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The Sustainable Energy Utility (SEU) Model for Energy Service Delivery

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Climate change, energy price spikes, and concerns about energy security have reignited interest in state and local efforts to promote end-use energy efficiency, customer-sited renewable energy, and energy conservation. Government agencies and utilities have historically designed and administered such demand-side measures, but innovative third-party administrative models present new options to finance, market, and deliver sustainable energy services to energy end-users. This study outlines the concept of a new third-party administrative model, a sustainable energy utility (SEU), with the potential to achieve deep energy efficiency savings and a high penetration of customer-sited renewable energy. An SEU is characterized by central coordination, comprehensive programs, flexible incentives, financial self-sufficiency, competitive procurement, and a focus on delivering energy services rather than commodity energy.

Keywords: *renewable energy; energy efficiency; utility policy; climate change*

The Conventional Energy Problem

The challenges associated with U.S. reliance on fossil fuels have been brought into sharp focus by concerns over fuel price volatility, dependence on imported energy, peak oil, and air pollution. The climate crisis has also increasingly emerged as a topic of public concern amid mounting scientific evidence of the role of anthropogenic greenhouse gas emissions (IPCC, 2007; Schneider & Lane, 2006), with public attention further reinforced by events such as the Wilkins ice shelf collapse (Spotts, 2008) and a series of high-profile public awareness campaigns (e.g., Gore, 2006).

In response to these challenges, cities and states around the country are playing a leadership role in enacting innovative policies to promote energy sustainability (Byrne, Hughes, Rickerson, & Kurdgelashvili, 2007; Peterson and Rose, 2006; Rabe, 2004). Even without strong federal policies targeting climate change, state and local sustainable energy programs are projected to result in reductions in carbon dioxide emissions of nearly 670 million tons by 2010, and 1.7 billion tons by 2020 (Byrne et al., 2007). While these gains are encouraging, the current U.S. policy mix will not be sufficient to create a sustainable energy infrastructure or achieve climate stabilization. The primary mechanism for supporting renewable energy in the U.S., for example, is the renewable portfolio standard (RPS). Thirty-three states and the District of Columbia currently have an RPS or a renewable energy goal in place (DSIRE, 2008). Even if their respective targets are achieved, they will only address a fraction of U.S. electrical load growth between 2006 and 2020 and will not significantly alter the existing U.S. energy supply infrastructure (Wiser, Namovicz, Gielecki, & Smith, 2007).

Meanwhile, other problems with more traditional energy systems in the U.S. center on their relative lack of a participant-oriented focus. Conventional energy suppliers are very capable of marketing and delivering energy products – electricity, natural gas, and other fuels. By contrast, energy users interested in improving energy efficiency, lowering their

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energy bills, and using renewable energy are faced with a fragmented array of equipment distributors, consulting firms, contractors, and energy services companies. They often have little access to financing for sustainable energy choices, and must navigate complex, bureaucratic labyrinths to secure funds. Because of the complexity of these conditions, more traditional approaches for supplying sustainable energy services can in practice discourage prospective participants. These trends have given rise to the concept of the *sustainable energy utility,* which was first established through legislation by the State of Delaware in 2007.

What Is an SEU?

A sustainable energy utility (SEU) is an independent and financially self-sufficient entity responsible for delivering energy efficiency, energy conservation, and customer-sited renewable energy to end users. An SEU targets all sectors and fuels, including electricity, transportation, and heating. This is a major departure from supply-side approaches and from traditional demand-side policies, which tend to address only certain types of fuels (e.g., electricity, but not heating or transportation), or limited "silos" of end users (e.g., residential but not municipal consumers). An SEU streamlines customer-sited energy service delivery.

Simply stated, a sustainable energy utility is the point-of-contact for efficiency and self-generation in the same way that conventional utilities are the point-of-contact for energy supply. The most important feature of an SEU is that energy users throughout a city or state can build a relationship with a single organization whose direct interest is to help residents and businesses use less energy and generate their own clean energy. As a nonprofit umbrella entity at a city or state level, an SEU relies on a third-party management model, competitive contracting, and performance incentives to deliver sustainable energy services across all sectors and customer classes. As such, an SEU is publicly accountable and can be financially self-sufficient; it has access to a range of potential funding sources and revenue streams and can achieve energy savings without raising taxes or utility rates.

This article explains the theoretical framework for an SEU, draws comparisons between an SEU and other models of sustainable energy service delivery, and reviews the evolution of the sustainable energy utility concept and the structure of the nation's first SEU in Delaware.

