integrated utility. For a stand-alone distribution utility, the loss to net profit is even greater – about double the impact. This basic sales incentive is at odds with a requirement to invest in cost-effective energy efficiency. Policies can, instead, align utilities' profit motives with acquisition of all cost-effective energy efficiency.

The most effective method for eliminating this sales incentive/efficiency disincentive is to *decouple* utility revenues from its sales. A utility's revenue requirement is determined through ordinary rate cases. Differences between the allowed revenues and actual revenues received in each ensuing year can be tracked on a per-customer or other basis. The difference (positive or negative) is flowed back to customers in a small adjustment to unit rates in the following year.

Another method of addressing lost sales revenues due to utility ratepayer funded efficiency investments is through an adjustment that tracks the implementation of energy efficiency and uses statistical means to determine lost revenues. Recovery of lost revenue (actually, net lost revenue, which accounts for utility cost savings attributable to the efficiency investment) can be contingent on achieving certain energy efficiency program goals.

States also can provide increased or diminished points on allowed rate of return for meeting predetermined (high and higher) levels of successful efficiency implementation.

3. Regulatory Proceedings Establishing The Efficiency Resource

The regulatory requirement that a utility or other licensed provider of electricity or gas service invest in all cost-effective energy efficiency can be established by rule, by rate case decision, by order in a Certificate of Need determination, in standard offer service resource decisions, or in the creation of funds to be spent to enhance public goods within the electricity system, such as System Benefit Charges (SBC) or Public Benefits Funds (PBF). In some states, the requirement may result from joint decisions of the legislature and the utility regulatory commission.

Regarding electricity, many states have Integrated Resource Planning (IRP) requirements which require demand as well as supply-side investment. Others, such as California and Montana, that have moved towards greater competition, require that the provider of electrical service to regulated customers(standard offer or default service) acquire a long-run portfolio of integrated resources, and that the distribution utility (whether or not the provider of energy services) also file an integrated resource plan.

4. Establish The Measure Of Cost Effectiveness

Investing in cost-effective energy efficiency at the generation, transmission, or distribution level requires establishing criteria for determining the cost-effectiveness of demand-side resources. Standard criteria are used to compare the costs and benefits of efficiency investments. These cost-effectiveness tests measure several perspectives: for society as a whole (Total Resource Cost), for all customers collectively of the utility (Utility Cost), and the price impact on non-participant ratepayers (Rate Impact Measurement). The available reservoir of energy efficiency is significantly dependent on the cost-effectiveness tests used to decide what programs will be invested in. States with the most successful efficiency development have used TRC as the primary test, while taking into account the information provided by the other tests.

5. Establish The Appropriate Method To Compare Supply Costs To Demand Reduction Costs

Cost comparisons need to take into account the way in which a supply or demand side resource changes a utility's load curve (hourly demand), as each hour has its own costs. Averaging costs across many hours often will fail to reveal the true value of a demand-side resource. (The same can happen with renewable and customer-owned resources, see Section 10, below.)

6. System Benefit Charge (SBC) or Public Goods Charge

These non-bypassable charges, paid by electric or gas ratepayers, were first created by legislation or by utility regulators as a means of ensuring some level of public investment in clean energy in the face of electric industry restructuring. Well known market barriers such a high first cost, high discount rates, split incentives between the owner and occupiers of buildings, etc., limit customer investment in efficiency and prevent society from realizing the full benefits of all cost-effective efficiency. The SBC funds were established to assure continued investment in efficiency but, with a few exceptions, the funds amounted to less per annum than had been spent on efficiency by the previously integrated utility. More problematic, the SBC funds are disconnected from the ongoing economic analysis of future resource acquisition. Worse, these efficiency funds have become a target for state budget officials as a source of general revenue. SBC's can be useful policy but they need to be closely connected to the ongoing resource acquisition decisions.

