

## **Solar Hot Water Task Force Report**

**Introduction:** In February of 2008, the Summit for Environmental Action identified five goals for further investigation. One of the identified goals was “that all new residential and commercial buildings as well as 50% of existing buildings in Sarasota County will have a solar hot water heater in 5 years.” A Solar Hot Water Implementation Group was established which issued a final report in July of 2008 recommending that the “stretch” goal of 50% coverage with solar hot water heating within five years might be possible through a utility model (Appendix 1). It recommended that Sarasota County undertake an investigation of the pros and cons of the various solar thermal utility-based models in order to meet this goal. The Sarasota County Commissioners established a Solar Hot Water Task Force in November of 2008 in order to address the recommendations of the SEA Implementation Group. The Task Force has operated using the following objective:

**Objective:** To maximize the number of solar hot water heating systems installed in Sarasota County within the next 5 years resulting in an increase in the use of renewable energy sources while creating local jobs.

The Task Force believes that the overriding guiding principles are to

- maximize the benefit to the public
- protect and enhance the environment
- maximize the number of residences, businesses and institutions that can benefit from the use of solar hot water systems in the shortest possible time
- maximize local business opportunities

### **Summary Recommendation:**

The Task Force strongly recommends a series of simultaneous actions for Sarasota County to take to maximize the number of solar hot water heating systems installed in Sarasota County within the next few years.

- 1. Establish a public solar domestic hot water utility (SDHWU);**
- 2. Facilitate the adoption of owner-installed systems;**
- 3. Develop a joint public education and marketing program with the local solar industry and other entities.**

These recommendations address the two primary barriers to large scale implementation of solar hot water heating:

- **High upfront capital costs.** Even with the federal tax credit of 30% of installed cost and the Florida rebate of \$500, the cost of an installed

system is recognized to be a significant barrier to achieving a goal of widespread implementation of solar hot water systems – especially considering today’s economic conditions.

- **Lack of knowledge of solar hot water.** The public knows very little about solar hot water and sometimes confuses it with solar photovoltaic systems. Most people are unaware of the costs and benefits associated with solar hot water systems and are unable to make informed purchasing decisions.

### **Detailed Recommendations:**

#### **1. Establish a public Solar Domestic Hot Water Utility (SDHWU).**

A public Solar Domestic Hot Water Utility (SDHWU) is publicly owned and operated and provides a solar hot water service to property owners for a monthly fee while maintaining public ownership and maintenance responsibilities of the systems.

This approach reduces the costs of hot water for the consumer, eliminates the up front costs of installing a system, reduces the risk of unexpected operating or replacement costs to the homeowner and can contribute to cost-effectively transitioning to renewable energy within the County.

Financing of the SDHWU does present a challenge. The Task Force has had discussions with Staff in which various forms of financing were considered – including grants, issuance of bonds, formation of either a Municipal Service Benefit Unit (MSBU) or a Community Development District (CDD), and taking advantage of recent Federal incentives such as Clean Renewable Energy Bonds (CREB) and Qualified Energy Conservation Bonds (QECB). The potential for federal incentives, other bonding mechanisms or public/ private partnerships seemed to have more potential in the initial discussions by the Task Force and staff. It is clear that this area will require more detailed investigation than the Task Force has been able to devote but we all believe that the financing problems are solvable. In order to facilitate the startup, we recommend that the financing of the SDHWU be staged and that in order to progress towards a self sustaining utility, commercial, institutional, and domestic customers with larger hot water needs may be initially targeted. The county shall consider the feasibility of offering buy out options for utility customers.

Liability issues with respect to potential property damage or bodily injury present another consideration for the County which was briefly discussed with the Task Force and should be addressed by the County.

The formation of a SDHWU does not preclude homeowners, businesses, or institutions from enjoying the full economic benefits of owning their own system. In fact, our second recommendation is to facilitate such transactions. But it is the opinion of the Task Force that the SDHWU is the model that would best meet the goals of maximizing adoption rates, increasing local jobs and providing benefit to the property owner. As a result, the Task Force's primary recommendation is focused on that model.

Given our keen interest in sustainability and local job creation we recommend:

1.1 The SDHWU shall offer its services to single family homes, multi-family residences, institutional and commercial accounts.

1.2 Through a competitive Request for Qualification (RFQ) process, the SDHWU shall select qualified installers with a Certified Solar Contractors (CV) License<sup>1</sup>. Successful bidders will submit a range of specific systems tailored to the diversity of housing and building types within the service territory area with agreed to unit prices for a specific period of time. To the extent possible, consistent with the county policies and ordinances, the program should maximize the use of local businesses.

1.3 The County shall work with the municipalities through interlocal agreements to ensure the widest possible adoption and maximum efficiency.

1.4 All selected systems shall be subject to an engineering and design review. The SDHWU shall coordinate with nationally recognized laboratories to ensure initial and on-going system efficiency.

1.5 All systems shall be metered. Meters may be a necessary feature in order to sell the renewable energy certificates for the hot water that is produced (currently valued at around four cents per kWh). In addition, the meters provide the user with knowledge that the system is working. This shall not preclude "flat fee" pricing.

1.6 The SDHWU shall evaluate the economics of local assembly or manufacturing for solar domestic hot water systems, and, wherever possible, encourage such enterprise.

1.7 The County shall fully explore the risk and liability implications of a SDHWU.

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<sup>1</sup> "Solar Contractor Licensing in Florida." Florida Solar Energy Research and Education Foundation. <http://www.fsec.ucf.edu/En/industry/pdf/SolarContractor.pdf>;  
Legal Citations: Rule 61G4-15.012, FAC, Certification of Residential Solar Water Heating Specialty Contractors, Rule 61G4-15.021, FAC, Certification of Solar Contractors, Section 489.105(3)(o), Fla. Stat.; Section 489.113(3)(f), Fla. Stat.

