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Report to the APEC EWG Under Voluntary Pledge and Review Program

MEXICO

INTRODUCTION

This document summarizes the activities and programs carried out in Mexico to improve energy efficiency both in the supply and demand of energy. These activities are closely linked to a broader set of national priorities such as the modernization of the productive sector, the protection of the environment, the diversification of primary sources of energy and the rationalization of investment requirements for electricity generation.

ACTIVITIES AND PROGRAMS TO IMPROVE ENERGY EFFICIENCY IN THE USE OF ENERGY

a. Daylight Savings Time

Daylight Savings Time (DST) was first introduced in 1996. This measure not only allows for investment deferments in electric infrastructure but also generates environmental benefits from the reduction in electricity consumption. From 1996 to 2000 DST allowed for more than 5,300 GWh of energy savings and an 823 MW decrease in maximum coincidence demand; this resulted in an investment deferment of 6,240 million pesos and in a reduction in the use of fuels of around 9.8 million of equivalent oil barrels. (Table 1)

Table 1. Energy savings from DST

Year	**Avoided demand MW**	**Energy savings** GWh	**Deferred investments (Million pesos)** [a/]
1996	529	943	4,100
1997	550	1,100	4,400
1998	683	1,012	6,830
1999	613	1,092	6,130
2000	823	1,182	6,240
Total 1996-2000	**823**	**5,329**	**6,240**

Source: Electricity Savings Trust (FIDE).
a/ Refers exclusively to infrastructure investment deferred by DST.

In 2001, the application of DST was reduced to 5 months (from May to September) in most part of the country. According to an evaluation performed by the Institute of Electrical Research (IIE), in that year DST benefits were of 933 GWh in energy savings and 908 MW in avoided demand.

b. Incentives and market-transformation program

The Electricity Savings Trust (FIDE) operates since 1996[1] a successful incentives and market transformation program. This Program has the objective of fostering the use of energy-efficiency technologies and the market transformation for high-efficiency equipment, by providing money incentives to industrial, commercial and residential energy users in the purchase and installation of high-efficiency equipment such as electric motors, air compressors, and lighting equipment.

During 2000, 3,244 high-efficiency electric motors, 183 compressors and 1.8 million units of commercial and industrial lighting equipment were installed.

c. State-Owned Energy Industry

During the period July-October 2001, CONAE provided assistance for the evaluation of 384 pieces of equipment and systems from 15 different installations of the State-owned Oil Company (Pemex). These activities leaded to the identification of saving potentials of approximately 574 thousand equivalent barrels of oil per year.

Additionally, during the same period, an evaluation of energy savings measures was performed in three important petrochemical centers. The evaluation reveals energy savings of nearly 900 thousand equivalent barrels of oil per year. Also, CONAE provided 17 training courses on energy-efficiency to 83 Pemex's engineers.

d. Municipal services

Beginning 2001, CONAE established a strategy to support municipalities and state governments in the development of institutional capacities to identify, quantify, analyze and implement projects, programs and actions concerning energy efficiency and renewable energy. Therefore, in the second half of 2001, a study to determine the opportunities to install or revive energy offices in 18 states was performed.

Also, from July to October 2001, CONAE provided technical assistance to 30 municipalities on the subjects of public lighting, water pumping, and renewable energy. Furthermore, three technical studies in the subject of public lighting were developed for the same number of municipalities.

In addition, in July 2001, CONAE along with the National Bank of Public Works and Services (Banobras), FIDE and CFE signed an agreement to promote energy savings through investment programs for states and municipalities. Banobras will provide 500 million pesos of funding at competitive rates.

[1] In 1996 the program started replacing incandescent bulbs for highly efficient Compact Fluorescent Lamps (CFLs). In 1998 FIDE started a strategy focused on providing incentives and services to the productive sector.

e. Energy Efficiency Standards

At present, 20 Energy Efficiency Standards (NOMs) are in force, 16 related to the use of electricity and 4 corresponding to thermal energy use. By 2001, estimated annual savings derived from the application of these NOMs are of 8,000 GWh in energy consumption and 1,300 in avoided power capacity (see table 2).

Table 2. Energy Efficiency Standards (NOMs), 2001.

