

ENERGY EFFICIENCY PROGRAM

(ME-0204)

EXECUTIVE SUMMARY

BORROWER: Nacional Financiera S.N.C. (NAFIN)

GUARANTOR: The United Mexican States

EXECUTING AGENCY: Fideicomiso para el Ahorro de Energía Eléctrica [Electrical Power Savings Trust] (FIDE) and Comisión Federal de Electricidad [Federal Electric Power Commission] (CFE)

AMOUNT AND SOURCE:

IDB:	US\$23,400,000 (OC)
Local counterpart funding:	US\$23,400,000
Total:	US\$46,800,000

FINANCIAL TERMS AND CONDITIONS:

Amortization period:	15 years
Disbursement period:	5 years
Interest rate:	variable
Inspection and supervision:	1%
Credit fee:	0.75%
Currency:	US dollars under the Single Currency Facility

OBJECTIVES: The purpose of the Program is to promote the marketing of energy efficient electrical equipment (motors, compressors, lighting, etc.) used in industry and commerce in the Mexican economy by helping the economy to adapt to the recent rate increases, generating economic benefits for energy users and electric power utility, and generating major environmental benefits through reduced power generation.

DESCRIPTION: The Program comprises (1) a campaign of cash incentives to stimulate the marketing of energy-efficient electrical equipment (US\$28 million), (2) a marketing and market development campaign to surmount the barriers to the widespread use and commercial financing of that equipment (US\$13.5 million), (3) a study of innovative rate options (US\$200,000), and (4) a monitoring of the transformation of the market (US\$500,000).

ENVIRONMENTAL CLASSIFICATION: This program (before it was separated from project ME-0006) was classified as a category III operation by the Environmental Committee on June 4, 1996. The

Committee recognized the beneficial environmental impact of the Program. The CESI approved the Environmental and Social Impact Report on the Program on October 24, 1997 (see paragraphs 5.21 and 5.22).

BENEFITS:

The Program will generate benefits directly for (i) the industrial and commercial users that adopt the efficient technology. The benefits derived from the difference between the value of the energy saved and the cost of purchasing and adopting the equipment promoted under the Program; and (ii) the electric power utility (CFE). These benefits come from the difference between the costs avoided (of investment in electric power generation, transmission and distribution and the associated operating costs, including fuel) and the income from sales not made.

RISKS:

There is some uncertainty about the impact of the proposals to grant monetary incentives and conduct marketing campaigns to transform the market for efficient electrical equipment.

To mitigate this risk, the Program will be conducted with flexibility, that is, it will be evaluated periodically for its focus on eliminating the remaining market barriers. In addition, the incentives campaign will be coordinated with the marketing one. The cost of these campaigns has been sized on the basis of the expected benefits to ensure that the Program will be economically feasible and financially viable.

Another risk relates to the level of the electric power rate, which is the basic market signal for energy efficiency. Although at present the rates for the industrial and commercial users are, on average, close to economically efficient levels and the authorities are extremely confident that the level in real terms will be maintained by means of the inflation and devaluation indexing mechanism put in place, any future decline in this indicator could hinder attainment of the goal of marketing efficient technology.

This situation would reduce the effectiveness of this Program for the promotion of energy efficiency. To mitigate this risk, the review and monitoring process will include evaluations of the rate structure applicable to the industrial and commercial sectors, to ensure that the Program continues to enjoy this basic support.

**THE BANK'S
COUNTRY AND
SECTOR STRATEGY:**

The Bank's medium-term strategy for Mexico (Programming Memorandum of June 1997) emphasizes support for economic recovery and sustainable growth. This would be achieved with the establishment of more efficient market mechanisms in all economic sectors by developing competition and intensifying participation by the private sector.

The Program is compatible with this strategy in that it promotes the marketing of efficient electrical equipment for the producing sectors by sending efficient market signals and fostering the development of a market infrastructure that favors the spread of new technology, including equipment distribution channels, technical services for the execution of commercial financing mechanisms and projects.

**SPECIAL
CONTRACTUAL
CONDITIONS:**

- a. The contract will contain the following conditions precedent to the first disbursement:

Presentation of the funds transfer agreement for execution of the Program (paragraphs 4.18 and 4.19).

Establishment of the Program Management Office to conduct the activities for which FIDE will be responsible, with the functions, structure, personnel and means required for that purpose (paragraph 4.20).

Presentation of the work schedule for the Program, which will include, among other requirements, the Program monitoring plan (paragraph 3.39).

- b. In addition to the conditions for execution and monitoring the Program (paragraphs 3.39 and 3.40), the contract also calls for the presentation of financial statements (paragraph 4.12) and the recognition of expenditures effected under the motors pilot program (paragraph 3.45), and for use of the Bank's procedures for the commissioning of consulting services.

I. FRAME OF REFERENCE

A. General

1. Reform of economic policies of importance for energy efficiency

- 1.1 The trend in recent years toward the liberalization and opening up of the Mexican economy has generated market conditions more favorable to the sustainable commercial development of investments in energy efficiency. Specifically, industry and commerce face intensified competition.

B. The energy sector and the electric power subsector

1. Sector policy

- 1.2 One of the principal aims specified in the National Development Plan 1995-2000 and in the Program for the Development and Restructuring of the Energy Sector is the promotion of energy efficiency and savings.

2. Composition of the electric power subsector

- 1.3 The electric power subsector consists of two autonomous public utility companies responsible for the supply of electric power in Mexico: The Federal Electric Power Commission (CFE), responsible for power generation, transmission and distribution in most of the country (75% of the market), and the Central Region Power and Light Company (LyFC), responsible for electric power distribution in Mexico City and its environs (the remaining 25%).

C. Demand for electric power in Mexico

1. Demand in the sector

- 1.4 In 1996 the non-concurrent peak demand in the country was 24,266 MW. The CFE's electric power sales totaled 137,357 Gwh. More than 50% of these sales went to the industrial and commercial sectors, 1/ and, if the sales of the LyFC to those sectors are included, 66.2%. Electric power consumption amounted to 17.3% of the total power consumption in the industrial and commercial sectors in 1995.
- 1.5 In the period 1990-1996, demand for electric power grew 5.4%. The CFE draws up its plans using two scenarios for demand growth in association with the expected performance of the socioeconomic

1/ Industrial 40%, residential 18%, LyFc 27%, commercial and others 15%.

indicators, according to which over the coming decade this demand will grow between a low of 3.8% and a high of 4.5% a year.

- 1.6 Although the rate of growth of demand for electric power supplied by the CFE and LyFC systems has slowed in recent decades as a natural result of satisfying the electrification needs of much of the country, and other factors relating to the state and performance of the economy, the investment requirements for keeping pace with future growth of demand are still enormous. At these growth rates, the generating capacity of the CFE will need to grow between 1997 and 2006 by about 38%, or 13,056 MW.
- 1.7 The objective of the Program is to moderate this growth rate in a manner beneficial to energy users and the electric power utility company, in addition to reducing the environmental pollution associated with the use of fuels to generate electricity.

2. Rate structure relative to the marginal cost of service

- 1.8 The ratio of the average rate to the marginal cost of electric power service declined in consequence of the economic crisis of December 1994 and the devaluation that accompanied it. This ratio dropped from 92% in 1994 to 77% in 1995, and 75% in 1996. With the rate adjustments of 1996-1997 the rate/marginal cost ratio began to recover, and now stands at 77%. The ratio is as follows in the different sectors: industrial 95%, commercial over 100%, services 85%, residential 44%, agricultural 29%, and sales to LyFC 100% (marginal cost based on a discount rate of 12% in real terms).
- 1.9 The financial condition of the electric power sector has remained relatively satisfactory despite the economic crisis. In 1996 and 1997 adjustments were made in the rates for all sectors, especially that of the major (industrial and commercial) users, and an automatic adjustment mechanism has been built in to maintain the level of the rates for general use at low, medium and high voltage in real terms. Nevertheless, major rate adjustments will be needed to cover the economic cost of service to residential and agricultural customers.
- 1.10 As the scope of the Energy Efficiency Program proposed in this report is confined to the industrial and commercial sectors, the present average rate level is satisfactory for this Program.

