Less Is More! Energy Efficiency as a Strategy for Energy and Environmental Policy in Mexico and South Africa

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ABSTRACT

Emerging countries have much to gain from incorporating energy efficiency and conservation into their future energy planning. Rapid energy demand growth and accompanying capital investments and rate subsidies are draining governments' capacity to address other pressing social needs. A carefully crafted integration of energy efficiency and conservation into current supply-focused future energy policy can better serve society at a cheaper cost.

This paper draws upon the experience with energy efficiency in Mexico and South Africa, two emerging economy countries that have established an energy efficiency infrastructure that is primed for significantly addressing their energy constraints in a more socially beneficial fashion.

The paper ends with a generalized discussion, drawing on the Mexican and South African experiences, to provide guidelines for other emerging countries so that they can all capture the benefits of embarking in energy efficiency as a key component of their future energy sector development.

Introduction

Mexico and South Africa power sectors share common challenges. They both face rapid electric demand growth that requires significant investment. Both have mostly public power systems. The crunch for capital has focused energy policy discussions around whether to allow private investment to cover future investment needs. Demand-side opportunities have not been adequately explored nor funded, despite the development of a relatively advanced institutional framework for energy efficiency. This infrastructure includes both internal and external institutions and links between these.

Mexico, with 40 GW of mostly public power, is facing the need for another 50-60 billion dollars investment over the next decade and spends over 2 billion dollars annually in subsidized tariffs (SENER 2003). Over the past 4 years, two opposing party administrations have proposed and implemented the opening of the previously exclusively public power sector to private investment. Laws have been passed since 1992 to circumvent the Constitutional prohibition to private electricity generation. Forgotten in all these discussions are the energy efficiency infrastructure and demand-side results obtained over the past 15 years. The National Energy Savings Commission (CONAE) and the Energy Savings Trust Fund (FIDE) have carried out a variety of energy efficiency programs addressing all customer segments via a broad gamut of intervention strategies. Yet, future energy policy still sees energy efficiency as an exogenous parameter (Friedmann and James 2003).

South Africa consumes about 40% of the total electricity demand of the African continent and is a major contributor to the carbon emissions per capita. Compared to countries of similar economies South Africa is highly industrialized and its energy-intensive industries like mining and minerals beneficiation contributes to its high use of energy per unit of economic output

(Davidson et al 2003). Yet, like many emerging countries, it faces the challenge of balancing its energy needs to sustain and grow its economy, protect the environment, and reduce poverty while increasing economic prosperity.

The Energy and Development Research Center (EDRC) and the Energy Research Institute (ERI) at the University of Cape Town have been working to make a difference since 1989. Eskom, South Africa's electric utility, initiated the South African mass electrification program in 1991. This initiative in concert with the South African Reconstruction and Development program and other government programs have increased electrification to over "2.5 million homes, provided access to electricity from 35 percent in 1990 to 63 percent at the end of 1998" (Spalding Fecher 2000). These changes were driven by the need to provide clean, safe, low-cost energy to low-income households. They were also driven by the need to provide electrification to the rural black municipalities where the majority of the population had no electricity. By 1999, 46% of South Africa's rural and 79% of its urban populations had access to electricity. Ninety-one percent of the installed electricity generation capacity (48 GW) came from coal-fired plants that contribute 61% of the national CO2 emissions (Dubash 2002). In 2004, South Africa is trying to balance its social, economic, and environmental priorities by pursuing ways to realize the potential of renewables and energy efficiency to protect the environment and sustain its development.

Energy Efficiency Infrastructure

Over the past 15 years, both countries have engaged in public promotion of energy efficiency in a sustained fashion. Over time, networks have been established with private market actors, evolving into a more complex and mature market. Yet many obstacles still remain before a mature energy efficiency market exists that does not require public support.

Mexico's Energy Efficiency Infrastructure---Maturing and Under-Appreciated

Mexico has a growing energy efficiency infrastructure (see Table 1).[1] The public sector (especially the Comisión Nacional de Ahorro de Energía-CONAE, and the Comisión Federal de Electricidad-CFE with financial backing from the Fideicomiso Para el Ahorro de Energía-FIDE), continue to be the main promoters and funders of energy efficiency activities. Local and foreign academic and public research institutions provide key technical and policy research for energy efficiency programs. Amongst the most involved are: the Universidad Nacional Autónoma de México, the Universidad Autónoma Metropolitana, the Energy & Resources Group of UC Berkeley, the Lawrence Berkeley National Lab-LBNL, the Instituto de Investigaciones Eléctricas-IIE, and the Instituto Mexicano del Petróleo-IMP. The Secretaría de Energía-SENER, incorporates energy-efficiency program results into national energy policy.

