FREE Policy Brief Series

Number 2

The FREE Policy Brief Series offers a topic-by-topic discussion of issues relevant to the mission of FREE.

Intended to provide readers with a deeper understanding of the SEU model and its potential, the Policy Briefs examine key ideas, successes, and challenges.

- Pursuit of New Economics of energy savings and renewable resource benefits
- Participation by a diverse group of stakeholders while remaining independent
- Matched approaches to energy supply and actual energy needs
- Promotion of local & community-based governance
- Pooled financing realizes net-zero carbon and energy benefits
- Guaranteed money savings drive large scale investment
- Structured incentives support long-term sustainability ("all hanging fruit" philosophy)

Sustainable Energy Utility: The Business Model of the SEU

Positioned as a 'one-stop-shop' utility serving 21st century sustainability goals (energy efficiency, renewable energy, materials and water conservation), a Sustainable Energy Utility (SEU) represents a new actor in the utility services landscape that is capable of restructuring priorities and pursuing strategies to realize a New Economy built on sustainability principles. At its heart, an SEU creates, captures, and delivers value to the communities it serves. It is built to accelerate transformative change in the energy, water, and materials sector. The basics of the model were described in the January 2013 policy brief (No.1). In this edition of the series, two elements of the SEU model are discussed: a) a sustainable energy bond financing strategy; and b) the role of an SEU in the design and operation of a solar renewable energy credit (SREC) market.

Sustainable Energy Financing (SEF): Capturing the Value of Energy, Water, and Materials Conservation and Renewable Energy

Challenges to investment in sustainability, especially in the energy sector, can be grouped in two barriers – financial and policy. Financial barriers include: limited access to capital, high perceived risk, and the small size of individual investments relative to conventional energy sources. Policy barriers include: misaligned incentive structures, large subsidies for conventional energy investments, and the lack of human resources, knowledge, or capacity to research and implement sustainable alternatives. While these barriers can present significant individual challenges, their greater harm is to the business case for energy efficiency and renewable energy as infrastructure. That is, financial and policy barriers currently constrain the size, scale, and applicability of sustainability-focused investments to project-level decision making, stunting opportunities to transform the energy sector itself. Upfront capital costs and risk perception are important barriers to sustainable energy investments that need to be overcome before other barriers can be tackled. Considering that public authorities usually face resource-constrained budgets, access to upfront capital to implement sustainable energy measures is greatly limited. Even modest efforts to stimulate sustainable energy markets create unreasonable burdens for energy consumers who must engage a disjointed network of programs and actors. Anyone who has tried to secure low/no-interest loans or rebates for qualifying efficiency or renewable energy purchases can attest to the difficulty of choosing sustainable options. While, in principle, private markets offer a significant financial resource pool, limited experience by private investors with low-carbon investments and the typically small size of individual energy efficiency and renewable energy projects detracts from their investment attractiveness. The non-conventional nature of energy efficiency investments, compared to investments in new generation capacity, creates a perception that sustainability-focused investments are high-risk. This perception is compounded by the typically long-term payback structure of deep retrofit and renewable energy investments, leading investors to question the viability of the sustainability strategy when compared to standard business-as-usual energy supply projects

Creating Value

At the heart of the SEU business model is the observation that saving a unit of energy is typically less costly than paying the retail price for that unit of energy. A recent study places worldwide self-funding conservation potential (i.e., those investments which cost less to achieve than the savings they provide) at US $30 trillion. [1] The challenge is to unlock this potential by overcoming the inertia of conventional thinking and economics. The first step is to validate the savings that follow from initial investments (Figure 1). The monetization of energy savings, as discussed in the first edition in this policy brief series, is the basis for contractually obligated payments which retire the debt from investing in clean energy. When done properly through independently evaluated energy audits, contractually guaranteed monetization materially lowers investment risk.