1.8 Nothing in this recommendation shall preclude the County from entering into partnerships with private entities to improve effectiveness of the SDHWU, including reduction of overall system costs and liability risks.

## **2. Facilitate greater adoption of owner-installed systems**

Our recommendation to establish a public utility seeks to enhance the rapid adoption of solar domestic hot water systems. At the same time we recognize that there is a significant financial benefit to those homeowners, businesses, and institutions that choose to install their own systems. Therefore we recommend that the SDHWU also encourage owner-installed systems.

### **2.1 Identify and facilitate property owner access to low-cost financing**

For example, the Energy Improvement and Extension Act of 2008 and the American Recovery and Reinvestment Act provide significant incentives to issuers of Qualified Energy Conservation Bonds (QECCB). The county should explore the feasibility of making these funding sources available for property owners. We understand that Sarasota County does not want to be put in a position to directly service the loans to consumers. Therefore the county may require third party loan origination and administration,

### **2.2 Streamline permitting**

We recommend that Sarasota County streamline the permitting process wherever possible and work with other municipalities to do the same. It should also enhance the training of building inspectors and ensure that all aspects of the solar hot water system are installed correctly (even if the standards are more stringent than the current building codes).

## **3. Public Education and Joint Marketing Program**

We recommend that the County should cooperate with existing solar companies and other entities including federal and state agencies, municipalities and community partners to develop a joint marketing and public education campaign on the benefits of solar hot water systems. This is an essential element if there is going to be any significant deviation from the business-as-usual low adoption rates. We note that public awareness of solar hot water systems is minimal. In addition, even among those individuals that have some knowledge, there is confusion as to the benefits and costs. Building on existing county and municipality sustainability programs, the Task

Force believes that this solar hot water educational initiative should be a well funded, continuing effort in order to be effective.

We believe that Sarasota County should use certain criteria in its education program. Among the facts to be considered are:

3.1 Although components of solar thermal systems are certified by the Florida Solar Energy Center, there is a paucity of factual data obtained by monitoring of existing installations which would guide the consumer in the choice and operation of the system.

3.2 Systems should be advertised using a consistent, verifiable approach for calculating the probable yearly savings to be obtained. This is difficult due to predicting the likely increases in the incremental rates of electricity in this region. Current claims based on a percentage of the electricity bill are misleading due to variations in many other factors (size of residence, number of occupants, insulation, air-conditioning efficiency, presence of a swimming pool, etc.).

3.3 The confusion is further confounded by the number of different systems currently offered. Education should include criteria for choosing a unit and standard questions to ask. This may include:

- Types of systems,
- Feasibility factors such as size of residence, number of occupants, insulation, shading,
- Financial benefits including lease vs purchase and rebate and tax credit information and net metering,
- Environmental benefits
- Questions to ask contractor/ installer

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## Details of Task Force Deliberations

Initially, Sarasota County staff prepared a policy paper for consideration of the Task Force (amended by the Task Force on January 6, 2009 – see Appendix 2).

The Task Force first met on December 19, 2008 and held subsequent meetings on January 6, January 20, February 3, February 24 and March 5, 2009 during which we had presentations from stakeholders and discussions with public input on topics related to our goal. We quickly recognized that the two main barriers to widespread solar hot water heating deployment in Sarasota County are:

- **High upfront capital costs.** Even with the federal tax credit of 30% of installed cost and the Florida rebate of \$500, the cost of an installed system is deemed to be a significant barrier to achieving a goal of widespread implementation of solar hot water systems – especially considering today’s economic conditions.
- **Lack of knowledge of solar hot water.** The public knows very little about solar hot water and sometimes confuses it with solar photovoltaic systems. Most people are unaware of the costs and benefits associated with solar hot water systems and are unable to make informed purchasing decisions. In addition, the multiple systems available and the different claims of the current installers also lead to confusion.

We addressed the question of the real rate of return that could be realized from an investment in a solar hot water system. Many factors enter into the calculation including the family size and the projected rate of increase for electricity rates for incremental usage. A spreadsheet was prepared with variable inputs (included in the Task Force records). A summary of the results are presented below:

### Electricity Used to Generate Hot Water by Family Size

Family Size	Electricity Used (kWh/year)
2	1990
3	3075
4	4160

### Estimated Electricity Saved by Solar Hot Water by Family Size

Family Size	Electricity Saved (kWh/year)
2	1590
3	2460
4	3330

## Estimated\* Rates of Return of Investment in Solar Hot Water

		15 year rates of return			20 year rates of return		
Family Size							
Electricity rate increase		3%	5%	7%	3%	5%	7%
	2	2.3%	4.0%	5.8%	5.4%	7.3%	9.2%
	3	8.6%	10.5%	12.4%	11.0%	13.0%	14.9%
	4	14.1%	16.0%	18.0%	15.8%	17.9%	19.9%

\* The rates of return do not account for replacement costs of water heater in non-solar systems.

As can be seen from the table, larger families will receive a greater return from installation of a solar hot water system. However, even a family of two will probably receive a competitive rate of return – especially considering a longer investment time. In addition, although we cannot provide any concrete figures, it is probable that the installation of a solar hot water system will marginally increase the sales value of a house (taxes on the property would not be increased with the installation). Finally, these figures do not take into account savings due to the longer life of the tanks associated with storage of solar generated hot water compared to conventional electric hot water tanks.

We have no data but all felt that certain businesses and institutions that use a considerable volume of hot water (gyms, hotels, large buildings, etc.), will profit even more from installation of solar hot water systems.

