Market Leadership by Example: Government Sector Energy Efficiency in Developing Countries[1]

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ABSTRACT

Government facilities and services are often a country's largest energy users, and major purchasers of energy-using equipment. In developing as well as industrial countries, government "leadership by example" can be a powerful force to shift the market toward energy efficiency, complementing other elements of a national energy efficiency strategy.

Benefits from more efficient energy management in government facilities and operations include lower energy bills, reduced greenhouse gas emissions, less demand on electric utility systems, and reduced dependence on imported oil. Even more significantly, the government sector's buying power and example to others can generate broader demand for energy-efficient products and services, creating entry markets for domestic suppliers and stimulating competition in providing high-efficiency products and services.

Despite these benefits, government sector actions have often lagged behind other energy efficiency policies. This is especially true in developing countries and transition economies – with a few exceptions discussed in this paper – even though the public sector share of total energy use in these countries may be at least as large as that in industrial economies. This paper summarizes work in progress to inventory current programs and policies for government sector energy efficiency in developing countries. We describe successful case studies from Mexico's implementation of public sector energy management, as a possible model for other developing countries. We describe how these policies, starting at the federal level, are now being extended to state and local agencies in Mexico.

Introduction

Government facilities and services are often the largest energy users within a country, and major purchasers of energy-using equipment. By focusing government investment, procurement, and operating practices on energy-efficient buildings, products, and services, the public sector can create a strong, sustained, buyer-led shift in the market toward energy

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efficiency. With support from the US Agency for International Development (USAID), Lawrence Berkeley National Laboratory (LBNL), the Alliance to Save Energy (the Alliance), and the Comisión Nacional para el Ahorro de Energía (CONAE) in Mexico are compiling an inventory of existing policies, programs, and administrative practices to improve energy efficiency within the government sector. This joint project focuses on developing countries in Latin America, Asia, Africa and Eastern Europe, with the aim of sharing information and lessons learned, and encouraging new pilot projects.

In the following sections we discuss the overall opportunity for energy savings in the government sector; summarize results to date from the international program inventory; describe two case studies from Mexico's government sector energy management program; and review initial lessons learned and plans for future work.

Government Sector Opportunities for Energy Efficiency

In every country there are important opportunities to improve energy efficiency in government facilities, operations, and public infrastructure and services. Benefits include lower government energy bills, reduced greenhouse gas emissions, less demand on electric utility systems, and reduced dependence on imported oil.

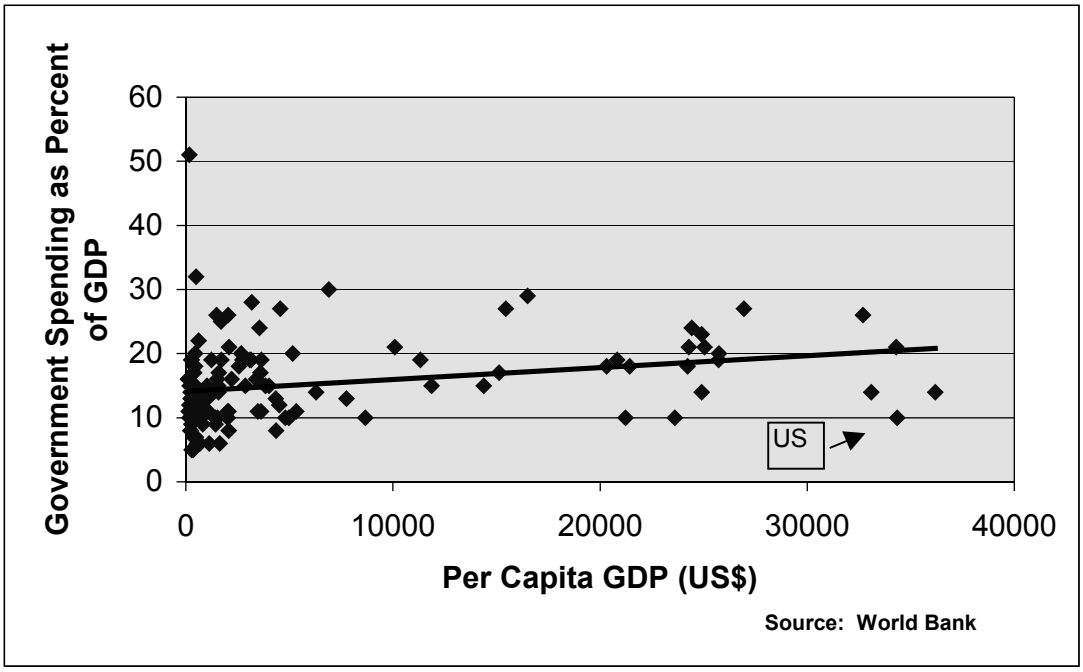
Equally important, government sector buying power and active, visible leadership offer a powerful non-regulatory means to stimulate demand for energy-efficient products and services. By establishing a reliable entry market for more efficient products and services government can encourage domestic suppliers to introduce more energy-efficient products at competitive prices. In other words, the government's own energy efficiency initiatives can leverage other actions by both buyers and suppliers throughout the economy – as well as helping public agencies themselves save money and energy, and avoid pollution.

