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The Role of Regulators: Energy Efficiency

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I. Introduction

This paper addresses policy and regulation in support of energy efficiency. "Energy efficiency" is defined as: measures to increase the productivity with which energy is used. To illustrate, higher efficiency central air conditioners (CACs) can use anywhere up to fifty percent less electricity than that consumed by the models that dominate sales across the nation. These more efficient models cost up to one-third more than models of standard efficiency. Even though they pay for themselves through electricity savings, relatively few are currently sold without market interventions providing programmatic information or financial incentives to "move the market" toward the higher efficiency equipment. Additionally, several utilities operate "load control" programs which provide rate credits to electricity customers in exchange for the right to cycle CACs off for brief periods to help meet peak demands. These examples of energy efficiency measures – more efficient CACs and CAC load control – are chosen because growth in summer peak period demand is creating needs for expensive new electric generating capacity throughout the nation. There are hundreds of other energy efficiency measures that can affect the whole range of electricity usage during all periods of the year.

While any form of energy can be used more or less efficiently, this analysis focuses on electricity. One route in support of demand-side energy efficiency is the consideration and adoption of minimum efficiency standards for equipment and appliances. This is the "codes and standards" route. By 2001, almost all states had in place construction codes requiring minimum levels of energy efficiency in new and substantially renovated buildings. In addition, there is a federal appliance and equipment standards pro-

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gram which has grown in scope over the past two decades.[1] Codes and standards will not be treated further here; our focus is on other approaches relating functionally to the ongoing regulation of the electricity sector.

Beginning in the 1970s, some electric utilities experiencing rapid load growth decided to develop programs to reduce customer demand driving load growth. The process of assessing demand-side savings measures and then implementing programs to cause them to be used came to be known as demand-side management (DSM).

With the regulatory and economic restructuring of the electricity industry that began in the mid 1990s, the capacity of industry regulators to promote energy efficiency has changed materially - at least where restructuring has gone furthest.

In the late 1990s, restructuring of the electric industry began to be widely implemented, with the objective of deregulating aspects of energy supply while providing for retail competition in energy supply. Restructuring is not uniform across the United States. The federal government has passed no "restructuring law." What the federal government has done is encourage and facilitate the deregulation of aspects of retail electricity services. This has been done largely through orders of the Federal Energy Regulatory Commission (FERC), beginning in the area of open access to transmission lines with non-discriminatory pricing. Deregulation of retail services is largely a state matter. About half of the states have taken decisive steps in the direction of deregulation. They are at widely varying stages of implementation, and their electricity market structures and rules vary. The rest of the states are avoiding deregulation at this writing.

This review identifies regulatory access points relative to DSM and energy efficiency that *cross-cut* the various differing restructuring actions (or lack thereof), while pointing out how cross-cutting elements of regulatory roles vary depending on the local situation. Though issues relating to federal action are identified, much of the emphasis is on the state level. The "regulatory role" encompasses both what regulators can or cannot do, and what parties interested in promoting energy efficiency can do to shape regulatory frameworks and actions. Four major categories of lever

1. Appliance Standards Awareness Project, http://www.standardsasap.org (last visited Feb. 8, 2001). Cumulative estimated savings from federal standards totaled 88 billion kilowatt-hours by 2000, according to the Appliance Standards Awareness Project.

are addressed: planning, retail rate-making, environmental regulation, and funding.

II. Planning

Planning for electricity can first be considered in terms of integrated resource planning (IRP), and then in terms of new planning paradigms suitable for deregulated environments. From the late 1980s through the mid-1990s, strategic planning in the form of IRP was adopted in most state jurisdictions.

A. Integrated resource planning

IRP is a dynamic process that evaluates alternative mixes of supply-side and demand-side resources according to specified criteria, including minimizing the total resource costs of providing energy services. It has been most extensively applied to and practiced by vertically integrated, investor-owned utilities (IOUs), but a number of public power systems (local and federal) have taken an IRP approach as well.