The Task Force considered several models for increasing adoption of solar hot water in the county:

- **Establishing a Solar Domestic Hot Water Utility with Sarasota County as the Owner/Provider.** The concept of a solar thermal utility was proposed in 1999 by the National Renewable Energy Laboratory<sup>2</sup>. In this model, the utility owns the resource (in this case the solar hot water system) and charges the user a monthly fee either based on the metered electricity equivalent for the hot water actually used or a fixed fee. The metered rate could be either based on a “frozen” electricity rate or based on a percentage reduction of the incremental rate for electricity. The utility would be responsible for the installation and upkeep of the solar hot water system and would be liable for any incremental damage to the house. If the County was the owner of the system, it would qualify for any Renewable Energy Credits available (currently valued at around four cents per kWh). At the end of a specified period of

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<sup>2</sup> Business Opportunity Prospectus for Utilities in Solar Water Heating, Energy Alliance Group, NREL, June 1999.

time (possibly 15 years), the solar hot water system might be available for sale to the user or turned over to the user. It is estimated that upfront costs for establishment of a County owned solar thermal utility would be considerable. This money might be obtained using grants, issuance of bonds, formation of either a Municipal Service Benefit Unit (MSBU) or a Community Development District (CDD), and taking advantage of recent Federal incentives such as Clean Renewable Energy Bonds (CREB) and Qualified Energy Conservation Bonds (QECCB).

- **Partnering with a third party in the establishment of a Solar Domestic Hot Water Utility with Sarasota County acting as the billing agent.** In this option, a third party would own the solar domestic hot water utility and would charge the user a monthly fee (as above). The main difference between this option and the one above is that Sarasota County would only act as the billing agent for the private utility. The County would be reimbursed in full for acting as the billing agent. In addition, in order to induce Sarasota County to accept this role, the private utility owner could offer the County a profit to act in this regard. As the establishment of a totally separate billing entity would significantly decrease the profit from the private utility, the County would be in an excellent position to negotiate the terms of agreement. In doing so, the County could ensure that significant savings would be realized by the homeowner as well as maximizing, to the extent possible, the number of local jobs created. It is to be noted that no large-scale private solar thermal utility has been established (although City of Lakeland's municipal utility is in the final stages of doing so with Regenesis, Inc.).
- **Partnering with Florida Power and Light in either the establishment of a Solar Thermal Utility or in some other mode.** Discussions with FPL indicated that no major moves on solar hot water, even a demonstration project, would be considered by FPL until completion of statewide report due mid-year. This precluded further consideration of this option. It is noted that FPL could, on its own, establish a large scale solar thermal utility completely separate from the County if they desired.
- **Providing low interest loans to homeowners.**
  - By obtaining money either by a municipal bond (tax-free), a general bond (taxable), or a grant from the Federal Government, Sarasota County could establish a program of providing low interest loans to property owners. This loan would be repaid through a voluntary property tax assessment or secured by a lien on the property and would

ideally convey to the next owner should the property be sold. It is not clear what the interest rate would be under this scenario. These two facts are important in determining whether loans are reasonable given the return on investment for solar hot water systems. It is to be noted that the city of Berkeley, California established a loan program<sup>3</sup> primarily for installation of photovoltaic systems. The loan rate worked out to be close to 8% which we believe to be too high to be an effective stimulant. Other programs are being developed that offer even lower interest rates.

- Private industry could also be the source of the low interest loans. Again, the interest rate and other expenses would determine the feasibility of this approach.

- **Conduct an extensive education program encouraging individual ownership of solar hot water systems.**

We also considered the various criteria that we should use in establishing the priority of recommendations to the Sarasota County Commissioners.

### Solar Hot Water Models – Matrix Criteria Development

#### Stakeholders

- Property owners
- Renters
- Local (Solar) Industry
- Local Government
- Third party partners
- Investors
- Society/Community

#### Major Program Goals

- Saving money for property owners
- Maximizing local economic development
- Maximizing program scope
- Reducing energy consumption and greenhouse gas emissions (dependent upon program scope and expansion possibilities)

#### Economic Development Criteria

- *Profits Remain Local* – benefits local industry, society/community. Local solar vendors currently profit from system financing. How will this be affected?
- *Increase Local Manufacturing* – benefits local industry, society/community

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3 "Berkeley Model Summary." Prepared by Bonnie Nickel and distributed to Task Force on 12-19-08. Saved in Task Force Files.

- *Increase Local Jobs* – benefits local industry, society/community

#### Scope Criteria

- *Maximizing number of new installations* – which model will customers prefer? Does the model work for various property types – new construction, residential, multi-family, commercial, industrial? Is the market for the model limited by 1-2 person households, part-time residents, renters, properties that are not properly situated? Does the model extend easily beyond unincorporated Sarasota County?
- *Lower System costs through volume discounts* – depends on rate of adoption and centralization vs. decentralization of program
- *Potential for Program Expansion* – can the system be expanded to include photovoltaic electric and energy efficiency applications? Solar thermal is one way to reduce energy consumption but not the only way and will not be applicable in all situations. Does the County's franchise agreement with FPL limit any options? How do you measure the return on energy efficiency projects? For example, you can't meter the efficiency of new windows or insulation.

#### Property Owner Benefit Criteria

- *Monthly Savings* – a financial analysis of each model will determine if the property owner will save money relative to current electric bills (savings should be considered over the life-cycle of the system/program); factors include system cost (does the model support volume discounts), federal tax credit eligibility, state rebate eligibility, cost of electricity, interest rate, hot water usage, etc. If applicable, how do the costs for billing, administration, customer service, and liability affect the cost to the property owner? Is the program eligible for future renewable energy credits and if so, how does this affect the financial analysis for each model?
- *Minimize Risk & Operating and Maintenance Responsibility* – who is liable for damage and repairs and routine maintenance?
- *Ease of Adoption* – does the property owner research and choose their system? Do they get bids and select a vendor/installer? How much paperwork is involved? Who is their point of contact? How simple is any contracting and administration?