How important is the government sector as a share of the total economy? In the US, government spending at all levels (federal, state, local) accounts for 18% of Gross Domestic Product (GDP), while government workers (including military personnel) represent about 16% of all non-farm employment (US Census Bureau 2001). Turning to another energy indicator, of total non-residential floorspace government buildings account for about 21% in the US; within this subtotal almost two-thirds of public floorspace is schools and colleges (US DOE/EIA 1995). Government agencies use 25% of total energy consumed in non-residential buildings, but a much smaller fraction of industrial and residential energy (mainly for military bases and military housing). Thus, the government sector in the US represents between one-fifth and one-sixth of the total economy. While US federal agencies account for only a minor share (20-25%) of the public sector total, the federal government by itself is still the world's largest customer for most energy-related products and services, buying over US$10 billion of energy-using equipment each year (Harris and Johnson 2000).

Compared with the US, the public sector share of the economy – based on GDP, employment, building floorspace, or energy use – is higher in most other industrial (OECD) countries, while the relative share of national *vs* local jurisdictions varies widely by country (Hammouya 1999). For developing and transition countries, however, reliable data on government *vs* private building floorspace, purchasing, or energy use are much harder to find. This forces us to consider indirect indicators of government's share of the market, including the market for energy-related products and services. **Figure 1** shows one such indicator, government spending as a percent of GDP, for 150 countries with widely varying

levels of per capita GDP. The data show more scatter than trend, although there is a slight tendency toward a higher ratio of government spending/GDP in wealthier countries (due mainly to the importance of the public sector in European economies).

Figure 1. Government Share of the Economy in Developing, Transitional, and Industrial Countries – 1999



A second indicator for many industrial and developing countries is public sector employment as a percentage of total employment. Despite numerous issues of data quality and definitions, available statistics show relatively modest differences worldwide in the public sector's share of total employment: about 22% in industrial countries, 40% (and falling) in the transition economies, and a range of 8% to 30% in developing countries (Hammouya 1999 and Schiavo-Campo et al. 1997).

Based on the government sector share of GDP or employment, what can we infer about the potential for energy-efficient government policies and practices to influence the broader market? While there are no established rules of thumb, it seems logical that where a customer segment represents 10% to 25% of the market, their openly stated policies, specifications, and purchasing criteria can have very substantial influence. One striking example of this was a 1993 policy directive that US federal agencies were to purchase only energy-efficient computers and office equipment that qualified for the Energy Star® label; this had an immediate positive effect on manufacturer participation in the labeling program. Even though federal sales amounted to only 2-3% of the total market, Energy Star office equipment quickly achieved penetration rates of 90% or more for the entire US market.

Overview of Programs and Policies in Selected Countries

Despite the direct benefits of lower energy costs to the government itself, and the potential for energy-saving measures by government to influence the broader market, public

sector energy management initiatives are often absent from the list of policy options in developing and transition-economy countries. A 1995 survey of energy efficiency programs in ten Asian countries examined 15 successful cases involving efficiency standards, building codes, audits and training/technical assistance, and financial incentives – but not one example of a program targeted to the public sector (Rumsey and Flanigan 1995). Our current survey does identify new activities for the Philippines, Korea, and Thailand.

Yet there are a few exceptions, including the important example of Mexico's public sector initiatives (discussed in the next section). With support from the US Agency for International Development (USAID), Lawrence Berkeley National Laboratory (LBNL), the Alliance to Save Energy (the Alliance), and Mexico's Comisión Nacional para el Ahorro de Energía (CONAE) are compiling an inventory of policies, programs, and administrative practices to improve efficiency of energy use within the government sector. This ongoing study focuses on government sector initiatives and future opportunities in developing and transition-economy countries, and builds on a previous LBNL survey (Borg et al. 1997). The present study defines the "public sector" broadly to include national governments, state (provincial) and municipal agencies, schools and public universities, and in some cases government-owned enterprises (especially those providing infrastructure or public services, such as transit, sanitation, and housing). Examples of energy-saving activities within the public sector include:

PROGRAM CATEGORIES	COUNTRY EXAMPLES
Policies and Targets • Energy savings goals; tracking and reporting progress • Government organization (lead responsibility for energy savings, interagency committees, etc.) • Budget policies (e.g., life-cycle costing, separate budget line for energy, energy cost savings shared with agencies)	Argentina (reporting) Dominican Republic (goals) Ecuador (goals) Mexico (savings goals and reporting requirements) Philippines (GEMP goals)
Energy-Saving Capital Projects • Energy audits • Retrofit projects: lighting, HVAC, building envelope, controls • Financing: third-party (ESCO) funding, loan funds, leasing, etc. • Efficiency standards/guidelines for new buildings • Design assistance, software tools, architect training • New technology demonstrations, showcase facilities • Public services - efficient systems and equipment (water supply and treatment, street lighting, LED traffic signals, etc.)	Brazil (low-interest loans to retrofit public buildings) Colombia and Argentina (street lighting) Mexico (Web-based lighting audits, "100 Public Buildings" and APF) Russia (pilot audits and retrofits)
Facilities Operation and Maintenance • Building system commissioning: pre-occupancy + continuous • Energy metering/monitoring, benchmarking, operator feedback • Facility manager training and certification • Operator incentives and recognition (awards) • Employee information and outreach campaigns • O&M for government vehicles; promote ridesharing and transit	Dominican Republic Mexico (building O&M, operator training, 'Ports of Attention' for outreach + technical assistance) Thailand (mandatory measures in public buildings)
Purchasing energy-efficient products • Specify efficient building equipment, office equipment, motors, lighting, appliances, etc. • Efficient and alternative fuel vehicles for government fleets • Green power purchasing	Korea Philippines (GEMP)

The 1997 study identified an emerging awareness of opportunities for public sector energy management in some developing countries, but few comprehensive programs underway[2]. *Mexico* had initiated several promising activities; the case study (next section) provides an update on these programs. Recognizing that conditions and programs may change quickly, the following brief summaries are based on the latest information available as of May 2002:

Argentina: Argentina had an active program for improving the efficiency of street lighting; a 1996 regulation required that all government facilities report on their energy performance.

Brazil: In Brazil, a government directive called for the creation of energy management committees in government enterprises. The national energy efficiency agency, PROCEL, estimated that electricity use in public buildings (for all three levels of government – federal, state, and municipal) was about 9.6 billion kWh/year, or around 3% of total electricity use in Brazil. Beginning in 1997, PROCEL provided grants and low-interest loans to retrofit 16 ministry buildings in Brasilia. Retrofit investments targeted to public buildings saved an estimated 40 GWh/year, with an additional 100 GWh/year saved from street lighting retrofits. Significantly higher savings in public buildings are proposed for future years. From 2001-2004, PROCEL plans to invest 7.6 million dollars in public building energy and water efficiency programs. Funding for these initiatives comes from a World Bank loan, co-financed by Electric Energy Concessions and the Brazilian Global Reserve. A few state governments also had established programs for energy efficiency audits and technical studies of public buildings.

Colombia: As part of a new national energy efficiency program, the government launched a loan program in 1995 to retrofit public (outdoor) lighting as part of the transfer of responsibility for public lighting from utilities to municipal governments. The aim was to replace all mercury lamps with high-pressure sodium lamps by 1998. Another program established energy management guidelines for local government facilities in medium-size cities (up to 400,000). In October 2001, Law 697 was passed, providing a legislative framework for a new energy efficiency and renewable energy program called PROURE (Programa de Uso Racional y Eficiente de la Energía y Demas formas de Energía no Convencionales). The Ministry of Mines and Energy (MME) is charged with implementing this program, which includes a public lighting initiative and voluntary energy labeling for appliances and lighting. Large energy savings are expected from the public lighting initiative, which offers a new array of payment options from municipalities to the electricity providers (MME, 2002).

Costa Rica: The national utility company in Costa Rica participated in a national energy efficiency program that included the government sector (about 3.4% of electricity sales). The program, established by legislation, called for equipment labeling and standards, energy-savings targets, energy audits and technical assistance, and time of use and utility-dispatched peak load reduction.

Dominican Republic*:* The Secretary for Industry and Commerce of the Dominican Republic has developed a National Plan for Energy Conservation for governmental offices, industries, transport, households, and businesses (Dominican Republic 2001). The plan is based on international experiences, including technical assistance from CONAE in Mexico.

[2] Not discussed here are a number of industrial (OECD) countries with strong government sector initiatives; for details see Borg et al. 1997.

The goal is to reduce overall energy expenses by 12%, and thus also reduce emissions of CO_2, SO_2 and NOx. The government plans to establish a National Committee on Energy Efficiency, to oversee training and information campaigns, a national program to replace incandescent bulbs with compact fluorescent lamps (CFLs), involvement of scientific and technical institutions, and the establishment of Energy Efficiency Units (UEE) to offer technical assistance to energy users. Within the governmental sector the goal is a 20% reduction in electricity costs. Plans include a coordinated program among the Energy Efficiency Committees to be created at each public institution. Other recommended actions will include:

- adjusting thermostats and controlling work schedules (to reduce building operating hours)
- cleaning light fixtures and unplugging unnecessary lights
- activating the power management features in desktop computers
- a training and awareness campaign for public employees

Additional actions will be taken to promote the use of solar photovoltaics and other renewable energy systems, under a Presidential Decree and funding provided by an added tax on fossil fuel sales (increasing annually, up to 5%).