D. Experience with Energy Efficiency Programs in Mexico

- 1.11 In recent years, Mexico has acquired considerable experience and succeeded in setting up an infrastructure sufficient to support the execution of national power efficiency programs in end power use centered on the marketing of efficient electrical equipment, with their associated environmental benefits. The country's experience in this field has been favorable compared with that of almost all other countries in the Region.

- 1.12 The multilateral and bilateral support of recent years has also made a significant contribution to boosting this capacity. For example, the World Bank, in conjunction with the Global Environmental Facility and the Government of Norway, has supported recent national efficient electric lighting programs initiated by the CFE (the ILUMEX program), which were later transferred, for implementation in additional geographic areas, to the country's specialized agency in this field, Fideicomiso para el Ahorro de Energía Eléctrica (FIDE). The World Bank has also granted technical cooperation to strengthen the capacity to chart policy guidelines in matters of energy efficiency on the National Commission for Energy Savings [Comisión Nacional para el Ahorro de Energía] (CONAE). 2/
- 1.13 FIDE is now one of the technical organizations in the region with greatest experience in the promotion of efficiency in the final use of electricity. It has experts on the efficient use of electricity in every sector of the economy.
- 1.14 In recent years FIDE has established various mechanisms for the promotion of energy efficiency, including publicity campaigns, demonstrations, training programs, equipment certification systems and standards of minimum energy efficiency, support for the development of energy efficiency markets, and incentives. Noteworthy among its medium-term aims in the field of electricity conservation is a reduction of more than 5% in national energy consumption and in the high demand projection.
- 1.15 FIDE has supported projects in enterprises representative of the branches of industry that are the heaviest users of electric energy, in installations of cooperative groups and in medium-sized enterprises and in the commercial sector. FIDE's services to users include diagnostic assessments and the design of demonstration projects for each of which it provides between 10% and 60% of the financing.
- 1.16 The savings it has achieved have amounted to as much as 40% of the user consumption, and the projects have been profitable, returning their investment within six to 36 months, allowing for the lower implementation costs involved in supporting this organization. 3/

2/ The Mexican government set up the CONAE in 1989 as a technical advisory body to the ministries and agencies of the federal government and the state and municipal governments and the private sector, so that it could forge national strategies for energy efficiency and support their implementation.

3/ Between 1991 and 1996, projects supported directly or indirectly by FIDE achieved energy savings of 4,000 Gwh and reduced peak demand by 1,170 MW.

- 1.17 FIDE is engaged in a program for the substitution of compact fluorescent lamps for incandescent lamps in the residential sector. The program collects the cost of the lamps in a separate charge on the electricity bill. This program is being conducted by FIDE's regional offices in 14 cities across the country.
- 1.18 In October 1997 a pilot program was launched to test a rebate mechanism being proposed as an incentive for this Program. In this pilot phase the level of the incentive will be calibrated to the market reaction, and procedures for the administration of this incentive will be tested.

E. International experience with incentive and marketing programs

- 1.19 Programs of incentives and for the marketing of efficient equipment have been successful in prompting purchases on a large scale, opening new markets, and achieving measurable savings in energy capacity and use. For example, between 1989 and 1995 incentive and promotion programs coordinated among several Canadian regional electric utility companies (British Columbia Hydro, Ontario Hydro, Hidro Quebec, etc.) increased the market share of high-efficiency motors from 5% to 60%. In the United States many electric utilities have been applying strategies for the promotion of efficient technology for years. Regarding mechanisms for the execution of incentive programs, electric utility companies in the United States and other countries have perfected the methods for granting rebates on the cost of equipment, for example, through the use of systems for the distribution and redemption of vouchers.
- 1.20 Incentive programs have been an important component of integrated efforts including standardization, promotion, demonstration and diagnostic services. The market for motors, for example, is a highly complex one in which a variety of participants with diverse interests compete. Effective conversion programs need to address the different characteristics of each level of the market system, including manufacturers of motors, manufacturers of other types of equipment such as compressors, pumps and ventilators, in which motors are used, engineers and consultants, equipment distributors, and end users.
- 1.21 Effective relations with these commercial allies (as have been achieved by the programs of Niagara Mohawk in New York state and Southern California Edison, for instance) are of key importance in promoting, disseminating information on, and encouraging the wider use of efficient equipment.
- 1.22 As their programs have moved forward, electric power companies have often added services in support of access to commercial financing. In addition, programs that include a mechanism, whereby financing is repaid by a separate charge on the electricity bill have been highly successful. Such are the programs of PacifiCorp-Pacific/Utah Power (Energy FinAnswer), Northern States Power,

Electricité de France, ILUMEX/CFE and FIDE). By facilitating financing, an electric utility can induce its customers to buy the equipment and pay for it in full.

- 1.23 In successful incentive programs, the rebate levels have been adjusted in accordance with the current market response. In general, the incentives for equipment were higher in the early stages, and have since been gradually replaced with other programs that focus on the other marketing problems (i.e. the programs of the New England Electric System). At the same time, it has been useful to set deadlines for the availability of incentives to allow commercial planning and an efficient market response.
- 1.24 The experience of electric utilities in the United States and other countries shows that the market response per dollar of expenditure on incentives and marketing has been strongest under programs directed at industry and business rather than the residential sector.
- 1.25 The reason for this is that the demonstration effect on the market of a program targeted at those sectors is more significant because there are fewer decision-makers and chains that sell very similar electrical equipment. In Mexico the conditions for the success of a marketing campaign in this field are most favorable in the industrial and commercial sectors because electric power rates, which are the primary market stimulus to rational energy use, are approaching the marginal cost of the service and the possibilities of establishing sustainable sales and commercial financing systems are much better.

F. The Bank's support to energy efficiency and lessons learned

- 1.26 As specified in the commitments associated with the Eighth Replenishment of Resources, in recent years the Bank has stepped up its support for measures to promote energy efficiency. It has financed marketing programs centered on end use power efficiency in Costa Rica, El Salvador, Colombia, Jamaica, Bahamas and Nicaragua, and several technical-cooperation operations. The World Bank has also granted several loans and done many studies in this field.
- 1.27 The principal lesson learned from this experience is that these programs must take a very careful approach to long-term marketing problems and consider the specific market situation for each technology. The government or utility company that acts as an executing agency has to play the part of a marketing promoter rather than a central organizer and leading investor in energy efficiency projects.
- 1.28 The new Sustainable Markets for Sustainable Energy program has been designed with these guidelines in mind, and the first round of technical-cooperation activities is scheduled to begin in El Salvador, Brazil, Argentina and Peru in the course of the year.

- 1.29 The Energy Efficiency Program proposed for Mexico is innovative and would receive the Bank's first loan made exclusively for an effort to market energy efficiency at the country level and not a program of studies.

G. The challenge of marketing high-energy efficiency technology in Mexico

- 1.30 The challenge is to remove or lower the market barriers or defects that prevent or hinder the marketing of efficient equipment. These barriers are of three types: (i) defects in the market for efficient equipment that limit the willingness of consumers to pay for this equipment; (ii) lingering defects in the structure of electric power rates relative to the marginal cost structure of electricity service for the producing sectors; and (iii) external costs not perceived by the market relating to the environmental impact of electric power production.
- 1.31 A program that addresses these three market defects will generate benefits for equipment users, the electric utility, and the population at large.

1. Defects of the market for equipment and projects

- 1.32 The principal barriers are a lack of relevant information on the technical, economic and financial characteristics of energy-saving technology and, more specifically, limitations on the capacity of market participants to justify the incremental cost relative to the cost of conventional equipment based on an appropriate evaluation of the energy saving to be generated in the future, which is uncertain.
- 1.33 This perception of risk leads to the use of high discount rates implicit in the comparison between the future savings in energy costs and the incremental cost of equipment. Directly associated with this barrier is the absence of commercial financing mechanisms that can take account of the flow of these energy cost savings as well as of the flow of other more conventional net revenue relating to the value of the goods and services produced by the equipment, to cover the service on the debt for the higher cost of the equipment.
- 1.34 Other barriers that suppress market demand for equipment with high energy efficiency are a lack of adequate specialized technical intermediation to facilitate sustainable market penetration and a lack of strong competitive pressure on industry in past years. As a result, managers give more priority to investments to expand production capacity than to investments to keep operating costs down (the opening up of the country to trade has intensified the pressure of competition).

