OPPORTUNITIES FOR INTERNATIONAL POLICY AND PROGRAM DEVELOPMENT

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National Association of State Energy Officials (NASEO), founded in 1986, is a nonprofit organization whose membership includes energy officials from the State and Territory Energy Offices and affiliates from the private and public sectors. NASEO is the state and territory energy officials' Washington voice on national energy issues-informing Congress, the administration, and regional and national organizations about the specific energy priorities and concerns of the states and territories. NASEO meetings and communications offer a forum for energy officials, policy makers, and others to exchange information and discuss important energy issues that have both regional and national implications.

The Export Council for Energy Efficiency (ECEE) was formed in 1994 to promote the global use of energy efficiency products and services, in partnership with US companies and state officials, by increasing the awareness of their economic and environmental benefits. ECEE is a non-profit consortium of five of the nation's leading advocates of energy efficiency: the Alliance to Save Energy; the International Institute for Energy Conservation, the National Association of Energy Service Companies, the National Association of State Energy Officials, and the Solar Energy Research and Education Foundation.

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PREFACE

An increase in the demand for energy efficiency products and services by emerging economies nations (EEN) will: a) improve the EENs economies; b) reduce EENs air emissions including CO^2 ; and c) increase the potential market for U.S. energy efficiency products and services.

The EENs are primarily concerned about their economies; global environmental groups are concerned about CO^2 emissions; and United States energy companies are concerned about serving this potential market. Each of these groups' interests are served if the energy efficiency products and services market in EENs grows rapidly and can be easily served.

The energy efficiency products and services markets in the United States were grown and shaped, in part, by federal and state energy policies and their resulting programs. Government's role in this market was key to its formation. The role of the government in the energy efficiency market of most EENs is even more direct than it was in the United States. If energy efficiency required a government policy to jump start it in the United Sates; one should expect EENs would require a similar and perhaps (given a less dynamic market) more vigorous jump start. Moreover, initial efforts by multi-lateral development agencies have demonstrated that much more than financing is required. The implementing and supporting government policies and resulting programs must also be developed and implemented if the market for energy efficiency products and services are to take root and grow in many EENs.

Policy development and implementation is more art than science, with prior experience being of greatest value. The state energy offices (the primary implementers of U.S. energy policies) and the U.S. government and private sector generally, have implemented pro-energy efficiency policies and programs and developed staff with considerable expertise in energy efficiency policy development and program implementation. This experience has been and can continue to be tapped to assist EENs in the development of policies that foster dynamic and competitive energy markets that are receptive to energy efficiency products and services. Peer exchanges, model policies, proof of concept materials, reference documents, advise and counsel from objective parties (i.e., state government official recommending to a foreign government official "if I were you I would . . . ."), and concept verification are all vital to ensuring that EEN staff are able to advance sound energy efficiency policies and programs.

Government officials in the EENs are often wary of foreign experts–many of the officials having encountered experts that are directly or indirectly selling services or products rather than sound advice. These officials are interested in exchanges with government energy officials that agendas which are similar to their own–acting in their citizens best interests.

Other developed and savvy export-oriented nations have long-known that the export of goods and services are often dependent upon favorable, rationale policies and regulations in the host country. The export of U.S. energy efficiency products and services can likewise be significantly enhanced by the development of supporting policies and programs in EENs, especially if the policy

assistance is provided by U.S. state, local, and federal experts. Other nations (e.g., Canada, Britain, France) aware of the linkage between EEN policy development and the resulting market development; assume a greater market share for their goods and services will follow due to their government-to-government involvement.

The EENs energy efficiency policies are similar to those developed in the U.S.; tax policies beneficial to energy efficiency investments; financing policies providing support for innovative financial packages; minimum efficiency standards for buildings and equipment; electricity utility load management and efficiency programs, equipment efficiency labeling programs; cogeneration incentives; energy service company (ESCOs) development incentives; and various delivery mechanisms for high efficient equipment, systems and buildings demonstrations and financial support. There is considerable pressure from the world community for the EENs to become more energy efficient and reduce air emissions. The U.S. energy efficiency industry can seize these opportunities beginning with the development of policies and programs supporting an expanding market for energy efficiency products and services.

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INTRODUCTION

Government policy has been, is and will continue to be a major factor in the degree of energy efficiency pursued and practiced in any nation. Government policies, or the lack of such policies, greatly influence energy consumption and the level of substituting higher efficiency equipment and practices. Government policies such as: energy taxes or subsidies; import tariffs or tax credits for energy efficient vehicles or equipment; preferential access to and /or cost of capital for energy efficient equipment; minimum energy efficiency standards for building, vehicles, and/or equipment; laws and regulations encouraging and supporting performance contracting and provision of specific information to manufacturers and customers on the value of energy efficiency to them, will have an effect on the degree of energy efficiency in that nation.

Government policies must work with fundamental economic equations of substituting energy efficiency for energy consumption. The customers, based on their perceived best financial interests, are the ultimate decision makers in a market economy. The "just order it" logic of some energy efficiency advocates might work in a command and control economy, but not in a mature market economy. Nor would such an approach work for long in an emerging economy nation (EEN) moving to a market economy. Customers, given a choice, will usually act in their perceived self interest. The goal of government energy efficiency policies must be to influence the fundamental efficiency investment equations and make the customer aware of their opportunities and their best interests in both the short and long term.

Government energy efficiency policies often are best translated into programs that lead directly to specific projects and hence a demand for energy efficient products and services. The first step is establishing the Government policy, then followed by developing the program, and finally starting specific projects. For example a major EEN interested in developing energy service companies (ESCOs) providing performance contracting might begin with outside financial assistance, an energy efficiency retrofit program in state and local government buildings educational and medical facilities in a specific state. The target state could initialize the program directly through a revolving loan program or indirectly through a loan guarantee for commercially provided financing. The state would recruit and evaluate ESCOs probably encouraging joint ventures between mature foreign ESCOs and local firms. Thus, a Government policy to encourage ESCOs and performance contracting would result in a series of projects for possible U.S. ESCO evolvement. The more involved U.S. policy experts are in this EEN policy development the more likely U.S. ESCOs will have a future role.