Ecuador: The Ecuadoran government was recently awarded US$1.9 million from the Global Environment Facility (GEF) to support a series of energy efficiency projects during 2002-2006, with another US$4.9 million of local co-funding. In addition to residential and industrial sector programs, a small component focuses on public buildings. Executive Decree No. 1359-A, signed by the President of Ecuador in April, 2001, creates an energy reduction goal of 15% for public buildings. To achieve this goal, the Ministry of Mines and Energy (MEM) has initiated a pilot project aimed at replacing conventional lamps with energy-efficient lamps in public buildings that use more than 1000 kWh/month. The implementing agency is the Dirección de Energías Renovables y Eficiencia Energética (DEREE) within MEM (DEREE 2001).

Ghana: In response to the energy crisis of 1983/84, the Government of Ghana initiated an Energy Efficiency and Conservation Program to demonstrate the potential for energy conservation in industrial and commercial enterprises. Several programs were launched over the next 13 years, but received less than adequate attention. In 1997 the government began to implement energy sector reform with passage of the Public Utilities Regulatory Commission Act (Act 538) and the Energy Commission Act (Act 541). The key functions of tariff setting, energy sector regulation, policy formulation, and efficiency promotion were re-assigned from the Ministry of Energy to other institutions. Previously, public sector energy policy had focused on public ownership of the main electricity generation and distribution utility, with little if any consideration given to actual energy use by the public sector. However, the Ministry of Energy building (formerly Ministry of Mines and Energy) has since been used in at least two demonstration projects, the latest of which yielded energy savings of nearly 27,000 kWh and maximum demand savings of 351 kVA (Energy Foundation [ND]). As part of that case study, the Ministry organized workshops for its staff and managers of other government ministries to educate them on simple but effective housekeeping measures that can eliminate waste and reduce electricity consumption. Policy advocates are now promoting public sector energy efficiency, to include not only government buildings but also publicly owned industries and utilities, notably the Ghana Water

Company. To date, no formal program has been established although several are being proposed, drawing on US and international experience.

Korea: The Government of Korea created a national program for promoting federal energy efficiency, though agency participation was voluntary and no conservation targets were set. The "Rational Energy Utilisation Act" (1995) established a set of energy-efficient public procurement guidelines for local, regional and national government agencies. The guidelines cover 36 groups of products, including lighting equipment, motors, HVAC systems, windows, boilers, pumps, transformers, refrigerators, washing machines, televisions, cars, and office equipment. There is also a mandatory energy efficiency code for public construction by both central and local governments. No English translation of either code is available (Loozen 2001).

Malaysia*:* Under the Eighth Malaysia Plan (2001-2005) a new energy efficiency initiative will be implemented called the "Energy Management Program in Government Buildings" (Roy 2001). This program is aimed at improving energy efficiency in government buildings and facilities in Malaysia, and is seen as a vehicle for government leadership on energy efficiency which has been limited, to date.

Peru: In Peru's public buildings sector, an energy-saving campaign initially targeted 20 public buildings. Operational changes in the first stage were expected to result in energy cost savings that would be reinvested in energy-saving capital improvements.

Philippines: In 1997, the government initiated a program to reduce national energy use by 10% compared to 1993 levels. The program included energy-saving guidelines, audits, training of building managers, and demonstration of new technologies. Initial funding levels, however, were low, leading to an emphasis on introducing third party financing from Energy Services Companies (ESCOs). The final report of a cooperative project between the Philippines and the State of Hawaii, funded by USAID, recommended that:

> "…the Philippines government should institute an energy efficiency procurement policy, establish a program like the US Federal Energy Management Program, and implement joint venture model procurement contracting projects within the private sector." (USAID 1999)

In December 2000, the Philippine Department of Energy (DOE) officially launched its national energy-saving program, Enercon, which restated the requirement for all government agencies to reduce their electricity and fuel consumption by at least 10%. Agencies are encouraged to achieve this energy conservation goal through more efficient use of existing equipment and by purchasing more efficient equipment (e.g., for room air conditioners, a minimum 9.1 EER for units below 12,000 kJ/hr and 8.6 EER for larger units). To reduce fuel consumption, there are tips for preventive maintenance of vehicles, low-fuel driving habits, and a spreadsheet for tracking monthly fuel use. A savings of roughly P550 million is expected in 2002 (from a baseline government energy bill of P2.8 billion for electricity and P2.7 billion for fuel). (Philippines DOE [ND]). In April 2002, the Philippine DOE was awaiting signature of an Executive Order directing the institutionalization of a Government Energy Management Program (GEMP).