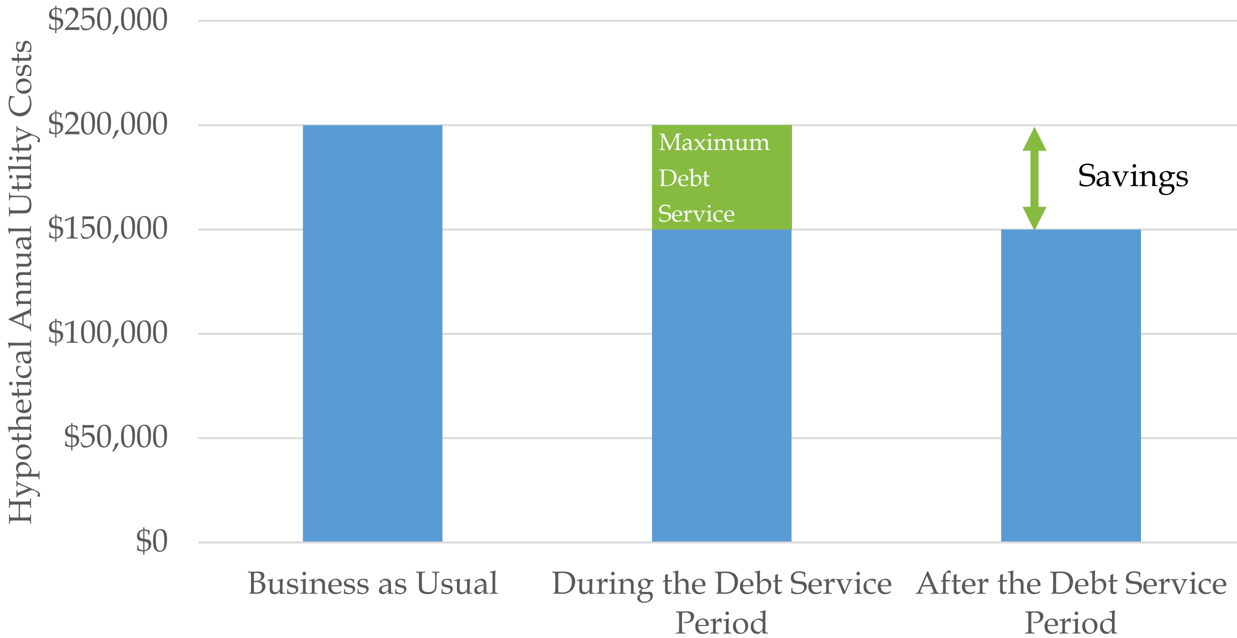

Figure 1. SEU Monetization of Energy Savings.

Private Capital Proposed to Meet Public Ends

The next challenge is to raise sufficient capital to implement portfolios of sustainable energy measures. One of the signature innovations of the SEU model is its capitalization strategy and capabilities. Discussed in detail below, SEU innovation in capital markets has already been tested in the market. As a public entity, an SEU (when properly developed) can be given bond-issuing capacity which allows it to organize tax-exempt financing. [2] The Delaware SEU statewide tax-exempt bond issue, the first of its kind in the U.S., generated $72.5 million with which to implement sustainable energy measures. [3] Financing through capital markets allows the pursuit of large scale sustainable energy investments compatible with its treatment as infrastructure. This step is key to long-term capitalization of clean energy development.

How Does Sustainable Energy Financing Work?

The SEU model relies on a specific structure of agreements between key actors in the energy field. While different configurations are possible, Figure 2 illustrates one of several designed by the Foundation for Renewable Energy and Environment (FREE) for public sector application. It involves four interrelated contracts: a) a guaranteed savings agreement; b) an installment payment agreement; c) a program agreement; and d) an indenture. Each is briefly discussed below.

Program Agreement

The program agreement describes the overall agreement between the issuer (e.g., the SEU), Energy Services Companies (ESCOs), and public sector Participants. This agreement outlines the reporting requirements for both the ESCOs and the Participant. It also specifies the monitoring and verification protocol and a regular reporting schedule for job creation and energy savings in physical and monetary units.

Installment Payment Agreement (IPA)

The IPA details the payments from the Participant to the Trustee. [4] Essentially, the Participant promises payments outlined in the indenture (described below). These payments meet the debt service obligation for the portion of the revenue bond used to fund each Participant's project and any other pro rata responsibilities.