Another example might be for a state in an EEN to fund an industrial motor driven system optimization assessment program, probably with outside financial assistance. The systems optimization assessment would be linked to a subsidized equipment rebate program and/or a low cost financing program which might be provided by distribution utilities or the state. Such a program would increase the demand for highly efficient motor systems and could create a demand for foreign expertise in motor driven system ESCOs and foreign systems.

Functioning EEN government efficiency programs consisting of many individual projects provide U.S. firms potential opportunities for exporting energy efficiency services and products. While energy efficiency projects can and do occur without supporting EEN government policies and programs they are small in number. The key to greater export of energy efficiency services and products is to help EENs and their states develop and adopt sound supportive policies. These policies then must be implemented through either specific regulations and rules and/or carefully designed and managed programs leading to specific individual projects.

The U.S. and the states have many examples of energy policies supporting energy efficiency program and their implementing project. There are numerous examples of energy efficiency programs at the federal, state and local level that have generated successful projects. Many of these policies and programs could be adopted by individual EENs and adapted for the specific EEN conditions.

The adaptation of a U.S. (or any foreign) energy efficiency policy and programs for an EEN and/or its states is a very difficult task. The objectives, conditions and processes that lead to the U.S. policy and programs must be understood. Also the operational environment of the programs in the U.S. must be understood as well as the lessons learned in program delivery.

Similarly the objectives, conditions and processes required for implementation in the EEN must be understood by U.S. experts providing guidance on policy adaptation. The likely program implementation environment in the EEN must be identified as well as the likely resources available. The transfer of a policy and implementing programs require knowledge of both the "donor" and "recipient" conditions. A direct means of making such a transfer is an exchange between U.S. and EEN experts on a specific policy/program implementation.

Fortunately, a vast reservoir of such expertise exists in the U.S. at the state government level in the area of energy efficiency policy and program development, implementation and operation. This reservoir could provide the U.S. side of a peer exchange with the EEN government officials working on energy efficiency policy and program development. Thus the "this is what we did, how it works and why we did it" U.S. experience can be shared with the "this is what we want to do, our ideas on how to do it, and what are my risks" interests of the EEN officials.

For example, the energy officials of a specific Brazilian state interested in developing an ESCO industry in their state through performance contracting the energy efficient retrofitting of government offices, schools and health-care facilities could partner with the energy officials of a U.S. state experienced in such an approach. The U.S. state official would provide information and advise to the Brazilian state officials, listen to the Brazilian ideas and offer suggestions. The Brazilian officials would explain their objectives, process requirements and conditions; discuss their plans with the U.S. officials; and seek successful projects examples from the U.S. officials. Ideally each set of peers would observe the “working conditions” of the other. A Brazilian observation of the U.S. retrofits likely would include discussion the U.S. ESCOs and major equipment providers as well as the managers of retrofitted facilities.

The following material is intended to offer policy and program directions for EENs to pursue that would lead to energy efficiency projects. These projects would create a market for imported energy efficiency products and services. Illustrative examples are provided to show the policy, program, and projects linkage critical to increasing the demand for efficiency products and services.

GENERAL POLICIES

Government policies that influence energy efficiency range from over-arching policies such as economic structure, taxation, financial and utility regulation to specific policies affecting energy use in specific sectors. The over arching polices are not driven by concerns for energy efficiency; energy efficiency is not a significant factor in the development of any of such policies. However, energy efficiency can be supported and encouraged by such policies, especially when the supporting linkages are identified and implemented.

For example small changes in taxing policy such as depreciation allowances and/or tax credits can significantly encourage energy efficient investments. The first EEN policy step is to decides to use taxation policy for investment encouragement; the second step is to include energy efficiency investments among those actions the EEN wishes to encourage.

ECONOMIC STRUCTURE

All EENs are undergoing a transition to a market based economy from a central government controlled economy. The changing economic structure is being driven by a need to participate in global markets, especially credit markets, and shaped by the EEN's energy policies implemented through law. regulation and practice. A period of basic economic policy change provides both an opportunity for policies supporting increased energy efficiency and a challenge to energy efficiency advocates to develop sustainable policies leading to programs and projects.

Realization that the customer is the key decision maker in a market economy needs to come early not late to EEN energy efficiency advocates seeking supporting policies. Policies that encourage customers to choose efficiency over consumption are the key to greater energy efficiency investment. Tax policies and financing policies can have strong influence over the customer choice of efficiency over consumption.

The U.S. government, governments of the developed nations and multi-lateral development institutions are providing much support to individual EENs during their transition to market economics. To be successful energy efficiency policy and program must be compatible with the economic reforms underlying this transition.

TAX POLICY

A traditional government policy means to influence investors and customer behavior in a desired direction is tax policy. High taxes on the consumption of an energy source raise the consumer's price and hence interest in more efficient use of that energy source. For example many nations have a policy of high taxation on gasoline consumption; those nations tend to have a greater share of more efficient vehicles in their vehicle fleets and a lower gasoline consumption per vehicle than nations without such policies. The lower per vehicle energy consumption levels translates directly into lower CO^2 emission. Thus a nation's tax policy is a major issue in global discussion of green house gas emissions reduction. Many parties concerned with rising global CO^2 emission argue for a global "carbon tax" to reduce use of carbon fuels through efficiency improvements and fuel substitution. The actual link between tax policy and lower CO^2 emissions is increased investment in energy efficiency; such increases would be driven by higher fuel prices and shaped by supporting policies and programs.

Interestingly EENs in their prior economic/taxation policies tended to subsidize energy consumption especially electricity by making up the financial losses of the below cost government energy provider from general government revenues. These subsidies are the equivalents of negative taxation of energy consumption. An energy price subsidy not only significantly weakens the financial stability of the energy providers; it reduces customer interest in substituting efficiency for consumption.

Fortunately, energy subsidies are being abandoned by EENs under heavy pressure from multi-lateral development institutions and the commercial financial markets. One price of admission to a market based economy and access to world capital markets is ending energy price subsidies. "The energy prices must be market based before the loan can be considered" has been heard by all EENs.

The shift to market based prices can be very encouraging to greater energy efficiency investments. Nations, such as Brazil, that are ending electricity price subsidies and privatizing their distribution utilities are strong potential markets for the export of U.S. energy efficient technology and services due to the rising electricity prices and the low efficiency level of existing equipment purchased during the era of low electricity prices.

Targeted tax credits and accelerated depreciation allowances are basic means to accelerate investments in activities desired by the government. Such credits and allowances can include energy efficient equipment and distributed generation equipment.

