



**Asia-Pacific
Economic Cooperation**

**APEC SYMPOSIUM
ON THE IMPLEMENTATION OF GOVERNMENT
ENERGY EFFICIENCY PROGRAMS**

Kunming, China
2-3 August 2004

**Session 2: Experience and Best Practice
in Specific Economies**

Federal Energy Management Program (FEMP)

Beth Shearer

APEC Symposium on the Implementation of
Government Energy Efficiency Program
2-3 August 2004

Why Energy Management in the Public Sector?

- Government is the largest energy user
- Lead by example
- Save energy and money
- Pull the market for energy efficient, renewable energy, and water-conserving products
- Test new technologies

FEMP Mission

FEMP increases energy security and reduces energy cost and the environmental impact of government by promoting:

- Energy efficiency and water conservation
- Use of distributed and renewable energy
- Sound utility management at Federal sites

Legislative History/Executive Directives

- Energy Policy and Conservation Act (1975)
- DOE Organization Act (1977)
- National Energy Conservation Policy Act (1978)
- Federal Energy Management Improvement Act (1988)
- Executive Order 12759 (1991)
- Energy Policy Act (1992)
- Executive Order 12902 (1994)
- Executive Order 13123 (1999)
- Executive Order 13221 (2001)



Federal Energy Snapshot

- \$9.6 billion Federal annual energy bill
 - 500,000 facilities
 - Buildings: \$3.7 billion
 - Energy Intensive Operations: \$0.6 billion
 - Exempt Buildings: \$0.4 billion
 - Vehicles & Equipment: \$4.9 billion
- Federal floor space 1.4% of national residential, commercial, and industrial space



Federal Buildings

- Office Buildings
- Laboratories
- Housing
- Parks and historic sites
- High bay applications
- Post Offices
- Court Houses
- Hospitals
- Warehouses
- Space launch buildings



FEMP Model

- ✓ **Set goals**
- Plan and implement projects
- Measure performance
- Report progress
- Reward Federal leadership

Federal Energy Management Goals

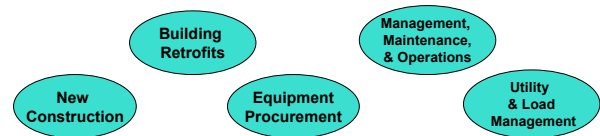
- **Reduce energy consumption**
 - Facility energy per square foot to be reduced by 30 percent in 2005 and 35 percent in 2010 relative to 1985
 - Industrial/laboratory energy to be reduced by 20 percent in 2005 and 25 percent in 2010 relative to 1990
 - Purchase energy efficient products including those that use minimal standby power
- **Expand use of renewable energy**
 - 2.5% of Federal facility electricity consumption by 2005
- Implement best management practices for **water conservation** in 80% of Federal facilities by 2010
- **Reduce greenhouse gas emissions** 30 percent by 2010 compared to 1990

FEMP Model

- Set goals
- ✓ **Plan and implement projects**
- ✓ Measure performance
- Report progress
- Reward Federal leadership

How agencies will meet the goals:

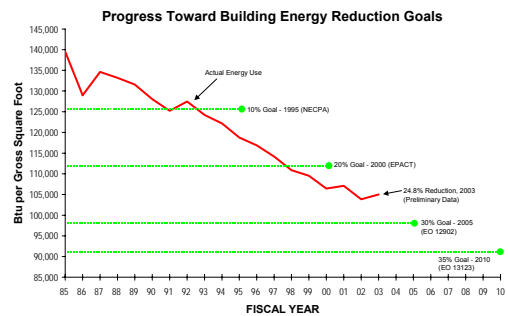
- **Whole building cycle projects**
- **Technology breakthroughs**



FEMP Model

- Set goals
- Plan and implement projects (Later)
- ✓ **Measure performance**
- ✓ **Report progress**
- Reward Federal leadership

Progress To Date: Buildings

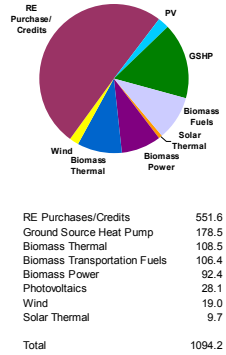


A dollar invested in energy efficiency saves about \$4 over the life of a typical project.