Indenture

The Indenture is the legal contract between the bond issuer (e.g., the SEU) and the Trustee. The Trustee acts on behalf of the bondholders. The indenture describes the obligations of each party as well as the nature of the bonds. The Trustee pays the bondholders and releases portions of the proceeds, upon prior approval of the Participants, to pay ESCOs for satisfactorily completed installations.

Guaranteed (Energy) Savings Agreement (GSA or GESA)

ESCOs and Participants complete a contract and undertake the implementation of specified energy, water and materials conservation measures, and renewable energy or other distributed energy systems on the property of the Participant. This agreement details the ESCO guarantee of an amount of energy saving in dollars which must exceed the payments due under the installment payment agreement.

Overcoming Barriers

The sustainable energy financing model of the SEU has several important features that help overcome well-known barriers.

Comprehensive Risk Reduction

A key feature of the SEU business model is its realignment of credit risk. Unlike a general obligation bond in which the State's taxing authority is pledged to repay debt from investments, the SEU model employs the public sector's appropriation process to promise repayment. There is a low probability that the state will fail to appropriate sufficient funds to cover the cost of essential services such as energy and water. As a result, investors typically assign a high level of credit worthiness to investments backed by appropriations.

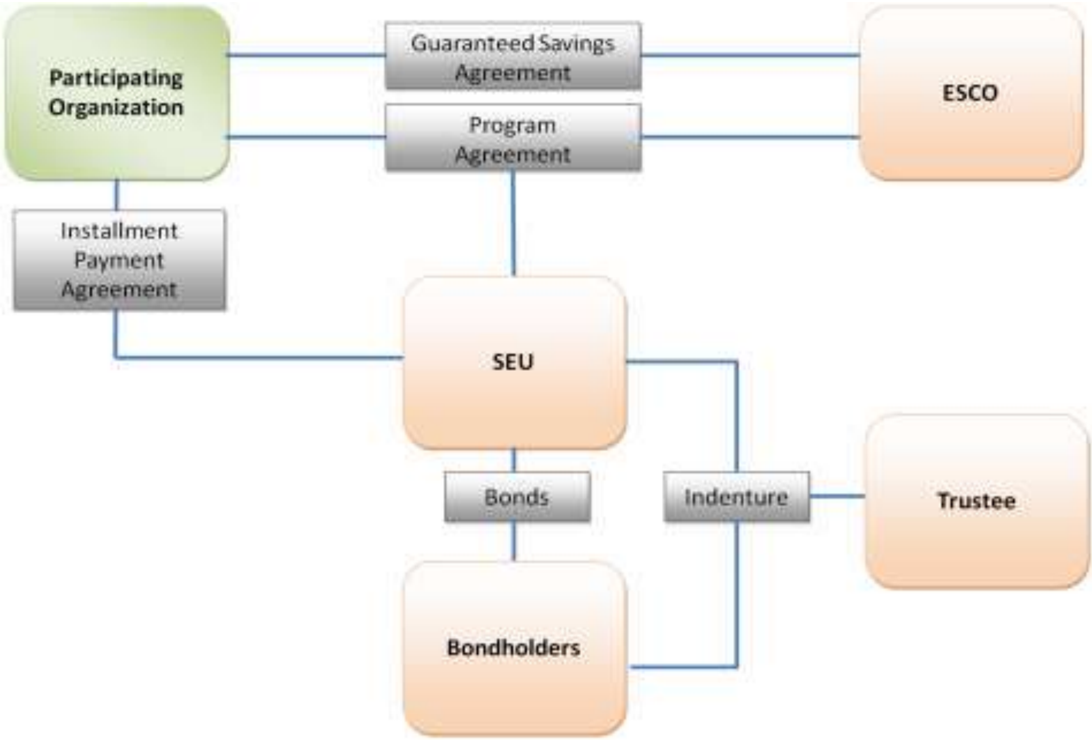

Figure 2. SEU Configuration Designed by FREE for U.S. Applications

The use of common contractual agreements also supports risk reduction. Previous experience with these agreements elevates private market trust in project implementation. FREE's SEF Program focuses on guaranteed money savings which strengthens the credit quality of clean energy investments. Conventionally, energy efficiency success is measured in units of reduced physical energy use. However, while valuable in its own right, this metric is often under-appreciated in the financial market where investment attractiveness is determined by financial metrics.

