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Ten Trends to Track: State Policy Innovations to Advance Energy Efficiency and Renewable Energy

Executive Summary

Energy efficiency and renewable energy help governors diversify their state's energy portfolio, advance economic development, lower the costs of energy, and meet environmental objectives. However, efforts to advance energy efficiency and renewable energy face a variety of regulatory barriers and market shortcomings that result in untapped opportunities. This paper presents governors with 10 recent policy innovations that help states move forward on four fronts: redesigning utility incentives to invest in energy efficiency, increasing consumer access to information and financing, removing regulatory barriers to residential solar power, and creating new ways to reduce the energy used in state buildings and fleets.

Redesign Utility Incentives and Procedures to Foster Energy Efficiency

In most regulatory structures, utilities earn their profit from selling electricity. They thus face a disincentive to invest in energy efficiency. However, states can redesign utility incentives, directives, and business models in the following ways to motivate utility investment in energy efficiency:

1. **Establish Utility Incentives for Energy Efficiency.** States can provide utilities with incentives to invest in energy efficiency by allowing an increased rate of return, sharing cost savings between ratepayers and shareholders, or offering monetary bonuses for meeting specific energy reduction goals. **Arizona** offers its utilities a performance incentive of 10 percent of the value of the energy cost savings if they exceed 125 percent of the state-set efficiency goals. In 2009, one utility earned a $2.5 million bonus and saved customers nearly 209,000 megawatt hours (MWh) of electricity, amounting to a reduction of about 1.8 percent of customer demand.

2. **Acquire All Cost-Effective Energy Efficiency.** States can explicitly require their utilities to invest in energy efficiency where it is less costly than supplying energy. Using that approach and a stakeholder advisory council to identify efficiency program options and costs, **Rhode Island** achieved a 3 percent decrease in average annual bills, saving consumers $12.3 million in electricity costs and $2.2 million in natural gas costs in 2010.

3. **Create a Sustainable Energy Utility (SEU).** As an alternative to the traditional regulatory model, states can charter a separate entity, known as a *sustainable energy utility.* SEUs are dedicated to providing energy efficiency and small-scale customer-sited renewable energy. As a result, they do not face the same disincentives as traditional generation-owning utilities. **Oregon** created an SEU that has delivered energy bill savings averaging $100 million per year for the past eight years—approximately a 3 percent reduction in annual energy use.[1]

1 Energy Trust of Oregon, "2010 Annual Report to the Oregon Public Utility Commission" (November 2011).

Facilitate Market Demand for Energy Efficiency

Consumers often face several barriers to pursuing cost-effective energy efficiency—access to data and financing being among the most common. Two emerging ways to address those challenges, respectively, are to establish information disclosure programs and support on-bill repayment mechanisms. States have primarily focused their disclosure efforts in the commercial sector, although initial efforts are underway to target the residential sector. State efforts in on-bill repayment programs have mainly targeted residential sectors, although some programs target the commercial sector.

4. **Benchmark and Disclose the Energy Performance of Commercial Buildings.** States can support or compel building owners to benchmark and disclose energy performance data. Benchmarking involves tracking a building's energy performance to compare it to its own performance over time or to that of other, similar buildings. Disclosing energy performance data can encourage better building management and investments in efficiency based on consumer demand. **Washington** requires nonresidential building owners to rate their buildings and disclose the information to prospective buyers, lessees, and lenders prior to closing a commercial real estate transaction.

5. **Establish Utility On-Bill Repayment.** States can support efforts to establish utility on-bill repayment of energy efficiency loans. Ideally, loan payments are structured to be less than the monthly amount saved from the efficiency improvements, allowing customer bills to decrease. The utility bill provides a convenient and familiar mechanism to consumers and offers security to lenders. States can provide additional security through a loan loss reserve. **Kansas**'s How$mart on-bill repayment program requires repayment charges on customers' bills to be less than 90 percent of the estimated monthly savings. The average loan amount is $5,751, and the average net savings after interest is deducted is $1,272 over 15 years.

Remove Barriers to Residential Solar Power

Lengthy permitting, complex grid connection processes, and financing limitations can add 3 percent to 20 percent to the cost of a small solar photovoltaic (PV) panel installation.[2] States can take the following steps to reduce those so-called "soft costs" by streamlining permitting processes, supporting innovative financing models, and removing restrictions on system size:

6. **Streamline Permitting for Solar PV Systems.** Complex, variable, and expensive permitting processes limit the economies of scale for solar PV. States can help streamline permitting by establishing statewide interconnection standards, training building and electrical inspectors in installation procedures, adopting legislation requiring consistent permitting requirements, capping permitting fees, and allowing online submissions of permit applications. **Vermont** streamlined permitting for solar systems below five kilowatts (kW). The process automatically approves solar installation permits 10 days after a customer submits a registration form, as long as the utility does not raise any interconnection concerns during the waiting period.

7. **Clarify Regulations for Third-Party Owners of Solar PV.** An emerging model for PV installations involves a customer signing a long-term contract to buy the solar electricity produced from a third-party that owns, installs, and maintains the system on the customer's property. This model removes the barrier of high upfront costs and potentially offers long-term savings on electricity bills. However, in many states, there is an unclear ability to use a third-party ownership model without those companies being sub-

2 AECOM, "Economic and Fiscal Impact Analysis of Residential Solar Permitting Reform" (July 2011).

ject to the added time and cost associated with regulation under the public utility laws, limiting the solar industry's interest in investing in those states.[3] States can facilitate the use of third-party ownership by clarifying the legality of the third-party owners to generate power without being subject to the utility regulatory process and allow those companies to access financial incentives. **California** legislation clarified that third-party PV companies would not be regulated as utilities in 2008. In the two years that followed, third-party PV systems grew from 9 percent to 36 percent of residential PV installations.[4]

8. **Increase or Eliminate the Cap on Net Metering for Renewable Energy.** Under net metering, utilities compensate homeowners with renewable energy systems for the excess power that their equipment provides to the grid. The compensation is in the form of credits on the customer's bill at retail rates. The policy is most frequently used with solar PV. For many programs, there is a capacity cap on net-metered systems whereby residents receive credits for systems only up to a certain size. An emerging trend is for states to remove or expand the cap to support greater adoption of solar energy. In 2010, **New Jersey** passed legislation removing a two megawatt (MW) cap on net metering.