The SEU and Market Transformation

Current supply-side energy policies in the U.S., such as the federal renewable energy production tax credit, have been criticized for supporting renewable energy development in a way that reinforces a commodity-focused energy system by which utility-scale power plants are promoted to the exclusion of robust demand-side policies. Such types of policy frameworks have been represented as supportive of limited "incremental" (Letendre, 1997) or "conservative" change (Hirsch & Serchuk, 1996), rather than the deep and fundamental structural change to energy services-based policies that are required to create a sustainable energy system. By contrast, a sustainable energy utility seeks to achieve its end goals by effecting four inter-related structural changes in the way that energy is delivered and consumed. These include a transition to carbon-free energy sources, a transition to energy service provision rather than energy commodity sales, a transition to a distributed energy infrastructure, and the direct involvement of end-users in the energy system.

Reorganizing Toward a Carbon Focus

Transitioning to a sustainable energy system in the U.S. will require a rapid transition to carbon free sources of energy, in order to achieve the climate stabilization scenario envisioned by the IPCC. This will require a focus on both renewable energy and energy efficiency for all types of energy usage, including transportation, electricity, and heating (Kutscher, 2006; Socolow, 2006). To date, energy efficiency and renewable energy have typically been targeted by separate sets of policies and deployed by distinct or separate organizations (Prindle, Eldridge, Eckhardt, & Frederick, 2007). The sustainable energy utility model is predicated on the simultaneous and synergistic pursuit of energy efficiency and renewable energy resources.

Transitioning from Energy Supply to Energy Services

A sustainable energy system will also require a shift away from the sale of energy as a commodity, which is socially, politically, economically, and environmentally problematic. As discussed by Byrne and Mun (2003), a focus on energy as a commodity has created an energy system that shifts decision-making power from the local to the national level, trends toward

increasingly powerful energy oligarchies driven by short-term profits to the detriment of long-term public interest, and has led to rapid increases in both energy prices and greenhouse gas emissions with little public benefit. Indeed, the ideology of tying public benefit to market metrics "conceives social need in commodity terms, that is, as a good or service whose value is determined by individuals being able to afford more or less of it" (Byrne & Mun, 2003: 63). Similarly, Basalla (1980) has argued that one of the principal obstacles to a sustainable energy future is the myth that economic growth and social welfare are inextricably linked to energy consumption. In other words, progress toward sustainability is hindered by the false belief that greater and greater quantities of energy must be consumed by a group, region, or nation to promote economic and social welfare. This myth has been debunked through studies of energy intensity and economic development in California and elsewhere (Rosenfeld, 2003; Schipper and McMahon, 1995).

Lovins (1976) argues that the achievement of energy sustainability will require a new framework for energy development, one that acknowledges the independence of economic growth and energy consumption. The objective of such a reframed energy system would be to deliver *energy services* to end-users, rather than to maximize electricity sales. The term "energy services" as defined by Goldemberg and Johansson (1995) entails "the desired and useful products, processes, or services that result from the use of energy, for instance …comfortable indoor climate, refrigerated storage, transportation, appropriate temperatures for cooking...etc." Adopting an energy service perspective makes the end-user the ultimate beneficiary of the energy system. This bottom-up perspective recognizes that a wide variety of interchangeable energy sources and conversion processes can be used to provide the same energy service. By adopting an energy services orientation, energy planning can be undertaken in a way that deemphasizes commodity sales and simultaneously prioritizes sustainability. The goal of the sustainable energy utility model thus becomes the provision of sustainable energy services to end-users, rather than the sale of electricity, natural gas, or petroleum fuel in bulk.

From Centralization to Decentralization, With Consumers as Participants

An energy system built around networks of distributed generators and energy efficient technologies has significant technical, security, and environmental advantages over traditional centralized generation and transmission systems (Byrne et al., 2005; Lovins et al., 2002; Weinberg, Iannucci, & Reading, 1991). As supported by the sustainable energy utility model, one of the benefits of customer-sited distributed resources and infrastructure is their involvement of end-users as active participants in the energy system. Consumers are engaged to "start to think about energy as a product or service, rather than a utility" (Mitchell, 2003: 22), so that they seek their own customized energy services and contribute to a more wide-ranging, varying, and ultimately more diverse energy infrastructure. Centralized energy systems, by contrast, treat "utility users as homogenous and passive, effectively siting them at the end of supply chains … [with] only limited involvement in system management" (van Vliet and Chappells, 1999: 1). As a result, under the conventional model, it is difficult to engage "passive" end-users to make behavioral changes that contribute to more sustainable patterns of energy consumption.