Unlike typical guaranteed energy savings arrangements, the translation of energy savings into contractual dollar amounts offers a creditworthy revenue stream to enable debt repayment. Interestingly, the cost of government [5] is reduced in this model while investment attractiveness is significantly enhanced. Framing guaranteed energy savings in this way is a key design feature for a strategy to treat sustainable energy as an infrastructure investment.

The performance-based character of the financing requires monitoring and verification to ensure savings over time. In the past, monitoring and verification (M&V) protocols were largely performed by ESCOs in an effort to establish their fulfillment of a guarantee to save physical units of energy. Methodologies underlying M&V often employed engineering algorithms to compare actual performance to technical expectations. While useful as a tool to diagnose technical defects, those findings could not necessarily translate into economic savings for the Participants or investors.

FREE's SEF initiative redefines M&V's purpose by relying on analysis to facilitate performance improvements that deliver on the financial guarantees made to Participants. Specifically, FREE's model treats M&V as a diagnostic tool to identify possible performance gaps and define measures to remove such gaps. The FREE framework supplements ESCO performance with independent M&V efforts carried out by FREE's experts to forecast quarterly and yearly performance. Through its redesign of the GSA, independent forecasts trigger actions by ESCOs to close shortfalls in one or more of the following three ways: 1) the ESCO can install at its own expense new measures to eliminate gaps; or 2) it can reach agreement with Participants to adopt new management methods, again to erase the risk of financial shortfall; or 3) the ESCO is obligated to pay Participants for a performance gap as part of its corporate guarantee.[6]

Using the monitoring and verification process as a diagnostic tool to determine project progress, rather than as a defensive tool to protect ESCO interests or as a punishing tool to elicit compliance, leads to better economic and technical performance. As a result, FREE's M&V strategy serves as a project strengthening tool which can provide Participants and investors with well-founded reasons to expect financial savings equal to or greater than debt service and to realize associated reductions in energy use and environmental harm.

Together, the innovations in FREE's SEF Program – guaranteed savings agreements promising financial performance, the ability to represent the interests of state or city or non-profit participants with a high level of expertise, independent diagnostic verification and auditing, and funding sources insulated from top-down political decision-making – greatly decrease investment risk for all parties involved, most notably participants, trustees, and bondholders. The resulting investment environment is stable and low-risk. Below, an empirical case of this approach to sustainable energy development is discussed.

Standard & Poor's Figure 2. SEU configuration designed by FREE for U.S. applications 3 FREE Policy Brief Series 2013 Rating Service rated the bond in the case study as a AA+ investment and Moody's Investors Service marked it at Aa2. [7]

Short-Term Versus Long-Term Investments

In practice, deep energy efficiency retrofits – long-term measures that affect structural building systems and assemblies such as high efficiency HVAC upgrades or building envelope improvements – require substantial upfront financial investments and have long payback periods. However, these retrofits often provide an opportunity to realize comprehensive energy consumption reductions well beyond the shorter term savings that individual energy efficiency measures can muster. To enable deeper retrofits without cross-subsidy of measures, a serial financing structure is used in which multiple measures with different payback periods are combined to ensure annual revenue streams available to cover debt service. Borrowing is then accomplished through, for example, serial bonds from one-year to twenty or more years with the amount equal to exactly the investment needed in individual years. In this way, the SEF Program incentivizes long-term deep retrofits.

The SEF business model – no upfront public sector costs, the reliance on private sector investments, the requirement of guaranteed dollar savings, independent monitoring and verification as a performance diagnostic tool, and pooled, serial financings structure – creates the opportunity for large-scale infrastructure investments in sustainable energy.