Lead by Example

States can advance energy efficiency and cleaner technologies in their own buildings and vehicle fleets. However, lack of familiarity with finance mechanisms and institutional resistance can stymie state efforts. To address those barriers, states can update their energy performance contracting efforts and limit unnecessary travel for state-operated vehicles.

9. **Update Energy Performance Contracting.** Under an Energy Performance Contract (EPC), a state enters into an agreement with an energy service company (ESCO) that develops and installs energy efficiency improvements that are paid for over time from the financial savings of the project. Using an EPC, an ESCO typically guarantees a fixed amount of savings and pays the difference if the savings do not materialize. Many states have legislation allowing them to use EPCs, but they are not fully using that authority. Through a number of innovations, states are beginning to make greater use of the EPC tool. States can set up self-financing mechanisms, explicitly require or encourage state building operators to use EPCs, preapprove project types and companies to avoid project-specific legal review, and establish real-time information systems to reduce wasted energy. In 2007, **Massachusetts** Governor Deval Patrick signed an executive order requiring EPCs for all state facilities larger than 100,000 square feet. The state also set up a tracking system that delivers real-time energy information to the operators of state facilities. The state expects that information will help building operators optimize energy use and save 5 percent to 15 percent—or at least $10 million annually—of its $200 million annual energy bill.

10. **Avoid Unnecessary Use of Government Vehicles.** One of the most cost-effective steps for improving the efficiency of state government fleets is to avoid unnecessary travel. Fuel management systems are widespread in the public sector. However, most do not include clear incentives to reduce travel. States can use vehicle telematics to integrate the use of global positioning system (GPS) and other technologies with mobile communications, consolidate weekly trips, encourage teleconferences, and reassign vehicles from individual drivers to shared-use assignments. In **Colorado**, a 2007 executive order required state

3 National Renewable Energy Laboratory, "Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners" (2010).

4 California Public Utility Commission's California Solar Initiative dataset (2011).

government to reduce petroleum use by 25 percent by 2012 and offered state agencies a variety of recommendations and tools, such as a list of teleconference websites and a trip optimizer that compares the cost of using public transit and government fleet use options. The state reduced its fleet's per-vehicle miles traveled by 15 percent between 2006 and 2011.

Introduction

Governors across the country are looking to reduce energy consumption and increase the amount of energy produced from renewable sources, such as the wind or the sun.[5] They are motivated by a variety of interests, including enhancing the economic development of their states, reducing energy costs, diversifying the energy resources available to their states, and reducing the environmental damage associated with energy use. Recent actions taken to achieve those objectives, along with efforts of the past several years, point to several promising innovations that can help states move forward even in fiscally constrained times.

This paper presents 10 new ways to address longstanding challenges to the increased use of efficiency and renewable energy. Each approach addresses one of the following four barriers:

- **Disincentives for Utilities to Promote Energy Conservation.** Under most current regulatory structures, utilities profit only from selling electricity and thus lack a financial incentive to encourage consumers to reduce their consumption.

- **Inadequate Information and Financing Support for Energy Efficiency.** Consumers often do not receive sufficient data about the costs associated with energy use and the savings from efficiency investments. Even where such data is available, they may not have access to the upfront capital needed to secure what can be reasonable payback periods (e.g., two to seven years).

- **Regulatory Hurdles for Renewable Energy Investment.** Unintended regulatory barriers can add to the upfront costs of renewable energy by adding uncertainty, time, and expense to the installation of a project. For instance, complex and lengthy permitting and grid connection processes and limitations on financing options can add 3 percent to 20 percent to the cost of a small solar panel installation.[6]

- **Institutional and Financial Barriers to Increasing Energy Efficiency in Government Operations.** Lack of familiarity with new financing mechanisms and institutional resistance can stymie state efforts to increase efficiency and adopt cleaner technologies.

The measures presented here also meet the following criteria:

- Advance energy efficiency or renewable energy;

- Include a **distinct role for governors**, such as issuing executive orders, encouraging utility regulators to review the issue, or proposing new legislation;

- Feature **innovative approaches** that are designed to address shortfalls of existing policy designs[7];

- Prioritize **fiscally responsible actions,** given states' budget constraints; and,

- Show promise for broader adoption at scale.

5 National Governors Association, "State Energy Actions—2011 Update" (2012).

6 AECOM, "Economic and Fiscal Impact Analysis of Residential Solar Permitting Reform" (July 2011).

7 Not included in this paper are policies and programs that are longstanding in many states and seen as a foundation for encouraging the adoption of efficiency or renewable energy. That includes measures such as public benefit charges and related funding programs, renewable portfolio standards (RPSs), RPS carve-outs for specific technologies, energy efficiency resource standards, building codes, and policies that internalize the external costs of energy production and use.

Redesign Utility Incentives and Procedures to Foster Energy Efficiency

A well-designed, comprehensive energy efficiency program can reduce energy bills, defer the construction of costly new power generation, and reduce the environmental damage associated with using traditional fuels to generate electricity. But in many circumstances, utilities do not have incentives to promote reduced energy consumption. In an effort to provide utilities with incentives to promote energy efficiency, states are beginning to create new business models and procedures to better align utility and ratepayer interests. Promising approaches include adopting incentives that encourage utilities to invest in energy efficiency, assigning energy efficiency a priority over generation where feasible and cost-effective, and creating a sustainable energy utility that focuses solely on providing energy efficiency.

1. Establish Utility Incentives for Energy Efficiency

Under traditional regulatory models overseen by state public utility commissions, utilities have a disincentive to pursue programs that reduce energy consumption, because such programs result in lower revenues and lost guaranteed profit margins, in contrast to capital investments in plants and equipment. There are three policy approaches that states can use are needed simultaneously to realign a utility's profit motive with a state goal for energy efficiency. First, to remove a utility's disincentive from investing in energy efficiency, states can remove sales volume as a factor in profitability and thus "decouple" revenues and profits from the amount of electricity sold. Second, states can allow utilities to recover their spending on efficiency programs. Third, states can allow utilities to provide shareholders with incentives for energy efficiency investments that are comparable or in excess of those for investments in generation capacity. Combining these three approaches will have the greatest impact; many states are using or pursuing the first two approaches and a growing number are including or examining the addition of shareholder incentives.

