging industries, Rayon industries, Food Processing industries and Cement factories. The service consists of plant energy audits with an assessment of the energy situation, including the necessary instruments and measurements by NPC's staff who work in co-operation with plant personnel. Specific recommendations are made to plant management for energy conservation measures.

A high level Inter-Ministry Committee for Energy Conservation and Management has been constituted for setting up of comprehensive national policy in this area. The first step is a report that will set forth policies and programs regarding energy conservation based on assessment of energy intensive and non-intensive industial sectors. In addition to technical initiatives, the policies and programs will deal with fiscal and legislative approaches and various incentives which the Indian Government can provide to industry.

The Committee considers that the opportunity exist in India for 20% improvement in industrial energy efficiency. About 10% of this can be achieved simply by better house-keeping and wiser use of the available energy .

INDONESIA

A nation-wide campaign on conservation of energy through information and education programmes was planned, and it was intended that the establishment of legislation, which could be technical and regulatory, in forms of tariffs and taxes would directly or indirectly give impetus and encouragement to the society for economizing energy .

MALAYSIA

In view of the vital need of the country to conserve petroleum resources, eliminate waste and promote efficient utilization of energy, general principles and methods of application for each energy conservation policy item would be studied and investigated by the working committee on enerrgy conservatio, which had recently been established .

THE PILIPPINES

The use of fiscal measures for reflecting the real economic and social costs of energy, direct Government management of demand levels , and the encouragement of public and private co-operation in the institutionalization of energy conservation are being pursued . The main short term measures adopted are : energy consuming plants to submit annual reports to the Ministry of Energy, tax credits for the use of energy conservation devices utilizing indigenous energy resources, and restructuring of electricity and oil product pricing. Longer term plans include the development of industrial standards for energy utilization and conduct of energy audits in large energy-consuming establishments. In order to promote the energy conservation policy, a Buro of Energy Utilization had been set up in the Ministry of Energy. A series of energy management training courses has started.

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THAILAND

Short term measures includ reducing oil and electric power consumption in the government sector by 10 percent within one year after august1979. Longer-range conservation measures includ increasing duties and taxes on electric appliances, petroleum products and applying a progressive electricity tariff. The Government has provided a fund for a mass media campaign to promote oil and electricity saving, and for promotion of technological improvements, to be managed by a committee on energy and fuel saving which would establish rules or measures to promote oil and electricity saving as well as technological improvement, by granting tax privileges and technical assistance.

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