Progress on Other Energy Management Goals (cont.)

- Renewable Energy Goal: By 2005, the equivalent of 2.5 percent of Federal facility electricity consumption

- Agencies used almost 1,100 GWh from renewables by the end of June 2004
- More than three-quarters of the way to the 2.5 percent goal for 2005
- 50 percent is from renewable energy purchases; the remainder from on-site generation.



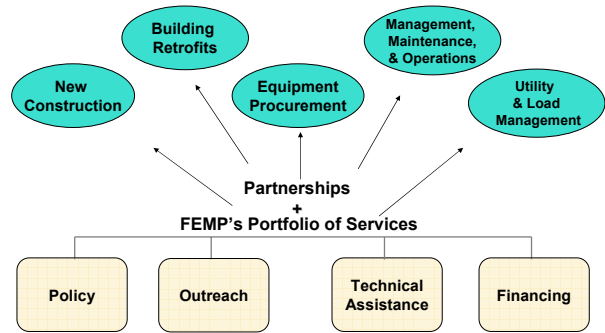
FEMP Model

- Set goals
- Plan and implement projects
- Measure performance
- Report progress
- **Reward Federal leadership**
 - **FEMP awards**
 - **Presidential awards**

2004 Presidential Awards



FEMP Support for Agencies

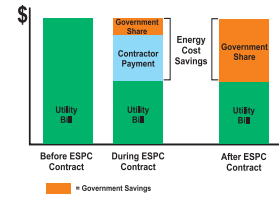


Financing

- Energy Savings Performance Contracts (ESPCs)
- Utility Energy Savings Contracts (UESCs)
- Appropriations
- Public Benefits Funds

Energy Savings Performance Contracts

- ESPCs reallocate the Government's utility bill
 - Pay a lower utility bill
 - Pay the contractor
 - Achieve cost savings for the government
- Benefits of ESPCs:
 - Sites reduce their energy use/\$
 - Improves the environment
 - Saves taxpayer dollars



Utility Energy Service Contracts

- Regulated utility is the preferred provider
- Utility pays upfront costs
- Utility warrants equipment performance
- Utility is paid from the savings



Technical Expertise

- FEMP Closely Coordinated with DOE Research Programs
 - DOE National Laboratories
- FEMP Procurement Recommendations
 - Rely on Credible Rating System Based on Significant DOE Research
- FEMP Benefits from Strong Technical Societies
 - Consensus Standards
 - Trained Architects, Engineers, ESCO's

Technical Assistance

- Assessments
 - SAVEnergy Audits
 - ALERTs
 - Industrial Assessments
 - O&M Assessments
- Design Assistance
- DER/CHP
- Renewable Energy/Green Power
- Labs21
- Operations and maintenance
- Water management best practices

Technical Information

- Training
- FEMP Software Tools
 - Building Life-Cycle Cost (BLCC) programs
 - Federal Renewable Energy Screening Assistant
 - Facility Energy Decision System (FEDS)
- Energy-Efficient Product Recommendations
 - Coordination with ENERGY STAR® program
 - Low Standby Power Products List
- Technology Demonstrations
 - Technology Alerts
 - Technology Installation Reviews

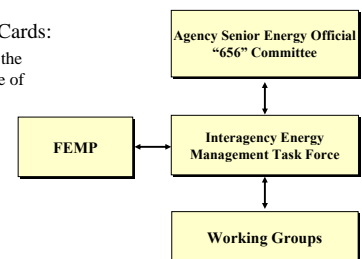


Outreach and Communications

- *Periodic Newsletter: FEMP Focus*
- *You Have The Power Campaign*
- FEMP Annual Workshop & Exposition
- Annual Energy Awards
- Web Site: www.eere.doe.gov/femp
- FEMP Help Desk: 800-363-3732
- DOE Regional Offices/DOE National Laboratory Liaisons