The need for strategic electric resource planning is, of course, driven by a number of economic and environmental objectives. The point emphasized here is that IRP has been a major lever by which DSM programs were developed and implemented, resulting in documented and societally cost-effective savings through increased energy efficiency. Electric IRP regulations remain in several states that have not restructured, including Colorado, Hawaii, Minnesota, Utah, and others. Other states that have not restructured have allowed their IRP regulations and practice to lapse, either by explicit policy or by regulatory neglect.

One lever for regulators and advocates aiming to strengthen the regulatory contribution to energy efficiency is IRP. Where IRP regulations have not lapsed, mobilization of multiple efficiency advocates may be required to secure serious attention to inclusion of DSM resources in IRP. In a September 2000 IRP proceeding, the Public Utilities Commission of Colorado approved a settlement committing the State's largest IOU to securing a substantial peak demand reduction (124,000 kilowatts) through energy efficiency and load management programs.[2] Funded at up to $75 million over four years, this outcome was secured as a result of detailed

2. *See generally DSM Win in Colorado*, ENERGY PERSPECTIVES (Tellus Institute., Boston, Mass.), July 2000, at 8, *available at* http://www.tellus.org/energy/newsletters/81enper.pdf.

evidence submitted by several public agencies and non-governmental organizations (NGOs) intervening in the case. Where IRP has lapsed, but the state has not restructured, regulators and advocates can work to restore the concept and practice of comprehensive IRP. The state can then use its processes to include cost-effective energy efficiency resources in resource plans, and implement them through feasible programs. In addition, public utility systems that retain the ability to own electric generation capacity can continue to use IRP or can adopt IRP processes.

Up until the time of this writing, restructuring has focused on the deregulation of electric generation investment and of the pricing of generated electricity. Thus, the distribution of electricity to retail end users remains a regulated utility function. Regulated utility investments in distribution plant and services, and in local transmission, can and should be governed by IRP processes. Least-cost transmission and distribution (T&D) planning can include significant demand-side and energy efficiency resources. The policy challenge where generation has been restructured is to create a distribution level planning framework. A model for this sort of framework has been adopted in Vermont.[3]

B. Strategic energy assessment

Where restructuring has taken place, planning must be reinvented. Where there has been a shift to competitive investment in and pricing of electric generation, and the concurrent demise of planning by integrated energy utilities and their regulators, the need for a different kind of comprehensive planning for the electric sector has become apparent. What we need is "strategic energy assessment."

The purpose of strategic energy assessment (SEA) for the electric sector is not to select investments, as is the case with IRP. Rather, its purposes are the traditional ones of state planning in sectors such as transportation, water, and others. The importance of energy in the economy of a region and its states, and the existence of numerous state policies regarding energy and the environment, make SEA a logical follow-up step to restructuring. SEA is a form of comprehensive planning. New SEA processes can provide information to policymakers and stakeholders as to where unfolding market forces are taking the power sector. From a tech-

3. *See* VT. DEP'T OF PUB. SERV., ENERGY EFFICIENCY PLAN, INTEGRATED RES. PLANNING GUIDELINES (1997).

nical viewpoint, SEA involves a scenario approach based on rigorous analysis of present and expected electric demands, by sector, and of the supply sources that are likely to be available and forthcoming to meet those demands. A limited set of scenarios can be used to reflect the major sources of uncertainty about future demand and supply. Like IRP, SEA includes, as one key element, market assessment of the expected penetration of energy efficiency, and identification and economic assessment of the amounts and types of energy efficiency unlikely to be realized without new types of policy or regulatory interventions. SEA differs from traditional IRP in that it does not select the electric generation resource mix and investments. It does provide a benchmark from which to assess needs for, and possible dimensions of, market interventions in such areas as public benefits charges and portfolio standards, as discussed below. The political challenge is to create state level SEA processes as well as regional SEA processes based on such regions as New England and the Mid-Atlantic (PJM Interconnection) area.