There are three types of shareholder incentives:

- **Provide rate of return for efficiency based on energy savings or program spending.** The utility may earn a rate of return for efficiency investments that is equal to or greater than the rate it earns for investing in new supply capacity. In **Wisconsin**, efficiency investments earn the same rate of return as capital projects.

- **Offer shared benefits mechanisms** to allow utilities to earn a portion of the benefits accrued to ratepayers from an energy efficiency program. For instance, if a utility helps ratepayers save $1 million in energy costs, a shared benefits regulation may allow the utility to claim half and the ratepayers to benefit from the other half. **Arizona, California, Colorado, Georgia, Hawaii, Kentucky, Minnesota, Ohio, Oklahoma,** and **Texas** use some version of a shared benefits mechanisms.

- **Provide bonuses based on performance targets** of a fixed amount of energy savings. When the utility achieves an energy savings goal, it can earn a percentage of the program costs that it spent to achieve it. **Connecticut, Massachusetts, New Hampshire, Rhode Island,** and **Washington** use performance targets.

Existing shareholder incentives for efficiency provide an average 10.5 percent return on investment, which is comparable to the average profit margin utilities earn for generation investments.[8] Although it is not possible to isolate the influence of shareholder incentives from the broader set of policy variables, utilities that have shareholder incentives spend significantly more money per capita on energy efficiency than utilities that do not have those incentives.[9] Shareholder incentives are most effective when com-

8 American Council for an Energy Efficiency Economy, "Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency" (Washington, D.C., January 2011).
9 Ibid.

bined with decoupling policies, lost revenue recovery mechanisms, and a policy framework that sets efficiency goals.[10] With respect to shareholder incentives, governors can encourage legislative action or request regulators to initiate an investigation into utility incentives for energy efficiency.

Arizona allows its largest electricity utility a shared benefit incentive equal to 10 percent of the net benefits achieved through its energy efficiency programs. Established in 2005 by state regulators, each utility was assigned a formula to recoup its energy efficiency expenses through its rates, and the shareholders can earn a return through an upward rate adjustment that recognizes the utility's success in energy conservation. In 2008, the program was modified to employ a tiered performance incentive that guarantees the utility a profit as a percentage of the ratepayers' reduction in energy spending. If a utility delivers 90 percent of the efficiency goal set by the state, it can earn a performance incentive of 6 percent of the net benefits; if it delivers above 125 percent of the efficiency goals, it can earn 10 percent of the net benefits. In 2009, the utility spent $25 million on energy efficiency programs, and its customers reduced their energy use by almost 210,000 MWh of electricity. That change reduced residential and business demand by approximately 1.8 percent and earned the utility a bonus of 10 percent of the net benefits it delivered to ratepayers.

2. Acquire All Cost-Effective Energy Efficiency

Traditional utility energy procurement rules do not classify energy efficiency as a "source" of energy, thereby preventing utilities from pursuing it under their standard generation and procurement operations. Requiring utilities to invest in "all cost-effective efficiency" recognizes efficiency as another "source" that is selected where it is less costly than providing energy.[11] The resulting level of energy efficiency investments and resulting energy savings can be higher than what most states achieve through energy efficiency resource standards or demand-side management programs, because the targets set in those programs typically do not reflect an "all cost-effective" goal. For instance, **Rhode Island**'s all cost-effective efficiency target is to reduce energy use by 2.5 percent annually, while most states' annual targets are between 1 percent and 2 percent through their energy efficiency resource standard.[12]

As depicted in Figure 1, states that add an all cost-effective efficiency procurement policy increase their investments per capita in efficiency programs.[13]

States can enhance policies to promote the use of all cost-effective energy efficiency by establishing a multi-stakeholder advisory council that evaluates and agrees on the expected costs of various efficiency program options. Council members could include consumer advocates, business associations, environmental advocates, and energy efficiency companies along with utility observers and presenters. Through a transparent stakeholder process, a state can build support for energy efficiency investments.

Under the advisory council model, regulators determine the "avoided cost of kWh" based on each utility's financial structure and direct utilities to invest in efficiency projects that the council identifies as cost-effective in the utility's facilities or consumers' homes and buildings. States use various methods to determine

10 The Regulatory Assistance Project, "Revenue Regulation and Decoupling: A Guide to Theory and Application" (June 2011), and American Council for an Energy Efficiency Economy, "Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency" (Washington, D.C., January 2011).

11 That policy is sometimes referred to as *adding demand-side resources to the least cost procurement regulation,* because it requires utilities to include considerations for increasing efficiency as a source of energy so long as it is less expensive than other energy sources.

12 ACEEE, "State Energy Efficiency Resource Standard Activity" (June 2011).

13 Environment Northeast, "Best Practices for Advancing State Energy Efficiency Programs: Policy Options & Suggestions" (February 2012).

Figure 1: Impact of "All Cost-Effective Efficiency" on Per Capita Spending

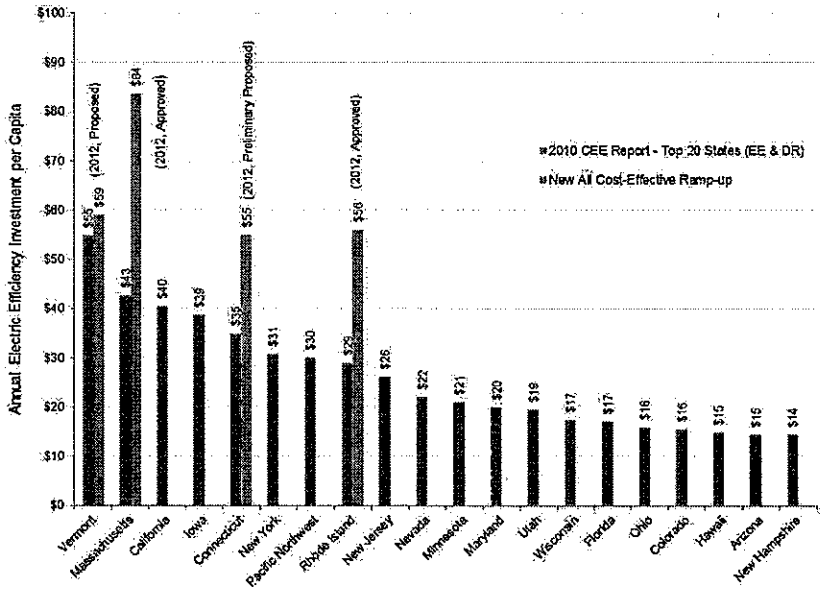

Figure 1. Historic and New Per Capita Electric EE Investment Levels for Top 20 States (Chart from Environment Northeast, "Best Practices for Advancing State Energy Efficiency Programs: Policy Options & Suggestions" [February 2012])