The SEU Model and the Evolution of Public Benefit Administrative Structures

In order to support the structural changes detailed above, the Sustainable Energy Utility relies on a third-party, non-profit management model to deliver services across customer classes and fuel types. The decision to use a non-profit management structure has its theoretical roots not only in discussions of incremental vs. structural change, but also in the debate over energy efficiency delivery models. Before the advent of electricity restructuring in the U.S., energy efficiency and demand-side management (DSM) programs were the responsibility of vertically integrated utilities under Integrated Resource Planning (Eto, 1996; Kreith, 1993).

The introduction of retail electricity competition in the U.S., coupled with the unbundling of vertically integrated utilities, required a reconsideration of how energy efficiency should be delivered. Utilities in competitive states abandoned their energy efficiency programs, and energy efficiency funding declined from $1.76 billion in 1993 to $0.92 billion in 1998 (York and Kushler, 2002). In response, many argued that renewable energy and energy efficiency under retail electricity competition needed to be supported by policies such as portfolio standards and public benefits funds (Byrne et al., 2000a; Golove and Eto, 1996; Vine et al., 2003). Although momentum for state electricity competition in the U.S. slowed with the California energy crisis (Blumstein, Friedman, &

Green, 2002), virtually every state that did restructure[1] also established a public benefits fund to support energy efficiency (American Council for an Energy-Efficient Economy, 2007). The creation of public benefits funds raised the question of which entity would be most appropriate to manage them.

The three potential public benefit administrators are utilities, government agencies, and independent non-profit organizations. All three models are currently in place in the U.S. (Prindle et al., 2003), and several comparative analyses have been conducted to date in order to assess their relative appropriateness and effectiveness. Eto, Goldman, and Kito (1996) and Eto, Goldman, and Nadel (1998) laid out criteria for evaluating different administrative models, which included compatibility with broader public policy goals, accountability and oversight, administrative effectiveness, and transition issues. The findings of several different studies on comparative administrative structures, most of which have referenced the criteria of Eto et al. are summarized here:

Utility Administered

Eto et al. state that utilities meet most of the criteria noted above, in that they are experienced administrators with strong customer recognition, have access to detailed information on customer energy use, and can take advantage of economies of scale and existing billing infrastructure. On the other hand, utilities have an inherent conflict of interest in preserving the centralized, commodity-based nature of the energy system, especially when their profit model is based on commodity electricity sales (Schultz, 1996). Didden and D'haeseleer (2003) elaborate on this conflict by distinguishing between "artificial" and "natural" frameworks for energy efficiency delivery. Artificial frameworks, such as IRP, involve forcing or creating incentives for utilities that would typically resist reductions in energy consumption to administer energy efficiency programs. Didden and D'haeseleer argue that "natural" frameworks, in which an entity without inherent conflicts of interest manages energy efficiency delivery, are more appropriate.

State Managed

Eto et al infer that state agencies are not optimal managers of energy efficiency programs because state procurement regulations and budgets limit agency flexibility to respond to changing market conditions by crafting new programs or hiring new staff. Harrington and Murray (2003) further characterize state agency management as the "weaker third choice," because "State agencies are less likely to be able to maintain the required flexibility to be effective efficiency entrepreneurs … State agents are also vulnerable to governmental and political events that are external to the energy efficiency efforts themselves."

Non-profit Managed

With regard to non-profits, for example, Eto et al argue that "(1) the organizational form, structure, and mission…could be very compatible with public-policy goals for energy efficiency… (2) market participants are unlikely to perceive conflicts of interest, (3) flexible planning and competitive procurement processes can be employed, and (4) the organization may be able to attract highly motivated, skilled technical and administrative staff relatively rapidly" (Eto et al., 1998: 53). Although a perceived additional benefit of non-profit models is that it is more difficult for states to "raid" their funds for other budgetary purposes (see, e.g., National Center for Appropriate Technology, 2003), Harrington and Murray (2003: 10) argue that no administrative model is wholly raid-proof.

Given the potential for conflicts of interest with utility administrators, as well as the limitations of governmental models, the non-profit administrative model appears, from the literature, to be the most advantageous model for sustainable energy service delivery.[2] The achievements of Efficiency Vermont, discussed further below, seem to suggest likewise (Parker & Hamilton, 2008).