EENs experiencing rapid growth in electricity demand that exceeds existing supply growth often are candidates for such a tax policies. For example, India's current tax policy includes a 100 percent depreciation allowance on specific energy efficient equipment. Also the government of India is exploring tax incentives for small power producers who can develop new generation quickly close to load centers.

An EEN's tax policy on imported equipment can determine whether "world shopping" for energy efficient technology is financially feasible. A U.S. firm seeking a market for its energy efficient equipment needs a favorable import tariff policy to participate in the EEN market. Also, the EEN market needs a favorable tax policy in terms of credits and/or accelerate depreciation-allowance to accelerate the use of energy efficient equipment. Both policies need to be in place for a significant market for U.S. (or foreign) energy efficiency equipment to develop.

Normally, a nation's tax policy is not subject to major changes; tax policies tend to evolve. Also, interest in energy efficiency incentives usually is not sufficient to result in tax policy changes. However these are not normal times in EENs, and their economic restructuring is resulting in major tax policy changes.

Government control over the market economy is vastly reduced but certainly not eliminated. Tax policy becomes a major means for the government to influence the new economy. Thus the tax policies of the EENs are under review and reform. An opportune period for tax policies to encourage and support energy efficiency investments exist in many EENs.

EENs tend to be concerned about energy, especially electricity demand. Some EEN governments are concerned about the rapid demand for electricity capturing all available capital to meet that demand. Other EEN's are concerned about the balance of payment gap caused by their energy import bill. EENs in Central Europe have both these concerns. Energy policy and tax policy can be intertwined as market based solutions are sought for basic economic problems such as available capital and balance of payments. Encouragement of more efficient use of energy is one a basic policy in addressing both the electric system capital needs and the balance of payments gap.

The U.S. Treasury Department and other organizations such as the World Bank and regional development banks are providing considerable guidance and assistance to the EENs struggling with the transition to market economies. This guidance can include the establishment of tax incentives for energy efficient equipment investments in revised EENs tax policies. Also such guidance could encourage the EENs to adopt import tariff policies which allow "world shopping" for such equipment.

Finally, a tax credits and/or rapid depreciation allowances are useful only if a firm is profitable and paying national taxes. A major goal of the economic reforms is to transform state owned industries into profitable tax paying firms. A "standard " tax reform package might include tax credit/depreciation allowances for a range of high energy efficient equipment and not import tariffs on such equipment. Convincing the U.S. Treasury, World Bank and others of the value of this tax reform package must occur if the package is to be enacted. A tax credit or rapid depreciation allowance which results in a more productive and profitable firm reinforces the basic goal.

FINANCING POLICY

The transition from a planned economy to a market economy will include a restructuring of the EEN financing structure and the financing institutions. Local commercial banking systems and institutions interacting with world capital markets and serving as conduits for foreign investments are at the core of this reform.

The emerging EEN commercial bank could be supportive of an emerging energy efficiency industry in the EEN. Energy efficiency investments tend to have relatively high returns over relatively short-time periods, just the type of investment that emerging commercial banks seek for their early portfolios. Linking the emerging commercial banks with opportunities in energy efficiency is an essential step in developing customer based energy efficiency in EENs.

Eventually, local commercial banks or other financial institutions in the EEN must be willing, able and eager to provide loan funds for energy efficiency investments. Funding from external sources such as the Global Environmental Fund grants and/or World Bank loans can stimulate the energy efficiency market; prove concepts to customers; demonstrate concepts to local financial institutions; and reveal necessary changes in national, and/or state laws, rules and practices. However, such external funding is not sustainable, it must serve as a catalyst for world and local commercial capital investments through local financial institutions.

An EEN financial policy action that can introduce emerging EEN banks to energy efficiency investments is a government guarantee of energy efficiency loans between the local bank and the customers. Such a program enables the EEN banks to test and experience the market at a low risk. The program must be structured in a manner that carefully reviews the individual projects and customers to assure a low default rate and successful projects. As the loan guarantees are reduced or eliminated this review would be a basic tool for the commercial banks to hedge their risks.

NEW EEN POLICY DIRECTIONS

A new policy direction By an EEN often provides an opportunity for new markets in services and products. Guidance from U.S. experts in translating the vision of the new policy direction into the essential implementing actions should help the market for U.S. services and products. This guidance can come through many channels. Peer exchanges, concept implementation information, technical assistance, training, concept demonstrations and financial packaging advice all can be very useful in translating and testing a concept new to an EEN. The guidance provided to translate a new policy include information on the necessary products and services to implement the concept.

Canada, France, Britain and other developed nations, provide free or low cost guidance to EEN's as a means to develop future markets for their products and services. There are many examples of new policy directions stimulating new markets for U.S. services and goods. South Africa has embarked on a massive rural electrification program to provide electric service to five million homes in the next five years. Many remote villages are likely to be served by non-grid power sources including PV-battery systems.

Brazil has a policy of increasing its natural gas consumption by connecting Brazilian metropolitan areas to the Andes natural gas fields. The availability of natural gas provides an opportunity for industrial cogeneration and low cost distributive generation including packaged cogeneration at commercial facilities. Also, Brazil has a policy of privatizing its government owned electricity utilities. The initial privatized utilities have major programs to reduce transmission/distribution losses through distribution system upgrades and improved system operation. Commercial losses are being reduced through detailed monitoring of use.

India, where electricity demand is growing much faster than supply, has a policy of encouraging cogeneration and small power generation projects to increase generation supplies especially those close to load centers. Unfortunately implementation of this policy has been hindered by the attitude and financial circumstances of many State Electricity Boards (SEBs). Before the great potential for cogeneration and small power production in India can be tapped; the rules and regulations supporting the general policy must be established and enforced. The basic pricing reforms that allow SEBs to recover costs and make a profit must be in place before potential generation suppliers are comfortable with a project.

China's movement towards a market economy includes introducing the concept of energy efficiency performance contracting by China based ESCOs. A major Global Environmental Fund (GEF),European community (EC) and World Bank (WB) project to demonstrate the concept in China is underway. The demonstrates include efficiency improvements in boiler combustion, motor driven systems, electric arc furnaces, commercial lighting, agricultural lighting and various industrial processes. Following these demonstrations, the establishment of the concept in China should provide opportunities for joint ventures with U.S. ESCOs and the importing of U.S. energy efficiency technology.