cost-effectiveness, and some states take into account wider state energy goals, such as improving air quality, avoiding greenhouse gas emissions, and reducing grid expansion costs, as is done in California.[14]

Rhode Island enacted legislation in 2006 that requires electric and gas utilities to purse all cost-effective energy efficiency measures before considering generation options. It also established an Energy Efficiency and Resource Management Council that includes representatives from all customer classes (residential, commercial, and industrial), property managers, environmental academics, low-income users, and building code experts. Three nonvoting ex officio members represent the electric, gas, and oil utilities. The law directs the council to collaborate with the state energy office to identify cost-effective efficiency options.
A council study found that the state could meet 29 percent of its energy needs over 10 years—an annual reduction of 2.9 percent of its energy needs through energy efficiency measures that are less expensive than traditional supply options.[15] State regulators set the target at 2.5 percent per year, which surpasses the state's average growth in energy demand. The policy led the utility to dedicate around 10 percent of its revenues to efficiency efforts—much higher than the typical utility efficiency expenditure of 1 percent to 3 percent—and helped ratepayers reduce their utility bills by 3 percent annually.[16] Since it was passed, the state's primary utility, National Grid, started including energy savings targets in its procurement plans. In 2010, it saved consumers $12.3 million in electric bills and $2.2 million in natural gas bills.[17] Other states implementing similar policies are **Connecticut, Massachusetts, Oregon, Vermont,** and **Washington**.

14 Energy and Environmental Economics, Inc., and Regulatory Assistance Project, "Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers" (November 2008).

15 Rhode Island Energy Efficiency Management Council, "Annual Report to the General Assembly" (April 2011).

16 Ibid.

17 The enabling legislation also required aggressive energy saving targets, and so—like most energy efficiency policies—it is not possible to precisely isolate the impact of each part of the legislation.

3. Create a Sustainable Energy Utility

An SEU is a new utility business model in which the state charters a regulated entity to provide customers with energy efficiency and sometimes also customer-sited renewable energy. The SEU receives compensation only for the verified reductions in energy use. In contrast to a tradition utility, SEUs generate profits by reducing the amount of electricity supplied from nonrenewable generators. An SEU can be organized in different ways, but typically the model focuses on energy services rather than commodity energy, executes a statewide strategy, and centralizes coordination to reduce transaction costs.[18] Financially, an SEU is self-sufficient and has greater flexibility than state-level agencies in seeking competitive procurement of energy efficient services and appliances and in providing different types of incentives. SEUs can be funded by aggregating funds collected under a surcharge on ratepayers' utility bills, by issuing a bond, or through other state revenue streams. SEUs can also use state tax incentives for energy efficiency and renewable energy to fund their efforts.

The Energy Trust of **Oregon** serves state residents and businesses with both efficiency and renewable energy services, resulting in energy bill savings of around $100 million per year for the past eight years.[19] The cost of reductions averaged 2.5 cents per kWh, while the retail electricity cost in the state averaged 8.9 cents per kWh.[20] In 2010, the Energy Trust saved 403,000 MWh of electricity through efficiency and generated 29,000 MWh of renewable energy. Over its eight years of operation, the trust lowered energy use by some 3 percent per year, generated 902,000 MWh of renewable energy, and reduced carbon dioxide by levels equivalent to removing 1 million cars from the road for a year. A public benefits charge provides direct funding, and there is a supportive structure of state tax incentives for energy efficiency and renewable energy. The state estimated that through the businesses that the SEU contracts with, it created approximately 2,500 full- and part-time jobs, generating $81 million in wages and $12 million in small business income.[21] Other states that use the SEU model include **Delaware, New York, Ohio, Vermont,** and **Wisconsin**.

Facilitate Market Demand for Energy Efficiency

The electricity market does not maximize the full amount of cost-effective energy efficiency because of several barriers. Although the exact size of this so-called "energy efficiency gap" is debated, a recent meta-analysis of energy efficiency potential studies estimates that between 13 percent and 30 percent of energy use could be avoided cost-effectively, with median savings of 20 percent.[22,23] The barriers to achieving this potential include high upfront costs, imperfect information, consumer inertia, unpriced externalities, and perverse incentives for consumers and utilities. Two emerging trends that aim to fix those market barriers are benchmarking and disclosing energy performance of commercial buildings and utility on-bill repayment financing.

4. Benchmark and Disclose the Energy Performance of Commercial Buildings

Building energy benchmarking is the process of tracking a building's energy performance using standard metrics to compare the building's own performance

18 In contrast to the traditional model of allocating efficiency funds to state agencies and utilities, SEUs centralize funds to serve as a "one-stop shop" for energy efficiency. To date, most SEUs have focused on energy conservation and efficiency services, but the focus can include renewable energy resources.

19 Energy Trust of Oregon, "2010 Annual Report to the Oregon Public Utility Commission" (November 2011).

20 Cost savings may be based on utility cost savings without consideration of customer costs for installing efficiency upgrades. Arimura et al. argue that it is challenging to account for customer costs and that utility costs savings are complicated by the wide range of hourly marginal cost of generation, which can range from 2 cents to 27 cents per kWh, depending on location and time of day (National Bureau of Economics, 2011). Electricity prices are from U.S. Energy Information Administration, average price by state by provider (1990–2010).