Although the SEU model is rooted in earlier discussions of energy efficiency delivery models, it represents a significant departure from the design of traditional public benefit funds, in that its goal is to serve all fuel types and all customer types. As a result, the independent non-profit model is an optimum choice, not only because it provides programmatic flexibility, but also because it would be awkward from both an administrative and a regulatory perspective for single-fuel utilities (e.g., electrical or gas utilities), or statutorily constrained public agencies, to attempt to deliver sustainable energy services targeting all fuel types across the electricity, heating, and transportation sectors.

Developing the First SEU in Delaware

This section reviews the evolution of Delaware's current SEU structure. The concept of the SEU has its origins in the efforts of California, Massachusetts,

New Jersey, Vermont and other states to establish an organizational framework that could most effectively deliver energy efficiency and customer-sited renewable energy to energy end-users. As conceived in Delaware, an SEU is the final step in the transition from utility-administered energy efficiency programs (California and Massachusetts) to third-party managed sustainable energy services (Vermont and others).

Delaware's SEU was a product of opportunities and constraints common to most political environments. In Delaware's case, a looming increase in electricity prices created the political momentum to focus attention on possibilities for a new energy policy framework. Price caps dating back to electricity restructuring laws from 1999 were set to expire in May 2007, with residential electricity rates initially expected to increase more than 59% overnight (Cabinet Committee on Energy, 2006). Neighboring states Maryland and Washington D.C., which had taken a similar approach to electricity deregulation, faced comparable price spikes.

Compounding the pending price increases, most of Delaware's demand-side management (DSM) programs had been discontinued with electricity restructuring laws in 1999, and there was very little DSM activity in the state when the rate caps came off. Moreover, there was no mandate for the Delaware Public Service Commission, the state's main investor-owned utility, or executive agencies to deploy energy efficiency programs. As a result, Delaware lacked energy service delivery infrastructure that could have been used to insulate consumers from electricity price shocks.

Although the state lacked a program for energy efficiency delivery, the policy framework for sustainable energy services had gradually been put in place. In 2000, Delaware had created a Climate Change Action Plan (Byrne et al., 2000b) that identified strategies to reduce greenhouse gas emissions 15-25% from 2000 levels by 2012. The Governor's Delaware Energy Task Force (2003) had also made a broad range of renewable energy and energy efficiency policy recommendations. In 2005, Delaware enacted a renewable portfolio standard (RPS) with a goal of 10% renewables by 2019, administered by the state's Public Service Commission. The RPS was complemented by a Green Energy Fund, whose revenues funded renewable energy incentives administered by the Delaware Energy Office (Delaware Energy Office, 2008). The Fund collected revenues of $1.6 million annually, through a surcharge of $0.00178 per kWh. Another executive agency, Delaware Health and Social Services, oversaw Delaware's Weatherization Assistance Program.

SEU Task Force

As a partial response to the likelihood of dramatically changing energy prices in the state, the Delaware General Assembly created the Sustainable Energy Utility Task Force in 2006,[3] a bi-partisan research effort to recommend best-practice sustainable energy policies. The SEU Task Force (2007a,b) examined sustainable energy policy frameworks and administrative models across the U.S. They compared policies by type and by magnitude of mandate and achievement, and characterized administrative models according to criteria such as structure, governance, funding, and target customers and fuel types.

With regard to a possible policy framework and funding strategy, the Task Force concluded that public funding sources for a new sustainable energy program were comparatively limited. Delaware's Green Energy Fund surcharge was an order of magnitude less than alternatives found in leading states such as Massachusetts, New Jersey, and Vermont. For example, 2006 energy efficiency funding in Massachusetts was 0.25 cents per kWh, versus Delaware's 0.0178 cents per kWh (Union of Concerned Scientists, 2004). Even so, the imminent expiration of price caps in Delaware made the prospect of increasing the Green Energy surcharge to best-practice levels politically challenging. Furthermore, the State of Delaware had reached its bonding capacity, and little political support existed to amend tax policy as a means to fund sustainable energy services. If a sustainable energy framework in Delaware were to achieve significant energy savings, the legislature would have to put broad new mandates in place, and any increased public funding would have to be justified by the potential to leverage private sources of funding. The design of the Delaware SEU reflects the state Task Force's recommendations regarding how Delaware could best overcome these various political challenges.

To identify best-practices, the Task Force report ultimately focused on seven states, of which three – Massachusetts, New Jersey, and Vermont – are mentioned in this article as representative of the then-existing approaches to sustainable energy service delivery. Each of these three states, as of 2008, has seven or more years of experience promoting sustainable energy. They also represent the three major types of sustainable

energy administrative models. Massachusetts, like California, is noted for its utility-administered energy efficiency services. New Jersey has played a leadership role with its public sector approach, in which regulatory and economic development-focused agencies oversee sustainable energy service delivery. Vermont is acknowledged as the first jurisdiction to introduce an energy efficiency utility, planned and organized by a non-profit corporation that employs competitive bidding procedures to implement goals set by a public regulatory body (Hamilton, Plunkett, & Wickenden, 2002).

