

Task Force on Solar Hot Water Systems in Prince George's County



Annapolis, Maryland

January 2012

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Report to Senate Finance Committee, House Economic Matters Committee, Prince George's County Senators, Prince George's County House Delegation, Prince George's County Executive, & Prince George's County Council

Attached is the report of the Task Force on Solar Hot Water Systems in Prince George's County.

The bottom line is that the Task Force accomplished its purpose: evaluate potential business models that could drive the widespread adoption of solar hot water in Prince George's County and then recommend the adoption of one or more.

The Task Force concluded that a solar water heating utility service business model could reduce energy costs for thousands of consumers currently using electricity. These savings are possible due to the economies of scale and cost of financing available to utilities. Moreover, our model allows low-income residents and tenants to benefit from the savings attributable to solar water heating. Washington Suburban Sanitary Commission (WSSC) would be an ideal platform to provide such a utility service, but other options exist and are expanded if alternative providers are allowed access to existing customer billing systems. Enabling competition between utilities would benefit all Maryland residents. Because the federal renewable energy investment tax credit expires at the end of 2016, there is urgency if the state or the county wants to proceed.

The Task Force recommends the Maryland Energy Administration or the Prince George's Department of Environmental Resources lead the effort to ensure the residents of Prince George's County have access to solar water heating utility service.

The Task Force appreciates the support of all the public and private sector representatives who assisted its work and particularly our consultant, Craig Marlowe, who developed the model.



Senator Jim Rosapepe
Chair

Task Force on Solar Hot Water Systems in Prince George's County

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Task Force on Solar Hot Water Systems in Prince George's County

Background

The Task Force on Solar Hot Water Systems in Prince George's County was created in 2010 by the Maryland General Assembly to develop a business model for rapid and significant deployment of solar water heating (SWH) throughout the county. The Task Force set an initial county-wide deployment goal of 25,000 systems (5,000 per year for 5 years), an admittedly aggressive goal and one that would take on an exponential rather than a linear market adoption pattern. Such a program would be the first successful mass-deployment of SWH in the continental United States (US) and thus a national showcase.

Achieving this goal would:

- Reduce electric utility cost for thousands of Prince Georgians
- Create jobs for local installers, engineers, and customer service representatives
- Reduce carbon and other emissions in Maryland
- Help increase the reliability of the electrical distribution network and lower the demand for peak electricity, ultimately saving money for all electric customers

SWH is significantly more cost effective at creating clean energy than solar photovoltaic (PV) solutions and therefore requires a fraction of the public subsidies necessary for PV. With less need for subsidies to drive adoption of clean solar energy, Maryland's overall electric rates could be reduced. Further savings are derived by SWH's ability to lower and flatten the overall electricity demand curve.

25,000 residential SWH systems would eliminate more than 25,000 tons of CO₂ emissions annually.

Finally, unleashing the widespread adoption of a cost effective clean energy solution creates a positive environment for continued public acceptance of clean energy solutions.

Charge to Task Force

The specific charge to the Task Force was to: 1) identify and assess public and private partnership models that can be utilized while minimizing impacts associated with mass-deployed SWH, and 2) provide policy recommendations that enable such mass market acceptance. The six key assignments identified by the enabling legislation are:

1. Conduct national best practices investigation
2. Assess federal, state and local incentives and policies that support SWH
3. Identify obstacles to implementing mass SWH
4. Assess possibility of monetizing emission reductions associated with SWH
5. Identify major markets that are ready to adopt SWH
6. Develop a plan that will result in savings to County residents and emission reductions. The Task Force interpreted this last assignment to require that our recommended plan be replicable throughout Maryland.

Additional information and analysis that support our findings are included in the attached report: *Unleashing Consumer Energy Savings: A Mass-Deployment Strategy for Solar Water Heating in Prince George's County*, prepared by the Task Force's consultant Craig Marlowe.

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Findings

Best Practices

Despite SWH being the most cost effective solar energy technology on the market today, limited examples of successful implementation best practices were discovered. In the continental United States, almost every program studied had market penetration rates of much less than 1%. Only 423 SWH systems were installed in Maryland during fiscal year (FY) 2011. That low penetration rate is typical across the United States.

The two notable exceptions are Hawaii and Valley Electric Association (VEA), a Nevada electric cooperative. While Hawaii has achieved mass penetration, their characteristics of high electricity rates, lack of natural gas resources, and deep state subsidies are not readily replicable in Maryland. It is worth noting that in January 2012, three Hawaiian electric utilities announced a program to provide SWH via a utility owned service, a program very similar to our recommended plan.