[1] See following URLs for more information: www.sener.gob.mx; www.conae.gob.mx; www.fide.mx; www.funtener.org; www.conservaenergia.com.

Table 1. Key Institutions Involved in Mexican Energy Efficiency Efforts

Institution	Main Roles, Responsibilities and/or Goals
Public	
CONAE	Coordinate Federal Efforts, fosters public-private collaboratives
CFE	Main public electric utility. Supports and runs efficiency programs
SENER	Secretary of Energy. Formulates energy policy
Private	
ANFAD	National Assoc. of Appliance Manufacturers. Involved in any appliance energy efficiency standards setting
ANFEAA	National Assoc. of AC Manufacturers. Involved in any AC energy efficiency standards setting
CANACINTRA	National Chamber of the Transformation Industries. Manufacture equipment whose energy efficiency is targeted for improvement.
CANAME	National Chamber of Electric Equipment Manufacturers. Manufacture equipment whose energy efficiency is targeted for improvement
Academic	
IIE	Core research on electric energy efficiency; e.g., technical documentation for minimum efficiency standards; evaluation of programs impacts.
IMP	Core research on petroleum energy efficiency
UNAM, UAM, ITESM, etc.	Various groups working on technical, economic, social, and policy energy issues
Foreign/other	
USAID	Supports foreign technical assistance and efficiency potential work
IDB	Loan to FIDE for 23.4 M$ for energy efficiency
UC Berkeley	Energy efficiency policy research
LBNL	Support for minimum energy efficiency standards, policy research, etc.
ASE (CLASP)	Support with minimum energy efficiency standards
Hewlett Foundation	Support efficient transportation to improve air quality in Mexico City

Over the years, institutions and their roles and approaches to promoting energy efficiency have evolved. Early public sector efforts that focused on providing information gradually evolved to reaching out to doing collaborative efforts with private, academic, and foreign actors. Even the people running the programs—initially engineers, have later on, brought onboard people with more market expertise—as a realization that the technical issues are not the largest barriers to uptake of efficiency by customers. Financing—in a credit poor country, for example is a key barrier that has been addressed with program evolution and is now provided by FIDE, and to a lesser extent CFE, and CONAE. In essence, programs now attempt to address the four main barriers to energy efficiency uptake: awareness, availability (of energy efficiency equipment), accessibility, and affordability. A short history of the evolution of the Mexican efforts follows.

Early efforts addressed awareness as part of CFE's social commitment. Energy efficiency efforts in Mexico began post the second oil crisis. In 1992, the Programa Nacional de Utilización Racional de los Recursos Energéticos (PRONURRE) was created within the Comisión Federal de Electricidad (CFE—Mexico's main public utility) to promote energy conservation. CFE, created in 1937 to provide electricity for all Mexicans, has always seen itself as an institution that takes into account social needs. CFE sees its prime role as one of ensuring that society has

an increasing supply of electricity to fuel economic development. There is even an expression "mejor que so-sobre a que fa-falte" (better to have too much than not enough), that aptly describes the CFE vision. In PRONURRE, CFE was attempting to enhance customer's wellbeing after realizing that customers needed to be informed about how they could conserve energy. During its seven years, the PRONURRE mostly focused on conservation, trying to educate customers. Its main efforts were elaborating informational materials; partly because it was never funded at a level that could allow for more in-depth interventions or services.

Public institutions were created to manage the increasing energy efficiency work. In 1989, as part of the incoming Salina's administration technocratic view that wanted to promote further efficiency in government, the Comisión Nacional de Ahorro de Energía (CONAE) was created. Its role was to coordinate efforts within government and society, to use energy more efficiently. As a response to its creation, the PRONURRE was renamed PAESE as CFE attempted to align itself with the Presidential agenda. Over the next couple of years neither institution had resources to do much. PAESE began to test programs geared to customers by promoting compact fluorescent lamps (CFLs) among residential customers, in part, thanks to private CFL manufacturers own interests in doing so, and with foreign interveners fomenting and serving as catalysts to their joint activities (Friedmann 2000). In 1990, the FIDE was created to provide funding for the increasingly more complex and successful PAESE efforts. FIDE was set up as a revolving trust fund for energy efficiency efforts (similar to the public benefits charges that many jurisdictions in the USA set up in the later 1990's). The seed funding came from a variety of contributions: the providers of electric equipment to CFE, the utility unions, and CFE itself, totaling 0.7% of total CFE purchases. FIDE was a quasi-private entity—with its board of directors coming from the entrepreneurial sector, and its first President, also being the CEO of ICA—Mexico's largest construction company. In 1998 FIDE's funding was augmented by an Interamerican Development Bank loan of 23.6 million dollars (to be matched by FIDE).