Features of a Sustainable Energy Utility

After more than a year of hearings and stakeholder input, and based on its analysis of experience in other states, the Task Force articulated the core characteristics of a sustainable energy utility:

- Central coordination: Sustainable energy services are coordinated by a single point of contact.
- Comprehensive programs: Programs target efficiency, conservation, and renewable energy across all fuels (electricity, heating, transportation) and customer classes (low-income, government, industrial, commercial, residential, etc.), regardless of utility service territory.
- Flexible incentives: Sustainable energy services are not constrained by strict programmatic criteria that might exclude, or inadequately serve, certain customer groups.
- Financial Self-sufficiency: A financing plan ensures long-term self-sufficiency by generating revenue through the supply of customer-sited sustainable energy services.
- Competitive Procurement: A governance system is based on competitive contracting of independent management services.

Although these characteristics represent innovations over other existing administrative models, an SEU does not supplant other private-sector activities, but seeks to complement them by providing a focal point for energy efficiency, affordable energy and renewable energy, including information, incentives, and services. The following sections discuss each of the five areas of innovation, as they relate to other states, in greater detail.

Innovation One: Coordinated Sustainable Energy Services

Central coordination is essential to avoid customer confusion, create cross-benefits among incentives, and reduce administrative costs. Central coordination will only become more crucial if climate policy increasingly becomes the animating force behind energy policy decisions in the next decade and cuts across different sectors of the economy and jurisdictional boundaries. One can look at the importance of coordination from a customer's perspective and from the perspective of administrative efficiency.

Massachusetts provides a case study of how uncoordinated energy programs can serve as a barrier to customer participation and market development. Massachusetts currently has three different systems for renewable energy, energy efficiency, and affordable energy services.[4] Moreover, on the energy efficiency side, energy service delivery is further subdivided by utility service territory and fuel. To a certain extent, the state has tried to organize efficiency resources through clearinghouses such as MassSAVE, an online tool for assisting customers with navigating utility incentives.[5] However, these resources do not cover the full spectrum of available services, since MassSAVE only serves residential customers. A commercial customer attempting to procure sustainable energy services for its facility, for example, would most probably have to submit separate applications: one to the Massachusetts Technology Collaborative (MTC) for renewable electricity; one to a gas utility for thermal efficiency; and one to an electric utility for electrical efficiency (personal communication, Bradford Swing, Director of Energy Policy, City of Boston). The transaction and learning costs of this process can be a barrier to sustainable energy technology adoption, while the lack of coordination across programs can cause significant customer confusion and create unnecessary programmatic discrepancies and administrative costs.

Vermont has sought to partially address these types of problems through the creation of its quasi-governmental energy efficiency utility, Efficiency Vermont (Hamilton et al., 2002). Efficiency Vermont replaced a patchwork of twenty-two separate programs, administered by small, individual utilities. Efficiency Vermont's approach to service delivery represents a significant innovation. At present, Efficiency Vermont only targets electricity efficiency measures, but its ongoing evolution (Hamilton, 2008b; Vermont Act 92,

2008) suggests that Efficiency Vermont may emerge looking much like a sustainable energy utility – an entity that serves as a central clearing house and point of contact for *all* statewide sustainable energy services, regardless of fuel, and with the authority to access private capital markets and revenue-generating business models to achieve significant scale.

Innovation Two: Market-Responsive Programs That Target All Fuels and All Customers

Another of Efficiency Vermont's innovations is to move away from a rigid, programmatic model of energy service delivery. Delivering services to specifically-defined customer classes naturally excludes, or inadequately serves, customers that do not fit neatly into predetermined categories. An SEU adopts a flexible, market-responsive stance similar to Efficiency Vermont, expanded to include all fuel types and income levels. The Delaware SEU is empowered, and required by law, to provide customers with a comprehensive set of sustainable energy services, customized to a participant's needs. This includes targeting different customer decision points (e.g., purchase/replacement, retrofits, new construction, etc.) and targeting different end-uses (electricity, heating, and transportation). Policy makers and an oversight board establish high-level performance targets, but an SEU has the flexibility to respond to customer needs and market changes to achieve deep savings.