Policy and Interagency Coordination

- Annual Report to Congress and the President
- Agency Energy Score Cards:
 - Top-level interest from the White House and Office of Management & Budget
- Policy Guidance
- Federal Energy Management Advisory Committee





Main results of the Mexican institutionalizing energy efficiency policy

Dr. Gaudencio Ramos Niembro

National Commission for Energy Conservation (Conae)

MEXICO

*International Symposium on the Implementation of
Government Energy Management Programs
Kunming, China
2-3 August, 2004*



Institutions related to energy

- Energy Secretariat (SENER)
- National Commission for Energy Conservation (Conae)
- Energy Regulatory Commission (CRE)

- Electricity Savings Trust (Fide)
- Electric Research Institute (IIE)
- Mexico's Petroleum Institute (IMP)

- National Oil Company (PEMEX)
- 2 National electric utilities
 - Comisión Federal de Electricidad (CFE)
 - Luz y Fuerza del Centro (CLYF)



Conae

- Created in 1989

- The Conae mission is both, design and promotion activities related with energy efficiency and energy saving to any sector who ask for it (public, private and social); and also to implement energy efficiency standards and to promote renewable energy



Main Energy Efficiency Programs

- Energy efficiency in Public Buildings
- Energy efficiency in Public Vehicles
- Energy efficiency Program in the National oil Company: Pemex
- Energy efficiency programs in national electric utilities
 - ⊗ Comisión Federal de Electricidad –CFE-
 - ⊗ Luz y Fuerza del Centro –LyFC-

- Technical assistance to municipalities
 - Public lighting



Energy Efficiency in Public Buildings: APF Buildings Program



Key elements

- **Mandatory for administrative-use buildings**
 - Buildings with more than one thousand square meters
 - annual consumption index of 75 kWh/m²-year or more
- **Strategy in its 5th stage of development**
- **First stage (1992-1996): "Isolated buildings"**
 - 120 energy studies and audits performed on federal buildings
 - Learning process
 - Large potential for energy savings on lighting systems



APF Buildings Program - 1-

- **Second Stage (1996-1998): "One hundred public buildings"**
 - Voluntary Pilot Program
 - Building operators' involvement in the design and implementation
 - Training and technical assistance provided by Conae
 - 90% of building officers were able to perform their own data gathering
 - 1998 assessment – 21% demand reduction could be achieved (19GWh / year and 3.5 MW avoided generating capacity)
 - Investment US\$1.5 million could be recovered in 17months



APF Buildings Program -2-

- **Third stage (1999): "Mandatory energy audits"**
 - Link local building operators with analysis tools provided on [Conae's Web Site](#)
 - Executable system to evaluate lighting systems and identify energy-savings measures
- **Fouth stage (2000): "Mandatory energy savings of 20%"**
- **Fifth stage (up to 2001): "Mandatory internal energy efficiency programs"**

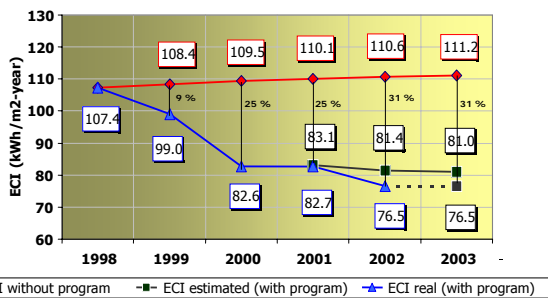
APF Buildings Program -3-

- Main results:**

- Mandatory since 1999
- More than 900 buildings registered under the APF program, 4.8 million square meters of floor space