21 Energy Trust of Oregon, "2010 Annual Report to the Oregon Public Utility Commission" (November 2011).

22 For more information on the energy efficiency gap, see Allcott, H., and Greenstone, M., "Is There an Energy Efficiency Gap?" *Journal of Economic Perspectives* (Winter, 2010) and Dietz, T., "Narrowing the U.S. Energy Efficiency Gap," *Proceedings of the National Academy of Sciences* (September 2010).

23 American Council for an Energy-Efficient Economy, "State-Level Energy Efficiency Analysis: Goals, Methods, and Lessons Learned," Proceedings of 2008 ACEEE Summer Study on Energy Efficiency in Buildings (Washington, D.C., 2008).

over time or to other, similar buildings. That tracking can help public and private-sector building owners manage their buildings better and save energy. Disclosing and publicizing energy performance benchmarking helps building owners appreciate the size of their energy expenses and trends over time. Requiring the disclosure of energy performance of commercial buildings makes lessees and buyers aware of the cost of energy associated with operating a building, which they can then factor into their decision to buy or lease a property.

States can provide information on building energy performance at a low cost by using the Environmental Protection Agency's free data-collection and rating tool, ENERGY STAR Portfolio Manager, and a complementary tool developed by the U.S. Department of Energy (DOE) that can track and disclose data on energy use. Public utility commissioners from across the country adopted a resolution in 2011 to support regulatory changes that require utilities to make energy use data available to potential buyers.[24]

In 2009, **Washington** Governor Christine Gregoire signed the Efficiency First law, requiring the energy use of commercial buildings to be rated and disclosed. The law requires owners of nonresidential buildings larger than 10,000 square feet to rate their buildings using ENERGY STAR software and to disclose the information to prospective buyers and lessees when presenting a contract or lease and, in the case of a purchase, as documentation in support of a loan application. Utilities are required to upload building energy use to the software when a building owner requests them to do so.

California requires a similar process for transactions involving commercial buildings. **Iowa** is operating a pilot project to track and benchmark energy data for 1,218 of its public buildings and plans to expand it to the private sector. **Nevada** is actively exploring commercial building disclosure requirements and comparing them with similar structures through a Commercial Building Retrofit Project. Policies requiring commercial building disclosure exist in more than 50 jurisdictions around the world, including all European Union countries and the following U.S. cities: the **District of Columbia; Santa Fe, New Mexico; New York City;** and **Arlington County, Virginia**.

5. Establish Utility On-Bill Repayment

On-bill repayment allows utility customers who borrow to invest in energy efficiency to repay their loans on their monthly bill for electricity or gas service. Historically high rates of utility bill payment and the potential for disconnection in the event of nonpayment make on-bill financing attractive to lenders. It is appealing to customers because it bundles repayment with a convenient, familiar utility bill and because loan payments can be structured so that the money the consumer saves from efficiency improvements is greater than the amount repaid each month on their energy bill.

Under some on-bill repayment programs, the debt "stays with the meter," allowing project costs to attach to the building instead of following the building owner after he or she sells the property. In addition, that approach allows rental owners to pass along both the costs and the benefits of energy efficiency investments through the utility bill. Under some policy designs, an owner can prepay the obligation as part of the negotiation of a sale.

On-bill repayment needs to be combined with a financing source. Three finance options are available:

- **A third-party lender**, such as a credit union or bank, provides the loan. The state or utility can provide additional enhancements, such as an interest rate buy-down, rebates, or loan loss reserves. Around half of the states with on-bill financing programs use third-party lenders.

24 National Association of Regulatory Utility Commissioners, "Resolution on Access to Whole-building Energy Data and Automated Benchmarking" (July 20, 2011).

- **Government provides capital** to seed a program from public benefit funds or federal grants. Around half of the states use ratepayer public benefit funds.

- **Utility serves as the lender,** likely from ratepayer funds collected to promote energy efficiency. That option is rarely used because utilities have reservations about taking on the liability. States can address that concern by providing a loan-loss reserve.

In 2008, **Kansas** put in place a "How$mart" on-bill program for residential, commercial, and industrial customers after it completed a successful one-year pilot. The program was able to take advantage of low-interest financing from state efficiency and housing program resources. Interest rates varied from 0 percent to 8.3 percent and are currently at about 5 percent for residential customers.[25] Subsidized low-interest loans were used for more than half of the 750 projects completed. As is common of on-bill repayment programs, no customer credit check is required. Instead, the utility bill history is used as proof of credit worthiness, enabling the program to provide financing to customers who may not have qualified for a traditional loan based on their credit score or debt load. Similar to traditional utility service disconnection terms, utilities are allowed to disconnect customers who do not make their payments. Charges on customers' monthly bills must be less than 90 percent of the estimated monthly savings that result from the reduced energy costs. The program saves customers approximately $19 per month in electric and $23 per month in gas bills for 15 years. On average, customers save $52 of combined electric, gas, propone, or other fuel. The average loan amount is $5,751. The estimated average net savings to the consumer after interest payments are deducted is $1,720 in the first 15 years.

States in which at least one utility has implemented an on-bill repayment program are **Alabama, Arkansas, California, Connecticut, Georgia, Hawaii, Illinois, Indiana, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New Jersey, New York, Oregon, Rhode Island, South Carolina,** and **Wisconsin.**

25 American Council for an Energy Efficiency Economy, "On-Bill Financing for Energy Efficiency Improvements: A Review of Current Program Challenges, Opportunities, and Best Practices" (2011).

Remove Barriers to Renewable Energy

Residential renewable-energy systems such as solar panels require homeowners to pay for equipment that reaps benefits over many years. Financing mechanisms that balance initial costs with later savings can facilitate wider adoption of such systems. States have adopted policies that reduce costs to homeowners by streamlining solar permitting as well as clarifying and allowing solar systems to be owned by third parties. States have also increased future benefits for installing solar by increasing the amount of power that a homeowner can sell back to the grid.

6. Streamline Permitting for Solar Photovoltaics

Streamlining and standardizing permitting processes reduce barriers to renewable energy installation and adoption. Reducing permitting fees and streamlining processing of permits can remove significant barriers that limit economies of scale and add to transaction costs.