An SEU takes a building-based approach to efficiency: it looks for the synergies that are possible in each participant's circumstance, including opportunities for building envelope, electric and gas appliance, heating and cooling, and transportation efficiency. This approach allows the SEU to supply services that are usually not possible under more rigidly defined programs. For example, SEU funds can be used to target the installation of reflective roofs on low-income households, where federal affordable energy programs cannot. Similarly, an SEU can support the simultaneous installation of PV and solar water heating systems at sites that have high electrical and hot water demand. The MTC by contrast, has historically been limited to providing incentives only for renewable electricity, and has not been able to support renewable heat. As a result, many customers seeking to install technologies like solar water heating are not eligible for an incentive in Massachusetts.[6]

Innovation Three: Flexible Incentives

An SEU has the flexibility to deploy financing programs to serve all income levels: programs can be designed to cover the full incremental cost of sustainable energy services for certain customers, and incentives can be adjusted to more deeply subsidize affordable energy clients. In many states, the cost-share required under sustainable energy service programs prevents many low-income end-users from taking advantage of the system benefits charge-funded incentives that they help to support. By contrast, an SEU has the flexibility to respond quickly and creatively to changing market forces and customer needs.

Innovation Four: A Financing Plan for Self-sufficiency

An SEU addresses the two fundamental financial challenges that slow the expansion of sustainable energy services: overcoming the upfront cost of sustainable energy measures, and structuring sustainable energy programs to grow without significantly increasing rate impacts, general funding commitments, and public liability. An SEU requires public-purpose funding to lower the initial capital costs of sustainable energy services. However, an SEU has the mandate to consider innovative approaches, including strategies to encourage third-party financing or to leverage customer contributions to the cost of program measures. An SEU also has the flexibility to operate much like an enterprise, where revenue streams from program activities repay liabilities, replenish public incentive funds, and enable program expansion.

Delaware's Legislature granted the SEU authority to raise special purpose tax-exempt bonds of up to $30 million over 9 years to finance its program activities. The legislature also designated the SEU to administer existing public-purpose energy funds and future Regional Greenhouse Gas Initiative (RGGI) emissions auction proceeds. The ongoing operations of the SEU are predicated on two core revenue-generating activities: shared savings financing and renewable energy certificate (REC) aggregation and sales.

These revenue streams allow program budgets to expand, and allow the SEU to target deep efficiency opportunities without requiring exponentially large amounts of public funding. The challenges and risks are equally clear: an SEU must minimize risk of participant

default; the SEU has a high burden to verify energy savings; and the SEU must create a value proposition attractive enough to encourage participation. With such a broad mandate, an SEU requires public oversight, exposure to competitive market forces, independent verification and auditing, funding sources insulated from political raiding, and the ability to represent a state or city government as a participant in regional energy and environmental markets – all aspects built by legislation into the structure of an SEU.

Innovation Five: Competitively Selected Independent Management

An SEU is managed by a competitively contracted entity independent of local utilities and power marketers. The SEU manager, however, can contract with any third-party, including utilities, to implement actual services. In Delaware's case, the SEU manager is under contract with the Delaware Energy Office, an Executive Agency, whose jurisdiction extends beyond electricity and natural gas markets.

This high-level independence is necessary to ensure that an SEU has an incentive to maximize public adoption of energy efficiency and customer-sited renewable energy, which in many states have the impact of reducing utility sales and revenues. Utilities often lack an incentive to exceed energy efficiency and renewable energy targets mandated by law or regulation. Even in a state like California, where utility revenue is decoupled from energy sales (Risser, 2006), utilities still have conflicting interests that complicate long-term planning: the extent to which a utility will proactively target efficiency savings, and especially deep savings versus cream-skimming, depends on whether regulation and energy prices make it profitable to invest in efficiency versus other capital projects. Government-administered programs may have an unambiguous mandate like an SEU, but they are shielded from the pressure of market forces which drives efficiency and rapid innovation, and can be hindered by cumbersome public contracting and procurement rules. A shift in management to independent entities sidesteps the conflict of trying to force supply-focused institutions to achieve market-transforming reductions in commodity consumption.

Tables 1 and 2 summarize the discussion above and compare the SEU model with sustainable energy service program coordination, service provision, financing, and management in Massachusetts, New Jersey, and Vermont. More detailed descriptions of each of these state programs can be found in SEU Task Force (2007a).