#### Feasibility Criteria

- *Financing Availability* – given current credit markets how easy will it be for each model to access financing?
- *Transferability* – we have a particularly transient population which may discourage program adoption. Can costs and benefits of the system be transferred to the next property owner?
- *Long Term Viability* – does the program depend on the long-term viability of one of the parties and if so, how will the program be affected?

- An additional category may be necessary under “Feasibility” if changes in local or state laws/regulations are required to implement a model or if aspects of the model need to be taken to the voters.

In order to help decide how each model would rank with respect to the various criteria, we put together a matrix with each Task Force member assigning their own assessment. The individual responses were then combined. The full matrix is included in the Task Force records. A summary of the combined weighted responses is reproduced below:

**Criteria**

Economic			Scope			Property Owner			Feasibility		
Development						Benefit					
Profits Remain Local	Increase Local Manufacturing	Increase Local Jobs	Maximizing number of new installations (Customer willingness & types of customers)	Lower System Costs through volume discounts	Potential for Program Expansion (PV, EE)	Monthly Savings	Minimize Risk &/or O&M Responsibility	Ease of Adoption	Financing Availability	Transferability	Long Term Viability

Normalized criteria average

7.0	7.0	9.0	10.0	6.8	5.8	7.6	5.6	7.0	9.0	6.5	7.4
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<b>Weighted Averaged Models</b>													
County-owned SHW Utility	34	25	42	44	27	12	26	20	27	29	25	31	<b>341</b>
FPL-Owned SHW Utility	9	7	29	43	30	21	24	28	33	44	28	28	<b>325</b>
Third Party SHW Utility	18	25	35	38	25	19	27	22	29	38	26	21	<b>321</b>
Individual Ownership/ Education Campaign	23	12	27	26	11	11	29	12	25	22	17	30	<b>243</b>
Berkeley Model: Voluntary Property Tax	29	16	30	28	17	18	24	11	19	27	29	31	<b>281</b>

The most important criteria that the Task Force identified are that the selected model should focus on the potential for maximizing the number of new installations, increase the number of local jobs, and ensure that financing is available.

We arrived at the recommendations as reported in the Summary above.

## Appendices

### Appendix 1 – Report of the Solar Hot Water Implementation Group

#### Summit for Environmental Action Solar Hot Water Implementation Group Report – July 16, 2008

##### Challenge

The challenge to the Summit for Environmental Action solar hot water implementation group was to investigate the “proposition ...that all new residential and commercial buildings as well as 50% of existing buildings in Sarasota County will have a solar hot water heater in 5 years. This will be implemented by a coalition of utility companies, governments, and financial institutions.”

##### Action Plan

Members of the implementation team conducted research into past and existing programs by internet searches, telephone interviews, and direct interviews with relevant parties. Meetings were devoted to a discussion of these programs and deciding upon probable models that would lead to a substantial increase in the number of solar hot water installations in the next five years.

##### Summary of Existing Hot Water Programs

Currently, in Sarasota County, the only approach for installation of solar hot water systems is for the owner of the property to contract with one of the many independent installers. The owner would get a Federal tax credit (30% of the purchase price up to a maximum of \$2000) as well as a rebate from the state of Florida (\$500). Even though both the environmental benefits and the long term financial advantages are known, the penetration rate has been low – presumably due to the high entry costs.

A variety of solar hot water programs and incentives from across Florida and the rest of the country were researched. Existing program and incentive types and examples include:

- Federal Tax Credits (30% up to \$2000)
- State Tax Credits or Rebate (Various; FL rebate currently underfunded, see table for details)
- Utility Rebates (FL - Tallahassee, Clay Electric, Gainesville, Jacksonville, New Smyrna Beach, Progress Energy)
- Renewable Energy Equipment Sales Tax Exemption (FL)

- Utility Low Interest Loans (FL - Tallahassee, Clay Electric, Gainesville, Orlando)
- Pay-for-Energy (Lakeland, FL)
- Lease Purchase Agreements (Santa Clara, CA, Sustainable Energy financing District, Berkeley, CA)
- Sustainable Energy Financing District (Berkeley, CA)  
The City is developing a program which would help property owners finance solar installations and energy efficiency improvements by creating a voluntary assessment that is paid through their individual property tax bills.
- Solar Production Credit (Orlando - \$0.03/kWh for solar water heating)
- Property Tax Exemption (Oregon; under consideration in FL)
- Solar Access Laws (Eugene, OR; CA)
- Mandatory Installation for New Construction (Hawaii)

According to USH<sub>2</sub>O<sup>1</sup> (Utility Solar Water Heating Initiative) there are at least 35 Utility Solar Water Heater Programs in 15 States. Penetration rates for all but Hawaii remain quite low. The main differentiating factors for HECO (Hawaiian Electric Company) are the high cost of electricity (27¢ kWh) and the large State tax credit (35%) as well as a high rebate from the electric utility (now \$1000).

There is a precedent for high market penetration rates for solar hot water heating in Florida. In addition to the 40% federal tax credit, Florida Power & Light offered rebates for residential solar hot water in the 1980's (1981-1994 according to NREL Report<sup>2</sup>). Rebate values were based on the number of household occupants and averaged approximately \$400. Over the life of the program, at least 45,900 systems were installed.<sup>2</sup>

The following table illustrates features of a few model programs:

**Model/Sample Programs**

	<b>EWEB Eugene, OR</b>	<b>JEA Jacksonville, FL</b>	<b>LE Lakeland, FL</b>	<b>HECO Hawaii</b>
Utility Type	Municipal	Municipal	Municipal	IOU
System Ownership	Property Owner	Property Owner	Utility	Property Owner
State Tax Credit	Up to \$1500	\$500*	\$500*	35%
Utility Rebate	Up to \$600/avg \$550	\$400-\$800	N/A	\$1000
Utility Loan	0%, up to \$4K, 5 yr		N/A	Low interest, 12 yr
# of Systems	1050	473	58	>41500
Program Start	1990	2002		1996

REC Ownership	No Program for Solar Thermal		Utility – Brokered by Sterling Planet	
kWh Rate			11.5¢	27¢

\*Underfunded – As of June 12, 2008 there were 2,594 unfunded approved applications totaling \$4.3M for the State of Florida.  
Table reflects data for residential systems only.