Access to Capital

With the use of bonds and other forms of financing, the private market is tapped by an SEF Program to inject capital to realize public ends, including more efficient public buildings, lower carbon footprints, protection of common resources, hedging against energy price risks, etc. Even though public goals are reached, resource-constrained budgets of public authorities are, as such, not burdened because the business model relies instead on capital markets. The bundling of projects overcomes the typically small size of energy efficiency investments and associated high transaction costs. Instead, the SEU business model scales up investments into volumes that can rightly be termed sustainable energy infrastructure involving capital improvements in the tens and hundreds of millions of dollars.

Delivering Value

The ability of the SEU to realize transformative change became clear in 2011 when a financing affecting approximately 4% of Delaware's total state-owned or managed building stock attracted $148 million in guaranteed savings and earned a 25% effective rate of return (Figure 3). The average payback period of the maturities was nearly 14 years and the longest maturity in the bond was 20 years. Illustrative of the capacity to incentivize energy efficiency with much longer time horizons, such measures go well beyond the conventionally performed market-based energy efficiency investments which typically demand a payback time of less than seven years.

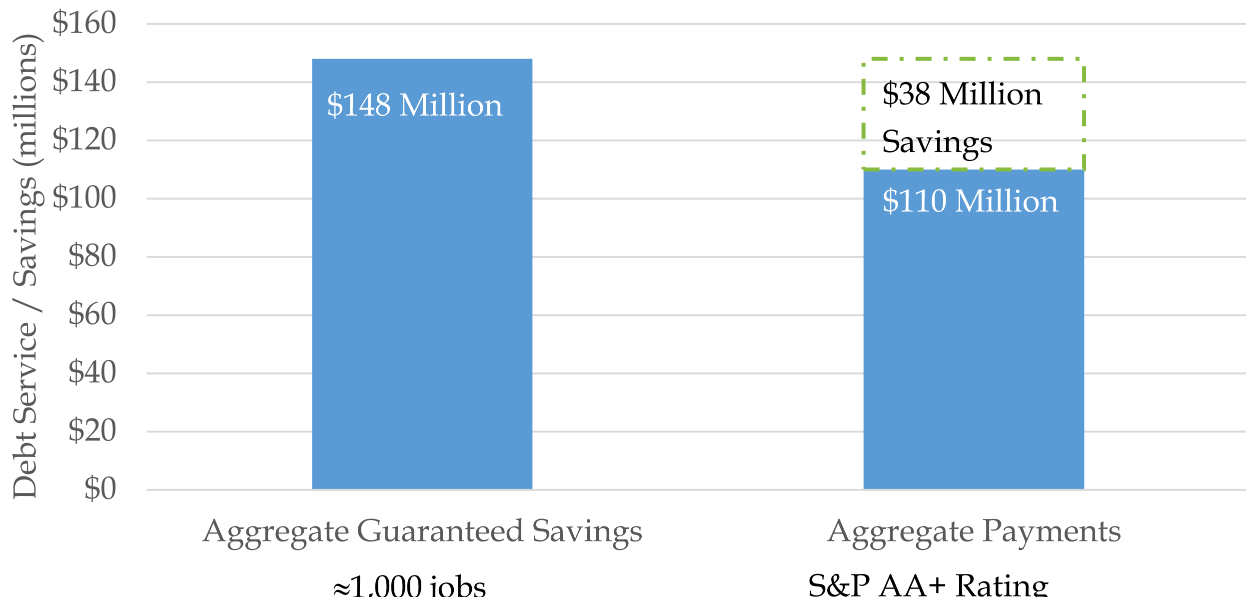

Figure 3. Savings, Costs, Job Creation and Credit Rating of 2011 Delaware SEU Bond.

The emphasis on monetary savings, rather than energy savings alone, incentivizes ESCOs to identify reliable estimates of impact during investment-grade audits. If anything, this structure encourages ESCOs to promise a volume of savings below expectations in order to avoid penalties for any shortfalls which may appear. Any savings realized above the guaranteed, therefore, lead to a larger public benefit, precisely the structure that will attract participation.

The aggregation of participants under a single financing reduces transaction costs and lowers overall borrowing costs. If participants attempted financing on the private market individually, the interest rate – and therefore the cost of the program – could be substantially higher. Even though participants are aggregated under a single financing, contractual agreements are tailored to target energy conservation and renewable energy measures specifically to individual participants. In sum, the SEF business model creates a favorable investment climate for sizeable energy efficiency and renewable energy investment. The performance of this model in actual financing is detailed in Table 1, which describes the 2011 bond sale by the Delaware SEU.