Structure of an SEU: Roles and Responsibilities

The above innovations are built into the mandate of an SEU and its relationship to other parties. In Delaware's case, the enabling legislation (SB 1, 2007) defined several roles:

- Executive Agency (Delaware Energy Office): holds contract with the SEU Administrator
- SEU: A nonprofit "entity" with authority to raise special purpose tax-exempt bonds
- SEU Administrator: a competitively selected contractor that develops the core strategy of the SEU and runs day-to-day operations; must be independent of local utilities and energy providers
- Oversight Board: a mix of public officials and industry experts with general oversight, evaluation, and goal-setting responsibilities over the SEU Administrator
- Implementers: any business or organization selected by the SEU Administrator to deliver services (this can include local utilities)
- Monitoring and Verification: performed by outside parties under contract to the Oversight Board
- Fiscal Agent: a third-party that holds and disburses funds as needed

A key structural difference between Delaware's SEU and Efficiency Vermont is that the SEU is under contract with the executive branch and has a policy-setting oversight board, while Efficiency Vermont is under contract with the state's Public Service Commission (Hamilton, 2008b). Jurisdictional limits represented a significant justification for this decision: while Delaware's Public Service Commission is limited to regulating electricity and natural gas markets, the Delaware Energy Office has the ability to target transportation initiatives, whole-building efficiency including heating fuels, codes and standards, and multi-state initiatives like RGGI. As Efficiency Vermont's experience demonstrates (Hamilton, 2008a,b), an SEU under contract with a typical regulatory body would face a range of constraints, including being restricted to limited target markets, an inability to participate as a party to regulatory proceedings, and limited ability to raise funding from private sources. The Vermont Legislature

Table 1
Program Coordination

State	Energy Efficiency: Electricity and Gas	Energy Efficiency: All Other	Renewable Energy	Affordable Energy
SEU Model	Sustainable Energy Utility			
Massachusetts	Utilities (programs distinct)	N/A	MTC	DHCD (federal) and Utilities (state)
New Jersey	New Jersey Clean Energy Program	N/A	New Jersey Clean Energy Program	NJ Department of Human Services
Vermont	Efficiency Vermont	N/A	Department of Public Service	Department of Children and Families.
Cambridge, MA[a]	Cambridge Energy Alliance and NSTAR	N/A	Cambridge Energy Alliance and MTC	DHCD, and NSTAR

[a]Cambridge Energy Alliance programs are still under development.

Table 2
Program Structure

State/City	Service Approach	Financing Plan	Program Management
SEU Model	• All fuels targeted • Flexible programs • Incremental cost covered	• Self-sufficient through revenue generating activities • Initial funding provided through bonding • Renewable + Efficiency + Low-income SBC	Third party
Massachusetts	• Electricity and gas targeted • Rigid programs	• Renewable SBC • Energy efficiency SBC	• Utility for energy efficiency • Quasi-government entity for renewable electricity
New Jersey	• Electricity and gas • Rigid programs	• Renewable + Efficiency SBC • Low-income SBC	Third party
Vermont	• Electricity, gas, some heat targeted • Flexible programs	• Efficiency and low-income SBC • MOU with utility for RE	Third party
Cambridge, MA	• All fuels targeted • Flexible programs	• Self-sufficient through revenue generating activities • Initial funding provided by foundations	Third party

addressed these constraints in part by significantly expanding the regulatory purview of the Public Service Commission (Hamilton, 2008b; Vermont Act 92, 2008) – a prospect no doubt made politically easier after three successful Efficiency Vermont program cycles.

The Policy Framework

In order to improve Delaware's sustainable energy policy framework and support the SEU's work, the SEU Task Force also made several recommendations which were incorporated into legislation and passed in 2007. According to the Task Force, the policy foundation necessary to make an SEU possible includes the following:

- An RPS with a solar requirement or other mechanism that explicitly encourages distributed generation and/or creates a market for renewable energy certificates
- Public purpose funding (e.g., ratepayer-funded incentive funds to lower capital costs of energy efficiency and renewable energy measures)
- Interconnection and net-metering rules that allow for commercial-scale installations and

that fairly value customer-sited generation (at least equaling retail electricity prices).
- Emissions auction proceeds that are committed to bolstering sustainable energy funding

Based on SEU Task Force recommendations, the Delaware legislature doubled the RPS to 20% by 2019 with a 2% solar requirement; doubled the Green Energy Fund surcharge (which is still an order of magnitude less than leading states like Massachusetts and California); and expanded the net-metering caps to encourage commercial-scale renewable energy installations. The SEU Task Force also noted that appliance efficiency standards, green building mandates, and clean vehicle incentives are best-practice policies that should also be in place to enhance the chances of success for an SEU.