Transmission may provide a point of departure for efforts to create SEA processes at technologically/economically useful regional levels. In its Order 2000, the FERC has directed the Independent System Operators (ISOs) that operate regional electric systems to plan for transmission.[4] With no planning guidelines having been set forth, the results are likely to be as skimpy as was the inadequate planning for generation typical of IOUs in the decades before development of IRP. On the other hand, regional SEAs would include economic and environmental assessment of transmission investments as well as alternatives to them, like localized generation and energy efficiency. Comprehensive transmission assessment requires creation of an SEA process, parties to which would work with ISOs, states, and the FERC. The SEA entity may need to litigate at FERC in order to assure meaningful planning. If non-transmission options are identified in tranmission SEAs, individual states could implement them through their authority over distribution utilities and over facility siting.

III. Rate Making

In price regulated systems, rates are set by regulators to afford the regulated utility an opportunity to recover its costs while

4. *See generally* FERC Regional Transmission Organizations, 18 C.F.R. pt. 35 (1999).

earning a fair return on investment. They also reflect a variety of other criteria such as fairness in reflecting costs of service among different rate payers and promotion of economic efficiency.[5] Where electric systems have not been "restructured," the cost of generation services are recovered through rates set by regulators, as are the cost of other services such as T&D and metering and billing.

The rates of generation and other components can be designed so that their pricing structures reflect (or "signal") objectives of promoting energy efficiency and environmental protection. The basic design tools are time of use (TOU) rates, which price electricity higher during times of peak demand, and inclining block rates, which increase the unit cost of electricity as the amount of consumption increases. TOU and inclining block rates can reflect the long term economic and environmental benefits of efficiency in electricity use.[6] In most "unrestructured" jurisdictions, rates do not reflect these environmental and efficiency design objectives. In many of them, in fact, rates are still "promotional," e.g., declining block rates during peak demand periods. There is an abundance of opportunities for regulators and efficiency advocates to pay serious attention to rate structures which in most cases are completely out of synchronization with efficiency objectives.

Once restructuring has become effective, generation service is available from third party electricity suppliers or from distribution utilities offering provider of last resort services of varying design. The non-generation services are still offered under regulated rates. They often constitute more of the electricity customer's rates and bills than do generation services. Distribution level rates seldom reflect environmental and efficiency design objectives and are often promotional. Here too, then, there are many opportunities to attend to rate structures that are out of synchronization with efficiency objectives. In both restructured and fully regulated jurisdiction, there has been increasing attention to innovative design of regulated rates. The innovations typically advocated and adopted cut against environmental and efficiency objectives.

One innovation is increasing the customer charge component of rates. Most rate designs include a fixed monthly charge simply to receive electricity service. One trend is to shift additional cost

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5. *See, e.g.*, JAMES BONBRIGHT, PRINCIPLES OF PUBLIC UTIL. RATES (1961).

6. *See* JOHN STUTZ ET AL., REPORT TO THE NAT'L ASS'N OF REGULATORY UTIL. COMM'RS, ALIGNING RATE DESIGN POLICIES WITH INTEGRATED RES. PLANNING (1993).

recovery to these fixed charges, which consumers cannot affect by using electricity wisely. There is no sound basis in economic or regulatory theory for increasing customer charges, and efforts to do so can be opposed by regulators.

Another rate-making innovation is multi-year rate-making frameworks, which provide for adjustments to rates during the period between rate cases. Such frameworks are usually known as performance based ratemaking (PBR) or alternative rate making. Traditionally, rates are set during periodic rate cases and remain unchanged from one rate case to the next. Thus, the utility has an incentive to be efficient by cutting its operating costs below the levels of operating expenses that were included when rates were set, thus increasing earnings. PBR has the stated objective of creating stronger incentives for operational efficiency over time. PBR schemes often increase the time period between full rate cases, and always provide for rates to be readjusted within the inter-rate-case period on some basis intended to allow the utility to profit from efficiency improvements. PBRs generally include provisions for adjustments for price inflation and a baseline level of productivity improvement. Unfortunately, they also usually include a price cap mechanism, which sets maximum prices over the entire PBR period, and allows the utility to retain some or all of the profit generated if the costs of service can be kept below the revenue generated at the price cap. Since greater sales volume increases revenue and helps keep unit costs below the rate cap, the utility is incented to promote sales growth. Price caps constitute a financial disincentive to the utility's promotion of energy efficiency. By contrast, revenue cap PBRs are based on the same general approach as price caps, but focus on controlling total energy bills (revenue) rather than prices. Under a revenue cap, either total revenue or revenue per customer is set over the entire PBR period. The key difference between the revenue cap and the rate cap is this: rate caps reward sales growth and productivity improvements, while revenue caps reward only productivity improvements. Increased sales cannot boost revenues above the revenue cap. To help utilities promote efficiency, regulators can avoid price caps and promote revenue caps in PBR.