ELECTRICITY INDUSTRY REGULATORY POLICY

National and state policies have great influence over the electricity utilities regulated by these governments. The governmental authorities regulating the distribution utilities in an EEN will determine whether energy efficiency investments are in the economic interest of the utility to pursue. The adoption and enforcement of policies which provide the proper framework and incentives for utility support of energy efficiency investments are essential for a distribution utility to engage in any activity that reduces kilowatt hours of customer demand.

The EENs are being encouraged by the multi-lateral development institutions and the private capital markets to significantly reform their electricity utilities. The objective of these reforms is to create distribution utilities that are profit making and financially stable. Their retail prices must reflect their costs and provide a adequate profit margin. These basic utility reforms tend to increase electricity prices, lower costs, especially labor costs; reduce technical losses in the distribution system; eliminate subsidies; reduce commercial losses; and increase the collection of revenues. One usual result of these reforms is a new group of utility managers eager to increase profits; hence, earn their performance bonus.

The profit making focus resulting in evaluation of any project in terms of its impact upon the utility's profits. This viewpoint was clear during a recent discussion with the CEO of a major distribution utility in a major EEN; "I am in favor of any measure that either raises our revenues or lowers our costs, I prefer measures that do both". His utility is under great peak demand stress (typical of utilities in EENs) and is able to charge "world" prices for electricity to most of its customers (the desired outcome of the recent electricity sector reform). This distribution utility purchases power for less that 5¢/kwh and sells the power to most customers for more than 10¢/kwh. Thus the distribution has a "mark up" of 5 - 10¢/kwh to cover its costs and gain a profit.

An end use energy efficiency measure that “costs” 2¢ per kilowatt hour is in the EEN's societal interest and in the interest of the specific retail customer employing the measure, but the measure is not in the distribution utility's interest unless extraordinary regulatory intervention occurs. The utility CEO would see the greater than 10¢/kwh revenue loss greatly outweighing the less than 3¢/kwh per cost savings. Also technology improvements in electricity generation such as gas fired combined cycle units producing power for less than 4¢/kwh tend to increase utility management resolve not to save energy and lose revenues because the cost of an additional kwhr is relatively low.

The policy solution to the dilemma of utilities not being interested in energy efficiency due to potential lost revenues is an extraordinary regulatory action to recover the lost revenues due to greater efficiency. This action was used briefly by some North American utility regulators to accelerate energy efficiency investments beyond token activities. “The rat must smell the cheese” proclaimed John Rowe, CEO of New England Electric Systems, in discussion about the essential need of the utility to be guaranteed recovery of the lost revenues before utility interest in energy efficiency was positive. The lost revenue policy solution was for the utility regulators to allow the

monopoly distribution utility recovery of their lost revenues from energy efficiency investments in their customer rates. This action was opposed by a number of large customers who believed they were highly energy efficient. As competition in retail sales of electricity appear likely to occur in North America; the utilities stopped their energy efficiency programs and stepped up their marketing programs and in some cases with same staff.

If any electricity distribution company with generation cost significantly lower than retail prices is to have an interest in supporting investments that save kilowatt hours, the regulatory authority must a) guarantee recovery of the lost revenues through a sophisticated accounting procedure and b) guarantee a monopoly in retail sales at least for the next few years. Both of these guarantees may be unwelcome as the regulatory authorities pursue reforms to establish a market based electricity industry.

If the EEN utility regulators do not have a lost revenue recovery mechanism in place the distribution utility will resist any government energy efficiency targets or mandates; management of a reformed utility will not act in a manner that reduces its profits and undermines its financial stability. The utility management would point out to their government regulators that such targets or mandates run counter to the electricity sector reforms necessary to attract the essential capital for the investments to insure the stable operation of the system.

The EEN utility management would be interested in kilowatt hour reduction measures in specific customer classes where their allowed prices are and will be in the foreseeable future lower than their power plus marginal distribution costs (i.e. they are losing money on selling these kilowatt hours). In some EENs agricultural pumping and municipal street lighting falls in this category. Of course the primary effort by the utility management would be to raise these prices; if this fails lowering the use of below cost kwhrs would be pursued.

An EEN distribution utility under peak hour supply stress (the typical case) would be greatly interested in load management measures that reduce the peak demand and raise off peak demand. Ideally from the distribution utility viewpoint, would be time of day tariff reforms that would have a neutral or positive impact on the utility's revenues and encourage shifting of the peak hour demand to off peak hours.

Time of day and seasonal variations in tariffs are strong incentives for customer based load management activities. Interruptible tariffs, either total interruption of service or demand limiting service, are another related means of coping with peak demand exceeding either the generation or transmission supply. A typical distribution utility in a typical EEN may have peak demand growth exceeding its ability to provide the necessary transmission and distribution facilities; a situation where both transmission and distribution expansion and load management programs are likely to be sought. Customer based and funded load
management which improves the distribution utilities capacity factor without reducing kilowatt hour sales are especially interesting to distribution utilities under peak hour demand stress. Reformed distribution utilities without an ironclad government guarantee of lost revenue recovery are likely to turn any international, national or state demand side management mandates and/or

funding into peak load management activities that either raise revenues (i.e. time of day tariffs) or lower the cost (i.e. demand limited tariffs and equipment) of meeting the peak. Some specific end use energy efficiency measures are likely to be pursued especially if the government has established a low price on some service (i.e. municipal street lighting). The reformed utility will avoid making an investment or accepting any grant not in its economic interest under this current or emerging regulatory structure; rather the utility would seek to use funding for projects in its economic interest.

A reformed distribution utility with rapid growth in demand would concentrate its primary efforts on expanding the distribution system and improving its operation to meet the growing demand. "DSM" funds would be used to improve the load factor, strengthen the distribution system and recover all revenues but not for increased efficiency of end use equipment of customers.

Large markets for equipment and systems that manages the load of customers in EEN distribution systems will occur when and where government policies establish tariffs to discourage peak period demand. Such tariffs are very compatible with the reforms to move the distribution utilities to cost based prices and profits sufficient to gain access to commercial capital. Models of such tariffs for the EENs to explore and adapt for their conditions are available from the U.S.