Designing Energy Efficiency Programs

- **Efficiency programs should be designed to provide opportunities to all customer classes and subclasses, and to address as many electric and gas end-uses and technologies as possible within cost-effectiveness guidelines.**
- **Efficiency programs should be designed to minimize the costs incurred by the utility (or program administrator). To the extent that customer contributions can be secured without adversely affecting the level of program participation, rate impacts can be lessened.**
- **Efficiency programs should be designed to maximize the long-term avoided costs savings for the electricity and/or gas systems.**
- **Efficiency programs that result in lower rates should be combined with those that might increase rates, to lower the overall rate impact.**
- **Budgets for efficiency programs targeted to a specific customer class (i.e., low-income, residential, commercial, industrial) may be based on the amount of revenues that each class contributes to the efficiency funds, if equity impacts are determined to be severe.**

Synapse Energy Economics, Inc. "Evaluating Options for Managing Electricity Demand." Chapter 6 in Portfolio Management. Gardiner, Maine: Regulatory Assistance Project, 2003.

7. Establish Wholesale Market Rules That Encourage Efficiency Investment

Wholesale market rules are written by the entity operating the market subject to approval by the FERC. Wholesale markets in the US have been designed to trade supply-side resources against an assumed level of demand. Wholesale markets need rules that allow trading on the demand side as well as the supply side. Markets are more efficient when suppliers and buyers are both bidding in the market. Market rules need to include provisions for bidding by demand side resources, provide market-clearing prices to successful bidders, and establish hourly and day-ahead markets, which give all participants (including providers of demand reductions) timely price signals to which to respond.

Some electricity markets have been incorporating short-term demand response options including load management, but no market has yet incorporated long-term energy efficiency in the market design.

8. *Demand Response*

At the time of electric system peak, the most expensive and often the most polluting electric sources are called on to maintain reliability. Demand response programs engage customers to give up their right to consume electricity in exchange for some value-based compensation. Under appropriate circumstances, demand response participants enable the system to avoid these high costs and emissions. Furthermore, if demand response can provide a functional equivalent to ten-minute reserves, then costs and pollution associated with maintaining combustion generators on hot stand-by are also avoided. It's important to note, however, that some kinds of demand response can have adverse consequences—for example, if the participant uses polluting on-site generation to replace the electricity it would normally receive from the grid. (See the discussion in Section 16, below, on air emission standards for distributed generation as a response to this concern.)

9. *Require Investment In Energy Efficiency Resources For Transmission Purposes*

Transmission system planning and investment are fully regulated activities. Just as with regulated generation and distribution services, policy makers and regulators should require utilities to develop cost-effective efficiency and customer distributed resources (i.e., those located on the customer's side of the meter) before investing in supply-side and transmission resources. Revenues for transmission investment should be collected by the same means (usually customer tariffs), whether the resource originates on the demand side or on the supply side. Transmission use, planning, and investment decisions are usually made by the same entity that manages the wholesale market, or a closely related entity. Transmission tariffs are regulated by the FERC.

Renewable Resources

LIKE ENERGY EFFICIENCY, renewables can be a very cost-effective hedge against rising fossil fuel prices. Policies which promote renewables will reflect the fact that renewable facilities tend to have different operating characteristics than conventional power plants. Traditional methods used to analyze the value of power plants and operate transmission systems were developed for conventional plants and tend to undervalue renewables, particularly wind systems. Likewise, the environmental benefits of renewables are often undervalued or ignored.

10. *Economic Integration Of Renewable Resources*

Renewable resources can look more expensive than other supply-side technologies if the cost comparison does not consider the costs avoided in the hours the renewable resource is likely to run, or if it does not consider the renewable resource's other risk-mitigating benefits such as non-fluctuating fuel costs. Wind and solar energy both tend to be available during peak hours, which are higher-cost hours to serve. An accurate avoided cost for many renewable resources would likely be higher than the average cost for all hours. These methods also need to replace existing methods that unreasonably discount the capacity value of intermittent renewables.