Rate design has been severely neglected during the furor over restructuring. Rate making is here to stay, and it is seriously overdue for focused attention on the part of regulators and advocates who care about promoting efficiency in the consumption of electricity.

IV. Environmental Regulation

Electricity generation has multiple and serious environmental impacts, all of which can be reduced through demand-side energy efficiency. Sulfur oxide (SO_x) and nitrogen oxide (NO_x) air emissions are among pollutants of concern from a health standpoint. Emissions of carbon dioxide contribute to warming of the global atmosphere and are the subject of national and international discussions about how to avert climate change. Electricity generation requires both land for plant sites and water for cooling systems. In addition, transmission lines require land. Any reduction in the amount of electricity supply over time will tend to reduce these unavoidable impacts of electricity supply.

A. Air emissions

One way to limit undesirable air emissions is the "cap and trade" approach. This approach is used in the 1990 U.S. Clean Air Act amendments (CAAA)[7] to limit SO_2 emissions from power plants and other sources. Under the CAAA, state-level cap and trade systems are allowed. A number of state NO_x caps have been put into place, mainly in the Northeast United States. From an environmental perspective, the key need is to set any emissions cap low enough that the entire cap and trade system yields the air pollution reductions desired by policy makers.

If savings from energy efficiency is included in a cap and trade system in an integral way, then generation savings from documented demand-side efficiency become an economically valuable way to comply with the caps. Of the several approaches to integrating efficiency, the most direct is setting aside a number of the allowances to emit the capped pollutant for allocation to savings from energy efficiency. This was done at the federal level under the CAAA, but restrictions on qualifying energy efficiency savings, combined with a low market price for SO_2 allowances, has limited the use made of this set-aside program. States like New Jersey, New York, and Massachusetts have included "set-asides" for energy efficiency in their new NO_x cap policies, but the portion of allowances reserved for efficiency is only a few percent at best. As states consider state or regional cap and trade systems, and if Congress revisits the CAAA, efficiency advocates can work for stronger integration of energy efficiency into environmental regulations. Set-asides must provide methods to measure and verify

7. *See* 42 U.S.C. §§ 7401–7671(q) (1994).

efficiency savings, as well as to aggregate savings from many small electricity users.[8] Clearly, efficiency advocates need to be involved in the design details of new environmental regulatory mechanisms.

B. Facility siting

The need for any sizable electric generation facility has to be established to the satisfaction of state regulators, though "certificate of need" provisions are typically weakened under electricity restructuring. Nevertheless, all states have retained a substantial degree of review over the siting of electric generation facilities within their jurisdictions. In addition to demonstrating compliance with applicable federal and state regulations, new facilities must typically demonstrate some level of need (however vitiated), exploration of alternatives, acceptable impacts on public health and safety, adequate waste management plans, and minimization of emissions and other environmental impacts. If siting regulations allow for investment in energy efficiency to offset environmental harms, energy efficiency can be "packaged" with a facility and its accompanying mitigation measures. In order to be environmentally beneficial, energy efficiency must be incremental and must offset environmental harms that remain after all feasible supply-side mitigation is incorporated.

V. Funding for Efficiency

There are both direct and indirect methods to collect funds from ratepayers to fund energy efficiency initiatives. Since direct methods have received much attention, we begin first with a promising indirect method, then turn to the more direct approach.