- 1.35 Energy efficiency projects entail waiting through lengthy marketing times and absorbing high transactions costs to surmount the barrier of a lack of information among end users. Another barrier is that the areas of technology and financial services are not yet mature enough to support the implementation of such projects. Energy efficiency projects require heavy expenditures on preinvestment and development in energy audits, engineering, contract formulation, sales and administration, and financial arrangements.
- 1.36 In Mexico there are from 20 to 30 million 3-phase induction motors ^{4/} installed in industry, yet only 200,000 units are sold per year. High-efficiency motors account for only 3% of this market. With this sales volume it would take more than 100 years to replace the existing motors. It is inferred from this that many users continue to employ old, inefficient motors. Hence the Program will have the effect of stepping an less than optimum rate of replacement of old, inefficient equipment, and thereby rectify a market defect.

2. Imperfections in the rate structure

- 1.37 The ideal rate structure to encourage an economically efficient pattern of electricity consumption fully reflects the structure of the marginal cost of the service. Hence, the continuing progress of the Mexican authorities in perfecting the rate structure of electric power service is important. At the same time, the ideal rate structure has practical limitations of a technical and economic nature, and political realities influence the pace at which those rates can adjust to marginal cost.
- 1.38 In view of the imperfections in the rate structure in the real world depending on the time, season of the year, voltage, location in the electric power system, etc., another factor that motivates this incentive and marketing Program is the possibility of at least partly offsetting the persisting market imperfections as a stimulus to efficient use of energy relative to its marginal cost (i.e. for those uses concentrated in peak demand time).

3. Environmental costs external to the market

- 1.39 The price of electricity does not reflect the environmental cost of its production (for example, in the form of a tax that considers that cost). This social cost not perceived by the market poses another barrier to investment in energy efficiency that further justifies this initiative.

^{4/} High-efficiency models of motors of these types are available.

H. The Bank's strategy for Mexico and the strategy for the Program

- 1.40 The Bank's medium-term strategy for Mexico (Programming Memorandum of June 1997) is to support the country's economic recovery and sustainable growth. This includes the establishment of more efficient market mechanisms in all economic sectors to foster competition and deepen participation by the private sector.
- 1.41 The Program is consistent with the Bank's strategy for Mexico. It consists essentially in a marketing campaign designed to open the market to equipment that is extremely energy efficient for the benefit of users of that equipment. The role of the electric utility company will be to facilitate that market conversion and the adjustment of the economy to the increases in electric power rates of the last two years.
- 1.42 There is full awareness that FIDE will not be the one to transform the market through the Program, but the economic agents themselves who are interested in building or establishing profitable businesses, which would include the sale of equipment and services for the implementation of energy efficiency projects.
- 1.43 The purpose of this Program is to start with the mechanisms already present on the market and to improve them, instead of generating new, ill-advised appropriations of resources in an effort to avoid market mechanisms or supplying equipment to users on noncommercial conditions. 5/

5/ The Program has been conceived so that only the customers of an electric utility who decide to purchase efficient equipment will pay for it. No financing is provided for the cost of the equipment, but only for the cost of the incentive, which the utility recovers with the benefits of the Program that go directly to it. The Program does not apply the cost recovery mechanism to the equipment as charges to all the utility's customers, and so avoids cross-subsidization of the cost of the equipment among those customers. The Program also avoids the uneconomic subsidizing of the market for efficient equipment. In view of the Program's market orientation, the incentive rebates to be offered will be moderate. The Program also avoids creating distortions in the electric power and financial markets.

II. THE PROGRAM

A. Purpose of the Program

- 2.1 The purpose of the Program is to overcome barriers that impede the marketing on a sustainable basis of electrical equipment of high energy efficiency for use in production in the Mexican economy.
- 2.2 Developing the potential for energy efficiency will (i) ease the adjustment of the economy to the electric power rate increases of the last two years; (ii) generate economic benefits for all parties: energy users, energy efficiency service companies and the electric utility; and (iii) generate important environmental benefits by reducing electricity generation.

B. Content of the Program

- 2.3 The Program will concentrate on encouraging market penetration by efficient models of technologies of key importance for the industrial and commercial sectors (motors, air compressors and lighting, which absorb more than 90% of the total electricity consumption in these sectors) and on promoting the demand for and capacity to supply a complete range of services for the design, execution and financing of energy efficiency projects. Encouragement will be given to marketing this efficient technology to the new-capacity market (i.e., motors for new factories) and the market for replacement of equipment at the end of its useful life.
- 2.4 The main components of the Program are two campaigns, one of monetary incentives and another of marketing and market development. The incentives campaign will directly support an immediate increase in sales of efficient equipment to generate the commercial momentum needed to launch the dissemination of efficient technology. Financing will be provided only for rebates on the cost of equipment (an average of 12%). No resources will be provided to finance purchases of equipment, for which buyers will resort to commercial sources of financing. The marketing and market development campaign, including the promotion of access to commercial financing, will support the transition to a sustainable commercial market without the use of any incentive.

C. Description

- 2.5 The Program comprises the following activities:
 - 1. Incentives component (US\$28 million)
- 2.6 Temporary and decreasing incentives will be offered to compensate purchasers for part of the cost of the high-efficiency motors, compressors and lighting equipment they buy. The incentives will

be in the form of vouchers that are given to the buyer through the established commercial channels. An administration system will be set up to ensure proper distribution and use of those incentives.

- 2.7 In the transition to the marketing of this equipment, the incentive rebates being offered will reduce its incremental cost by comparison with conventional models. This means that the rebate program will establish an initial level of sales until the activities are set in motion to demonstrate the advantages of high-efficiency equipment and the advantages of developing appropriate financing mechanisms for it.
- 2.8 The expected effect will be to break the vicious circle of low sales of equipment, which keeps prices high and limits demand. This situation will be supplanted by a healthy market dynamic in which a growing sales volume will spur stronger competition and lower prices.
- 2.9 The incentive will range from 5% to 15% of the selling price of energy-efficient equipment, but from 30% to 50% of the incremental cost (the difference between the selling price of energy-efficient and conventional equipment), which is what matters to the investor. 6/

2. Marketing and market development component (US\$13.5 million)

This component comprises the following activities:

Information, promotion, training and standardization

- 2.10 Publicizing the technical, economic and financial features of investments in efficient equipment promoted under the Program, including their lower cost during their service life compared with conventional equipment.
- 2.11 FIDE, in cooperation with CONAE, will continue formulating technical standards for high-efficiency equipment and setting minimum acceptable levels for the efficiency of the models on the market.
- 2.12 FIDE will work with equipment manufacturers to authorize the use of the FIDE seal as an indicator of high energy efficiency on more models of equipment and to change product labels and catalogs so that buyers will be properly informed of the energy costs.
- 2.13 The main beneficiaries of these programs will be final industrial and commercial energy users, as well as the distributors of energy efficient equipment, the energy-efficiency services companies and financial institutions, to encourage a much greater volume of

6/ See Annex II-1 in the Technical Files of RE2/FI2.

promotional investment in commercial development by these market agents.

Promotion and development of commercial financing

- 2.14 The promotion of access to the financing from commercial sources for energy-efficient equipment and energy efficiency projects, in collaboration with equipment suppliers and energy efficiency service companies. The commercial financing program will start with the financial services in place in Mexico and will help extend normal channels of equipment financing for high-performance equipment and integrated energy efficiency projects.
- 2.15 As a result of this initiative, a supplier credit program will be provided under an equipment manufacturer distribution network. The commercial financing that must be mobilized just for the sale of the equipment promoted by the incentives is estimated at more than US\$200 million.

Development of energy service companies

- 2.16 Strengthening the capacity of the domestic energy efficiency companies in the areas of marketing, project formulation, and the supply of turnkey energy efficiency projects and services. Mexico has a good base of energy efficiency companies: consulting engineers, mechanical and electrical contractors, and equipment manufacturers and distributors.
- 2.17 These businesses can grow into energy service companies (ESCOs), which combine under one roof all the elements required for a successful efficiency project: technical design, execution, construction, operation, verification of results, warranty of energy savings and financing, thereby overcoming many of the constraints imposed by market barriers.
- 2.18 The ESCOs can deliver to final users projects that require a minimal or no initial capital investment and yield an immediate positive cash flow, while the ESCO assumes the lion's share of the risk entailed by the project.