11. Net Metering For Renewable Resources On The Customer's Side Of The Meter

Net metering policies permit customers with on-site generation resources to "run the meter backwards" to zero, and set the price to be paid to the customer for power generated in excess of the customer's own use. Net metering policies have been widely adopted, though with slightly different criteria as to eligible projects, maximum project size (100 kW is common), and the price to be paid for power in excess of the customer's own use. Net metering policies can merge with distributed resource policies if the eligible projects include small-scale, clean generation. Also, project size allowances can increase. For example, NJ is considering raising maximum project size to 2 MW, which in effect moves from ordinary net-metering practice, typically in the 100 KW range, towards something more like a renewable distributed resource interconnection standard. California is the other leader on unit size. It currently permits net metering for facilities up to 1 MW.

12. Establish A Renewable Portfolio Standard (RPS) Or Set-Aside

Many renewable resources are not yet cost-effective or cost-effective in all applications. Nevertheless, it is in society's interest to spur the development of these resources, which hedge the price volatility of fossil fuels today and which will be essential to meet future power needs. Requiring a minimum level of renewable resource investment works to lower the unit costs of renewable resources. To be fair to all market participants, these requirements must be applied to all distribution companies or to all retailers operating in a jurisdiction. A set-aside for solar or other high-priority, high-cost resources is a key way to jump start development of that sub-sector. Since the virtual demise of the mandatory purchase requirements of PURPA, a majority of the renewable generation being added to the grid today is being added in response to state RPS requirements.

13. Establish A Renewable Development (Clean Energy) Fund

States that want to address development barriers to renewable energy projects can create a fund, often called a clean energy fund. Such a fund can target its resources in various ways, depending on state priorities and the amount of money available. Identifying the most promising technologies and applications, and supporting demonstration projects are typical activities. Some states also view these as economic development activities.

14. Establish Transmission Rules That Do Not Penalize Intermittent Renewable Resources

This, like other transmission policies, originates with the entity that manages transmission and operates under a tariff approved by the FERC. Advocacy is underway in FERC dockets to create appropriate expectations for the electricity market while securing for wind generators the value of their product.

Distributed Generation

Distributed generators (DG), which include combined heat and power (CHP), are smaller scale resources that are dispersed throughout the system, often close to loads, that can be sited on either the utility or the customer's side of the meter. Well-considered

DG can provide real benefits to the electric system including increased efficiency of energy use, improved reliability for customers and the grid in general, and reduced environmental impacts.

15. Regulatory Financial Incentives

When placed on the customer side of the meter, distributed generators reduce kWh sales just as energy efficiency reduces kWh sales. Thus, the financial incentives discussed in the Energy Efficiency, Section 2, above, are equally important for distributed resource development.

16. Air Emission Standards For Distributed Generation

The most common distributed resource in use today is the stationary diesel engine. These small engines are generally not subject to air regulations and they emit significantly more air pollutants than are emitted by larger power plants, which are subject to air regulations. Cleaner diesel technology is under development, but, though there are promising developments, it is unlikely to achieve the emissions reductions that other (e.g., gas-fired) combustion technologies have or are expected to achieve. States can adopt air emission rules that prohibit the continued hook-up of dirty diesel and encourage the use of cleaner technologies (including diesel, as appropriate – for example, for emergency generation). These rules are generally adopted by a state's environmental regulatory agency rather than its utility regulatory agency. States that have adopted, or will soon adopt, emissions standards for distributed generation include Texas, California, Connecticut, Massachusetts, Maine, Delaware, and New Jersey.

17. Net Metering For Distributed Generation

This issue is the same as discussed in Section 11, Renewable Resources, above.

18. Interconnection Protocols

To allay initial concerns from some utilities that distributed resources could complicate and possibly disrupt the operation of the electric system, several states have developed technically specific, standardized interconnection protocols. Proponents of distributed generation generally attributed these concerns to utility unfamiliarity with distributed resources. Utilities and DG proponents ultimately worked in collaborative processes in states like Texas, New York, Delaware, Massachusetts, and California to establish the standard interconnection policies. Several other states have policies under development. Larger-scale combined heat and power (CHP) arrangements should be strongly encouraged and will also benefit from well-designed, standardized interconnection policies.