In the typical EEN, load management and energy storage markets are likely to have two great incentives, new high prices especially in the peak periods and very limited existing systems/equipment to manage load or store energy. These markets will be primarily customer based following the initial distribution utility programs to stimulate the market, demonstrate the concept and assure customers that the technology works.

A basic energy efficiency measure in many EENs is eliminating "commercial losses" which primarily are theft of services which arise from no metered or tampered meter hookups. Once electricity is paid for on a regular basis; the customer is likely to gain an interest in more efficient use of the electricity. The distribution utility gains revenue with limited additional costs. A large market in theft detection equipment and tamper resistant meters will develop in EENs with reforming distribution utilities.

Major investments in meters will follow the reform of the EEN distribution utilities into profit making market based institutions.

GOVERNMENT POLICIES AFFECTING INDUSTRIAL AND COMMERCIAL SELF GENERATION

An EEN with rapid growth in demand resulting in distribution system stress especially during the peak usually suffers frequent power outages, voltage reductions and poor power quality; all factors negatively affecting industrial processes. Unreliable power supply is especially a problem for manufacturers using sophisticated and sensitive equipment. Often such equipment is necessary to provide the quality of products necessary for global markets. Thus, unreliable power quality is a problem for an EEN's export manufacturers. An unforeseen interruption can ruin the production run; a power surge will shut down or even harm expensive equipment.

To cope with unreliable power supplies an EEN industrial firm may seek to generate their own power needs for at least their essential load and use the thermal waste energy to meet all or some of the thermal energy demand. If the industrial firms has a major thermal load, a cogeneration system with excess power production could be a financially feasible option especially if the government authorities have a reasonable power purchase requirement for their distribution utilities.

Government policies and the implementing rules and regulation will determine whether self generation/cogeneration are financially feasible in an EEN and/or an EEN state. If natural gas is available and/or waste fuels available the resulting cost of self generation is likely to be significantly less than the retail price of electricity. If the coal-fired boiler house is not new, a cogeneration retrofit is likely to be cost effective if the excess electricity can be sold for the wholesale electricity generation price.

An industrial firm generating electricity must have: 1) have a seamless interface with the distribution grid for buying or selling power; 2) fair prices for excess generation and 3) fair prices for stand by services. The EEN distribution utilities, not wishing to lose major customers, might oppose any government
polices encouraging self generation/cogeneration. Thus government policy is essential to enable and promote self generation and cogeneration facilities that
would 1) lower the energy cost of the industrial firm 2)lower the peak period demand stressing the distribution system; 3) increase power supply and 4) provide distribution system support usually close to load centers.

Cogeneration is not limited to industrial firms. Major commercial and institutional facilities could use packaged cogeneration units to provide all their thermal load and sell excess electricity or provide their electricity needs and all or part of their thermal needs. The government policy governing grid connections, power sales and back up power costs are very critical to the economics of such activities. A positive set of government policies encouraging self/cogeneration by industrial and commercial firms would open a large market for such equipment and supporting services in EENs where electricity prices are reaching world prices for industrial and commercial customers.

However, until the essential government policies affecting grid connection requirements, power purchase requirements and rates and stand by power purchase requirements and rates are in place and functioning, the potential market for industrial, commercial and institutional cogeneration will not be achieved, U.S. States have model implementing laws and regulators and staff skill in their implementation. A peer exchange between California officials and an interested EEN could lead to the development of the essential policies.

POWER FACTOR

Power factor is a term used to indicate the effectiveness of an AC circuit and is expressed as the ratio of the power and apparent power flowing in a circuit. The ideal power factor is 1.0; factors .90 and above usually are considered acceptable by the distribution utility. Lower power factors are usually caused by the electrical relationship between the generation source and the end use equipment. Large induction motors used in industrial applications often lower the power factor, reducing the effectiveness of the utility's distribution system.

Poor power factors reduce the effectiveness of generation, transmission capacity and distribution capacity in meeting a given demand. Hence more system capacity is needed to meet a given load with a poor power factor than would be required to meet a load with a good power factor. Improvements in power factors reduce transmission and distribution system line losses and improve the ability of existing capacity to meet increasing load demand.

Distribution utilities are very interested in improving their power factor through either distribution system upgrades or customer equipment upgrades; usually both approaches are pursued. A tariff which rewards customers with high power factors and/or punishes customers with low power factors is the essential incentive for customers to seek retrofits or new equipment to improve the power factor . Such upgrades may improve the customers energy efficiency; however, the primary reason for the upgrade is to improve the effectiveness of the utility distribution system. Often power factor correction programs are classified under utility demand side management programs, however, these programs affect more the quality than quantity of customer demand.

Power factor improvement programs are very likely to be highly supported by EENs distribution utilities under stress to meet demand and as power quality becomes an issue. The basic upgraded program is to add capacitors within the customer's facility either at load centers or directly on motors. Such utilities could provide financing for capacitor retrofits once the tariff incentives are in place to raise the customer's interest. The cost of the capacitor upgrades could be recovered in the utility bills.

Another related approach is for the utility to work with ESCOs. ESCOs would have the necessary expertise to determine the optional capacitor upgrade program for the customer especially the placement of the capacitors. Also, the ESCO could provide a performance contract which would pay for the capacitor upgrades from the reduction in poor power factor penalties in the utility tariff. An existing tariff which penalizes poor powers factors is an essential step in correcting the problem through customer action. A major capacitor programs/power factor is underway in India using ESCOs. Ahmadabad State Energy Board working with ESCOs such as Asian Electronics has a very active customer base power factor improvement program.

The market for power factor improvement equipment such as capacitors is very large once the government tariff policy to reward good power factors and punish poor power factors is in place. Models for such tariff exists in many U.S. States. ESCOs working with the distribution utility could have a strong delivery system for such equipment.

The role of policy development is power factor improvement programs is direct. New tariffs must be either advanced or accepted by the government utility regulators and implemented before customers are concerned about power factor improvements. Such tariffs are in place in developed economy nations; regulator to regulator peer changes should be useful to advance such tariff reforms. Until such reforms are in place the market for power factor correction capacitors will be small.

DISTRIBUTION - CUSTOMER TRANSFORMERS

The transformers that step down the distribution system voltage to the customer's service voltage are the last link in the distribution system. Often such transformers are inefficient and have combined no load and load losses of 5± percent.