Project development and demonstration services

- 2.19 Promotion of the marketing and dissemination of energy efficiency projects that make use of the equipment promoted by the incentive campaigns together with other technologies such as speed control devices in integrated industrial/commercial systems, to demonstrate their viability as a going concern.
- 2.20 FIDE will support users and energy efficiency service companies in preparing projects and will demonstrate innovative methods for the commissioning and financing of these services. Hence, the demonstration projects will generate demand for energy services and

serve as a vehicle for promoting the development of energy efficiency companies.

3. Concurrent activity: Study of rate options (US\$200,000)

- 2.21 A study will be done to examine the characteristics and effects of innovative rate options for the industrial and commercial sectors and for intermediate and high-end residential consumers. An evaluation will be made of the impact of applying options such as hourly rates to most industrial and commercial customers to enhance the economic efficiency of the rate structure. A program has been devised to study how power use by different customers adjusts to changes in rates. The results of this study will be presented to the CFE and the government authorities in the electricity sector for analysis so that measures can be taken.

4. Concurrent activity: Program monitoring and market research (US\$500,000)

- 2.22 Progress in marketing and market development will be evaluated periodically using the indicators and cost-benefit studies to be established in a monitoring plan for making adjustments in the Program.

D. Cost and financing of the Program

1. Cost of the Program

- 2.23 The cost of the Program will be US\$46.8 million. This figure includes the financing of the components referred to in section II.C and FIDE's administrative expenditures, which amount to 6% of the total Program, the financial charges and fees of the IDB loan, and an allowance for contingencies. An itemized breakdown of these costs is presented in table 2.1.

2. Financing plan

- 2.24 The Program will be financed equally by FIDE and the IDB. The IDB resources (US\$23.4 million) will finance 65% of the incentive mechanism, 31% of the marketing and market development activities, and 50% of the contingencies and expenditures for inspection and supervision. FIDE's counterpart contribution will go to finance the balance of the aforementioned items and all of the Program's administrative costs. The sources of financing for the Program are itemized in table 2.1.

Table 2.1: ENERGY EFFICIENCY PROGRAM COST OF THE PROGRAM AND FINANCING PLAN				
	SOURCES OF FINANCING (US\$000s)			
	IDB	CFE/FIDE	TOTAL	%
I. Rate study	200	0	200	0.43
II. Incentives	18,320	9,680	28,000	59.83
Motor pilot project	0	1,700	1,700	3.63
Motors (excluding pilot)	10,600	3,500	14,100	30.13
Compressors	1,105	2,495	3,600	7.69
Industrial and commercial lighting	6,615	1,985	8,600	18.38
III. Marketing and market development	4,320	9,680	14,000	29.91
Information, promotion, training and standardization	1,500	3,500	5,000	10.68
Promotion and development of commercial financing	500	300	800	1.71
Development of energy services companies	350	350	700	1.5
Project development services and demonstrations	1,720	5,280	7,000	14.95
Monitoring of program and market research	250	250	500	1.07
IV. Program administration	0	3,000	3,000	6.41
V. Unallocated expenses	320	320	640	1.37
Contingencies	160	160	320	0.68
Escalation	160	160	320	0.68
VI. Financial expenses	240	720	960	2.05
Interest during set up	0	390	390	0.83
Credit fee	0	330	330	0.71
Inspection and supervision	240	0	240	0.51
TOTAL	23,400	23,400	46,800	100.00
Percentage	50	50	100	

III. EXECUTION OF THE PROGRAM

A. Execution of the incentives component

- 3.1 The Program's monetary incentives component will consist of vouchers which a buyer of equipment that FIDE has certified as energy efficient may redeem after purchase.
- 3.2 The value of the incentive for an item of equipment will be higher in the first years of the Program to elicit a quicker market response. As the benefits of energy efficient equipment become better recognized and esteemed, and as the impact of the marketing programs mounts, this value will be reduced and eliminated by the end of the Program. The shrinking incentive will be superseded by commercial financing for this equipment, and complement the marketing effort.
- 3.3 The characteristics of efficient equipment, its price and the amount of the purchase incentives will be entered on a bar code to be stamped on each voucher. FIDE will issue a quantity of vouchers to each manufacturer. Any manufacturer or distributor in the Mexican market that sells equipment certified by FIDE and accepted by the Bank as energy efficient may enter into an agreement of participation in this initiative. The number of vouchers issued will be proportional to his program for the sale of efficient equipment over a specified period (a six-month period, for example).
- 3.4 The manufacturer will guarantee that the vouchers will be used and distributed properly by posting with FIDE a bond in an amount equivalent to that of the vouchers received. This bond will be returned to the manufacturer as the vouchers are redeemed by FIDE.
- 3.5 The manufacturer will deliver the equipment and vouchers to his authorized distributors, who will offer them to the public through their distribution and promotion networks. When the equipment is delivered to the distributors, the manufacturer will send FIDE the serial numbers of the machines, their capacity, and the voucher numbers.
- 3.6 The amount of the incentive must not influence the selling price set for the equipment. This price will be set by the market. As the sales volume grows, the manufacturer could offer discounts from list in accordance with his own sales strategy as established in the agreement with FIDE.
- 3.7 To prevent distributors from profiting from the incentive by raising the price of the equipment, the agreement each manufacturer enters into with FIDE will require him to provide and periodically update that price.

- 3.8 FIDE will verify compliance with the commitments undertaken by the manufacturer and impose penalties when he does not fulfill them. If it is found that a distributor has not abided by the established price, FIDE will notify the manufacturer who will compel the distributor to reimburse the overpayment to the customer and warn the distributor that his continued participation in the Program will depend on immediate reimbursement being made and on the irregularity not being repeated.
- 3.9 The customer will pay full price for the equipment and apply to FIDE for redemption of the voucher by submitting a copy of the sales receipt, a copy of the latest receipt for payment to the CFE for electricity, and the voucher with its bar code.
- 3.10 FIDE will use the information supplied by the customer to verify the authenticity of the voucher, that the user is a CFE customer, that the equipment is of the brand and model selected by the Program, and that the incentive is in the amount assigned to that brand and model. This information will be compared with the information supplied by the manufacturer and by the CFE data base. The incentive will be redeemed by means of a check issued by FIDE to the order of the purchaser of the equipment.

B. Execution of the marketing and market development component

- 3.11 The marketing and market development activities have been divided into four categories: (i) information, promotion, training and standardization, (ii) promotion and development of commercial financing, (iii) development of energy efficiency companies, and (iv) project development and demonstration services.

1. Information, promotion, training and standardization

- 3.12 This category covers (i) campaigns to publicize the incentives component; (ii) public information on the benefits of equipment with high-efficiency technology in brochures and technical publications, audiovisual materials, the Internet, and specialized software; (iii) public information on the significant savings of electric energy realized by customers who have purchased efficient equipment, using diagnostic and verification techniques; (iv) training for manufacturers and distributors of high-efficiency equipment in courses and seminars prepared in coordination with business associations, and workshops via satellite in coordination with universities and institutions specializing in energy efficiency; (v) instruction and training in seminars and courses conducted in coordination with industrial associations and IFIs for technical personnel of industrial and commercial enterprises and lending officers of financial institutions so that they may evaluate the potential for savings and financing; and (vi) standardization, consisting in the study, framing and circulation of energy efficiency standards for the equipment considered under the Program, extension of the use of the FIDE

seal, and enactment of legislation specifying the information to be included on product labels and catalogs.