VEA's model proves volume purchasing's effectiveness on lowering SWH's installed costs. Building on their lowered costs, the cooperative provides fifteen year interest free on-bill financing. Of course, most Maryland consumers are not served by consumer cooperatives willing to provide such favorable financing terms.

Incentives and Policies

The 30% federal investment tax credit (ITC), the primary federal incentive currently available for SWH, is scheduled to expire at the end of 2016. Thus, there is less than 5 years to generate the volume necessary to drive installed costs down to a point where SWH cost effectiveness is not dependent upon the ITC.

Another potential federal incentive is the New Market Tax Credit. While limited exploration of this subsidy was conducted for the Task Force, the competitive award process and applicability to limited census tracts could limit its usefulness to a significant extent. However, it remains an option in Prince George's County.

Most existing state and local incentives will not scale for mass-deployment. The Maryland state SWH grant¹ will probably cease during 2012 due to structural declines in its ultimate funding sources, Regional Greenhouse Gas Initiative's auction proceeds and alternative compliance payments from utilities. Regardless, state subsidies are unlikely to support the mass-deployment of SWH even within a single county. Similarly, limitations on funding for local incentives, such as the Prince George's County Solar Property Tax credit, prevent these incentives from benefiting more than a handful of residents.

Maryland's primary SWH subsidy going forward will likely be solar renewable energy credits (SRECs), which are under significant pricing pressure due to perceived short term surpluses of SRECs. With each SWH system being eligible for 2.5 SRECs, mass-deployment of SWH will exacerbate this problem as 25,000 SWH units would generate 62,500 SRECs annually. The Task Force's proposed business model works with relatively low SREC market prices: thus we believe there will be enough SREC demand to build-out the first 25,000 homes in Prince George's County SWH program. However, if market demand is materially higher in Prince George's County than modeled, or if other communities in Maryland decide

¹ The MEA grant is currently 20% of installed costs up to a maximum award of \$500.

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to adopt our model, a surplus of SRECs could materialize. Clearly, the more successful the SWH rollout, the more pressure on the SREC’s market price. The SREC’s market price is the key to its effectiveness as an incentive.

Obstacles

Fundamental reasons why SWH use has not taken hold are:

- Costs (for small quantity markets) greatly exceed potential benefits
- Complexity of homeowner financing limits market demand
- Complexity of buying process does as well

In small quantities, even with current federal, state and local subsidies, SWH will not save money for most Maryland customers. While SWH is more cost effective in Maryland than Florida, installed costs greatly outweigh the energy savings. In FY 2011, the average Maryland residential SWH installation cost approximately \$10,000² and provides less than \$500 in annual energy savings for customers. Due to currently low natural gas prices, SWH is not economically competitive with natural gas. The below table reflects the average gross energy savings for both electricity and natural gas from the 2010 San Diego SWH pilot. As shown, after deducting our recommended program’s likely \$25 monthly (\$300 annual)³ equipment charge, there are still no economic savings associated with natural gas displacement.

Type of Fuel	Annual Gross Savings	Annual Cost of Equipment	Annual Net Savings
Electricity	\$493	\$300	\$ 193
Natural Gas	\$135	\$300	\$(165)

Since short-term energy savings cannot be expected to dramatically increase, the installed cost must drop for SWH to become economically viable. Fortunately, it appears that Maryland’s installed cost for SWH can be dramatically lowered via volume buying and installation. As shown by VEA’s successful program, the average residential installed costs can be driven down to approximately \$4,000 (before incentives) with an annual volume of less than 1,000 units.

The cost and terms of the financing used to purchase SWH are critical to mass-deployment – and therefore to economic viability. The combination of SWH equipment’s long economic life and relatively small annual energy savings requires long-term and low-cost financing. Since the largest potential market for SWH is residential, the massive loss of significant home equity and tightening of the mortgage market in recent years have limited access to long-term and low-cost financing.

² Using \$10,000 as the installed costs, current incentives reduce the cost by: \$3,000 federal ITC, \$500 MEA grant, and an estimated \$2,000 from SRECs, for a net cost of \$4,500. Ignoring the time value of money, with gross annual savings of \$500 the payback period is nine years.

³ Continuing with the above \$4,500 net equipment costs and no time value of money, charging \$300 annually for that equipment means a fifteen year payback. At 5% interest, the payback period grows to 27.8 years.