Year	Savings		
	%	GWh	Millions (\$ US dlls)
1999	9%	24	1.7
2000	25%	104	7.3
2001	25%	104	7.3
2002	31%	175	30.7
2003	31%	178	31.2
Total		585	78.2

Electric Consumption Index



Energy Efficiency in Public Vehicles: APF Vehicle fleets

APF Vehicle fleet actions - 1-

- Technical committee since 1998
 - 45 Dependencies of the Federal Government
- Official fleet: 120 000 vehicles
- 8-12 technical meetings per year
- 15 MM of fuel consumption reduction (2003)
- Computer vehicle system management
 - 4 Biggest dependencies: CFE -18 000-; Pemex -18 000-; CNA -5 000-; and INEGI -5 000



APF-Vehicle fleet actions -2-

- **Main Activities -technical committee-**
 - Technology evaluation
 - Vehicle selection
 - Training on economic driving
 - Maintenance
 - Fleet management
- **Mandatory fleet control system**
 - To be developed during 2005
 - To be implemented: 2005 & 2006



Energy efficiency Program in the National oil Company: Pemex



Main activities

- **Largest public sector company in Mexico**
 - One of the world´s ten biggest oil companies
- **Is responsible for**
 - Exploration
 - Exploitation
 - Commercialization of oil and associated gas in the country
- **Largest energy user**
 - 118 million barrels oil equivalent per year
 - Total national consumption: 730 million barrels



Main energy efficiency activities -1-

- **During 25 years Pemex has carried out several energy efficiency related activities**
 - Integral, scattered, and isolated
- **In 1999 an “Energy efficiency and Environmental Protection Campaign” started**
 - Objective: consumption reduction by 5 %
- **Pemex established since 2001 the “Energy-Efficiency Institutional Program”**
 - Objective: reduction of the energy consumption index between 1.5% to 5%

Main energy efficiency activities -2-

• First stage (1995-1997): energy audits

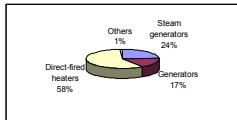
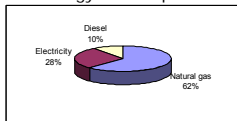
- Creation of working groups:
 - National
 - Any Installation –plants-

- Identification of technical and operative Energy Saving Opportunities

- Energy conservation potentials

- Cooling Towers (15%)
- Direct Fire Heaters (10%)
- Heat recovery (20%)
- Steam generation (5%)
- Insulation (30%)
- Lighting (40%)

Typical distribution of energy consumption



Main energy efficiency activities -3-

• Second stage (1998-2000): bottom-up and Internet assistance

- Design of simplified analytical software tools

- Identification of energy saving opportunities
- Recommendations for energy efficiency
- Most energy using systems
- Operated by Internet

- Scope of the program

- 208 installations
- 9 office buildings
- Training for more than 600 engineers and technicians

Main energy efficiency activities -4-

• Third stage (2001-2003): Energy Performance Index Approach

- The tools and protocols for Energy Indicators Control and Follow-up System was established for

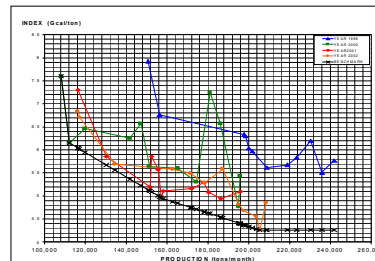
- Processing plants
- Systems
- Equipment

- Main activities

- Compilation of annual and global energy-consumption production data
- Implementation of energy audits
- Integration of energy-efficiency benchmark curves
- Elaboration of energy distribution diagrams

Main energy efficiency activities -5-

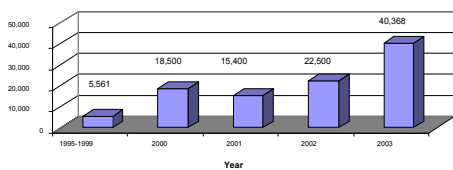
• Evolution of the energy-efficiency benchmark in "Cangrejera" petrochemical center:



Main energy efficiency activities -6-

- **Main results: 1995 -2003**
 - More than 100 millions of cubic feet of natural gas (150 millions of equivalent oil barrels)

Energy savings in Pemex
(millions of cubic feet of natural gas)



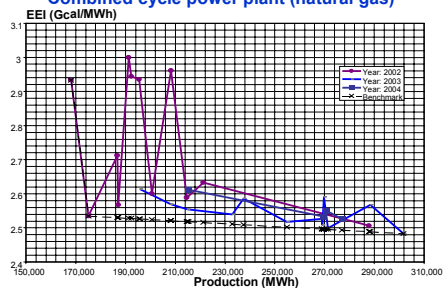
Energy efficiency programs in the National utilities: CFE and LyFC

CFE: main energy efficiency activities

- **CFE**
 - Main electrical utility in Mexico
 - 70 % of the customers
 - 54 thermal power plants
- **CFE - Conae program started in 2004**
 - Thermoelectric power plants:
- **Actions in 2004:**
 - Operators training
 - Determination of energy consumption index

CFE: main energy efficiency activities

- **Energy efficiency index:**
Combined cycle power plant (natural gas)

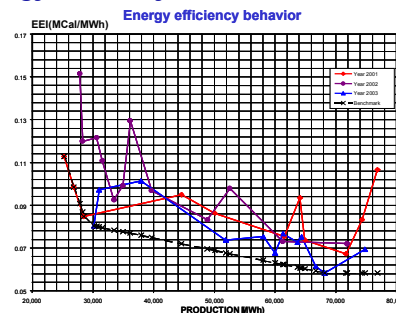


LyFC: main energy efficiency activities

- General overview:
 - 2nd. electrical utility in Mexico
 - 30 % of the customers
 - Main activity: distribution
- LyFC - Conae program started in 2004
- 2 generation power plants
- Actions in 2004:
 - Operators training
 - Determination of energy consumption index

yFC: main energy efficiency activities

- Energy efficiency index:



Technical assistance to municipalities: Public Lighting

Energy efficiency in Public lighting – 1-

- Evaluation of 401 municipalities -over 2,400- (1997-2003)
 - Potential:
 - Energy savings = 182 GWh
 - Economic saving = 22 Millions US dlls/year
 - Investment required = 42.7 millions Us dlls
 - The implementation depends on municipality budget availability
- Financing committee
 - Fide – Banobras - Conae

Energy efficiency in Public lighting –2-

Year	Municipalities (# of studies)	Annual savings		Investment (US dlls)
		GWh	Millions (US dlls)	
1997	27	10	0.85	1.08
1998	94	22	2.09	2.70
1999	103	57	6.23	15.96
2000	20	12	1.74	3.97
2001	13	11	1.43	2.92
2002	68	35	4.60	8.21
2003	77	35	5.05	7.81
Total:	402	182	21.99	42.65

Conae´s strategy

Conae´s strategy

- **Conae Website - www.conae.gob.mx -**
 - In operation since April, 1997
 - An average of more than 100,000 hits/month (different sections)
 - Organized by user categories
 - **Contents:**
 - Computer analysis tools to identify energy saving potential
 - Recommendations
 - Information
 - Energy prices
 - Directories of products and services , etc.
 - Technical Assistance (Email)
 - Links to other interest sites
- **Committee integration –institution-**
- **Technical assistance**
 - Training, energy diagnostics, etc.

Conclusions



Conclusions

- ☞ Mexico has had results because it has institutions which design, implant and operate programs**
- ☞ EE potentials are still high**
- ☞ We need to reinforce what we have**
- ☞ We need to promote the development of decentralized institutional capacities**
- ☞ We need to tie private financing with existing opportunities**
- ☞ We need to widen our training and information efforts**



www.conae.gob.mx