With institutional maturity, a focus on availability, accessibility, and affordability also occurred. As FIDE, PAESE and CONAE delved more and more into what was found to be a very fertile field, redefinitions of their roles and scopes of work were required. This became particularly clear during the tenure of Guillermo Fernandez de la Garza, the second Technical Secretary of CONAE (1991-1993). His dynamism and willingness to try out policies and programs that seemed possible led to an ever increasing range of activity and increasing budget—most of which came from foreign donor sources. During his last year at the helm of CONAE, Guillermo Fernandez de la Garza had set in place the initial energy efficiency standards, a program to improve the efficiency within the public sector, efforts to promote summer savings time, cogeneration (especially within PEMEX, the Mexican public oil company), and a variety of localized CONAE outreach offices in various States. FIDE and PAESE, worked more in tandem—with PAESE trying to identify residential projects and FIDE funding them (as well as efforts in other sectors). Eventually, CONAE was left in charge of promoting non-electric energy efficiency, except for programs geared to public institutions, Summer-savings time, and minimum energy-efficiency appliance standards. FIDE was given the role of promoting electric energy efficiency among end-users—mostly through information and incentive programs to customers. PAESE has been relegated over the years to become a facilitator to FIDE programs, and a promoter of energy efficiency within the electric utilities.

Thus, when FIDE needs to set up sales booths in cities served by CFE, PAESE helps this happens. For many years, the head of FIDE was also the head of PAESE.

During the ensuing years, the private sector has become more involved with energy efficiency. The main lighting manufacturers set up assembly or production plants in Mexico—for example, CFLs and, also, high-efficiency refrigerators and AC. In energy efficiency, the entrepreneurial sector has found a fertile ground for expanding their markets. Indeed the minimum energy-efficiency refrigerator standards that CONAE had set up by 1995 saved the Mexican residential refrigerator manufacturers. When the internal market imploded in 1995 due to the economic crisis, Mexican manufacturers found a lucrative market in the USA, and were able to protect their internal market share, as their key competitors, the South Koreans, had equipment that did not meet the standard's minimum energy efficiency requirements.

Many of the Mexican efforts drew upon foreign experiences and funding. Indeed, the USAID, the GTZ, and other international aid organizations as well as various academics working on Mexico's energy sector helped forge strong venues for the exchange of ideas on energy efficiency and conservation efforts. If initially Mexico mostly learned from what had happened elsewhere, it quickly was implementing rather complex energy efficiency programs that were providing ideas being used by foreign parties in their own countries' efforts.

The success was partly due to the stable leadership and staffing at FIDE and later on, also CONAE. Mateo Treviño has led FIDE since its inception. CONAE was fortunate to have Odon de Buen at the helm for six years (and four different Energy Ministers). Both were able to keep a core of human capital that is well versed in the technical, political, and social aspects that must be addressed effectively to be enhance the success of energy efficiency programs.

Going forth: new paradigms to tap into the energy efficiency infrastructure. Today there is a significant capability within government, private sector (chambers of commerce, industry associations, entrepreneurs, joint-ventures), academia, and international links, to carry out energy efficiency in Mexico.

Lacking still is the full inclusion of this infrastructure and the potential it provides for meeting future demand growth into the energy sector planning. Even after more than a decade of efforts, energy policymakers are still of the belief that the country needs more and more energy per capita to become a developed country.

The paradigm that national development can be attained in a more sustainable fashion by ensuring optimal use of resources (including energy) is still not part of energy policymaking. Indeed, most policymakers, would find totally unrealistic Goldemberg's late 1980s vision of developing countries attaining standards of living similar to those of the European countries in the 1960s with only 1 kW/capita. Energy policy still is based on a paradigm that believes that Mexico will only become developed by tapping into much more energy than it does today. Indeed, the need for new supply is perceived so great (about 5 billion dollars per year for electricity supply enhancements alone), that the last three administrations have been attempting to modify the Mexican Constitutions ban on foreign and private ownership of electric generation, transmission and distribution. Unfortunately public energy policy debates focus only on how to ensure sufficient expansion of the electric supply, ignoring the option of energy efficiency and conservation. Furthermore, this perpetuates the insufficient resources and attention provided to energy efficiency.