Renewable Energy and the SEF Program

Another purpose of FREE"s SEF Program is to spur rapid scale-up of renewable energy investments. The SEF business model is capable of overcoming several barriers to renewable energy use as it creates, captures, and delivers value.

Challenges to an Effective Renewable Energy Market

U.S. states have adopted a variety of policy strategies to engage energy and climate policy challenges. Perhaps the most popular today is the Renewable Portfolio Standard (RPS). RPS policy typically relies on trading renewable energy credits (RECs) to establish the environmental and ancillary services benefits 8 of including renewables in an electrical generation portfolio. One opportunity is to utilize the SEF Program to bundle RECs of participants and negotiate their sale in current and future years to electricity providers with statutory obligations to purchase RECs. Using the Program for this purpose improves leverage of participants, lowers transaction costs of energy providers, and can foster renewable energy market development by tailoring REC sales to foster predictable growth of renewable energy development (the 'boom-bust' problem in the U.S. markets has hindered such development – see below).

Again the Delaware SEU offers an example. It created an effective tool to facilitate sound operation of its REC market, especially to stimulate investment in onsite solar energy generation.

Consistent with the focus on lowering conventional energy use, onsite renewable generation enables energy users to choose low-carbon options without being dependent on conventional utility decision-making. This choice was facilitated by the Delaware SEU through a restructuring of REC procurement dedicated to this source (usually called SRECs [9]).

Delaware's RPS currently calls for 25% of electrical energy generation to come from qualifying renewables by 2025. To capitalize on the potential and promise of solar photovoltaic (PV) energy, the RPS provides a 3.5% carve-out for that technology. That is, 3.5% must come from PV installations leaving 21.5% from other renewable sources.

However, SREC price volatility and market uncertainty have hampered solar energy development throughout the U.S.. Delaware and several of its neighboring states have struggled with an overabundance of SRECs in the market, driving down their price and, as a result, the attractiveness of solar energy investment. Pennsylvania's SREC market price, for instance, collapsed from $300 per SREC in 2009 to only $9.00 per SREC in 2013. Similarly, New Jersey, with the largest SREC market in the U.S., saw prices plummet from $470 per SREC in 2011 to $116 currently, putting solar installations into rough waters.

Table 1. Summary Overview of the 2011 Delaware SEU Bond Transaction

Focus:	Public & non-profit facilities
Transaction Details:	Tax-exempt bond financing Par value of the bond: $67.45 million With premiums, total investment: $72.5 million Effective borrowing rate= 3.67 % Serial bonds: ranged in maturity from 1 year (borrowing rate= 0.65 %) to 20 years (borrowing rate= 4.37 %) Borrowing rate for average conservation measure payback of 14 years: 3.77 %
Participating State Agencies:	Department of Children, Youth and Their Families Department of Correction Department of Natural Resources and Environmental Control Carvel State Office Building Legislative Hall Sussex County State Courthouse

Participating Higher Education Institutions:	Delaware State University Delaware Technical and Community College (3 campuses)
Participating ESCOs:	Ameresco, Noresco, Pepco Energy Services, Seiberlich Trane, Honeywell, Johnson Controls
Mayor Institutional Buyers:	Definitive Capital, Lord Abbott, Gannett First New York Securities, Merrill Lynch
Key Features:	No upfront capital costs required from public participants Guaranteed dollar savings Incentivized deep retrofits (longest payback is 20 years with the average just under 14 years) Common contractual documents Net savings accrue to public participants who own all improvements at the conclusion of the project Project flexibility (selection of Energy Conservation Measures [ECMs] & repayment terms customized to meet Participant needs while providing immediate, positive cash flows) Monitoring & verification protocols that support participant objectives

Overcoming SREC Market Volatility and Uncertainty

In order to advance solar energy investment in the state, the Delaware SEU initiated an SREC Procurement Program in 2010. The SEU occupies a key position in this program as the sole banker of SRECs generated in the state. Rather than asking all owners of solar systems which generate SRECs to compete in SREC spot markets, which would leave pricing and quantities bought and sold to speculators, the SEU offers to purchase each SREC generated in the state from newly built systems and then sells them to the local energy providers as they are needed for compliance with the state's RPS policy.

