

## **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 Regensis Power was researched by the group. A third party (in this case, Regensis) 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%

## **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 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?