2. Promotion and development of commercial financing

- 3.13 FIDE will choose a local financial advisor, who will be supported as needed by international specialists, to perform a study of alternative schemes for the financing of energy efficient equipment and projects. These advisors will collaborate in the development of appropriate mechanisms for the financing of energy-efficient equipment (through distributors) and energy efficiency projects (in collaboration with ESCOs).
- 3.14 FIDE will promote participation by equipment manufacturers and distributors in supplier-financing programs that IFIs may want to set up. The financing will be available to customers at the point of sale. Distributors will be the channel through which demand for financial services will flow.
- 3.15 These financial schemes for distributors will help increase the demand for capital, lower the administrative IFIs costs, and strengthen the credit structure, and so lower or remove the main barriers to commercial financing in this market.
- 3.16 Yet another way to strengthen the credit structure of the supplier-financing mechanism is to record the installments due in repayment of the loans made for the purchase of efficient equipment as a separate charge on the electricity bill from the charge for electric energy consumption. This mechanism offers advantages that are crucial to the mobilization of commercial financing for some sectors of this market. In particular, because of the large numbers of small and medium-sized customers, the mechanism will make it possible to reduce collection costs, improve recoveries of these loans, and increase the demand for capital. The CFE will hand over the resources collected in this way, but will not guarantee the payments to the IFIs.
- 3.17 FIDE will invite and promote the participation of all IFIs interested in offering commercial financing for the purchase of efficient equipment. In its announcement, FIDE will describe what it can offer the IFIs: (i) the existence of a sizable group of manufacturers and distributors participating in the Program; (ii) that equipment marketing campaigns have been designed to include the award of incentives to stimulate the sale of energy-efficient equipment and generate demand for its financing; (iii) the availability of the option of the collection of loan installments on the electricity bill; and (iv) the possibility of cooperating with the IFIs in the promotion of financial services, including organizing training for equipment distributors.
- 3.18 In this announcement FIDE will also specify the Program's aims and ask the IFIs to respond creatively, indicating the financial

services they would be able to offer. When it has received the responses to its announcement, FIDE will promote agreements between IFIs and manufacturers of efficient equipment for the execution of financing programs through distributors. 7/

- 3.19 Finally, FIDE will conduct training programs for manufacturers and distributors on suitable financial mechanisms for the acquisition of efficient equipment, and public information programs on the same subject. It will also make the necessary arrangements for the participating IFIs to provide this specialized training to their lending officers.

3. Development of energy service companies

- 3.20 FIDE will support the existing energy efficiency firms in their establishment and development of energy service companies (ESCOs). Some of this support will be channeled to those firms in training sessions and conferences on the practices and methods of energy efficiency businesses, including the preparation of business plans and projects.
- 3.21 This support will be complemented by international exchanges on these subjects with energy service companies willing to form companies in Mexico with Mexican firms, and a variety of contracts will be promoted for energy efficiency projects suited to the Mexican situation.
- 3.22 Monitoring and verification of energy savings are key aspects of ESCO operations. FIDE will seek to transfer to Mexico the best practices in this field through training and the adoption of procedures (i.e., the USDOE Protocol). FIDE will carry out these programs with its own staff and some consulting assistance. Executing these general programs will move energy efficiency companies to seek specific assistance for the development of their businesses.
- 3.23 FIDE will also support the supply of entrepreneurial development and advisory services to specific energy efficiency companies. It will identify the existing businesses that are interested in developing their energy efficiency operations and help them develop the additional capabilities needed to function as ESCOs.
- 3.24 These capabilities may include the development of projects and contracts incorporating arrangements for sharing or guaranteeing energy savings, monitoring and verification, operation and maintenance, and project financing. Supplying these services may also qualify energy efficiency firms for assistance in project development, using the following procedure: (i) framing eligibility criteria, and (ii) sending invitations to companies, using the

7/ See Annex III-1 in the RE2/FI2 Technical Files.

lists of firms available in such institutions as the National Association of Consulting Firms and also through mayor local and international publications.

4. Project development and demonstration services

- 3.25 FIDE will promote the development and execution of energy efficiency projects by providing technical and financial backing to energy users and energy efficiency firms. These projects will apply the technologies promoted under the incentives program and integrate systems that include related technologies, such as variable speed drives, etc.
- 3.26 For energy users, FIDE will provide diagnostic services (guides, computer programs, preliminary audits, etc.) to enable them to bring together the information on the energy cost-consumption of the types of equipment in their plants, analyze the potential of energy-saving measures, evaluate alternative methods of project development, and then identify the source of supply of energy-efficient equipment and energy-efficiency services.
- 3.27 FIDE will work with groups of users organized for this program (i.e., members of industrial, hotel or business associations). The information generated by the Program will be made available to firms concerned with energy efficiency (ESCOs, contractors, engineers, etc.) engaged in helping users to obtain energy-efficient equipment and energy-efficiency services. This program will generate demand for energy efficiency services and encourage private investment in setting up firms that provide them.
- 3.28 Project development services will be provided to users by engineers and specialists in the development and contracting of energy efficiency projects commissioned by FIDE. International consulting services will also be obtained to assist in adopting the best international practices.
- 3.29 FIDE will support the development of demonstration projects and collaborate in the implementation of contracts for energy services between users and ESCOs involving, for example, guaranteed savings or shared benefits.
- 3.30 For energy-efficiency firms, FIDE will provide funds to cover project development costs. These funds will be reimbursable fully or in part if the project reaches execution. This mechanism assures that FIDE's resources will stimulate, promote and complement investment and risk-taking in the private sector. FIDE will be a party to agreements in support of project development with selected energy-efficiency firms. These agreements specify what assistance is needed from FIDE for a project.
- 3.31 For demonstration projects by energy-efficiency service businesses the following procedures will apply: (i) establishment and

updating of a list of energy-efficiency companies and ESCOs qualified to participate in the development of projects (including firms trained as ESCOs under the Program); (ii) formulation of terms of reference for the evaluation and selection of projects presented by those firms; (iii) technical and economic evaluation of projects, cleared by the industrial or commercial firm for which the project is intended. Ultimately, the firm that executes the project will be selected by the industrial or commercial company; and (iv) selection of the projects best suited for demonstration purposes.

- 3.32 On a preliminary basis, it will have to be demonstrated that a project is economically viable and has a final user committed to it and a qualified sponsor. The assistance funds will be disbursed as the targets specified in the proposals for development of the project are attained.
- 3.33 The process will also permit energy-efficiency firms to propose how to use the assistance of FIDE most creatively and effectively to accomplish the marketing of and development of the market for energy efficiency. The funds for this activity will be used to support several projects in rotation.
- 3.34 Where necessary, FIDE will share in a project's investment costs and participate in the purchase and installation of equipment. The purpose of these demonstration projects is to convince the energy user that the new systems are economically feasible and compatible with his operations. It is therefore expected that these demonstrations will prompt larger and more comprehensive projects. This program will focus on the generation of energy efficiency business and on demonstrating the development of successful projects that can be replicated, and methods for contracting, financing and risk allocation. The costs of this program will be reimbursable and will be rotated among several projects.

C. Concurrent activity: Performance of study of rate options

- 3.35 The study consists essentially of examining the advisability and feasibility of extending and implementing new, efficient rate options (including hourly rates). It will be done by consultants hired by the CFE's Economic Studies Department, in two phases as follows: (i) a study of medium-scale customers in the industrial and commercial sectors, by category of establishment, and (ii) an study of high- and mid-end residential consumers.
- 3.36 For the performance of this study, that Department will present for the Bank's approval the final terms of reference, including the qualifications to be satisfied by the required local and international consultants. The consultancy will be supervised by the Department following the Bank's procedures. The Department will also evaluate and approve a final report.

D. Concurrent activity: Monitoring of the Program and market studies

- 3.37 Owing to the Program's innovative nature it is important to establish a mechanism for coordination between the Bank and FIDE to monitor its principal components. The Program's results in terms of the progress of the marketing will be evaluated through the monitoring of quantifiable indicators and the performance of cost-benefit studies. These studies will take account of the estimated reductions in the costs of market barriers (which enhance the willingness of energy users to pay for efficient equipment). It is proposed that program execution be adjusted every six months on the basis of these evaluations.
- 3.38 This work will be facilitated by the flexible execution scheme designed for the Program, which consists in offering higher incentives in the first two years and reducing them thereafter in order to concentrate on the marketing activities that will have to be emphasized as the Program advances on the basis of the evaluations of the results as they are obtained.
- 3.39 The logical framework (Annex III-2) includes the indicators that will be used in the Program monitoring plan. The details of this plan will be described in the plan for execution of the Program to be prepared by the executing agency (based on the experience of the pilot phase) and presented for the Bank's approval in compliance with a condition precedent to the first disbursement.
- 3.40 In addition, for satisfactory execution, the program will be reviewed every six months. The review will include monitoring and an evaluation of electricity rates for business and industry. From the proceeds of the financing, US\$234,000 will be used to finance inspection and supervision.