### Lessons Learned

- A very limited amount of data from the Lakeland Electric program shows that solar hot water systems can displace 53-72% kWh-equivalent of conventional electric hot water systems.
- Many communities are at various stages of exploring solar hot water utility models including Sarasota County.
- A model proposed by Regenes Power was researched by the group. A third party (in this case, Regenes) would own, install, maintain, and acquire financing for the systems, while the local water utility would market and administer customer billing for a fee. Profits would remain with the third party and its investors. Whether the municipality or the investors would retain the renewable energy credits is open to negotiation. This type of arrangement would not be regulated by the Public Service Commission. Customers would pay a monthly fee and may be given a couple of rate options. The customer could buy the system outright after a minimum number of years (15 years under their proposed agreement).
- Utility incentives for solar hot water programs include: market transformation, demand reduction, clean power goals, revenue generation, meeting customer demand, environmental stewardship, and an access route for promotion of other energy efficiency measures. In particular, the Lakeland program cited a commitment to “*progressive change which benefits the ratepayers/owners of the utility, the community at large and the environment*”.
- Barriers to further market penetration include: high upfront cost, high product cost (Eugene, OR - \$7800 vs. \$4600-\$6000 in Florida), and perceived reliability concerns. Reliability issues were addressed in the following research findings from HECO<sup>1</sup>:

	Est. Claims
Collectors	<0.1%
Tanks	<1.5%
Pumps	
AC	<1.0%
DC	<3.0%
Controllers	<1.0%

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## **Conclusions**

### **1. To achieve a 50% installation rate of solar hot water systems within 5 years is an ambitious goal.**

In order to achieve this objective, over 20,000 systems would need to be installed in Sarasota County every year. In the United States, only 8000 systems are installed every year. In the early 1980's, in addition to the 40% federal tax credit, Florida Power and Light had a statewide solar thermal rebate program. Over the life of the program, at least 45,900 systems were installed. Of the modern programs in existence, Hawaii has the highest penetration in the US, one out of every 4 homes, or 25%. That program has been in existence since 1996 and only has 41,000 systems installed. In addition, Sarasota County has a large number of mobile home units as well as a large number of very small single family homes (under 1000 square feet), many of which are rental units. It is difficult to imagine a large installation rate for these small units.

### **2. Initial (first) cost is the biggest barrier to large scale implementation.**

The economic payback for solar hot water systems is well-established. Well-designed and funded incentive programs coupled with aggressive marketing campaigns are essential to achieving higher levels of market penetration. The success of the Hawaii model rests on generous state tax credits (in addition to the Federal tax credit) as well as a very generous utility rebate. This model is unlikely to be adopted in Florida. No other recent program in the United States to date has had large scale participation.

### **3. Whatever the model that is used, a strong marketing effort is essential for success.**

The implementation group also believes that public ignorance of the benefits of solar hot water has been another barrier to large scale implementation. Thus, we came to the conclusion that a strong marketing effort is essential for success.

### **4. A different business model is required.**

Our assessment of the success factors of various state and utility programs suggests some type of utility-based model is a necessary ingredient in achieving the goal of 50% penetration. A solar thermal utility would own and maintain the system, which would eliminate the largest single barrier (cost) to widespread adoption. The monthly cost of a system, including capital, operating and maintenance costs, can be priced below comparably priced electric hot water costs for the average homeowner.

There are three potential utility models, akin to the various types of electric utilities: an investor-owned (private) utility, a municipal utility or a coop utility, or some combination thereof, i.e. a private firm partnering with an existing utility to handle billing and marketing.

We recommend evaluating the pros and cons of each approach. This evaluation would include an analysis of start-up funding requirements, financing options (including the possibility of tax-free revenue bonds), on-going operational issues, including billing, liability, sales and marketing.

Whatever the model that is eventually chosen, the following principles should apply:

- a) The primary benefits should accrue to the homeowner and business owners.
- b) Every effort should be made to use local manufacturing, installation and repair companies.

**5. It is beyond the purview of this working group to propose legal changes to mandate solar hot water systems in all new residential and commercial buildings.**

**Recommendation:**

Work with County and Cities to investigate means to achieve the Summit for Environmental Action goal of having a 50% solar hot water penetration rate for Sarasota County as soon as reasonably possible. This would entail evaluating the pros and cons of the three potential utility models in detail. This evaluation would include an analysis of start-up funding requirements, financing options (including the possibility of tax-free revenue bonds), on-going operational issues, including billing, liability, sales and marketing.

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## Addenda

### I. References

<sup>1</sup>Guerillas Going Green: Utilities Get Into (Solar) Hot Water, USH20, October 2007.

<sup>2</sup>Business Opportunity Prospectus for Utilities in Solar Water Heating, Energy Alliance Group, NREL, June 1999.

<sup>3</sup>Colleen Kettles, Executive Director, Florida Solar Energy Research & Education Foundation, private communication

<sup>4</sup>Jim Ley, Sarasota County Administrator, private communication

<sup>5</sup>[www.heco.com](http://www.heco.com) and private communication with administrative staff

<sup>6</sup>Jeff Curry, Alternate Energy Coordinator, Lakeland Electric Company, private communication

<sup>7</sup>"City to Consider the Sun as an Energy Source" Fort Myers Florida Weekly, May 21, 2008

<sup>8</sup>Brian Tippin, Jacksonville Electric Authority, private communication

<sup>9</sup>William A. Foster, Managing Director and Dell Jones, VP Renewable Project Development, Regenes Power LLC, private communications.