NOM/ Equipment or System	Came into force on	Savings (1)		
		GWh	% (2)	MW
NOM-001-ENER-2000 Vertical pumps	XII/2000	102.5	13	36.3
NOM-004-ENER-1995 Centrifuge pumps	VII/1996	29.3	18	40
NOM-005-ENER-2000 Clothe washers	X/2000	78.1	29	NA
NOM-006-ENER-1995 Pumping Systems	XI/1996	2,312.0	30	51.3
NOM-007-ENER-2001 Building lighting	IX/1996	567.0	20	30.4
NOM-008-ENER-2001 Non-residential building envelop	VI/2001	45.0	20	11
NOM-010-ENER-1996 Submergible Pumps	I/1998	47.0	3	12
NOM-011-ENER-1996 Central air-conditioners	II/1998	84.7	3	10
NOM-013-ENER-1996 Street lighting	V/1998	11.2	2	2.5
NOM-014-ENER-1997 One-phase motors	VII/1998	140.0	30	132
NOM-015-ENER-1997 Refrigerators	VIII/1997	2,292.1	41	465
NOM-016-ENER-1997 Three-phase motors	VI/1998	1,208.3	7	386
NOM-017-ENER-1997 Compact Fluorescent Lamps	VI/1998	21.1	60	3.1
NOM-018-ENER-1997 Thermal insulation for buildings	X/1998	65.2	20	5.6
NOM-021-ENER/SCFI/ECOL-2000 Room air conditioners	VI/2001	858.3	32	96
NOM-022-ENER/SCFI/ECOL-2000 Commercial refrigeration	VI/2001	157.9	5	19
NOM-002-ENER-1995 Boilers (3)	- -	- -	- -	- -
NOM-003-ENER-1995 Water heaters	- -	- -	- -	- -
NOM-009-ENER-1995 Thermal insulation	- -	- -	- -	- -
NOM-012-ENER-1996 Low capacity boilers	- -	- -	- -	- -
TOTAL		**8,019.7**		**1,300.2**

Source: CONAE, Direction of Standards. Internal documents. 2001.
Notes: (1) The table does not present thermal-electric conversions for equipment under thermal-energy consumption NOMs.
(2) Percentage of efficiency improvement or reduction on energy consumption.
(3) The gray shaded NOMs are related to thermal-energy efficiency.

Currently three new NOMs are being designed. Two of them correspond to three-phase electric generators and the third to up-to-three-story residential buildings. Also the NOMs related to refrigerators and central air conditioners are being updated.

f. Installation-oriented programs

CONAE and Fide promote the development of specific projects in intensive energy-use installations from both public and private sectors. Fide provides financial support for the development of feasibility studies, as well as for the development of retrofit measures.

CONAE provides technical assistance through its Web site and through a national network of *"Ports of Attention" (PACs)*[2], to help energy users identify energy efficiency opportunities, and evaluate and analyze technical and economic feasibility of energy

[2] PACs are located in research institutions, industry chambers and universities around the country. Currently 108 PACs are established and operating.

efficiency projects for industrial, commercial and services installations. During the period July-October 2001, CONAE provided assistance to 1,124 small and medium size enterprises in their identification and use of their energy efficiency opportunities.

g. Energy Efficiency in Federal Government Buildings

The Energy Efficiency Program for Federal Government Buildings (PAEIAPF) was implemented in 1999 with the objective of reducing electricity consumption in federal buildings.

During 2000, an analysis of 350 buildings, performed by CONAE to estimate energy savings for the period of 1999-2000, revealed that the average energy-consumption index of the buildings participating in the program decreased by 13% from 112.3 to 97.5 kWh/m^2 per year. This reduction amounts to roughly 36 million kWh of savings in electricity consumption. Presently, 855 buildings are registered into the program and 109 internal committees instituted. Table 3 presents the summary of PAEIAPF to October 2001.