Rate Design

19. Good Rate Design Accurately Reflects Long-Run Cost

Good rate design will strongly complement clean energy acquisition policies because it reflects the long-term costs of power resources, including more polluting sources. But, rate design alone is not enough to overcome the well known consumer barriers to investment in energy efficiency. Also, because many environmental costs, such as health and atmospheric damage related to carbon emissions, are not included in electricity or gas prices, the price signal received by customers falls short of reflecting true costs.

20. Avoid Bad Rate Design

Higher fixed charges with lower usage (unit) charges have been advanced recently by several utilities. This rate design is attractive to utilities because it creates a larger assured revenue stream and reduces the risk of lower revenues when lower usage occurs for whatever reason. The downside is twofold: the design fails to reflect the long-term marginal costs of providing the product, and it removes the price signal to customers to consume electricity and gas efficiently. Moreover, it raises bills for low-volume consumers (i.e., those who consume less than the average) and lowers bills for high-usage customers, including those with high air conditioning usage, who are helping to drive high-cost system peaks. A utility's interest in avoiding risks of revenue loss due to greater use of efficiency is much better addressed through revenue/sales decoupling, described above.

21. Cost-Based, Time-Differentiated Rates

Time-of-use (TOU) and/or real time rates give customers a price signal that encourages efficient use (to the degree that the rates reflect all costs of production, including external ones). There are limitations, however, as the cost of providing TOU signals to customers who do not already have demand meters can overwhelm the system savings expected from voluntary customer response. In addition, absent automated systems that monitor prices and adjust consumption, the relatively small potential savings for (especially) residential and small commercial customers means that these customers are unlikely to consistently respond to price changes unless they are large and sudden. Combining energy efficiency program offerings with inverted block rates and seasonal rates (where costs justify them) is a highly synergistic strategy and a reasonable proxy for TOU rates.

22. Seasonal Rates

Seasonally differentiated rates capture the cost of service differences between summer and winter seasons. Many states experience markedly higher demand due to use of air conditioning in the summer months. A higher seasonal summer rate reflects the higher costs of serving customers in the summer months. By delivering this price signal to customers, seasonal rates help to drive investment towards higher-efficiency air conditioning, with marked environmental gains.

23. Green Pricing

Green pricing is a generic term for the offer of electricity generated from clean, environmentally-preferred sources such as solar, wind, geothermal, and some types of biomass and hydro energy resources. Consumers who choose to purchase this product pay a small premium for the green electricity. The premium directly supports the development of green resources. Green pricing initiatives have met with some (limited) success. Green pricing elevates customer awareness but can also implicitly send the inaccurate message that clean energy is an expensive luxury. Companies must also have a plan to provide sufficient electricity from qualifying clean energy sources to match the amount they are selling to green pricing subscribers.

Final Words

A common characteristic of states with successful clean energy policies is the presence of a champion—a governor, a legislative leader,

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a utility commissioner—who has a sustained interest in making clean energy happen and will advocate effectively for it. Another characteristic is a long-term commitment to some degree of energy resource planning.

When working to establish successful clean energy policies, policy makers need to be mindful of the distinction between the initial policy decisions and the myriad follow-up decisions required to actually secure successful long-term development. A state may require electric utilities to collect a systems benefit charge or to file an integrated resource plan that includes all cost-effective energy efficiency, but many crucial steps remain between the policy requirement and the actual deployment of energy efficiency, renewable power, and other clean power resources. Follow through, continued advocacy and consistency matter.

Where you can learn more: www.raponline.org. RAP's website has papers with in-depth discussions of most of the clean energy policies discussed here. Look for the following topics:

- Portfolio Management: Discusses strategies for public investment in reliable, low-cost and efficient resources.
- NEDRI: The New England Demand Side Initiative Final Report, June 2003, describes in detail the options for efficiency, renewable resources and distributed generation in wholesale markets.
- Distributed Generation: This series of seven papers covers everything from rate design and financial incentives to a Model Emissions Rule.
- Decoupling: Profits and Progress discusses the need for correcting regulatory disincentives to efficiency investment.
- Issueletters: Issuesletter: Electric Industry Restructuring and the Environment, August 1999.

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