E. Consulting services

- 3.41 FIDE will structure and organize the Program using its own personnel and consultants to the appropriate extent. Consultants will be hired following the Bank's procedures.

F. Preparedness

- 3.42 The incentives pilot project has been designed and a start has been made on the phase of incentives for motors, with resources provided by the CFE, in the North Gulf Division. The other components of the pilot project (compressors and lighting) will be started in 1998 with resources of the Program.
- 3.43 In the marketing and market development component, FIDE has designed the mechanisms for involving the financial sector in the financing of purchases of equipment. The final design of this

activity will be one of the tasks of the consultancy to be hired. 8/ The same plan for final preparation applies to the public information and advertising activities.

G. Timetable for investments and disbursements

- 3.44 The timetable for investments and disbursements under the Program has been drawn up in accordance with the program for execution of all the projects and their cost estimates. 9/

H. Recognition of expenditures

- 3.45 FIDE will invest an estimated US\$1.7 million in incentive payments under the pilot motors project. This outlay is taking place during the period between presentation of the loan request and its submission to the Bank's Board of Executive Directors. Hence, it is recommended that this amount be recognized as part of the local counterpart contribution upon verification of its eligibility.

I. Revolving fund

- 3.46 To execute the Program, an advance of funds is required, and it is recommended that authorization be given for setting up a revolving fund in an amount equivalent to 5% of the loan amount. This fund will be replenished when FIDE has justified its request for those resources in accordance with the standards of the Bank.

8/ See Annex III-1 in the RE2/FI2 Technical Files.

9/ See Annex III-3 in the RE2/FI2 Technical Files.

IV. THE BORROWER AND EXECUTING AGENCY

A. The Borrower

- 4.1 The Borrower will be Nacional Financiera S.N.C. (NAFIN) in its capacity as financial agent of the United Mexican States, the guarantor of the operation. NAFIN is the financial agent in 66 IDB loans and is the direct borrower in two loans (693/OC-ME and 911/OC-ME). 10/

B. The executing agency

- 4.2 The executing agency for the study of new rate options for the industrial and commercial sectors will be the CFE, through its Economic Studies Department. This Department has had considerable experience in performing studies similar to those of the Program. In addition, it has the technical capacity needed to hire and supervise consulting firms.
- 4.3 The executing agency for the activities involved in the awarding of monetary incentives and the marketing and development of energy efficiency markets will be FIDE, acting through a department to be set up for the purpose.
- 4.4 FIDE is a nonprofit institution constituted on August 14, 1990, under a trust contract entered into as founding trustees by the Confederación de Cámaras Industriales de los Estados Unidos Mexicanos [Mexican Federation of Industry], cámaras nacionales de la Industria de la Transformación, de Manufacturas Eléctricas, de la Industria de la Construcción y de Empresas de Consultoría [Mexican Federations Processors, Electrical Manufacturers, Construction Companies, and Consulting Firms]; the CFE, LyFC, and the Sindicato de Trabajadores Electricistas [Union of Electrical Workers] (SUTERM). NAFIN is the trustee of FIDE.

1. Purposes and functions

- 4.5 The purposes of FIDE are (i) to engage in actions to induce and promote rational use of electric power throughout Mexico and in all economic sectors, and (ii) to provide technical assistance to consumers to induce them to economize electric energy.
- 4.6 FIDE operates within the guidelines laid down in a Strategic Plan based on the information obtained in energy assessments of the sectors and regions of greatest potential for energy-saving in Mexico. This Plan defined the mission and strategies of FIDE and stated the kinds of programs and projects it was to execute.

10/ See Annex IV-1 in the RE2/FI2 Technical Files.

2. Administrative and personnel structure

- 4.7 FIDE's supreme authority is its Technical Committee. This Committee has the powers and performs the functions of a board of directors. Its members are representatives of the trustees, each with one vote, and NAFIN (without the right to vote). Decisions are taken by a simple majority of a quorum of the members.
- 4.8 The Technical Committee meets every three months to evaluate the progress of FIDE's programs and projects, take decisions on matters submitted to it by the board of directors and, in the fourth quarter, approve FIDE's budget for the next year.
- 4.9 FIDE's organizational structure has very few tiers, and is adequate for programs and projects of fixed duration. The highest administrative officer of FIDE is its General Director, to whom three managers report (Industry, User Advisory Services, and Administration and Finance) and six coordinators (Trade and Services, Municipal Services, Standardization and Public Information, FIDE Seal, Hourly Summer Program, and the Incentives Program). Under the managers and coordinators there are department heads.
- 4.10 There are 47 employees in FIDE's central offices, of whom 39 are professionals, including two information processing specialists, and the rest are administrative support. There are 30 employees in the 15 regional offices. Each regional office has one engineer coordinator and a secretary.
- 4.11 In addition, under the monetary incentives program, conducted to induce the replacement of incandescent by compact fluorescent lamps in households, there are 42 equipment sales modules operated by 75 persons hired temporarily for the purpose.

3. External auditing

- 4.12 The financial statements of FIDE are audited yearly by an independent auditing firm

4. Financial administration

- 4.13 The resources of FIDE consist of contributions made in the course of the year by its trustees, the CFE and LyFC, in amounts equal to the contributions of its suppliers and contractors, which come to 0.2% of the amount that they receive in contracts and orders awarded them by the two electric utilities. SUTERM puts up the equivalent of 0.33% of the amount of the public works contracts that CFE awards to its contractors.
- 4.14 FIDE uses these resources to finance its activities in the year in which they are received. Because of this, FIDE's total assets have generally been liquid. Its liabilities have never exceeded 20% of

total assets and have consisted of short-term debt. The long-term liabilities are not significant (consisting of payroll expenses).

- 4.15 In 1996 FIDE had total assets of US\$15.8 million (US\$14.2 million in current assets) and total liabilities of US\$2.4 million. This year FIDE's income came to US\$2.3 million, consisting essentially of accrued interest on cash balances, and the costs and expenditures of its own operations came to US\$5.9 million. In addition, it administered CFE energy efficiency projects totaling US\$9.1 million. For the period 1998-2002 the annual cost of the Program will average one fourth of the FIDE budget.
- 4.16 All FIDE's funds are deposited with NAFIN, which acts as trustee. NAFIN transfers resources to FIDE to meet its payment obligations through a revolving fund in the amount of one million pesos (about US\$130,000). As this fund is drawn down NAFIN, replenishes it or increases it by the necessary amounts.
- 4.17 FIDE operates on the basis of program/project budgeting. Its expenditure budget is constructed by allocating resources to the projects of a program that have previously been authorized on an annual basis by the Technical Committee. Available balances are invested by the trustee in risk-free government securities.

5. Provenance of the counterpart resources

- 4.18 The counterpart resources (US\$23.4 million) will be put up by FIDE. This amount has been included in FIDE's financial program for 1998-2002, the period for execution of the Program (five years). FIDE's own resources in that period are estimated at US\$54.3 million. In addition, FIDE has agreed with the CFE that, if FIDE's internally generated funding should prove insufficient to cover the total amount of the counterpart or the amount required in any given year, the CFE will supply the difference.
- 4.19 To this end the CFE has asked the Ministry of Finance (i) to enter the Energy Efficiency Program on the CFE budget; (ii) to allocate on that budget the annual installments of debt service payable to the IDB that it will have to transfer to NAFIN; and (iii) to appropriate US\$8.4 million as counterpart resources for transfer to FIDE.

6. Executing Unit

- 4.20 To execute the Energy Efficiency Program, FIDE will convert the unit now called the Incentives Program from a coordination to a management office. This management office will report directly to the General Director of FIDE and consist of (i) four units charged with execution of the components of the Program (Commercial Financing, Marketing, Incentives for Motors and Compressors, and Incentives for Commercial Lighting); (ii) a unit to coordinate the execution of incentives for household lighting, which is not

financed by the Program; (iii) two supporting units: administrative control and information systems; and (iv) a Liaison Group, to facilitate coordination with the Bank and between the institutions that have any responsibility under the Program. 11/

11/ See Annex IV-2 in the RE2/FI2 Technical Files.