Russia: For several years, the Center for Energy Efficiency—CENEf—has been campaigning with Ministry of Fuel and Energy officials to transfer experience from the US Federal Energy Management Program (FEMP) to Russia. Ministry of Energy officials have expressed interest, and discussions are ongoing. Meanwhile, at least two laws encourage public sector energy management in Russia. The 1996 Law on Energy Conservation

encourages more effective use of energy resources and water by government-funded facilities. The 1998 law "Energy Conservation Russia" regulates energy expenditures and energy use in all sectors, but to date there has been little funding to implement this law. In 1998-1999, the Russian government initiated an energy efficiency program for federally-owned facilities. The Ministry of Fuel and Energy financed energy audits at 52 facilities within the 6 most energy-intensive Ministries. As a result of the audits, the Russian Energy Efficiency Agency estimates that low-cost measures in federal buildings could potentially save 30-60% for heat and 17-40% for electricity. A target of 20% in energy cost reductions was set, but due to political changes the project was never financed or implemented. However, the federal program Energy Efficient Russia (1998-2005), includes the following elements:

- Analysis of potential energy savings at the 52 facilities
- Development of normative guides for energy efficiency and a method of accounting for energy demand in these facilities
- Development of recommendations on rational energy use of energy resources in the federal sector
- Organization of a system to train engineers and technicians in energy efficiency

The Ministry of Education continues to move toward energy efficiency improvement in its buildings, with a workshop planned in spring 2002 to assess progress. Two federal agency roundtables are planned, to discuss the opportunities and obstacles to an energy-efficient purchasing program in Russia, based on the US DOE's FEMP program (Cenef 2002).

South Africa: Historically, South Africa has not faced energy shortages or high costs – at least as far as policy-makers were concerned. The Apartheid period suppressed demand from the disenfranchised black population, while public sector energy use and costs were not a factor in planning. Even recently, when government investment in facilities and services for the entire population has increased dramatically, very little consideration has been given to energy efficiency. This is partly a result of limited staff capacity, but also due to a surplus of low-cost electricity from coal-fired plants. As early as the 1980's, the South African utility ESKOM started to look into Demand Side Management, but with few results to date. Now, the Department of Minerals and Energy (DME) has officially been charged with pursuing energy efficiency, and the government's "White Paper on Energy Policy" has expanded the concept broadly. Additionally, the Department of Environmental Affairs and Tourism (DEAT) has taken up the idea of a public sector energy management program modeled on the US FEMP program. In light of the political reform in South Africa, the government is directing massive amounts of capital and resources to infrastructure development in areas and populations historically shut out by Apartheid. None of those funds or resources include any guidance on energy efficiency, even though large infrastructure projects may represent a 50 year commitment to energy consumption. This is of concern to ESKOM and others who have forecast a peak demand deficit as early as 2007, and a base load deficit soon after. DEAT expects to finalize the plan and implement the first phase in time for the August 2002 World Summit on Sustainable Development, which may have a strong positive influence on public sector programs throughout the African continent.

Thailand: As of 1997, large federal facilities in Thailand were one of the targets of compulsory energy conservation measures, requiring the appointment of an energy manager,

assessment of efficiency opportunities, and a savings program using best-available technologies.

The international survey now underway will continue to update the information on government sector energy efficiency programs in these and other countries.

Case Study: Leadership by the Government Sector in Mexico

While many countries may have overlooked opportunities to save energy in the government's own facilities, one important exception is the program in Mexico, led by CONAE, the National Commission for Energy Conservation. A series of projects aims at helping government agencies at all levels use energy more efficiently and set an example for the private sector, through energy audits and retrofits, training, and purchasing energy-efficient products. Two of these important CONAE initiatives are described below.

Energy Efficiency in Federal Buildings - From Energy Audits To Large-Scale Programs

In the early 1990s, CONAE started a program of energy studies and audits in different sectors, including the public sector at the federal level. In 1992, CONAE established a "Sub-Commission for Energy Savings in the Public Sector," involving twenty federal agencies, to address federal buildings and vehicles. By 1996, more than 120 energy audits and studies had been performed on federal buildings. Besides the learning process involved, this rich experience also showed that the largest potential for energy savings was in lighting systems.

Based on this experience, CONAE decided to launch a major, voluntary pilot program called "100 Public Buildings." The program design was based on the principle of "least transaction cost and increased certainty in the cost and quality of proposed measures" (de Buen 2000). From the start, the individual building operators were involved in the design and implementation of their specific projects. The audit and retrofit decisions were based on three different sets of data: lighting systems data, information from electricity bills, and on-site measurements carried out by CONAE's technicians.