The Delaware SEU has contracted with a third-party to operate statewide auctions. The Delaware SEU originally set SREC prices for systems smaller than 100 kW. This practice was discontinued in 2013.

The owners of small scale solar systems (<250 kW) operate through a consolidator. The consolidator bundles the SRECs of those systems and sells them to the SEU. That reduces the administrative load of the SEU. Owners of medium and large scale systems sell SRECs directly to the SEU.

Owners of small systems originally received a fixed price for their SRECs. For the first 10 years of the 20 year contract in Delaware, the SRECs were priced at $260/SREC for systems less than 50 kW and $240/SREC for systems between 50 and 250 kW (nameplate rating). For years 11-20 of the contract, the owner of any system size receives $50/SREC. The selection process gives priority to applications using Delaware labor and equipment. Winners are drawn until the pre-announced SREC quota has been filled or until the list of applications has been exhausted. If more SRECs are needed, the SEU can open a subsequent auction.

Owners of medium (250 kW – 3 MW) and large scale systems (> 3 MW) enter their bids into an SEU-operated auction which competitively determines the SREC price. Like the SRECs for the smaller tier, the price is fixed at $50/MWh for year 11-20 of the contract. But unlike the small tier case, prices for years 1-10 are set through competitive bidding to find the market-clearing price for the pre-announced volume of SRECs.

The use of the SEU to clear the market at competitive prices, the requirement that all energy providers secure SRECs through the SEU via 20-year contracts, and the ability of the SEU to sell forward SRECs (discussed below), combine to create predictable prices at levels which enable solar projects to receive affordable financing.

The SEU can also “bank” SRECs for later sale. This feature empowers the SEU to prevent an oversupply or undersupply of SRECs in any given year. Thus, while long-term contracts awarded to PV installations offer market certainty to private investors, the SEU can also effectively hedge against price volatility in the SREC market by temporarily reducing or increasing the delivery of SRECs. It accomplished this purpose in 2010 when it took a position in the financing of the Dover SUN Park. At 10 MWp, the Dover SUN Park is the largest public sector PV installation on the U.S. east coast. The SEU banked 25% of the projects SRECs with a forward contract for utility purchase of these SRECs in three years. This auction enabled a large, solar investment to occur in the state without swamping the SREC market in the near term. The SEU has propelled Delaware to the top ten in the country in solar installations per capita – it now ranks eighth (Table 2).

Table 2. U.S. Top Ten States in Terms of Cumulative Per Capita PV Installations. [7]

State	Cumulative Installation through 2011 (Wdc /Cap)	2011 Rank	PV Market Growth Rate (%)
New Mexico	80.4	1	285%
New Jersey	64.4	2	118%
Hawaii	62.6	3	89%
Arizona	62.2	4	262%
Nevada	45.9	5	18%
California	42.0	6	53%
Colorado	39.1	7	63%
Delaware	**29.4**	**8**	**373%**
Washington, DC	19.3	9	158%
Vermont	18.7	10	303%

In sum, the advantages of the SEU operated SREC program include:

- A single point of contact for owners of solar systems who are interested in selling SRECs and a single point of contact for electricity suppliers
- A long-term (20 year) guarantee of prices

- Certainty for system owners in the quantity of SRECs they will be able to sell each year through preannouncement of SREC volumes to be purchased
- Administrative pricing for small sized systems guaranteeing that SRECs from owners of systems of all different sizes have a place in the SREC program [11]
- A central bank which can sell forward SRECs in order to stabilize market prices
- A viable solar energy market.

In Short…

FREE's SEF Program creates an independent, public/private partnership that draws on customer energy savings and private sector investors to address shortcomings of traditional approaches to supplying sustainable energy services and programs.