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Dependence on consumer-obtained unsecured⁴ financing further limits the potential market. Every existing business model we examined is reliant upon consumer financing, virtually ensuring that only wealthier early adopters can utilize the technology, and completely eliminating the low-income and the tenant market segments. The newer solar leasing models are also built on consumer financing and have not seen significant deployment into the SWH space, primarily due to the relatively high collection costs associated with SWH's small monthly payments.

Buying SWH in Maryland is not easy. SWH manufacturers and installers are largely unknown to the public. This lack of trusted brands results in high marketing cost for sellers and excessively long shopping time for potential consumers, especially in relation to the potential cost savings. Today, due to the lack of a credible solution provider, when electing to purchase a SWH system the consumer must educate him or herself in SWH technology, installation contractors and incentives. Each aspect has a significant learning curve and potential for mistake. Not surprisingly, even motivated customers become frustrated or overwhelmed, and do not complete the transaction. Offering SWH systems through a trusted and competent party allows the consumer to forgo the steep learning curve and rely upon the provider.

Finally, there is little understanding of the costs associated with heating water and the benefits of SWH. This unrecognized appreciation of the benefits of SWH affects both customers and the community at large. Our plan is designed to move the appreciation of SWH's value into the mainstream,

Monetizing Emission Reductions

The Regional Greenhouse Gas Initiative (RGGI) was expected to create a marketplace for selling carbon offsets. With the recent collapse of RGGI's market price on carbon, there is little short-term expectation for any significant financial incentive value from monetizing emission reductions.

Potential Markets

The largest single market in Prince George's County for SWH is the residential market. In 2010 the county's 304,000 households were comprised of 209,000 single family or duplex units, and 93,000 apartments. Approximately 43%⁵ (or 130,000) of these households do not use natural gas to heat their water. Ignoring that some natural gas households will choose to adopt SWH for environmental reasons, installing 5,000 systems annually represents a 3.8% adoption rate of non-natural gas households. In comparison, the VEA program achieved a 3.5% adoption rate in 18 months. After five years, more than 25% of Prince George's County non-gas households could be participating in the program.

⁴ The large cost of installing and removing a SWH system eliminates any collateral value associated with the system.

⁵ Statewide, less than 50% of Maryland's 2 million households utilize natural gas for heating water.

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Proposed Business Model for Mass Deployment in Prince George’s

Create a SWH Utility Service

The business model for successful mass-deployment of SWH requires four key components to drive down costs:

- 1) Vendor Negotiating Power – a solution provider that has the financial capacity and marketplace credibility to convincingly create the expectation that mass-deployment will occur
- 2) Low Cost Capital – access to low cost and long term capital that has little or no dependency on direct consumer financing
- 3) Existing Customer Billing – a customer billing relationship with most households in the service area that can be leveraged to cost effectively collect a small ongoing payment
- 4) Technology Validation – a trusted brand name that provides the validation necessary to position SWH away from the “green” niche market and into the mainstream.

Each of these components are provided in the utility model, which we define as utility-owned equipment, installed on the user’s structure, that provides hot water partially heated by solar energy and for which the utility is entitled to reasonable compensation, estimated at \$25 monthly.

Having marketplace credibility allows negotiation of steep discounts in both equipment and installation. The benefits of low cost financing are readily understood. Possessing an existing customer billing relationship allows little to no incremental costs associated with collecting SWH payments. Technology validation significantly decreases customer acquisition costs since consumers trust the solution provider and are no longer required to understand SWH technology, its incentives and providers. Lower customer acquisition costs feed into the positive feedback loop of increased volume driving down costs.

Offering SWH as a utility service provides an additional benefit – expanding the potential market. The easiest way to drive adoption is to increase the number of people who benefit from the product's value proposition and are in the position to afford it. Newly empowered customers would include middle and low income households, tenants (with their landlord’s permission), and homeowners that have limited collateral or other credit deficiencies.

Customers currently obtain hot water by buying the water from one utility and the energy used to heat it from another. There is nothing which precludes hot water as being the primary product bought and sold. While novel, such an “energy as a service” business model in which the local water utility provides hot water via its owned distributed solar infrastructure is both feasible and practical. With extremely low cost of capital and existing billing relationships with most residents, the water utility can be the low cost provider of SWH services.

Thus, in Prince George’s County, Washington Suburban Sanitary Commission (WSSC) could be the ideal solution provider. But it is not the only viable option.