A. Energy efficiency portfolio standards

The indirect method that regulators and efficiency advocates might well consider is modeled on the renewable energy portfolio standard (RPS). The RPS requires the regulated or unregulated entity supplying generation services in a given jurisdiction to acquire specified minimum portions of its generation from qualifying renewable energy resources. Analogously, an energy efficiency portfolio standard (EEPS) would require electricity suppliers to

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8. *See* CATHERINE MORRIS & PAIGE SHELBY, CENTER FOR CLEAN AIR POLICY, RECOGNIZING EFFICIENCY AND RENEWABLES UNDER A CAP AND TRADE PROGRAM (1999).

match a stated percentage of their electricity sold with documented, incremental demand-side resources.

An EEPS requires that retail suppliers of electricity cause energy savings equal to a stated percentage of the volumes of energy they sell. For example, each electricity supplier might be required to document that it induces demand-side energy conservation savings equal to one percent of its electricity sales each year. An EEPS would require a minimum level of demand-side energy efficiency from each supplier, which it could provide through its own competitive products or by partnering with other companies or entities. The portfolio standard would ensure that energy suppliers do not neglect the efficiency market, but rather participate in it and spur its development. If set in the same spirit as renewable resource portfolio standards, an EEPS would result in a modest increase in the amount of energy efficiency activity in a jurisdiction.

Because it has defined requirements, an EEPS would create an incentive for energy suppliers to sell energy-efficiency services on a profitable basis to the extent possible, and to contribute the least amount possible of their own funds to meet the requirements. An EEPS would encourage suppliers to find the lowest-cost efficiency resources available to satisfy their required delivery level. Texas' recently adopted requirement that utilities meet ten percent of estimated load growth with energy efficiency is a simple form of EEPS.[9]

B. Ratepayer Funding

In rough correlation with the momentum toward restructuring, ratepayer-funded utility investment in DSM nationwide began to decline from its peak of over $2.7 billion annually in 1993 and 1994, to half of that amount in 1998. It was only because of the cumulative effect of DSM measures that the total estimated reduction to utilities' peak demands in 1998, 45 billion kilowatts, was the same as that in 1994.[10] One of the major emphases of efficiency advocates in restructuring jurisdictions has been creation of distribution level charges that would provide a steady reve-

9. *See* PUB. UTIL. COMM'N OF TEX., SUBSTANTIVE RULES, ch. 25 Electric, § 25.181 (2000).

10. *See* U.S. ENERGY INFO. ADMIN., U.S. ELECTRIC UTIL. DEMAND-SIDE MGMT. PROGRAM ANNUAL AND INCREMENTAL EFFECTS, tbl. 46 (1998). This includes public and cooperative as well as investor-owned systems. Cumulative estimated energy savings totaled 52.5 billion kwh.

nue stream for publicly supported energy efficiency initiatives. These charges go by a variety of names including system benefits charge, societal benefits charge, and public benefits charge (PBC); we use the last term here.

This policy area has been left to last because it has already received wide attention. PBCs have been adopted in about half of the restructuring jurisdictions as well some jurisdictions that have not restructured. The level of PBCs varies greatly, from small fractions of a mil on each kilowatt-hour (kwh) sold, to over 3 mils/kwh. Most are levied on distribution utility customers as volumetric (per kwh) charges, but one is levied as a customer charge. The duration of PBCs varies as do the processes for considering extensions of them in the future.[11] The mobilization of multiple efficiency advocates has proven a prerequisite to establishing and sustaining significant PBC funding levels for energy efficiency.

Most PBC charges were designed to continue the DSM funding level in effect (through rate cases or other regulatory proceedings) just before the PBC was established. But often they have represented deliberate reductions from those levels. Either way, PBC levels have been set without reference to the magnitude of the untapped potential for demand-side efficiency gains. In the future, regulators and efficiency advocates may wish to link the amount of revenues a PBC is designed to yield to the magnitude, cost, and cost-effectiveness of untapped energy efficiency potential, as revealed through an SEA or IRP process.

Once a PBC is in effect, documentation of its costs and benefits is essential, especially in those jurisdictions where the legislature established the charge. Rigorous evaluation methods have been developed and successfully applied which can isolate with reasonable accuracy the energy savings produced by DSM programs. Drawing on these, Massachusetts has prepared documentation of PBC results that can be considered a model report.[12]

Proposals have been mooted in Washington, D.C. for a national PBC system. This system would be in the form of U.S. contributions matching state-initiated PBCs. At this writing, the

11. *See* DAVID NICHOLS ET AL., REPORT TO THE COLO. GOVERNOR'S OFFICE OF ENERGY MGMT. AND CONSERVATION, FUNDING FOR ENERGY RELATED PUB. BENEFITS (1999).