### II. Points for Consideration in Private Enterprise – County Models

Among other solutions, we will be looking at the Lakeland Electric and Regenes Power proposal as possible models for a private enterprise – county agreement in which homeowners' are given the option of having a private enterprise (or utility company) put up solar hot water panels and charging the homeowners a reduced (or level) rate for the equivalent kwh of the solar power utilized for the generation of hot water. I propose that we consider the following points carefully:

- System Ownership
  - Under what conditions will the homeowner ever be able to own the system?
- What benefits/liabilities will accrue to the homeowner?
  - Benefits
    - Reduced cost for hot water by utilizing solar energy
    - Eventual ownership (?)
  - Liabilities
    - Possible damage to roof
    - Who is responsible for longer term consequential damage from leaks, improper installation, delays in repair, etc.?
    - Repair turnaround time
    - Possible increased liability to storm damage

- Unsure of increased costs associated with roof covering replacement
- What benefits/detriments will accrue to the County?
  - Benefits
    - Charge for services rendered for billing
    - Share in Renewable Energy Credits (REC)
    - Helps in 2030 Challenge
  - Liabilities
    - Uncertainties about expenses associated with non-payers of monthly fees
    - Uncertainties about long-term financial stability of company and consequences of insolvency (possible repair burden)
    - Is there a mechanism to withhold payment to the company for non-performance?
- What benefits/detriments will accrue to the company?
  - Benefits
    - Long term return on investment
    - Ability to sell company's share of Renewable Energy Credits
    - Lower cost of materials by buying in bulk
    - Lower cost of installation if large numbers of homeowners sign up
  - Liabilities
    - Unknown repair and consequential damage costs
    - Unknown reliability of locally contracted installers and repair people
- Other concerns
  - Are the installations efficient?
    - Best design utilized
    - Correct placement
    - Best insulation material used
    - Best panels used
    - Are the tanks really efficient
  - Is the metering fair?
    - Pay for equivalent solar power captured or delivered?
    - What about standby losses?
  - Does the company have enough reliable financial backing?
  - Would the homeowner/county have rapid recourse to correct deficiencies due to non-performance of the company?
  - What about local involvement
    - Would the panels be built by local companies?
    - Would local installers be used?

## **Appendix 2 – Original Charge to the Solar Hot Water Task Force**

### **Solar Thermal Hot Water**

Policy Paper  
(As amended 1/6/09)

At the June 2, 2008 meeting, the Board of County Commissioners directed the County Administrator to work with Sarasota County Openly Plans for Excellence (SCOPE) to review/outline the framework for a Solar Water Heater Study Group. They recommended the appointment of a limited citizen task force to determine community desire in implementing a solar hot water program.

**Objective:** To maximize the number of solar hot water heating systems installed in Sarasota County within the next five years resulting in an increase in the use of renewable energy sources while creating local jobs.

**Task Force Scope of Work:** In assessing the various models to maximize the number of installed solar hot water heating systems (including the establishment of a Solar Thermal Utility), the Task Force will specifically address the potential benefits and costs of County involvement and to advise staff on a way forward.

#### **Background:**

**Solar Hot Water:** It is well established that solar hot water systems are capable of reducing reliance on non-renewable energy sources. This mature technology is reliable, relatively low cost, and has low maintenance costs. In Southwest Florida, a properly designed and installed system can save between 50 and 80% of the non-renewable energy costs associated with providing residential hot water. Commercial installations which use hot water (gyms, hotels, etc.) can also achieve considerable savings in energy costs.

**SCOPE Summit for Environmental Action Solar Hot Water Implementation Group:** At the SCOPE Summit for Environmental Action, collaborative prioritizing exercises identified the goal of a 50% installation rate of solar hot water systems within five years. The SCOPE Solar Hot Water committee researched past and existing programs to increase use of solar thermal technologies and produced a report that is included as Appendix A. The report finds that the identified goal is extremely ambitious that faces barriers of high initial cost and a lack of public understanding of the benefits. The committee finds that a utility-based model could help overcome those barriers and make progress toward the goal. The report recommends an investigation of the pros and cons of the various utility-based models taking into account financing and operational issues. They also recommend the application of two principles: 1) the primary benefits should accrue to the homeowner and business owners; and 2) every effort should be made to use local manufacturing, installation, and repair companies.

**Solar Thermal Utility Service:** A Solar Thermal Utility would merchandise solar thermal energy used to heat water. The on-site system could provide water heating for home and/or pool. The system would consist of solar collectors located on the roof, a water heater with backup electric or gas, all piping and connections, and a meter to register equivalent electrical kWh for billing purposes.

**Possible County Roles/Business Models:**

**Solar Thermal**

**Scenario #1 County as Owner/Provider**

<b>Program</b>	<b>Application</b>	<b>Risk/Liabilities</b>	<b>Advantages/Disadvantages</b>
Sarasota County would offer Solar Thermal to customers of Sarasota County Utilities. The equipment would be purchased and owned by Sarasota County, with options for the homeowner to purchase the system from the county. County would select local contractor(s) to provide Installation and labor warranty.	Homeowner indicates desire for thermal solar power; a feasibility audit is performed. If qualified, homeowner contracts with county to install a complete operating system consisting of panels, water heater, meter and piping. Customer's utility bill would indicate kilowatt hours off-set with metered use of solar thermal power.	County would assume risk of property damage associated with roof work and plumbing piping. Installation contractor would share risk for labor. County would brand installation contractor(s) with its reputation	<b>County</b> would have full control of program with maximum financial return to provide revenue. Possible leverage to encourage solar panel manufacturer to the area. <b>Homeowner</b> would have solar water heating with no initial outlay. Cost for water heating would be equal to or less than current cost for electric water heating. Cost would be fixed for contract length, avoiding price increases of fossil fuels. The new water heating system warranty would mean no repair or replacement cost for the length of the contract. <b>Environmental</b> impact would be reduction in fossil fuel emissions.