Ownership of such transformers usually, but not always, rest with the utility, not the customer. Inefficient transformers increase the kilowatt hours necessary to serve a given load. Under most regulator systems these "loss kilowatts" are paid for by the customers. In a cost plus regulatory system, the norm for monopoly utility structures, the cost of the inefficient utility service transformer is passed on to the customer. Such circumstances do not provide a strong incentive for the distribution utility to replace the transformer or upgrade the standard for new transformers.

Establishment of an energy efficiency standard for service transformers is the direct means to ensure new transformers are more efficient than the current stock. A national and/ or state policy by law or regulatory rule could ensure highly efficient transformer are installed for new service or replacement of non functioning units. The customer would prefer a new transformer since it could lower their electricity demand by as much as 2 percent without any customer investment.

Reform of the electricity sector in EENs tend to result in higher electricity prices and in some cases privatization of the distribution utility. New standards for service transformer efficiency are logic complementing actions during the reform of the distribution utility. Higher revenue and new or greater access to capital enables the distribution utility to fund increasing the energy efficiency of new service transformers. A national standard for such transformer could be a "balancing" action for the increasing revenue stream. U.S. expertise could be beneficial in assisting EENs to develop such standards.

TESTING, CERTIFICATION, LABELING AND MINIMUM STANDARDS

To make an informed financial decision on the purchase of any major energy using equipment or system, the customer must be aware of the likely energy and financial consequences of operating the equipment or system under the customer's conditions. The claims of the seller may or may not be accurate. To be creditable the energy use and financial consequences to the customer must be determined by an independent party with adequate testing to enable certification of the likely results.

To ensure all customers are provided with the necessary information, a label on the equipment or system is necessary. This label must be simple, and effectively translate the likely cost of operations of the equipment. This label can be enhanced by an “excellent energy efficiency” badge which highlights efficiency well beyond the minimum standard or norm.

Testing and certification of energy efficiency has limited value without a labeling system to convey the information to the customers. Labeling systems have limited creditability and value with out testing and certification. Thus testing, certification and labeling should be designed, developed and implemented together. Expertise abounds in the U.S. and Europe in creditable energy efficiency labeling systems.

Perhaps the most basic policy action an EEN can take to improve the energy efficiency of equipment is to label the relative efficiency of equipment in terms that have meaning to the customer. The market for highly energy efficient equipment requires a creditable means to both identify the efficiency equipment and to provide an understandable cost comparison between the efficient and inefficient equipment.

Often proper facilities for testing and certifying the energy efficiency of specific equipment are not available in the EENs. Yet these EENs usually have firms manufacturing such equipment, often with low efficiencies. The effort required to establish a testing, certification, labeling program must start with ensuring the proper testing facilities are available and a commitment from the EEN to establish a labeling program based upon proper testing and certification. This program can be either a government function or manufacturer association program based. Usually efficiency testing and labeling is an additional program to the existing equipment of safety and performance standards programs.

Minimum energy efficiency standards for major energy use equipment is a logical policy extension of the testing, certification and labeling activities. Minimum standards tend to eliminate the products of lower quality manufacturers; therefore, such standards are usually supported by the high quality manufacturers. Often voluntary minimum standard established by the equipment manufacturers association is a more politically feasible means to establish a standard than is a government mandated standard.

Industrial motors are a major labeling and standards target in most EENs since most EEN electricity demand is in the industrial sector and most of this demand is by motor driven systems.

For example Chinese officials have expressed an interest in establishing energy efficiency standards for industrial motors. Ongoing research has demonstrated significant cost effective electricity saving through more efficient motors and motor driven systems in China.

The creation of a testing, certifying and labeling system must have the support of the entire EEN government especially the government units that oversee and/or regulate the equipment manufacturing and oversee, regulate or provide the equipment testing function. For example; the China officials exploring the establishment of industrial motors standards included representatives from the Machinery Manufacturing Bureau, the Materials Testing Bureau, the Energy Research Institute and the State Economic and Trade Commission. Thus the overseer of electric motors manufacturing, the equipment and materials testing group, the energy efficiency advocates and the market transformation advocates are working together in evaluating energy efficiency standards. This evaluation included a tour of the U.S. and discussion with appropriate officials and parties.

Recognition of highly efficient equipment through a "badge" (i.e. Energy Star for computers) is a means to market such equipment. The recognition badge system can be used with a labeling system to identify the more efficient models. Such a recognition system can be used with a minimum efficiency standard to encourage the production and purchase of models considerably more efficient than the minimum standard.
Procurement can be linked to recognition badges (i.e. we will only procure computers that have an Energy Star). Federal and State governments in EENs can tie their equipment procurement to only high efficiency equipment meeting or exceeding the recognition badge efficiency threshold level; thus, creating an early market for such equipment.

The Government of Brazil (GOB) has an ongoing testing, certification and labeling system; an "excellent" efficiency badge program and voluntary standards for some equipment. GOB is seeking Global Environmental Fund grants to expand their programs through expanded testing and certification facilities to cover additional equipment. The Brazilian approach might be a model for other EENs.

BUILDING CODES

Buildings are a major source of energy consumption which tends to grow in market share as an EEN's economy grows. Visitors to the major cities of EENs are usually amazed by the level of large buildings construction, both commercial and residential, underway. This phenomenon can be summarized by the joke "the national bird of China is the building crane".

Such buildings offer an opportunity for increased energy efficiency through design, construction, materials, equipment and operation. Most of this opportunity will be lost unless the building design and procurement of equipment and materials is done with energy use as an important factor. High quality energy efficient designs result in high efficiency building systems procurement which in turn lead to increased markets for U.S. energy efficient services and equipment.

The primary function of a building code is to regulate the design, construction and operation of a building to ensure the health and safety of its occupants. Such codes are a basic government function usually carried out in at least the urban areas of EENs. Adding an energy efficiency element to the basic building codes is an action that has been underway in the U.S. since the 70's on a state by state basis. Some attempts to export such codes to EENs is underway.

The act of adding an energy efficiency element to existing building codes is a major policy action by the National and/or state governments of the EEN. This policy action is essential if energy efficiency is to be a factor in future EEN buildings and contribute to reduced operating costs; improved national balance of payments; and improved air quality. The development, adoption and enforcement of a building code are major political actions balancing the positions of the various parties; hence, these are difficult complex actions to implement.