Table 3. Summary of PAEIAPF - October 2001

Registered buildings	855
Internal committees instituted	109
Energy audits submitted (June 2001)	105
Trained buildings operators (June 2001)	451
Inner surface of registered buildings	4.4 million m²
Average annual energy consumption of registered buildings	309 million kWh
Reduction in the Electricity average index 1998-2000	13%
Approximated Savings 1998-2000 (energy consumption)	36 million kWh

Source: CONAE, Direction of Buildings, 2001

h. Residential sector

Programs to improve energy efficiency in the residential sector comprise three main interrelated action guidelines: energy efficiency standards for appliances, energy conservation programs and information dissemination to promote energy efficiency.

Trough organisms such as CONAE, FIDE, ASI[3] and the *Trust for Energy Savings through Household Insulation Program* (FIPRADEE) specific energy conservation programs for the residential sector are being instrumented. During 2000, these programs completed the Thermal insulation of 71 thousand dwellings; the substitution of 7.6 thousand air conditioning units for highly efficient ones; and the replacement of 7.5 million incandescent bulbs for Compact Fluorescent Lamps (CFLs).

The activities developed by CONAE in terms of energy efficiency standards and their benefit for the general public were described in the NOMs section.

i. Industry

CONAE aims to improve energy efficiency in the industrial sector by identifying energy-efficiency and conservation opportunities in the major energy-intensive

[3] The *Ahorro Sistemático Integral Program* evolved from the FIPATERM program.

industrial processes. These activities have been strengthened by six analysis methodologies[4] designed by CONAE and available in its Website:

- Steam generation and distribution
- Cooling towers
- Demand control
- Cogeneration
- Process heaters
- Industrial refrigeration

CONAE has developed an *Integral Energy Savings Program* to be applied in the industry. During the period July-October 2001, CONAE implemented that strategy in 8 firms performing 308 evaluations in different types of equipment and systems -mainly in boilers, steam traps heat exchangers and cooling towers. These activities helped identify energy savings potentials of around 32,500 equivalent barrels of oil.

ACTIVITIES AND PROGRAMS TO IMPROVE ENERGY EFFICIENCY IN THE SUPPLY OF ENERGY

a. Renewable Energy

On the second half of 2001, CONAE carried out several activities in order to develop a program to promote the generation of "green energy" (i.e. electricity generated from renewable energy). In this sense, and with the objective to evaluate the companies' willingness to buy green energy, CONAE along with the North American Commission for Environmental Cooperation (CEC) have conducted a survey to the 100 largest electricity users in Mexico. The survey suggests that 94% of these users are willing to buy green energy and that 54% are willing to pay a premium for it.

Additionally, on September 2001, the Energy Regulatory Commission (CRE) published in the Federation Official Gazette several instruments to regulate the interconnection and distribution services for renewable energies. These instruments take into consideration the technology used to generate electric energy; do not consider the application of subsidies and do not acknowledge the participation of renewable energy in electricity generation as a firm power supply. Such instruments apply to wind, solar and hydroelectric projects with a generation capacity of more than 0.5 MW and with intermittent availability of its primary energy. Through the application of these instruments, licensees may pay 30-50% of the interconnection and distribution fee and may interchange with CFE the electricity generated during different time periods.

b. Cogeneration

By August 2001 the Energy Regulatory Commission (CRE) had registered 35 standing permits for cogeneration systems of which only 26 were in operation; 22 operated by natural gas, 3 by fuel oil and one by residual thermal energy. These systems in operation represent 1,131 MW of capacity and 5,660 GWh/year of electricity generation. Table 4 presents electricity generation by technology as well as the estimated savings, expressed in millions of cubic meters of natural gas, compared to conventional generating systems.

[4] These methodologies are part of the overall technical assistance strategy developed by CONAE through Internet.

Table 4. Operation of Cogeneration Systems (August, 2001)

Technology	**Number of permits**	**Capacity MW**	**Generation GWh**	**Plant Load Factor (%)**	**Savings Natural gas (Millions of m^3)**
Internal combustion engine	2	10	56	64%	8
Combined-cycle	6	380	1,548	47%	223
Steam turbine	7	387	2,371	70%	341
Gas turbine	11	354	1,685	54%	242
Total	**26**	**1,131**	**5,660**	**57%**	**814**

Source: CONAE, based on information published by CRE

Further information on all the programs described above can be found through CONAE's Website at: **www.conae.gob.mx**