**Scenario #2 Partner with FPL**

<b>Program</b>	<b>Application</b>	<b>Risk/Liabilities</b>	<b>Advantages/Disadvantages</b>
FPL would partner with Sarasota County to offer Solar Thermal to customers. FPL meter reading and billing systems would be utilized. Details of partnership and assignments would be defined in agreement.	Equipment purchase, installation and ownership would be defined in agreement.	Assignment of Risk/Liabilities would be defined in agreement.	Potential customer base would be expanded by partnering with FPL.

### Scenario #3 County Utilizes Third Party

Program	Application	Risk/Liabilities	Advantages/Disadvantages
Sarasota County would contract with a third party which would own, install and operate Solar Thermal systems made available to Sarasota County Utilities customers. County would provide billing services.	Same except homeowner would contract with the third party and Sarasota County. Third party would take advantage of tax credits and utilize banking to finance program.	Third party would assume all risk of property damage associated with roof work and plumbing piping including installation. County would brand third party with its reputation	<b>County</b> would have diminished financial return as risk/liabilities are assumed by third party. A bond could be required of the installer to ensure rapid response and fulfillment of contract. <b>Homeowner</b> and <b>Environmental</b> advantages same.

### Scenario #4 County Promotes Solar Thermal

Program	Application	Risk/Liabilities	Advantages/Disadvantages
Sarasota County would provide solar thermal information to public. Partner with SCOPE to provide brochures indicating the financial and environmental benefits. Provide information on current incentive and tax credits. Facilitate partnerships with financial institutions and existing local installers to develop packages and marketing strategies.	Owner contracts for installation utilizing current incentives and tax credits to reduce cost.	Owner assumes all risk. State rebate fund could be depleted. Program participation minimized with homeowner having to fund.	Low cost initiative promoting renewable energy by utilizing solar thermal to reduce fossil fuel emissions

### **Issues to be Considered:**

**Financing:** How could such a program be financed and what would the county's role be in that financing? What would the revenue opportunities be for the county?

**Benefits and Liabilities:** What benefits and risks would accrue to the homeowner, county, and partner organization under the various scenarios? See Addendum II to SCOPE report for their initial analysis.

### **Rebates/Revenues:**

**Federal Rebates:** The existing federal renewable energy tax credit (30% up to \$2000 for solar thermal) expires at the end of 2008, but was renewed under the \$700 billion Emergency Economic Stabilization Act of 2008 (H.R. 1424) signed into law the first week of October. In that bill, solar energy gained an 8-year extension (through 2016) of the 30% tax credit for residential and commercial solar installations, as well as the elimination of the \$2,000 tax credit cap for residential solar electric installations (Source: USDOE EERE Network News, Oct.8, 2008).

**State Rebates:** Florida's Solar Energy System Incentives Program was established in June 2006 ([SB 888](#)) to provide financial incentives for the purchase and installation of solar energy systems. A total of \$2.5 million was available for the 2006-2007 fiscal year, and \$3.5 million for 2007-2008. The funding appropriated for 2008-2009 was \$5 million, but that funding has already been awarded to those on the waiting list from the previous year.

Solar Hot water incentives are:

- Residential: \$500 per installation
- Commercial, Non-profit, Multi-Family, or Public Facilities: \$15 per 1,000 BTU/day up to \$5,000 (BTUs must be metered)
- Solar Thermal Pool Heaters: \$100 per installation

**Carbon Credits/Renewable Energy Credits:** Depending on voluntary market conditions and future Carbon and Renewable Portfolio Standard regulations, revenue may be available through the sale of emission reduction or renewable production credits. Any agreement with a third party would need to address ownership of these credits.

**Local Contractors/Local jobs:** How might the various scenarios support local businesses? How might such an agreement be structured to ensure local economic benefits?

**Scope of Program:** Would the program be limited to existing homes or include new construction? Would the program include commercial systems as well as residential? Would the program be limited to solar thermal systems or be designed for possible future expansion into solar photovoltaic and even energy efficiency retrofits? Etc...

### **BCC concerns expressed:**

- How the panels would fare in a hurricane? The installations would meet building code for wind requirements. Panels would fare as well as the roof where the panels are mounted.

- What about deed restricted communities? Florida Statutes forbid restrictions on solar energy devices such as the solar hot water panels.

### **Community Partners and Resources**

#### **Partners:**

FPL

Vendors/Industry Installers

Municipalities – Utility Representatives

Florida Solar Energy Center- Robert Reedy

Lakeland Electric- Jeff Curry

SCOPE Committee

#### **Subject Matter Experts:**

Rae Dowling

Robert Reedy

Jeff Curry

Utility Representatives-

Sarasota County- Jody Kirkman

City of Longboat Key- Juan Florenzia

City of Venice- Len Bramble

City of Sarasota- Bill Hallisey

City of North Port- Cindi Mick

Englewood Water District- Rich Rollo

#### **Vendors:**

Florida Solar Energy Industry Association

Local Solar Vendors-

Tom Harriman

Solar Direct

Doug Greenlaw

Dave Schroeders

Builder/Architect/Developers

Affordable Housing/Affordable Living

## Appendix 3 – Rate of Return Spreadsheet

### Electricity Used to Generate Hot Water by Family

Size	Electricity Used
Family Size	Electricity Used
2	1990
3	3075
4	4160

### Minimum\* Electricity Saved by Solar Hot Water by Family Size

Family Size	Electricity Saved
2	1590
3	2460
4	3330

\* It is likely that smaller family sizes will save a greater fraction of their needs

### Minimum\* Rates of Return of Investment in Solar Hot Water

Elec rate incr	Family Size	15 year rates of return			20 year rates of return		
		3%	5%	7%	3%	5%	7%
	2	2.3%	4.0%	5.8%	5.4%	7.3%	9.2%
	3	8.6%	10.5%	12.4%	11.0%	13.0%	14.9%
	4	14.1%	16.0%	18.0%	15.8%	17.9%	19.9%

\* It is likely that smaller family sizes will achieve a greater rate of return; the rates of return do not account for replacement costs of water heater in non-solar systems.