There is considerable experience in the U.S. in developing, adopting and enforcing energy efficient commercial and residential building codes. Since building codes are a state and local government function in the U.S., most of the U.S. experience is based upon state policies and programs. The U.S. Federal Government provided both encouragement through State energy conservation grants and support through building systems expertise. However, the existing energy efficiency building codes were established state by state as this new public policy was implemented through each state's traditional political process balancing the interest of many parties.

EENs exploring the development of building codes as a new public policy are facing questions similar to those faced in the U.S. States from the 70's to today. These questions result from a blend of political economic and technical issues most of which have been addressed before in the U.S. State codes process. A review of the political processes used to establish a successful energy efficiency building code would be useful to EENs government officials exploring the development of such codes. The California code: its development, substance, and implementation is a good model for EENs exploring the development of such codes.

The history of building code development has a strong element of crisis or disaster occurring which then results in a remedial action by government in applying tighter building regulation. The collapse of a department store, uncontrollable fire in a resort hotel, and collapse of an apartment complex all have lead to tighter construction codes. The "energy crisis" of the 70's and early 80's lead to the energy efficiency codes in the U.S.

The reform of EEN energy prices (i.e. end of subsidies) may not be of the magnitude of a crisis but such price increases are a strong reason to reevaluate current building practices and standards. Often the initial opponent of new building codes are the current builders who argue "we know this market best". However, the market may be in rapid transition due to general economic reforms in the EEN especially in the energy sector.

The potential art of developing and adopting a code has been practiced in the U.S. at the State level for 20 years. Such experience can be very valuable to EEN officials seeking to develop such codes.

The technical aspects of a building code often are greatly influenced by climate. For example, California recognizes eleven separate climate regions in its state building codes. The Florida codes must deal with both heat and moisture. The Alaskan codes must deal with extreme cold. The U.S. states by their climate diversity can provide relevant models for EENs and/or their states. For example the ongoing peer exchange between Alaska and Siberia includes building codes and building practices.

The Mexican government is in the midst of a major building code effort. The prior experience in California is being used as a input. International experts who developed their expertise in the California code work are providing technical assistance to the Mexican government.

The development and enforcement of strong building codes is a very direct means to increase the market for energy efficient products and services. The EEN governments require considerable assistance in the development and implementation of such a code. National and International models and processes are available for review and adoption. However, this adoption requires considerable technical skill and implementation skills (i.e. political, legal, economic.)

ESCO DEVELOPMENT PERFORMANCE CONTRACTING

Energy efficiency retrofits are not high on the list of actions that industrial and commercial firms in an EENs would take with their available capital. Increased and higher quality production are their primary interests. A steel plant management would be more interested in adding a new rolling mill to produce a new higher quality product than retrofitting their arc furnaces with more energy efficient technology. Yet the retrofitted arc furnace would lower costs and increase profits.

A traditional energy efficiency assistance program from multi-lateral development agencies such as the World Bank has been the establishment of lines of credit for energy efficiency investment by industrial firms. These credit lines tend to be under utilized, frustrating the development agency and the EENs. New concepts are needed. The focus of industrial firms on new production investments instead of cost effective energy efficiency investments is a global problem that is especially acute in EENs. A means to address this lack of focus is the development of energy service companies (ESCOs) in the EENs. Such ESCOs would focus on the business of developing, designing and installing energy efficiency retrofits as they have done in North America and Europe. The business of ESCOs is energy efficiency; thus they seek opportunities that are beneficial to the customer and themselves.

The ESCOs have developed an innovative concept to finance their projects. The essence of the concept is that the capital for the energy efficiency investment is found in the financial value of the reduced operating costs created by more efficient energy use. While there are numerous variations on this concept; all have the basic element - the investment money is from the savings. ESCOs can guarantee the financial savings from a project, provide or find the initial financing, structure payment terms in which the customer receives initial or early benefits without any up front costs. To be successful the ESCO must develop very cost effective projects for credit worthy customers and have access to financial markets either directly or for their customers. ESCOs tend to develop basic "product lines" of projects which are repeated over and over. Rapid deployment of basic energy efficient technology and practices is in the ESCO direct self interest.

ESCOs development is a means to create an energy efficiency business in an EEN. The ESCOs become the marketers and delivers of energy efficiency services. The objective of ESCO managers is to make money from energy efficiency investments at a "low a risk" as possible.

The ESCO must find willing customers and offer terms and conditions that both appeal to the customer's self interest and provide healthy return's to the ESCO.

While customers should be interested in energy efficiency investments in an EEN with rising prices, other priorities of often intervene. Commercial and industrial customers usually are experiencing both tight capital markets and a need for capital to expand their operation. Nor do these customers have much knowledge of or experience in energy efficiency projects; thus, energy efficiency projects which would be very cost effective to the customer are unknown or ignored as too trivial or too uncertain to risk capital.

The too trivial or too uncertain viewpoint of energy efficiency projects by customers was a North American problem as well. Energy efficiency investments which were cost effective to the customer just were not happening. "We have better places to spend our capital with more certain results" often was the decision maker's veto statement regarding energy efficiency investment proposals.

The development of the North American ESCO industry and its implementing mechanism the performance contract in response to the "too trivial and too uncertain to risk our capital" barrier. The ESCOs have provided energy efficiency expertise, access to special financing; guaranteed the performance of the project including energy to be saved; and through the performance contracting mechanism repaid the investment from the customer's operating budget. This concept has grown in recent years as customers became aware of and comfortable with it.

Perhaps the largest ESCO and performance contracting programs underway worldwide are the recent Federal Energy Management Program to "mine" energy efficiency returns in Federal and State facilities and the similar Department of Defense program for military facilities These programs are estimated to cause energy efficiency investment in the multi-billion dollar range. These programs select specific ESCOs for specific regions and facilities. The ESCOs working with the customers determine the cost effective efficiency measures.

The U.S. government program has its roots in prior and ongoing performance contracting by State government programs supported by Federal grants. Early U.S. ESCOs where able to develop early markets in state facilities, educational and health care facilities through the state programs. Such programs were very important to the development and early growth of the ESCO industry in the U.S. Such programs can be replicated in many EENs with assistance from government experts knowledgeable in developing performance contracting based energy efficiency programs in government facilities. The ESCO industry during its early development in the EEN require demonstration projects to prove the concept and create early markets just as was done in the U.S. through the state programs.