Expansion of the SEU Model

During the past decade, renewable energy and climate change policies, such as renewable portfolio standards (Wiser & Barbose, 2008) have diffused rapidly from state to state in the United States. Recent examinations of clean energy policy diffusion, for example the widespread adoption of net metering laws, has further demonstrated that the likelihood of one state adopting a policy if its neighbors do so plays an important role in regional policy diffusion (Stoutenborough & Beverlin, 2008).

The Sustainable Energy Utility model, although a comparatively recent policy innovation, is already beginning to diffuse regionally. The second U.S. government to formally adopt a Sustainable Energy Utility structure, after Delaware, is the District of Columbia. The District, although not a state government, shares many of the same energy regulatory structures as a state, and has developed a clean energy policy framework similar to that of mid-Atlantic states.

In 2007, Washington, DC, began exploring how to adapt Delaware's SEU structure to meet its own policy objectives. The District Department of Environment actively consulted with Delaware SEU Task Force members, and eventually requested a scoping study for a DC SEU from the Center for Energy and Environmental Policy at the University of Delaware (Byrne et al., 2008a). The scoping study reviewed Delaware's SEU design decisions and legislative initiatives and discussed how they might be applied within the District context.

On July 15, 2008, the Council of the District of Columbia passed the Clean and Affordable Energy Act,[7] which empowered the District Department of Environment to create a third-party administered non-profit SEU, and an Oversight Board. The SEU was tasked to "design and deliver comprehensive end-use energy efficiency and customer-sited renewable energy services to households and business in Washington, D.C."

The SEU and its programs will be funded partially by a public bond – in the District's case $100 million – and partially by revenues from a public benefits fund. The SEU will also be responsible for disbursing revenues earned through the regional carbon market, the Regional Greenhouse Gas Initiative (RGGI), if the District signs on to RGGI. In terms of structure, governance, and financing strategy, the District's SEU is very similar to the SEU currently in place in Delaware.

The District additionally followed Delaware's lead by using the SEU design process as an opportunity to revisit and revise its clean energy policy framework. In the District's SEU legislation, the Council expanded the District's renewable portfolio standard from 11% by 2022 to 20% by 2020, and slightly increased the solar-specific target from 0.386% by 2022 to 0.4% by 2020. The legislation also raised the District's net metering cap from 100 kilowatts to 1 MW, and replaced the existing Reliable Energy Trust Fund with the Sustainable Energy Trust Fund (Office of the People's Counsel, 2008).

Conclusion

Now that both Delaware and the District of Columbia have established Sustainable Energy Utilities, and New Jersey has converted some of its sustainable energy programs from utility-managed to third-party managed, the mid-Atlantic region of the U.S. is emerging, alongside Vermont, as a hub for innovation in sustainable energy service delivery models. While it remains to be seen whether the initial momentum behind the regional diffusion of the SEU model will be sustained in the coming months, the model is already diffusing internationally. In 2007-2008, for example, the Center for Energy and Environmental Policy undertook an SEU design study for Seoul in Korea (Byrne, Kurdgelashvili, Partyka, & Rickerson, 2008b). While developments such as this indicate that the SEU model is attractive in different locations and at different levels of government, it is likely that the SEU model will remain

dynamic and will continue to evolve, drawing on international best practices, such as those described in other articles within this journal.

Notes

1. With the exception of Virginia.

2. Blumstein et al. (2005) argue to the contrary that "no single administrative structure has yet emerged in the U.S. that is clearly superior to all of the other alternatives" and that the considerations of different administrative models to date are "missing…a more fundamental discussion on the underlying strategy to create a vibrant, long-term energy-efficiency services infrastructure, particularly one that serves residential and small commercial customers." Blumstein et al. do not anticipate the emergence of an SEU model with its cross-cutting approach to all fuels and all customer types, which would limit the effectiveness of incumbent, single-fuel utilities to serve as administrators.

3. Delaware Senate Concurrent Resolution No. 45 of 2006

4. Which are administered by a quasi-state agency, individual utilities, and a state agency, respectively.

5. http://www.masssave.com/

6. National Grid offers rebates for solar heating applications (water heating and air heating) as part of its natural gas energy efficiency programs, but similar programs are not available statewide (National Grid, 2008). The Green Communities Act of 2008 approved the use of MTC funds for solar hot water, but rebates for renewable heat have not been developed by the MTC to date. *See also http://www.mass.gov/legis/laws/seslaw08/sl080169.htm,* Section 49.

7. Council Bill 17-492, Codification District of Columbia Official Code, 2001 Edition. *See also* http://www.dccouncil.washington.dc.us/images/00001/20080819161530.pdf

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