South Africa's Energy Efficiency Infrastructure---Still at the Early Stages and Still Much Appreciated

Energy has historically been at center of South Africa's economic infrastructure development. Fueled by a national energy policy driven to be self-sufficient under apartheid and restricted by an international oil embargo in the 1970s and 1980s, the South African government invested heavily in building cheap coal-fired power plants. In addition to coal fired generation there was also a focus on the production of synthetic fuels given the global social and political changes. Electric power generation accounts for nearly 90% of South Africa's coal consumption and 75% of the total energy consumption (as of 2001) is from coal. These factors are prime contributors to air and groundwater pollution, and industrial waste.

In 2004, as South Africa moves into its second decade of post apartheid, its "social and economic development priorities and its self-assessment of the need for electricity sector reform is highlighting the potential role of energy efficiency as a resource. Key institutions that have contributed to South Africa's evolving energy infrastructure are described in Table 2 below[2].

Like Mexico, South Africa energy policy began in the late 1980s and was driven by the needs that drove the rest of the world's concern in the 1970s - the oil crisis. Unlike Mexico, apartheid South Africa was isolated from the 1970s oil crisis yet faced political isolation by the international community. Given these circumstances, the South African government focused on addressing the country's needs for development and security. Out of these needs, Eskom, the state-owned utility, and Sasol, the state-owned synthetic fuel producer, were established to exploit the country's large coal reserves. The oil crises of the 1970s and 1980s led the South African government to create academic research centers, such as the Energy Research Institute (ERI) at the University of Cape Town to address energy concerns. ERI was tasked with conducting supply-side-focused techno-economic research. In 1982, the Department of Mineral and Energy was created and was later replaced with the National Energy Council to direct energy policy.

Energy Efficiency had its beginnings in South Africa with the establishment of the Energy Development and Research Center (EDRC) at the University of Cape Town (UCT). In 1989 EDRC was founded through an agreement between the National Energy Council and the Energy Research Institute at UCT. EDRC was tasked with the mission to address developing areas energy issues. Emphases were placed on the technical and social concerns of energy demands in low-income rural households (Marquard 1999). The Center's work also focused on other concerns such as the development of reliable photovoltaic systems.

[2] See following URLs for more information: www.eia.doe.gov/cab/safrica.html; www.treasury.gov.za

Table 2. Key Institutions Involved in South African Energy Efficiency Efforts

Institution	Main Roles, Responsibilities and/or Goals
Public	
Eskom	The South African state-owned electric utility, runs efficiency programs
DME	Department of Minerals and Energy, set energy policy pre-1988
NEC	National Energy Council, replaced the energy branch of DME from 1988 to 1992. NEC had more resources and more autonomy
Private	
Sasol	A partly private (1979) synthetic fuels company set up to produce petroleum products from coal to counter the effects of the 1970s and 1980s oil embargo against South Africa
Academic	
ERC at UCT	Energy Research Center at the University of Cape Town, created in 2003, merged the previous energy policy research efforts of the Energy Research Institute (ERI) and the Energy and Development Research Center (EDRC)
CAREDA	The Cooperative Assistance for Rural Energy and Development in African Program, a cross-cutting program; includes energy efficiency
SEED	Sustainable Energy, Environment and Development Program, focused on sustainable energy in housing developments for low-income communities.
EPRET	The South African Energy Policy Research and Training Project, tracks energy use.
Foreign/other	
OECD	Organization for Economic Cooperation and Development, supports energy efforts of EDRC, Eskom, and others.
DCED	Danish Cooperation for Environment and Development, supports the SEED program.

Under the reorganization of EDRC in 1996 to move more towards energy policy, the RAPS program (that focused on solar home photovoltaic systems) was abolished and succeeded by CAREDA where the energy efficiency and environmental research continued. Energy efficiency was refocused from renewables research to rural community electrification. The Sustainable Energy, Environment and Development Program (SEED) became the core effort of EDRC and the Danish Cooperation for Environment and Development. SEED addresses both urban and low-income rural communities. In these projects, SEED focused on sustainable energy for housing developments for low-income communities while building partnerships with local municipalities and other housing initiatives.