Although the permitting process for installing solar PV systems typically takes place at the municipal level, states can help streamline permitting in several ways:

- Prequalify small solar installations unless the utility demonstrates interconnection concerns;

- Establish statewide interconnection standards for renewable energy equipment;

- Train local building and electrical inspectors in installation procedures;

- Adopt legislation requiring consistent and ap-

propriate permitting requirements and fees for distributed renewable energy systems;

- Cap permitting fees; and
- Allow online submission of permit applications.

Vermont Governor Peter Shumlin signed a law in 2011 to ease the registration process for solar systems up to five kW. The new process eliminates permitting and authorizes solar customers to install their system 10 days after completing a registration form and certificate of compliance with interconnection requirements. If the customer's utility does not raise any interconnection concerns during the 10-day waiting period, the state issues the customer a Certificate of Public Good and allows project installation.

The municipal fee for small-scale solar PV permits in **Colorado** is capped at the lesser of the cost to local government to issue a permit or $500 for residential and $1,000 for nonresidential customers. Additional states that have adopted some element of solar permit streamlining are **Arizona, California, Florida, Massachusetts, Maine, New Hampshire, New Jersey, Vermont, Wisconsin,** and **West Virginia**. The U.S. Department of Energy's (DOE) SunShot Initiative is developing resources to expedite permitting reform through the Rooftop Solar Challenge, in which 22 entities have committed to developing improved permitting and interconnection processes for residential and small commercial rooftop PV systems by the end of 2012. States that are participating in the Rooftop Solar Challenge are **Arizona, Massachusetts, Minnesota, Nevada, Puerto Rico,** and **Washington**.

7. Clarify Regulations for Third-Party Owners of Solar PV

A financing solution involving third-party ownership of solar PV has emerged with increasing popularity as a way to address the upfront costs of solar installations. Instead of purchasing a solar system directly, a customer signs a long-term power purchase agreement to buy the electricity from a third party that owns, installs, and maintains the system on the customer's roof. Many states prohibit electricity generation being owned by nonregulated third parties. That framework worked well historically in the context of regulated monopolies, but it can hinder investment in on-site solar energy. A growing number of states are encouraging third-party ownership as a method to remove the barrier of a PV system's upfront cost and offer residents the possibility of long-term savings on electricity prices.

Facilitating third-party ownership arrangements offers states a way to harness private investment in solar energy systems in concert with other programs that support renewable energy development.[26] Third party arrangements are particularly advantageous to governmental entities that are unable to take advantage of federal and state income tax credits. The developer maintains ownership of the system, gets the credit, and passes the savings on to the governmental entity. For residential customers, the model can result in a lower overall cost to the customer, assuming solar companies are more likely than individual customers to follow through on securing government incentives. In the past two years, third-party ownership arrangements have grown significantly in the residential sector and are now in use in more than a dozen states. Some states have opted to use a lease option in which customers lease the solar equipment and receive the power generated by that equipment instead of paying a per kWh charge. That model is viewed as suboptimal by the solar industry, because it creates challenges for using the federal tax credit and accelerated depreciation by the third party.

California legislation clarified that third-party PV companies would not be regulated as utilities in 2008. Be-

26 For that policy to lead to significant solar market increases, states generally must also have in place policies that support renewable energy investment, including, for example, measures to internalize externalities, a well-designed net-metering policy, monetary incentives to bridge the gap between the current cost of solar energy and retail rates that third parties can access, or a distributed generation carve-out in their renewable portfolio standard. In states where municipally owned utilities and cooperatives are a significant share of the market, policymakers should ensure that their customers are also allowed to use third-party ownership financing.

tween 2009 and 2011, third-party PV systems grew from 9 percent of residential PV installations to 36 percent.[27] During this time period, demand for solar PV plateaued in the state, while demand for this finance mechanism more than tripled.[28] The residents who adopt third-party financing are less affluent, younger, and less educated than those who buy systems directly.[29] Therefore, third-party PV products appear to be increasing total PV demand by serving a new demographic of customers.

Additional states that allow third-party ownership are **Arizona** (limited to government and nonprofit sectors), **Colorado, Connecticut, Delaware, Hawaii, Illinois, Massachusetts, Maryland, Michigan, Nevada, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Puerto Rico, Texas, Utah** (limited to government and nonprofit sectors), and **Vermont.**[30]

8. Increase or Eliminate the Cap on Net Metering

Net metering allows solar and other forms of small-scale on-site renewable energy generation to flow on to the grid when the amount of electricity generated exceeds on-site needs. When that occurs, the customer's meter runs backwards and creates net-metering credits that can be used later when the customer's energy needs exceed generation, such as at night. Under that framework, a customer receives a full retail rate credit for the energy he or she has produced. When there is a size cap on net-metered systems, residents receive net-metering credits valued at full retail rates for systems only up to a certain size. As states have become more familiar with on-site generation, some have begun to eliminate or increase the size cap to allow for the installation of larger, more cost-effective systems and for larger energy users to offset their energy needs by net metering. Accordingly, although system size caps were features of many state net-metering programs in the past, an emerging trend is for states to remove the size cap entirely or expand the size cap to support greater adoption of solar energy.

In response to concerns around providing an unwarranted subsidy to solar energy system owners as well as a recognition that solar energy is often produced during periods of peak energy demand close to the load it serves, states have taken several measures, including limiting the size of facilities that are eligible to net meter or placing an overall program cap on the states' net-metering programs that is frequently set in the range of 0.2 percent to 5 percentage of peak demand.[31] Utilities sometimes express the concern that eliminating the size cap or the overall program cap could compromise the reliability of the grid, because power that solar systems generate is not available on a continuous basis. Adoption of well-designed interconnection standards can address that concern, and many states adopt net-metering programs and interconnection policies as a package. Indeed, an emerging trend found in 24 states is increasing the total program limit to 5 percent or more of peak demand.

New Jersey's net-metering and interconnection regulations have evolved greatly since the Board of Public Utilities first developed regulations implementing the legislative directives to offer net metering in 1999. In 2010, legislation was enacted that removed the two-MW cap on net metering. The maximum capacity that a small-scale facility can interconnect and net meter is determined by the historic annual consumption of the customer generator. Accordingly, a customer generator can exceed two MW only when that customer can demonstrate that he or she can consume the additional generation on site. Customers receive credit on their next electric bill at the retail rate, and any excess is credited at the end of the year at the "avoided cost" rate. The customer owns the renewable energy credits created and can choose to sell them to help off-

27 California Solar Initiative dataset (2011).

28 Solar Energy Industries Association and Greentech Media Research, "U.S. Solar Market Insight," 1st Quarter 2011.

29 Energy Policy, "The Transformation of Southern California's Residential Photovoltaics Market Through Third-Party Ownership" (December 2011).