V. FEASIBILITY AND RISKS

A. Economic justification

1. Economic benefits

5.1 The Program generates net economic benefits to equipment users and the electric utility:

a. Energy users who acquire energy-efficient equipment as a result of the initiative supported by the Program will be direct beneficiaries as their energy savings, less their incremental installation and maintenance costs and other costs incurred in connection with the marketing of the new technology, are greater than the difference between the incremental cost of the investment and the conventional cost of the equipment. The level of demand, and the willingness to pay for the additional cost of energy efficient equipment depends on the extent to which the barriers to marketing can be surmounted; though the generation of economic benefits to users is the central aim of the Program, it is conservatively supposed that during the execution period the marketing initiative will not yet have increased the willingness to pay for efficiency measures; the participants in the incentives campaign receive the additional benefit of the value of the incentives;

b. Implementation of these energy efficiency measures will reduce the demand for electricity that corresponds to the level of the given rate, but will also generate direct benefits to the CFE (producer surplus) in the form of costs avoided for investment (in generation, transmission and distribution facilities) and operation (including fuels), net of lost income because the bills for electric services are lower; this includes a realistic estimate of the difference between avoided costs and lost revenue, 12/ and deducting the costs of the Program from the net benefits accruing to the electric utility. 13/

5.2 The evaluation looks at three scenarios for the development of sales of efficient equipment and determines the net benefits to users who adopt this equipment and to the electric utility:

12/ Given the latest data and projections of marginal costs and rates for each rate class, and estimates of the hours of operation of each type of equipment, and taking into account the agreement with peak demand of the electric power system and that of each class of user.

13/ Annex V-1 in the RE2/FI2 Technical Files contains a discussion of the relationship of these two net benefits to the Program's political and financial feasibility and economic justification.

- a. **Scenario 1:** considers only sales of equipment purchased with incentives during execution of the Program (five years).
 - b. **Scenario 2:** to the sales of scenario 1 are added those of equipment purchased without incentives replacing equipment purchased with incentives at the end of its service life.
 - c. **Scenario 3:** to the sales of scenario 1 are added the yearly sales of equipment without incentives after the Program execution period has ended, estimated as equivalent to average annual sales during the execution period with incentives.
- 5.3 Given the assumption that the equipment market is not transformed during the period of execution of the Program, the net benefits to customers who purchase efficient equipment (with incentives) during this period would be negative without the incentive received. 14/
- 5.4 In scenarios 2 and 3 the net benefits to customers after the Program execution period depend on the degree to which the marketing and market development campaign succeeds in increasing the willingness of the consumer to pay for energy efficiency measures, thereby eliminating the key costs that represent the market barriers.
- 5.5 Before the marketing campaign, since energy users are not willing to pay the additional cost of efficient equipment without the incentives, the maximum value assigned by the market for energy-saving measures falls short of 100% of their incremental cost.
- 5.6 If the supply of an incentive of, say, 40% of the incremental cost prompts the purchase of efficient equipment, this indicates that the market valuation must be at least equal to 60% of the incremental cost. In this case it can be concluded that the market valuation of the efficiency measures with no real marketing campaign lies within the range of 60%-100% of their incremental cost, or approximately 80% on average. 15/
- 5.7 The value of the net benefits to those who adopt efficient equipment is determined in the following manner:

14/ Even under this conservative assumption, the net benefits without the incentive would be positive if they included the additional amount by which certain costs would be reduced if the new technology were acquired specifically under the Program. The economic evaluation of the program makes no attempt to quantify that additional amount.

15/ See Annex V-2 in the RE2/FI2 Technical Files.

- a. During the execution period, the net benefits to participants in the incentive campaign equal the value of the incentive received minus about half of that value as the difference between the incremental cost of efficient equipment and its average incremental market value, or the willingness to pay per unit of equipment. 16/ It follows that the total of these net annual benefits during the execution period are equal to about one half of the value of the incentives granted.
- b. In scenario 3, it is assumed that the market barriers go down moderately after the end of the execution period. It is further assumed that the marketing campaign has raised the incremental value of efficient equipment by an amount equal to the incentive to buy it, producing annual sales equal, on average, to the annual level previously attained with the incentive, which constitutes a modest achievement under the Program. In this case, the net benefits from efficient equipment purchased after the end of the execution period are approximately equal to one half of the value of the incentive to buy it, reflecting the difference between the new average incremental market value (the willingness to pay for the equipment) and the total incremental cost of the equipment. 17/ These annual net benefits after the end of the execution period are, then, equal to approximately one half of the amount of the average annual incentive offered during the five-year execution period.

2. Results: economic evaluation and sensitivity analysis

- 5.8 Table V-1 presents the results of the economic evaluation in terms of the net present value of the benefits discounted at 12% in real terms, and the internal rate of return under the previously described alternative scenarios and conditions.

16/ See Annex V-2 in the RE2/FI2 Technical Files.

17/ See Annex V-2 in the RE2/FI2 Technical Files.

Results of the Economic Evaluation (US\$thousands of 1997)			
	Scenario 1	Scenario 2	Scenario 3
Net benefits to CFE	-10,449	-6,968	20,832
Net benefits to equipment purchasers	9,818	9,818 <u>18/</u>	18,149
Total net benefits	-631	2,850	38,982
EIRR	12	14	28

- 5.9 In scenario 1 (no sale of efficient equipment without incentives or any replacement of original equipment of participants in the incentive campaign), a fairly pessimistic scenario), the Program remains marginally justified from the economic standpoint. The economic internal rate of return is close to 12%. 19/
- 5.10 In scenario 2, additional (not quantified) net benefits are generated in future years by the willingness to pay of the original participants in the campaign of incentives to replace equipment. The net benefits to the CFE in scenario 1 are also increased by the replacement of equipment. The present value of the net economic benefits is significantly enhanced and the rate of return rises beyond 14%.
- 5.11 In scenario 3 the present value of the net benefits rises considerably and the rate of return is 28%.
- 5.12 In conclusion, the Program remains economically justified even under conservative assumptions about the impact of the incentive and marketing campaigns. In scenario 3, which could be taken as a conservative estimate of the impacts of a successful incentive and marketing campaign, the present value of the net benefits to buyers of efficient equipment is substantial. The net benefits to the CFE are clearly positive. This finding is not sensitive to reasonable changes in sales of efficient equipment with incentives during project execution or in the rate level. 20/ Whereas a

18/ No quantification is made of the net benefits to purchasers of equipment in future years to replace equipment sold during execution of the Program. These net benefits would slightly increase the rate of return.

19/ The present value of the total costs of the CFE/FIDE Program is US\$32.4 million, which exceeds the present value of the net benefits to the electric power company in scenarios 1 and 2, which are pessimistic about the success of the marketing.

20/ A decline in the net benefits captured by users of efficient equipment as a result of a slight drop in rates is offset by an increase in the net benefits received by the CFE.

substantial reduction in rates could eliminate the likelihood of achieving this degree of market penetration (see paragraph 5.27), equipment marketing scenarios that are less conservative than scenario 3 push up estimates of all the net economic benefits accruing from the Program.

B. Financial and institutional feasibility

- 5.13 The financial and institutional feasibility of the Program is based on fulfillment of the responsibilities assigned to NAFIN, FIDE and the CFE. NAFIN is the borrower and is responsible for (i) administering all the resources of the Program (which consist of the loan from the Bank and FIDE's counterpart contribution), and (ii) repaying the IDB loan.
- 5.14 As executing agency of the Program, FIDE is responsible for (i) executing the activities under the program, and (ii) providing the programmed counterpart resources on schedule. As executing agency and a direct beneficiary of the Program, the CFE is responsible for (i) supplying the NAFIN resources with which it will repay the loan from the Bank, and (ii) making up any shortfalls in the counterpart resources required.