Cost of Solar System (installed)	\$ 4,600	Solar pump \$5,000
Annual electricity savings (minimum)	\$ 273.81	294.43
Annual increase in electricity cost	3%	3%
Federal Tax Credit Rate	30%	30%
Florida Rebate	\$500.00	\$500.00
Family size	3	3
Average temperature rise (degrees F)	55	55
Daily usage (gallons)	60	60
Standby loss in tank Service	12%	12%
Factor	80%	80%
BTU generated per day	24364	24364
KWH equivalent generated per day	7.1	7.1

Net KWH/day with electric use of pump (5 hours/day at 100 watts)	6.6	7.1
Net KWH equivalent generated per month	199.16	214.16
Net KWH equivalent generated per year	2423.09	2605.59
Incremental cost per KWH	\$ 0.11	\$ 0.11
Savings per year	273.81	294.43
Size of Panel (sq. ft.)	40	40
Size of Panel (sq. meter)	3.72	3.72
Average Daily Solar Insolation (kWh/sq. meter/day)	5.00	5.00
Average Daily Solar Insolation per panel (kWh)	18.58	18.58

**Federal rebate in following year**

Year	Cash outlay	Return	
2009	\$ 4,600.00	\$ (273.81)	\$ 4,326.19
2010	\$ (1,380.00)	\$ (282.02)	\$ (1,662.02)
2011	(\$500.00)	\$ (290.48)	\$ (790.48)
2012		\$ (299.20)	\$ (299.20)
2013		\$ (308.17)	\$ (308.17)
2014		\$ (317.42)	\$ (317.42)
2015		\$ (326.94)	\$ (326.94)
2016		\$ (336.75)	\$ (336.75)
2017		\$ (346.85)	\$ (346.85)
2018		\$ (357.26)	\$ (357.26)
2019		\$ (367.98)	\$ (367.98)
2020		\$ (379.02)	\$ (379.02)
2021		\$ (390.39)	\$ (390.39)
2022		\$ (402.10)	\$ (402.10)
2023		\$ (414.16)	\$ (414.16)
2024		\$ (426.59)	\$ (426.59)
2025		\$ (439.38)	\$ (439.38)
2026		\$ (452.56)	\$ (452.56)
2027		\$ (466.14)	\$ (466.14)
2028		\$ (480.13)	\$ (480.13)
	Total savings		\$ (8,963.54)
	15 year rate of return		8.63%
	20 year rate of return		10.99%

**Federal rebate in same year**

Year	Cash outlay	Return	
2009	\$ 3,220.00	\$ (273.81)	\$ 2,946.19
2010		\$ (282.02)	\$ (282.02)
2011	(\$500.00)	\$ (290.48)	\$ (790.48)
2012		\$ (299.20)	\$ (299.20)
2013		\$ (308.17)	\$ (308.17)
2014		\$ (317.42)	\$ (317.42)
2015		\$ (326.94)	\$ (326.94)

2016	\$	(336.75)	\$	(336.75)
2017	\$	(346.85)	\$	(346.85)
2018	\$	(357.26)	\$	(357.26)
2019	\$	(367.98)	\$	(367.98)
2020	\$	(379.02)	\$	(379.02)
2021	\$	(390.39)	\$	(390.39)
2022	\$	(402.10)	\$	(402.10)
2023	\$	(414.16)	\$	(414.16)
2024	\$	(426.59)	\$	(426.59)
2025	\$	(439.38)	\$	(439.38)
2026	\$	(452.56)	\$	(452.56)
2027	\$	(466.14)	\$	(466.14)
2028	\$	(480.13)	\$	(480.13)
Total savings			\$	(7,583.54)
15 year rate of return			9.29%	
20 year rate of return			11.71%	

**Without cost of electricity from pump factored in (\$400 for solar panels).**

Year	Cash outlay	Return	
2009	\$5,000	\$ (294.43)	\$ 4,705.57
2010	\$ (1,500.00)	\$ (303.26)	\$ (1,803.26)
2011	(\$500.00)	\$ (312.36)	\$ (812.36)
2012		\$ (321.73)	\$ (321.73)
2013		\$ (331.39)	\$ (331.39)
2014		\$ (341.33)	\$ (341.33)
2015		\$ (351.57)	\$ (351.57)
2016		\$ (362.11)	\$ (362.11)
2017		\$ (372.98)	\$ (372.98)
2018		\$ (384.17)	\$ (384.17)
2019		\$ (395.69)	\$ (395.69)
2020		\$ (407.56)	\$ (407.56)
2021		\$ (419.79)	\$ (419.79)
2022		\$ (432.38)	\$ (432.38)
2023		\$ (445.35)	\$ (445.35)
2024		\$ (458.71)	\$ (458.71)
2025		\$ (472.48)	\$ (472.48)
2026		\$ (486.65)	\$ (486.65)
2027		\$ (501.25)	\$ (501.25)
2028		\$ (516.29)	\$ (516.29)
Total savings			\$ (9,617.05)
15 year rate of return			8.27%
20 year rate of return			10.68%