30 More states allow third-party leasing, but a firm list is difficult to develop. The reason is that, in many states, the law is not settled as to whether they are allowed.

31 Network for New Energy Choices, "Freeing the Grid 2011: Best Practices in State Net Metering Policies and Interconnection Procedures" (2011).

set the customer's installation cost. The state also has no statutory cap on program capacity, although the state's Board of Public Utilities may choose to allow the third-party suppliers or utilities to stop offering net metering when installed capacity exceeds 2.5 percent of the state's peak demand. The state's rules were initially fashioned after the Interstate Renewable Energy Council's model net-metering rules.[32]

Other states that do not have a cap on the size of net-metered systems are **Arizona, Colorado,** and **Ohio. Pennsylvania** allows net metering up to five MW, and **New Mexico** allows up to 80 MW for certain systems. Total program capacity throughout a utility region is uncapped in **Iowa, Minnesota, Montana, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Puerto Rico, Wisconsin,** and **Wyoming.**

Lead By Example

Governors can lead by example by reducing energy consumption in state facilities and their state's vehicle fleets. Such efforts lower energy costs for the state, build market demand for energy efficient systems and vehicles, and offer case studies of demonstrated impact for the private market to consider. Two promising policy trends emerging in that arena are energy performance contracting and reducing fleet vehicle miles driven.

9. Update Energy Performance Contracting

Most states have legislation that allows the agencies responsible for government-owned buildings to enter into EPCs with ESCOs. ESCOs provide states with capital improvements to buildings that include efficiency upgrades, and states pay for them through the projected energy cost savings. Innovations in the field include requiring or encouraging agencies to use EPCs, preapproving project types and companies so that the state legal department does not need to review each contract, and issuing general revenue bonds to fund energy efficiency retrofits on state buildings. EPCs transfer responsibility from the state agency to the ESCO for investments in improving the energy efficiency of state buildings and, after the investments are in place, managing energy use in the buildings.

Because the contracts shift risk from the state to the contractor, the ESCO must be compensated for assuming that risk—a cost reflected in the a stream of future payments the state commits to pay the contractor. The saving from reducing energy use may be sufficient to leave the state better off than it would have been without the contract. Yet if the state were to make the necessary investments itself and better manage energy consumption in its buildings, it could capture all of the saving associated with reduced energy use and, perhaps, be better off. Many states do not have the in-house capacity to manage their energy use and prefer to retain a private contractor to manage it. Effective contracting on the state side requires assessment of the prospect of reduced energy use associated with investment in energy efficiency, the cost of financing embedded in specific contracts, and future fuel and electricity prices.

A state can use minimal management by simply allowing or encouraging ESCOs, or it can centrally manage EPC programs by directing an agency to provide support such as contract forms, prequalifying ESCOs, and managing contracts. Some states, including **Kansas, Oregon**, and **Washington**, have set up self-funding EPC programs. The state's program administration and project technical support are funded from a portion of the saved costs from EPC projects that the program helped agencies identify and implement. After as little as three years, those EPC administration revolving loan funds can be self-funded from the savings.

After having EPC guidelines in place for many years, in 2007, **Massachusetts** Governor Deval Patrick signed an executive order requiring performance contracting for all state facilities larger than 100,000 square feet as part of the broader state goal to reduce greenhouse gases by 25 percent and reduce energy consumption by 20 percent by 2012. State agencies must sign EPC contracts

32 Model Interconnection Procedures, Interstate Renewable Energy Council, available at http://www.irecusa.org.

that guarantee energy savings and can sign contracts that last up to 20 years. Since 2007, the state has completed EPCs worth more than $457 million, avoiding 3.8 million BTUs and 65,000 tons of carbon emissions.[33]

The state also entered into an energy information service contract that sets up a tracking system to deliver real-time energy information to the building operators at 470 state facilities, including colleges and hospitals. The tracking software identifies patterns of inefficiency—such as when the lights are left on at night or on the weekend—and when shifting certain functions can avoid peak-time charges without compromising comfort. The contractor will train state building managers on how to better operate buildings so that the benefits last beyond the life of the contract. The state expects to save 5 percent to 15 percent—or at least $10 million annually—of its $200 million annual energy bill. Additional states with energy performance contracts are **Colorado, Connecticut, Delaware, Hawaii, Indiana, Kansas, Kentucky, Minnesota, Montana, New Mexico, Pennsylvania, Utah, Virginia, Washington,** and **Wisconsin.**

10. Avoid Unnecessary Use of Government Vehicles

One of the most cost-effective steps for improving the efficiency of state government fleets is to avoid unnecessary travel. Fuel management systems are widespread in the public sector, with 83 percent of fleet professionals reporting that their fleets use some form of fuel management system.[34] However, those systems typically do not include clear incentives to avoid unnecessary travel. Governors can write executive orders to reduce vehicle miles traveled, and agencies can implement such an order without adversely affecting services in several different ways, including:

- Installing value-added technologies such as GPS and telematics that reduce gas and miles driven by inspiring employees to drive more slowly, taking more efficient routes, eliminating unnecessary drives, and reminding drivers of timely maintenance check-ups;
- Consolidating weekly trips, setting agency goals such as shifting maintenance equipment deliveries or library book transfers from three to two weekly trips for deliveries that will not significantly affect public service;
- Encouraging teleconferencing and web conferencing; and
- Reassigning vehicles from individual driver assignment to shared-use assignments or enrolling in car-share programs run by private companies.