12. *See* COMMONWEALTH OF MASS. OFFICE OF CONSUMER AFFAIRS AND BUS. REGULATION, DIV. OF ENERGY RES. REPORT: 1998 ENERGY EFFICIENCY ACTIVITIES (2000); *See also* COMMONWEALTH OF MASS. OFFICE OF CONSUMER AFFAIRS AND BUS. REGULATION, DIV. OF ENERGY RES. REPORT: 1999 ENERGY EFFICIENCY ACTIVITIES (2001).

National Regulatory Research Institute is completing a survey of state-level funding of DSM through PBCs and other regulatory measures such as rate case decisions. It is intended that the results will provide the National Association of Regulatory Utility Commissioners with information they may use to consider options and recommendations for a national PBC framework. Although the PBC concept arose in the context of restructuring debates, there is no necessary linkage between a PBC and deregulation. Advocates active in national debates can delink consideration of PBC options from restructuring issues, especially since rising prices in restructured jurisdictions had, by 2001, thrown the entire electricity deregulation enterprise into disarray across the nation.

If a PBC system is set up to generate revenue dedicated to efficiency, there are different approaches to the application of these monies. In many states utilities continue to administer and implement DSM under regulatory oversight, but in others new approaches are being tried. New approaches include administration by a state agency and administration by a third party administrator selected through competitive bidding. There are advantages and disadvantages to each delivery approach. These are beyond the scope of this paper, but one point is not: regulators and efficiency advocates need not conflate the issues of funding levels on the one hand, and implementation approaches on the other. Common ground on the need for and appropriate level of funding is logically anterior to the question of administration and implementation.

VI. Conclusion

The complexity of regulation of electricity is growing both from the vantage point of business regulation and that of environmental regulation. The expertise and effort required of regulators or advocates who would work for regulation that materially advances energy efficiency are now greater than ever before. This paper describes four key sorts of regulatory policy and intervention which can have major effects on the pace and level of market penetration of energy efficiency measures. These may be summarized as follows:

(1) *Constitute and seriously apply planning frameworks that integrate demand-side efficiency measures into the assessment of overall strategic scenarios to meet electricity-related energy ser-*

vice needs. Strategic energy assessment to provide benchmarks for structuring and regulating new energy markets needs to be created in restructured jurisdictions, while integrated resource planning needs to be reinvigorated in the many jurisdictions which, as is increasingly apparent, will not soon restructure.

(2) *Review and overhaul rate-making frameworks; redirect rate design so that prices signal the value to consumers and society of efficiency in the consumption of electricity.* Rates set by regulators are here to stay, applying at least to the distribution level, and in many jurisdictions to generation services as well. Inclining block rate structures and mandatory time of use rates can be promoted. Equally important is opposition to efforts to establish price cap regulation or to increase fixed monthly charges that are independent of electricity usage.

(3) *Integrate energy efficiency into environmental regulation.* Federal and state air emission regulations should incorporate set asides of non-token numbers of emission allowances to be awarded for emission reductions arising from energy efficiency savings. Additionally, facility siting regulations should provide for energy efficiency as a means of mitigating environmental harms still remaining after strict environmental criteria have been satisfied by a facility plan.

(4) *Create direct or indirect public benefits funding mechanisms commensurate with the achievable potential for cost-effective energy efficiency in a given jurisdiction.* Energy efficiency portfolio standards are a promising and relatively untested approach. Loosely modeled on renewable resource portfolio standards, EEPS require each electricity supplier to induce energy efficiency equivalent to a small portion of its electricity sales. Direct funding, alone or in tandem with other policies, is already widely recognized as a potentially powerful lever for energy efficiency. Experience with PBCs has shown that the mobilization of multiple efficiency advocates can create the political momentum to establish and sustain significant PBC funding levels for energy efficiency.