The SEU business model successfully acquires financial resources required to implement energy efficiency, conservation and renewable energy measures at infrastructure scale. The SEF approach is the cornerstone of the new structure, arranging and directing the dynamics between participants, private market, and financial institutions.

The Delaware bond issue offers an example of SEF principles at work: reducing energy use, supporting community choice, and protecting the environment. Furthermore, the Delaware SREC program applied SEF principles during 2010-2011 to strengthen the solar energy market and create additional long-term value that would otherwise have remained untapped.

Providing predictability and high credit quality in its financing, FREE's SEF Program can accelerate small-scale energy generation, contribute to diversification and decentralization of the energy-supply, advance the efficiency of energy, water, and materials use, and, in general terms, support the move to a New Economy built on sustainability principles.

Works Cited

1. Dobbs R., Oppenheim, J., Thompson, F., Brinkman, M., Jones, M., (2011). Resource Revolution: Meeting the World's Energy, Materials, Food, and Water Needs. McKinsey & Company, November 2011.
2. Europe and Asia generally provide incentives to investors financing public sector improvements. Exempting taxes on interest earnings from public investments is only one form that an incentive can take and is the most popular in the U.S.
3. Citi. Delaware Sustainable Energy Utility - Energy Efficiency Revenue Bonds. Series 2011: Post-Pricing Commentary. New York, NY : Citigroup, 2011.
4. Financial institution given fiduciary powers by the bond issuer to enforce the indenture's terms. In effect, the trustee ensures that bond interest payments are according to schedule and is positioned as the protector of the interests of bondholders in case of default.
5. Cost of government refers to the operating expenses of government including energy, water and other services.
6. In some instances, a corporate guarantee can be backed by an insurance facility. FREE is working on strategies to expand the availability and improve the affordability of this option.
7. Citi. Delaware Sustainable Energy Utility - Energy Efficiency Revenue Bonds. Series 2011: Post-Pricing Commentary. New York, NY : Citigroup, 2011.
8. Ancillary service benefits can include peak shaving, line decongestion, and hedges against volatile conventional fuel prices.
9. 1 SREC = 1000 kWh = 1 MWh
10. Sherwood, L. (2012). U.S. Solar Market Trends 2011. Latham, New York: Interstate Renewable Energy Council (IREC) Inc.
11. In 2011-2012, the Delaware Public Service Commission ended administrative pricing for small systems and removed the restriction on seller eligibility and newly constructed systems, thereby allowing owners of systems built three to ten years ago to enter the market. In addition, the Delaware Governor in a move to woo a fuel cell manufacturer to the state, persuaded the legislative to include fuel cells in the state's RPS solar carve out. The combined effects of these regulatory and legislative changes is a dramatic decline in SREC prices in late 2011 and has continued through 2013.

FREE Policy Brief Series
Number 2

About the Foundation for Renewable Energy & Environment (FREE)

The Foundation for Renewable Energy and Environment (FREE) is a non- profit, international organization established to promote a better future based on energy, water and materials conservation, renewable energy use, environmental resilience, and sustainable livelihoods. Guided by experts and distinguished academics, FREE sponsors research, supports graduate education and consults with organizations on strategies to create new sustainability models, to advise policy makers and other societal leaders, and to provide outreach to communities seeking to transform energy-environment relations. Managing an active agenda of conferences, films, exhibitions, seminars, and publications, FREE works with cities, non-profits, governments, businesses, and academic institutions around the world on environment and renewable energy issues.

The Policy Brief Series is drafted by the FREE research team (http://freefutures.org/about/free-team/free-research-team/). For more information, contact FREE Program Manager Pam Hague (pam@freefutures.org).

Suggested citation:

“FREE Policy Brief Number 2. Sustainable Energy Utility: The Business Model of the SEU. *FREE Policy Brief Series*. Document available at: www.freefutures.org/policybriefs“

Copyright © Foundation for Renewable Energy & Environment (FREE) www.freefutures.org.
All rights reserved.

This Policy Brief is available at no cost from at: www.freefutures.org FREE welcomes the use of its material for noncommercial purposes, such as policy discussions or educational activities. For commercial use, please contact contact@freefutures.org. Header image under Creative Commons 2.0 Generic License.