Some of the states adopting those policies are **California, Delaware, Kentucky, Massachusetts, Michigan, Minnesota, New York, Oregon, Utah, Virginia, Washington,** and **West Virginia.**

A 2007 executive order in **Colorado** requires state government to reduce petroleum use by 25 percent by 2012 and offers state agencies a variety of recommendations and tools. The suggestions include establishing a target for vehicle mile reductions at the agency level, requiring a daily trip log that is reviewed by fleet coordinators to identify possibilities to combine trips, and researching the feasibility of using GPS to improve routing. The state Department of Personnel and Administration offers a variety of tools, including a list of teleconference sites that agencies are encouraged to use for meetings that are shorter than four hours long and a trip optimizer that compares public transit and travel using government vehicles. The state reduced its fleet's per-vehicle miles by 15 percent between 2006 and 2011.

33 Energy Services Coalition, "ESPC Dollars Per Capita: Massachusetts" (2012).

34 Government Fleet, "Fleet and Fuel Management Systems" (September 2011).

Appendix: Resources for More Information

Utility Shareholder Performance Incentives for Energy Efficiency

- American Council for an Energy Efficiency Economy. *Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency,* January 2011. http://www.aceee.org/research-report/u111. Accessed July 11, 2012.
- Utility Motivation & Energy Efficiency Working Group, State & Local Energy Efficiency Action Network. http://www1.eere.energy.gov/seeaction/ratepayer_efficiency.html. Accessed July 11, 2012.

All Cost-Effective Energy Efficiency

- Environment Northeast. *Best Practices for Advancing State Energy Efficiency Programs: Policy Options & Suggestions.* http://www.env-ne.org/public/resources/pdf/ENE_StatePolicyOptions_BestPracticesWhitepaper_February2012.pdf. Accessed July 11, 2012.
- Rhode Island Energy Efficiency Management Council. Annual Report to the General Assembly, April 2011. http://www.rieermc.ri.gov/documents/annual/1_EERMC_April%202011.pdf. Accessed July 11, 2012.
- Massachusetts Joint Statewide Three-Year Electricity Energy Efficiency Plan. http://www.ma-eeac.org/docs/DPU-filing/ElectricPlanFinalOct09.pdf. Accessed July 11, 2012.
- Environment Northeast. Comments of Environment Northeast to the Connecticut Energy Advisory Board on the Integrated Resource Plan for Connecticut Submitted by the Connecticut Light and Power Company and the United Illuminating Company. http://www.ctenergy.org/pdf/ENEFIX.pdf. Accessed July 11, 2012.

Sustainable Energy Utility

- Center for Energy and Environmental Policy, University of Delaware. The SEU Project. http://www.ceep.udel.edu/ceep.html. Accessed July 11, 2012.

Benchmark and Disclose Energy Performance of Commercial Buildings

- SEE Action: State & Local Energy Efficiency Action Network is a collaborative state, local, and federal effort that has created a list of top 10 policy and program solutions for commercial buildings, including a fact sheet on Energy Benchmarking, Rating, and Disclosure for Local Governments. The group plans to post a model policy in 2012 that states can use in developing their own policies: http://www1.eere.energy.gov/seeaction.
- BuildingRating.org lists 50 rating and disclosure policies from around the world: http://www.buildingrating.org.

Utility On-Bill Repayment

- National Governors Association. State Clean Energy Financing Guidebook. January 2011. http://www.nga.org/files/live/sites/NGA/files/pdf/1101CLEANENERGYFINANCING.PDF.
- Bell, C. J., Nadel, S., and Hayes, S. On-Bill Financing for Energy Efficiency Improvements: A Review of Current Program Challenges, Opportunities, and Best Practices. Report E118. ACEEE, 2011. http://www.aceee.org/sites/default/files/publications/researchreports/e118.pdf. Accessed July 11, 2012.

Streamline Permitting of Solar PV

- Solar America Board for Codes and Standards. Expedited Permit Process Report. 2011. http://www.solarabcs.org/about/publications/reports/expedited-permit. Accessed July 11, 2012.
- Network for New Energy Choices. Taking the Red Tape out of Green Power. 2008. http://www.newenergychoices.org/uploads/redTape-rep.pdf. Accessed July 11, 2012.
- U.S. Department of Energy. SunShot Rooftop Challenge Awardees. http://energy.gov/articles/sunshot-rooftop-challenge-awardees. Accessed July 11, 2012.
- Tri-Chapter Uniform Code Committee. Guideline for Residential (Single-Family) Root Mounted Solar Photovoltaic System Utility Grid–Tie Connection. http://irecusa.org/wp-content/uploads/2010/09/TUCC_Policy_11_Standardized_PV_guide_revised_070810-1.pdf. Accessed July 11, 2012.

Facilitate Third-Party Power Purchase Agreements for Solar PV

- Kollins, K., Speer, B., and Cory, K. Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners. 2010. National Renewable Energy Laboratory website. http://www.nrel.gov/docs/fy10osti/46723.pdf. Accessed July 11, 2012.
- National Renewable Energy Laboratory. Solar Leasing for Residential Photovoltaic Systems. 2009. http://www.nrel.gov/docs/fy09osti/43572.pdf. Accessed July 11, 2012.

Increase or Eliminate the Cap on Net Metering

- Network for New Energy Choices. Freeing the Grid: Best Practices in State Net Metering and Interconnection Procedures. 2011. http://www.newenergychoices.org/uploads/FreeingTheGrid2011.pdf. Accessed July 11, 2012.
- Interstate Renewable Energy Council. Model Interconnection Procedures. http://www.irecusa.org. Accessed July 11, 2012.

Update Energy Performance Contracting

- Energy Service Coalition. Tools and examples of state ESCO policies. http://www.energyservicescoalition.org/espc/tools/index.html. Accessed July 11, 2012.

Leverage State Purchasing Power for More Clean Technology

- Responsible Purchasing Network website. http://www.responsiblepurchasing.org/about/index.php. Accessed July 11, 2012.
- Electronic Product Energy Assessment Tool and database of energy efficient products and contract language. EPEAT website. http://www.epeat.net/who-are-you/purchaser/governmentinstitutional. Accessed July 11, 2012.

Avoid Unnecessary Travel in Government Vehicles

- *Government Fleet* Magazine. http://www.government-fleet.com/?prestitial=1.
- Colorado Department of Personnel & Administration. Greening Fleet Management. http://www.colorado.gov/cs/Satellite/DPA-DCS/PA/1200535985059. Accessed July 11, 2012.

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