Throughout the different stages of the "100 Public Buildings" program, CONAE provided training and technical assistance to building operators. These on-site personnel eventually acquired the theoretical and practical knowledge to conduct their own assessments under the supervision of CONAE staff. Ultimately, 90% of the building operators were able to perform their own data gathering. The operators also were trained in follow-up measures, including permanent monitoring of energy use, and operation and maintenance of the newly installed equipment.

Energy audits showed that more than 50% of the energy used in public buildings could be attributed to lighting systems. The existing systems were mainly fluorescent, but only about 16% were energy-efficient. By 1998, after assessing 90 buildings (800 thousand square meters and 135 thousand lights), CONAE concluded that if all the recommended measures were implemented, a total demand reduction of 21% could be achieved – equivalent to 19 GWh per year, or 3.5 MW of avoided generating capacity. The estimated investment of US$1.5 million would be recovered in 17 months.

The program showed the value of targeting two types of energy saving measures: *technological,* to upgrade or replace obsolete equipment, and *operational,* to improve the use of existing equipment with little or no capital cost. The program also showed the importance

of including building operators in the early planning stages. These building operators produced a reliable database of the physical and electrical features of each building, as well as indicators for tracking and comparing their energy efficiency.

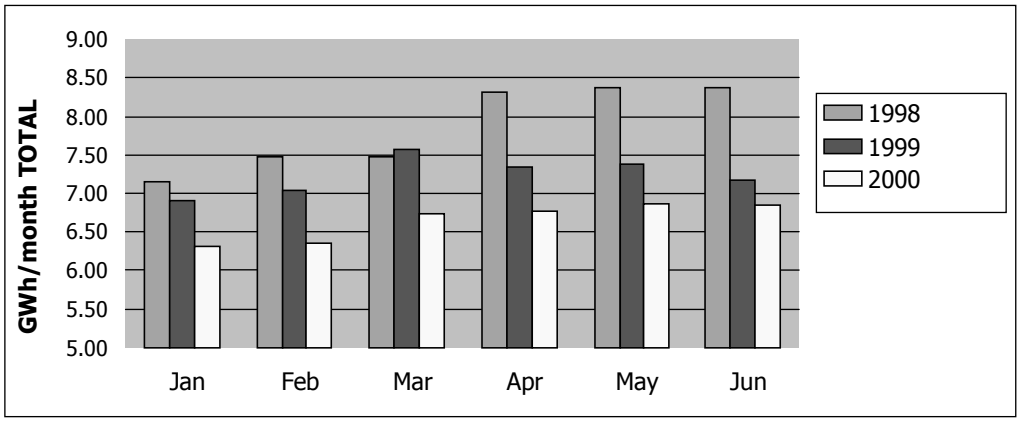
The "100 Public Buildings" program was not only a success on its own terms, but a precursor to the larger-scale Program of Energy Savings in Federal Buildings (APF) now underway. By the end of 1998, APF represented a response to the general push to modernize the public sector, along with tighter budgets and austerity measures by every major Ministry.

CONAE had to overcome certain challenges in order to implement the APF. First, CONAE had to develop and update its technical analysis tools and create even more automated procedures. Based on previous experience, CONAE knew that it had to involve in the decision process not only building operators, but also high-level officials in each Ministry, in order to ensure that energy efficiency measures could be implemented in *all* public federal buildings. Given its very large universe of operators and officials, the APF program was designed to link local building operators with analysis tools provided on CONAE's website (http://www.conae.gob.mx/). In some instances, where on-site staff lacked access to the Internet or found it difficult to use the on-line tools, CONAE began to create the "Ports of Attention" (see below) to provide proper training in using the Internet as well as direct technical support for energy-efficiency projects.

Through CONAE's website, interested parties can now find key information on building efficiency standards, building registration procedures, guides for operational savings measures, answers to frequently asked questions, and other technical assistance tools and information. CONAE developed an executable program (SIAPF) to automate the process of evaluating lighting systems and identifying energy-saving measures. SIAPF was so successful that it was later used by other large organizations (both public and private), state and municipal governments, and small and mid-size companies. Since 1999, the APF has continued to achieve better results each year, as more participants, tools, and training options are added to the program. In addition, participation in the program was made mandatory for the largest federal buildings. To monitor the program, a high-level government committee was formed in 1999, presided over by the Director of CONAE. There are also 106 Energy Savings Committees operating in different government agencies. By the end of 2001, close to 900 buildings were registered under the APF Program, representing about 4.6 million square meters of floorspace. After three years of operation, the APF program has achieved a reduction in energy use on the order of 100 GWh, saving the equivalent of US$7.4 million. **Figure 2**, based on data for 342 public buildings, shows a significant decrease in electricity use (averaging about 13%) for buildings participating in the APF Program.