As EDRC was reframed to address energy policy, the Energy Policy Research and Training Project (EPRET) was formed as a way to develop "a sound understanding for the role of energy efficiency in provision of energy services to low-income households, and the potential environmental impacts" (Marquard 1999).

Under EPRET, energy efficiency was seen as a cheaper resource to provide poor households with their basic energy services. EPRET enhanced poor households awareness, accessibility, and affordability of energy efficiency. As a result, energy efficiency became the

central link between ensuring efficient electrification of households and reducing the environmental climate change impacts.

Energy Efficiency Strategies

Mexico's Rich Variety of Energy Efficiency Programs

Mexico has a wide variety of programs promoting energy efficiency. In 2003, the programs are expected to save 15 TWh, or about 9% of current electricity sales. By 2012, it is expected that the savings will add to 36 TWh, or about 13% of the sales projected for that year. Table 3 shows the savings from each of the 7 main program categories (SENER, 2003). We describe each of these program categories briefly below.

Table 3: Mexican Demand-Side Energy Efficiency Programs: Energy Savings in 2003 and 2012

Program	Energy Savings GWh		Demand Savings MW	
	2003	2012	2003	2012
Min. Appliance Standards	10,806	28,053	1,886	5,404
Summer Savings Time	1,175	1,575	919	1,013
Installation Programs	1,017	1,427	243	339
Agricultural Sector	885	1,404	210	330
FIDE Incentives	1,083	1,969	481	853
Residential	514	1,817	228	551
Federal Buildings	119	188	11	17

Minimum energy efficiency equipment standards. By 2003, Mexico had 16 minimum energy efficiency standards for electric motors, refrigerators, air-conditioners, clothes washers, pumps, etc. The CONAE supervises the committees that design the standards and their testing procedures. CONAE in coordination with various certification and testing institutions also ensures compliance with the standards. These standards were expected to save 11 TWh and 1,886 MW in 2002. By 2012, the savings would grow to 28 TWh and 5,004 MW.

Summer savings time. The Summer Savings Time is the simplest measure for reducing peak electricity demand due to lighting. Despite some political opposition to the application of this measure, it continues to be applied on a yearly basis. Between 1996 and 2002, this measure has saved 7,380 GWh and 900 MW of peak coincident demand.

Installation programs. In the Installation Programs, CONAE and FIDE offer large energy consuming installations (small and medium businesses, large corporations, and municipal and state buildings) with a variety of programmatic offerings. FIDE provides various financing options for carrying out feasibility studies, as well as the instrumentation of energy efficient measures (EEMs). CONAE provides technical assistance as well as methodologies to allow customers to design and develop integral energy efficiency programs in their installations.

Agricultural sector programs. The agricultural sector programs seek to improve the efficiency of water pumping and substitute incandescent lighting with fluorescent lamps in the poultry

farms. Agricultural pumping is about 4.7% of electricity sales. On average, about 40% of the electricity can be saved by rehabilitating the agricultural pumps. By 2002, 13,610 agricultural pumps had been rehabilitated, and over 1.6 million CFLs had been installed in poultry farms. Another 10,000 agricultural pumps are slated for rehabilitation by 2012.

FIDE's incentives program. FIDE's incentives program goal is to promote the use of high efficiency equipment and the markets for high efficiency electric motors, air compressors, T-8 lamps and electronic ballasts by giving customers monetary incentives for the purchase of such equipment. By the end of 2002, FIDE had provided incentives for 182,263 high efficiency motors, 1,109 air compressors, and 4 million commercial and industrial lighting equipment projects (FIDE 2003).

Residential sector programs. Three main efforts address the residential sector's needs: the minimum energy-efficiency appliance standards, the various energy-efficiency programs, and the promotion of an energy-conservation culture. By 2002, over 79 thousand homes had been insulated (mostly in the hot northwestern parts of Mexico), 39 thousand air conditioners had been replaced with efficient units, about 13 million incandescent bulbs had been replaced with CFLs, and over 90 thousand home energy audits had been conducted. During 2003 the efforts will be strengthened, with the goal of insulating another 21 thousand homes, replacing 56 thousand air conditioners with efficient units, replacing another 1.4 million incandescent bulbs with CFLs, doing another 74 thousand home energy audits, and substituting 23 thousand refrigerators with efficient units.