1. Financial feasibility

- 5.15 NAFIN, as financial agent to the government of Mexico, has assumed the commitment to pay the service on the loan from the Bank in the event that the CFE does not transfer the resources required to pay one or more installments on their due dates.
- 5.16 For the period of execution of the Program (1998-2002), FIDE (i) has already appropriated from its budget for 1998 the counterpart resources required for that year; (ii) has programmed the use of internal resources (i.e., resources from contributions established in the trust agreement) in the amount required for the counterpart contributions in 1999 and 2000); and (iii) has arranged with the CFE for a special contribution of resources to supplement, if necessary, the internal funds it would use to cover, in 2001 and 2002, the balance of the total counterpart contribution that the Program will require.
- 5.17 Against this eventuality the CFE has asked the Ministry of Finance to include an amount of up to US\$8.4 million on the CFE budget for the period 2001-2002.
- 5.18 In view of the foregoing, the Program is feasible from the financial standpoint. It should be stressed that its execution will enable the CFE to release resources that it would otherwise have to apply to other uses (i.e., investment in increased capacity and operating costs to meet the increased demand for electric power that would be generated without the Program, net of lost income from lower sales). These released resources are sufficient to

permit the CFE to transfer to NAFIN the amounts needed to service the Bank's loan and make any special contributions that FIDE may require to provide the counterpart contribution.

2. Institutional feasibility

- 5.19 FIDE was expressly established to engage in activities similar to those that the Program will generate. In addition, it has performed efficiently and successfully, and its professional staff are technically qualified and have earned for the institution a prestige that is recognized in important sectors of Mexico and abroad, where its technical services are in demand.
- 5.20 The organization proposed for execution of the Program is easy to implement, being based on an existing unit and requiring only two or three additional experts to cover the areas of marketing, finance and the development of markets for energy-efficient equipment. Hence, the Program may be rated as feasible from the institutional standpoint.

C. Environmental feasibility

- 5.21 Electrical equipment will be distributed and replaced along established commercial channels, and no special measures will be required to handle the process. Consequently, no adverse environmental impact is anticipated.
- 5.22 The Program will generate considerable environmental benefits in terms of reduction of environmental pollutants. It has been estimated that the impact of the sale of efficient equipment through the incentive campaign will eliminate 5.6 million tons of pollutants (CO₂, SO₂, NO_x, particulates, etc.) over the five years of Program execution, and afterwards 1.6 million tons a year, 21/ until that equipment reaches the end of its useful service life. The environmental benefit associated with the permanent success of the marketing effort will be much greater. The Program monitoring plan will review the equipment replacement process and quantify the realized environmental benefits.

D. Benefits and risks of the Program

- 5.23 In conclusion, the Energy Efficiency program, designed to open a market for efficient electrical equipment for the production sector, is feasible from the economic, institutional, financial and environmental standpoints. This section summarizes the principal benefits and risks of the operation.

21/ Associated with a reduction of the annual burning of fuel to generate electricity, equivalent to 4.5 million barrels of fuel oil.

1. Benefits

- 5.24 This Program will help open up the market for efficient electrical equipment used in the industrial and commercial sectors. The successful marketing of these technologies as the result of an enduring conversion of the equipment market to more efficient technology will generate economic benefits for industrial and commercial users by reducing their operating costs generated by energy consumption, which will stimulate economic activity in those sectors and improve their productivity and competitiveness. In so doing, the Program helps these sectors adjust to the rise in electric power rates of the last two years.
- 5.25 The Program also generates financial benefits for the CFE in the avoided costs of investment in and operation of the electric power system, less lost income. Finally, it contributes significantly to improving the environment through the diminution in pollution associated with the reduction of electric power generation.

2. Risks

- 5.26 One risk associated with this operation centers on the fact that the effects of processes to disseminate and market new technology are always uncertain. It cannot be anticipated exactly how the incentive and marketing campaign will fare. To mitigate this risk it has been decided that it is important to coordinate the incentive campaign very closely with the marketing campaign. It is also anticipated that the Program will have to be executed with flexibility, possibly by reducing expenditures for incentives as the marketing begins to bear fruit and redirecting these expenditures to surmount the remaining barriers to marketing.
- 5.27 Another risk has to do with the rate stimulus. The rate level is the primary stimulus to rational energy use. Although industrial and commercial rates are reaching satisfactory levels at this time, a marked deterioration in the future level of this stimulus could prevent the goal of marketing efficient technologies from being attained. This situation would detract from the effectiveness of this energy efficiency promotion program. Nevertheless, this is considered to be a minor risk. We are confident that rates will be maintained in real terms through the automatic indexing system conceived by the government to reflect changes in the price due to inflation and currency devaluation. The rates will be carefully studied in the review that will be performed every six months to monitor program execution on reasonable conditions.

**ME-0204: ENERGY EFFICIENCY PROGRAM
LOGICAL FRAMEWORK**

PURPOSES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>used electrical equipment market in and commercial sectors from a market to a high energy efficiency one.</p>	<p>Sales volume in terms of dollars of a broad range of energy-efficiency businesses of equipment and integrated systems, their financing, and their implementation by specialized services (see quantitative benchmarks in Annex II-1 of the RE2/FI2 Technical Files; the final list of Program benchmarks will be added to the work plan).</p>	<p>1. Reports on development of these markets prepared by FIDE and associations in the private producing and financial sectors. 2. Reports on energy consumption and peak demand prepared by the CFE.</p>	
<p>or lower the market barriers or following market defects that prevent marketing of energy-efficient</p> <p>ns that limit the willingness of pay for more efficient equipment that expensive than conventional equipment lack of:</p> <p>mation on the technical, economic characteristics of energy-saving</p> <p>mechanisms that offset the flows of the mounts required for efficient equipment of energy savings generated by that</p> <p>pecialized intermediation services to tration of the market</p> <p>the rate structure caused by practical nsumption times, season of the year, on in the electric power system)</p> <p>s: the price of electricity does not vironmental cost of generating it.</p>	<p>1. Share of market penetration 2. Number of units of energy-efficient equipment sold without incentives, including those sold to energy users who participated in the incentives campaign. 3. Number of projects financed by IFIs participating in the Program 4. Number of ESCOs operating in Mexico 5. Number and cost of energy-efficient projects developed by ESCOs and energy efficiency firms 6. Marketing costs of the energy-efficiency business incurred by equipment manufacturers, energy-efficiency service companies, and IFIs</p>	<p>1. FIDE market studies 2. Reports of the efficient equipment manufacturers and of energy-efficiency services. 3. Reports of commercial banks 4. Reports by the CFE on extension and operation of the electric power system 5. Reports on the environment by specialized agencies</p>	<p>1. Mexican economy conti growth 2. Market liberalization and programs continue</p>

PURPOSES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
incentives campaign marketing and market development	<ol style="list-style-type: none"> 1. Number and total dollar amount of sales of equipment, by types of equipment and rate stratum and type of user <ol style="list-style-type: none"> a. with incentives b. without incentives 2. Hours of operation of efficient equipment and congruence with peak demands of the system and user 3. Value of energy saving to users 4. MW of capacity and kWh of energy saved by efficient equipment 5. Amount of cost avoided and income not received by CFE 6. Number of financial programs established through equipment distributors 7. Number of FIDE seals awarded 8. Number of standards established 9. Number of information, training, and instructional programs or courses offered or provided through the media 	<ol style="list-style-type: none"> 1. FIDE reports 2. CFE reports 3. Reports on environmental pollution prepared by specialized agencies 	<ol style="list-style-type: none"> 1. Industrial/commercial p maintain their real value 2. Incentives campaign g adequate momentum, whic exploited in an effective m and market development c
information, promotion, training, and n, commercial financing promotion ent, development of energy services project development services and s, study of rate options		Periodic reports on execution of the Program	<ol style="list-style-type: none"> 1. Program adjusted in ac with results of pilot project 2. Program executed in a manner in response to ma reaction 3. Favorable response of banks

Original signed
RGII-ME087P
ME-0204
Original: Spanish

PROPOSED RESOLUTION

MEXICO. LOAN ___/OC-ME TO NACIONAL FINANCIERA S.N.C.
(Program of Energetic Efficiency)

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with Nacional Financiera, S.N.C., as Borrower, and the Estados Unidos Mexicanos, as Guarantor, for the purpose of granting the former a financing to cooperate in the execution of a Program of Energetic Efficiency. Such financing will be for the amount of up to US\$23.400.000, which are part of the resources of the Single Currency Facility of the Ordinary Capital, and will be subject to the "Special Contractual Conditions" and the "Terms and Financial Conditions" of the Executive Summary of the Loan Proposal.