From their relatively modest start in the early 90's under the "100 Public Buildings" pilot program, later evolving into the APF program, energy-saving activities in Mexico's government buildings have achieved significant results, not only in electricity and cost savings but also in terms of cooperation among different government agencies, training of personnel, and private sector investment opportunities for lighting designers and suppliers.

Figure 2. Mexico Public Buildings: Monthly Energy Consumption for 1998, 1999, 2000



CONAE's "Ports of Attention" - A Least-Cost Instrument For Technical Assistance

Among the most important and innovative activities launched by CONAE is a countrywide network of technical assistance resources serving all types of energy users, from residential consumers to large industrial and commercial consortia. CONAE has the mandate to provide technical consulting on energy efficiency for all the federal bureaus and offices throughout the country and, when required, can use its well-established network to extend these same services to local (municipal) and state governments.

About a decade ago, CONAE started providing technical assistance directly from its central office. Starting in 1993, these efforts were supplemented through regional delegations called Liaison Units for Energy Efficiency (U3Es), that now serve 15 different states and adjoining regions, where the regional managers work in close collaboration with local authorities and industrial associations (chambers). At their inception, the U3Es promoted energy efficiency by visiting a limited number of industrial and commercial facilities to perform walk-through (or "Level 1") energy audits – sometimes followed by more comprehensive studies to identify specific energy saving measures. The U3Es also have become active in training and in organizing local events together with private firms and state or municipal agencies.

Given the usual budget restrictions for both CONAE and the local organizations, and the growing national demand for technical assistance in energy efficiency, in 1997 CONAE set out a new strategy to widen the reach and scope of technical assistance activities. This strategy, called "Virtual CONAE," was centered on the use of the Internet to: a) link U3Es and their customers to other research centers, energy efficiency offices, and financing institutions, in Mexico and worldwide; and b) provide on-line technical assistance in the form of updated economic and technical information as well as software tools for evaluating energy efficiency projects.

To help implement the concept of Virtual CONAE, the agency began creating the "Ports of Attention" (PACs) to assist potential users who did not have access to the Internet; at that time this included many small firms and some offices of municipal governments. The PACs are very low-cost technical assistance units; each PAC requires only a computer connected to the Web and an operator. The PACs are typically located in educational institutions, industrial and commercial chambers, or government agencies. Each PAC is established through an agreement between CONAE and the interested party. Their basic

function is to assist energy users in identifying energy savings potential and evaluating the economic feasibility of specific measures. CONAE does not provide the PACs with funding for salaries, office space, or computers, but does supply training and back-up technical assistance. A few PAC operators are paid salaries, but many are students who are meeting their "social service" obligation (a graduation requirement in all Mexican universities). Others use a PAC assignment as an undergraduate thesis topic, and some get course credits.

Currently, the "National PACs Network" has more than 100 PACs in all 31 states of Mexico. One of the basic strategies outlined in CONAE's 2001-2006 Program will be to maintain and strengthen the network, in four main ways: a) signing more agreements with different institutions, b) additional operator training, c) increasing Internet support, and d) providing additional services, especially high-quality audits. After some time in operation, many of the PACs have developed a specialization in one or another field, generally related to the emphasis of the host institution. Thus, there are a number of PACs that now concentrate on industrial sector energy efficiency; others deal more with state and municipal energy issues; and some address relationships between energy and the environment.

Training PAC operators is an ongoing task for CONAE; to date more than 300 people have been trained on issues such as basic energy analysis methods, energy-efficient lighting (buildings and municipal), steam generation and production, and electric energy demand. CONAE's regional managers give direct, personal support to the PACs, but operators also use email to contact CONAE's central office staff directly for many of their requirements, and use their own Web page on CONAE's site.

The PAC approach provides a number of benefits to the participants. For energy users, they offer an accessible, local source of qualified and personalized technical assistance, and a "partner" they can continue to count on while developing energy efficiency projects. The sponsoring institutions receive recognition for their efforts, training from CONAE for staff or students, and access to technical assistance for their own needs. The individual PAC operators benefit from technical training and valuable work experience, while developing or strengthening professional ties to industrial firms and public agencies. CONAE itself has found the PAC network to be a highly leveraged way to implement energy efficiency projects and programs in both the public and private sectors, while developing a large number of well-trained young professionals and encouraging many of them to consider the field of energy efficiency. The system also encourages cooperation and coordination among the partners. By utilizing Internet services, the PAC program has reduced costs and increased quality in the delivery of energy efficiency services.

Discussion - Lessons Learned

Some useful observations are beginning to emerge from several sources: the many years of experience with public sector energy management in countries such as Mexico and the US, initial findings of our international survey, and comments from those involved with recent initiatives in developing countries. While the list continues to evolve, some initial findings include the following:

Most Common Program Elements

Public sector energy management strategies most often pursued in developing countries include:

- setting quantitative targets or goals (but not always accompanied by specific actions or resources);
- energy audits of public buildings;
- creation of energy management committees; energy-saving retrofits of buildings and municipal lighting; and
- increased emphasis on proper equipment use and maintenance.