Federal buildings program. Finally, CONAE also has been promoting the enhanced efficiency in Federal buildings. Between 1999-2002, 900 federal buildings of over 40 million square feet of office space, participated in this program. Savings of almost 11% were observed, with a reduction from 104 to 94 kWh/m2-year.

Supply-side energy savings program. Mexico also works to save energy in the supply side, by promoting cogeneration and renewable energy technologies. Only cogeneration is described here. CONAE estimates the cogeneration potential to be between 8,360 and 15,670 MW. A significant portion of this potential lies within the oil production and refining done by PEMEX. As of 2002, over 2 GW of cogeneration were operating. Still challenging is connecting these systems to the national electric grid.

Energy Efficiency Has Taken a Strategic Position in South Africa's Energy Sector

The country's economic growth is tied to energy production and use just as much if not more than it was during the apartheid era. This strategic role for energy efficiency is best understood in the context that South Africa as the most industrialized country in Africa and with over fifteen million people has "only about two-thirds of the households are connected to the power supply grid" (Davidson 2002).

South Africa's energy efficiency strategy encompasses programs focused on peak load management. Consumers are introduced to efficient CFLs, motors, reflective roofs, as well as renewable and solar energy. Energy efficient programs are expected to save 1,000 MW by 2005. Programs include for example, a household initiative to replace incandescent bulbs with CFLs.

"The Global Environmental Facility and Eskom targeted all households with the intention of installing around 18 million compact fluorescents over 20 years. Eskom estimates a total energy savings of 4 TWh per year" (Davison 2002).

These energy efficient programs are expected to contribute to South Africa' social and economic development by increasing job growth and its environmental goals by reducing carbon dioxide emissions by approximate 1.5 million tons of carbon in 2010 (Winkler et al 2002).

Energy Efficiency Programs in South Africa

Energy efficiency is central to South Africa's social and economic development just as electricity supply is vital to the country's commercial, agricultural, industrial, and transportation development. The diversity of South Africa's energy efficiency programs is exemplified is some of the programs and their potential impacts listed below (Davidson et al 2003).

Residential energy efficiency programs. Energy efficiency housing efforts include incentives for "damp-proofing" homes to provide higher efficiency cavity walls, plastering and ceilings. Eskom's residential programs address peak load demand with efforts such as raising residential efficient in cooking, lighting, refrigerators, space heating and hot water systems.

The efficient lighting initiative. This co-funded program between the Eskom and the Global Environmental Facility intends to install 18 million CFLs over 20 years.

Commercial lighting. This project aims to replace 50 thousand 100W incandescent bulbs with 11W electronically ballasted CFLs at several mines.

HVAC retrofit. A retrofit of the HVAC system at The University of Pretoria library reduced its energy consumption by 37%.

In addition to these energy efficiency experiences in South Africa, the country and its institutions are looking to policies and energy efficiency end-use measures as ways to efficiently use its energy. These activities include employing tax credits and subsidies for residential and commercial sectors, appliance labeling and establishing minimum efficiency equipment standards, in particular for low cost housing. There is also an appreciation for raising awareness about energy efficiency in households and promoting efficiency awareness among industrial, commercial, and transportation sectors.

The Future—More with Less? Or Less with More?

Energy efficiency and conservation have the potential to be the main resources to accommodate expected energy demand growth and even short-term energy supply shortages in developing country contexts like Mexico and South Africa. By fostering energy efficiency, countries can improve their international competitiveness, create an entire new source of employment, reduce the need to use scarce government capital for continued growth of the energy sector, while reducing the current large subsidies in tariffs.

Capturing the full benefits of energy efficiency and conservation will not be automatic. A strong infrastructure, comprised of both public and private institutions, is needed. It will also

require a paradigm change among energy policy makers—to allow for the full entry of demand-side options into their energy policymaking.

Among key actions to consider are:

- Increase funding for studies to identify energy savings opportunities and obstacles.
- Establish methods to fully integrate demand-side and supply-side options.
- Establish an ongoing evaluation infrastructure—to both determine the savings impacts and also, provide information to continuously enhance the energy efficiency programs.
- Establish procedures to ensure an equal playing field for energy efficiency and conservation with supply side options; instituting all-resource bidding for future energy sector development.
- De-link public utility budgets from energy sales.
- Promote the manufacturing of energy-efficient products and services.

Perhaps the most difficult change will be the paradigm switch from one where energy policy is focused on ensuring sufficient supply, to one where all resource options are considered in an integrated vision that leads to more sustainable energy policies.

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