The following table rates five potential Prince George’s County SWH providers on the four cost components, the keys to potential success in achieving widespread adoption of SHW in Prince George’s. While all have the ability to negotiate volume pricing and strong trust in the marketplace, the governmental entities have access to the lowest cost financing.

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Required Capability	WSSC	Pepco/BGE	Washington Gas	Prince George's County	State of Maryland
Vendor Negotiating Power	Excellent	Excellent	Excellent	Excellent	Excellent
Low Cost Financing	Excellent	Good	Good	Excellent	Excellent
Existing Customer Billing	Excellent	Excellent	Non-optimal	Non-optimal	Non-optimal
Technology Validation	Excellent	Excellent	Excellent	Excellent	Excellent

The key differentiation is the entities’ billing relationship with the consumer. In Washington Gas’ case, no billing relationship exists for all electric households, while the existence of a billing relationship implies the household has natural gas water heating and would not benefit from SWH. Due to current federal mortgage regulations, the county’s property tax collection system cannot be utilized if a property lien can be created.

For reasons made obvious by the chart, the Task Force recommends that Prince George’s County residents and small businesses have access to solar heated water as a utility service from WSSC.

Benefits of SWH as a Utility Service

To the Customer

- Immediate ~\$200 net annual savings for electric, propane and heating oil customers
- Simple, hassle free, utility service with no new financial obligation
- New top-quality water heater – elimination of repair/replacement costs
- Being part of the energy solution

Direct Financial Impact on Average Electric Customer				
Annual Gross Savings	Annual Cost of Equipment	Annual Net Savings	Maintenance Savings ⁶	Savings over 20 Year Program Life
\$493	\$300	\$193	\$1,500	\$5,359

To the SWH Service Provider

- New source of revenue that has a potential net present value of \$30 million
- Positive national, state and local recognition
- Positive public recognition towards addressing both the community’s energy and environmental needs, also known as the “Green Halo”.

⁶ The estimated cost of replacing a hot water tank in Prince George’s County is \$1,500.

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To the Community

- Creates local green jobs
- Enables access to SWH for middle and low income households – where the savings are most critical
- Reduces emissions – health benefits
- Reduces market price needed for clean energy incentives (SRECs), thus holding down electricity rates for all customers, not just those who convert to SHW
- Renewable distributed SWH's generation of energy improves the reliability of the electricity distribution network
- Lowers the need for peak demand electricity, the most expensive to obtain

Recommended Next Steps

Public Sector Leadership, either State or Local

The mass-deployment of SWH technology is clearly outside of all existing local utilities' core expertise. Without either the State or Prince George's County governments taking the lead, directly or indirectly fleshing out the details of the business model proposed here, and finding the partners (technical and financial) need to fill gaps in existing utilities' competencies, mass deployment is virtually impossible to be achieved in Prince George's (or elsewhere in Maryland) in the five years remaining before the expiration of the federal tax credit. That leadership should not be expensive, primarily taking the form of high level commitment from the Governor, the General Assembly, the County Executive and the County Council, together with modest staff and/or consulting resources for no more than a year. The Maryland Energy Administration and the Prince George's Department of Environmental Resources are obvious candidates to house this staff/consulting role but other agencies selected could as well.

State Law to Open Access for Customers to Alternative Utility Providers

There are significant benefits to Maryland's residents derived from our recommended business model. While the Task Force is currently attempting to obtain WSSC's participation in a SWH utility service, there is no certainty that this will occur. The decision to allow Prince George's County (and Maryland) residents the benefits of SWH utility service should not solely rest in a single utility's hands.

While the Task Force believes providing SWH as a utility service through an existing utility is the optimum SWH business model, many of the model's benefits still accrue if the utility only provides billing and related customer service. As previously shown, there are numerous entities that could effectively provide SWH as a utility service if they had access to a cost effective customer billing system. With the primary target market for SWH being customers using electricity to heat their water, the electric utility's billing system is the obvious candidate. Placing the charge for SWH on the electric bill carries the additional benefit of having SWH's monthly savings and costs on the same bill, thus continually reinforcing SWH's value proposition to the consumer.

Therefore, the Task Force recommends that legislation be introduced that allows other appropriate public and private entities the ability to create a SWH utility service and require its service fee be collected by the electric utilities. Such a law could also create an environment that stimulates competition from multiple utilities and financiers, thus expanding the probability that Maryland residents will be able to obtain SWH for a reasonable price.