To a lesser extent, countries have experimented with training and awareness campaigns for public employees, third-party financing through Energy Service Companies (ESCOs), and purchasing guidelines for energy-efficient products.

Additional Opportunities

A number of other strategies with significant potential are often overlooked when developing countries create public sector energy management programs. These include:

- broad-based and easily accessible guidelines for purchasing energy-efficient products;
- support for an emerging ESCO industry, led by a government market for third-party financing of energy-saving projects;
- improved metering of energy use at the facility level, performance tracking and benchmarking, and feedback to building operators;
- meeting or exceeding energy-efficient building code requirements in new government construction or renovation;
- individual or agency-level recognition for best-practices, and financial incentives such as agency retention of a share of energy cost savings.

Characteristics of Successful Programs

The more successful public sector energy management programs seem to share a number of characteristics, although details may vary widely due to local circumstances. For example:

- It is important to have a clearly stated, written policy to indicate support from the highest levels of an agency or governmental jurisdiction.
- However, merely adopting a policy statement is not enough. The policy must be clearly (and repeatedly) communicated throughout the administration and translated into operational actions with clear accountability and means of measuring progress.
- Finally the policy and program guidance must be accompanied by adequate resources – both funding and staff time – and other tools (such as technical information, changes in administrative rules, etc.) that make it possible and easy for staff to comply.
- Effective energy-saving strategies generally will include an appropriate balance of both technological (hardware) investments and non-capital, operational measures. Investing in hardware upgrades without parallel investments in human resources (training and improved skills) is a likely recipe for disappointing results.

- Programs benefit the most when both on-site building operators and high-level officials are brought in at the early planning stages.
- Two or more program elements can often work in a complementary fashion, if this is part of a carefully planned and staged program. For example, energy efficiency labeling contributes to successful public procurement programs, since labels give government buyers a quick and easy way to identify and specify efficient products. In turn, government purchasing strengthens labeling programs by providing a strong core of buyer demand for efficient, labeled products.
- Similarly, clear energy efficiency labels for building equipment can make it easier to ensure compliance with energy-efficient building codes, for government buildings and private construction alike.
- Sometimes the strongest impetus for improving energy efficiency (in the public sector and elsewhere) may come from non-energy policies: a strong government commitment to reducing air pollution or greenhouse gas emissions, a drive to develop domestic industries or to reduce dependence on foreign oil, or a movement to reform and modernize government procurement mechanisms and other aspects of public administration.

Beyond the Public Sector: Market Transformation

By itself, transforming federal government purchasing to emphasize energy-efficient products would represent a significant accomplishment, and would contribute to direct cost savings in federal facilities and operations. When closely coupled to an array of other market-oriented programs, however, energy-efficient purchasing can potentially set the stage for a much broader and more sustained market transformation.

One key point bears repeating: this coordinated approach to market transformation depends on establishing *common technical criteria for energy efficiency*, in order to provide a clear and uniform signal to the market. These criteria may cut across traditional program boundaries. An important part of the federal strategy is to enlist other levels of government, as well as non-governmental purchasers, to voluntarily adopt the same energy efficiency criteria for their own purchasing.

Government purchasing policies will have more impact if they are part of a visible, open process that encourages active participation by these other, non-federal purchasers. Maintaining good communication with government vendors and manufacturers is equally important, in order to better identify new opportunities, resolve any performance problems with newly introduced technology, and help ensure that energy-efficient products will be available in adequate quantities to meet the demands of government buyers and others.

Market leverage increases in direct proportion to the stability and predictability of signals from major buyers -- not just the scale of their purchasing. The more reliable the demand for efficient products, the easier it is for manufacturers and distributors to prepare to meet this demand, and the more profitable it will be for the private sector to introduce or expand a line of more efficient products.

Conclusion

Government facilities and services are often the largest energy users and major purchasers of energy-using equipment within a country; government expenditures typically

account for at least one-fifth of the GDP in industrialized countries, and close to that level in developing countries. Based on the opportunity for energy savings in this sector and the potential for government "leadership by example," public sector energy management deserves more emphasis as a policy option, particularly in developing countries.

Experience in the US and Mexico, and preliminary results from more limited programs in other countries, have shown that the government can take an active and explicit role in shaping the market. Focusing government design and construction practices, facility operations, and procurement on energy-efficient products and services can create a strong, sustained, buyer-led shift in the market toward energy efficiency. With continued support from USAID and other sponsors, LBNL, the Alliance to Save Energy, and CONAE will continue to compile information on and learn from existing policies and programs, and will seek out opportunities to assist other countries in initiating public sector energy management programs.

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