The U.S. ESCO industry development required a supportive set of government policies which resulted in changes in laws, rules and procurement practice to facilitate performance contracting. The government supported ESCO/performance contracting projects not only demonstrated the concept they blazed the trail in savings verification, performance contract packaging, changes in procurement practices and the testing of project product lines. The development of ESCOs and performance contracting in the U.S. was significantly assisted by Federal and State policy.

POLICIES AND PROGRAMS SUPPORTING ESCO DEVELOPMENT AND OPERATION

Fortunately the concept of ESCO development and use of performance contracting appear to be a good fit for EENs with strong technical expertise and emerging capital markets (i.e. Brazil, China, Central Europe, and India). Ideally the ESCO industry will grow with the EEN's expanding reliance upon competition and emerging capital markets. Since the performance contracts in such EENs could have high annual return (i.e. greater than 20 percent) and short time period (i.e. 2-3 years) for basic energy efficiency equipment retrofits and improved operational practices; the linkage to the emerging capital markets is feasible.

The linkage with the EEN's developing capital markets is essential for the ESCO industry to grow beyond a few demonstration supported by outside funding. Interestingly the high return and short time period nature of energy efficiency projects especially in rapidly rising energy price markets. (i.e. electricity as subsidies end) fit well with emerging capital markets looking for low risk, short term projects that have a great replication potential. However, the concept must be clear to the bankers and the finance laws supportive of the concept. The eventual outcome of the EENs policies and program must be an ESCO industry with ready access to world and local commercial capital. The various policies and programs must be designed to lead to this condition.

The multi-lateral development institutions have great interest in the ESCO industry and performance contracting concept. ESCO development and performance contracting is being supported by the World Bank, Global Environmental Fund, Asian Development Bank, Inter American Development Bank and European Reconstruction Bank in a number of EENs including China, Brazil, Hungry, India and Thailand. The approach varies by EEN based primarily upon local conditions.

The most direct early action by an EEN to support ESCO development is a major demonstration program financing a series of projects. Likely sectors for such a demonstration program are government buildings, education and health care facilities. Just as the U.S. ESCO industry was accelerated by the U.S. Department of Energy's "schools and hospitals" program through the states so could the ESCO industry in an EEN. This direct approach would create a market for ESCO services; demonstrate the performance contracting concept to customers, local banks, local engineering services firms and government officials; reveal legal and regulator changes necessary to advance ESCO development; and gain the interest of mature foreign ESCOs in the EEN energy efficiency market.

For example, a state in a major EEN might receive funding through a GEF grant with the EEN to demonstrate the ESCO based performance contracting concept in its education and health care facilities. The state, with technical assistance, would target the customers to be served, how these customers are to be served (i.e. performance contracting principles), and how to competitively procure ESCO services. The GEF funding might be used directly to establish a state revolving fund, replenished by the financial savings of the energy efficiency investment. The funds might be used indirectly to guarantee local bank loans to the ESCO and/or customer for the performance

contract. The direct financing might be used initially and replaced by loan guarantees as the concept is initially demonstrated.

The direct demonstration program should be large enough to attract foreign ESCO interest and include adequate technical assistance to insure the program is well designed and implemented. Such a demonstration program could benefit U.S. ESCOs seeking markets in the EEN; since U.S. ESCOs have vast experience in the educational and health care sectors. Also, U.S. state officials are very experienced in developing and operating ESCO procurement in these sectors. U.S. procurement models and expertise could be provided initially through peer exchange programs.

Once successfully demonstrated in one or more state of an EEN; the concept can be repeated in other states with minor adaptations. However, the early demonstration programs must focus on successfully demonstrating the concept. The focus on the successful concept demonstration require adequate foreign technical assistance. Without such assistance the concept demonstration program is not likely to be successful; this would be a major set back for establishing such a concept in the EEN.

Foreign technical assistance is being offered by some parties as a means to develop long term business in supplying ESCO services usually through a joint venture and in supplying equipment for energy efficiency projects. For example the efforts to create an ESCO industry in Brazil has included: a) an exchange between the U.S. ESCO industry (i.e. National Association of Energy Service Companies) and Brazilian government and private sector officials interest in ESCO b) a formal ESCO development technical assistance program of Canadian ESCO members funded by the Canadian Trust c) and an exchange between European linked ESCO officials and Brazilian government officials interested in ESCO development, this exchange would provide some technical assistance in Brazil.

Coupling available foreign technical assistance with multi-lateral development funding for a focused demonstration program may provide an EEN with the means to successfully demonstrate the ESCO industry and performance contracting concept. The multi-laterals under considerable pressure to develop sustainable energy efficiency programs have a high interest in successful demonstration.

An other approach to stimulating the ESCO market in an EEN is fund local ESCOs and/or their early projects from global funding sources such as the World Bank and GEF. This approach focuses directly on the creation of ESCOs, successful early projects, removal of EEN barriers discovered in the development and replication the ESCOs. A major ESCO demonstration program is underway in China funded by the European Community, GEF, and the World Bank and PRC. The project is focused on three Chinese provinces.

CONCLUSION

Prior experience is one of the greatest strengths in policy development and implementation. The state energy offices, which are the primary implementers of U.S. energy policies, and the U.S. government and private sector generally, have implemented energy efficiency policies and programs, and have staff with considerable expertise in energy efficiency policy development and program implementation. This experience has been and can continue to be tapped to assist EENs in the development of policies that foster energy markets that are receptive to energy efficiency products and services. Peer exchanges, model policies, proof of concept materials, reference documents, advise and counsel from objective parties and concept verification are all vital to ensuring that EEN staff are able to advance sound energy efficiency policies and programs.

The adaptation of a U.S. energy efficiency policy and programs for an EEN and its states is a very difficult task. The objectives, conditions and processes that lead to the U.S. policy and programs must be understood. Also the operational environment of the programs in the U.S. must be understood as well as the lessons learned in program delivery.

Fortunately, a vast reservoir of such expertise exists in the U.S. at the state government level in the area of energy efficiency policy and program development, implementation and operation. This reservoir could provide the U.S. side of a peer exchange with the EEN government officials working on energy efficiency policy and program development. Thus the U.S. experience can be shared with interests of the EEN officials, and promote the global benefits of energy efficiency.

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