SOLAR THERMAL HEAT & HOT WATER PROGRAMS

Program Name:	On-Site Solar Thermal (Hot Water & Space Heat) Market Transformation
Working Group Contacts:	Ron Kamen, John Smigelski, Keith Christensen
Administering Entity:	NYSERDA, Utilities, ESCOs
Targeted Sectors:	Residential, Commercial, Institutional, Governmental, Industrial, Low Income
TRCs:	1.39 to 1.39
Existing Programs:	California, Illinois, other states, Europe, Canada,

Program Background and Description:

Solar Thermal technologies are ready for widespread application, but require additional focus and incentives to achieve their potential.

PLANYC2030 identifies that heat and hot water consumes 51% of the energy in NYC buildings. The percentage is even greater for buildings throughout the rest of the state. Solar Space Heating and Solar Hot Water systems can supply a significant portion of this heat and hot water energy load for 20 plus years– at a cost 80% less than solar electricity (photovoltaics, or PV).

According to NYSERDA, more than 900,000 homes use electricity to heat their hot water, with another 4.2 million burning natural gas and 1.8 million using oil. While similar data is not available for the non-residential sectors, the combined carbon impacts from the burning of fossil fuels to heat hot water can be dramatically offset by the widespread acceptance and adoption of cost-effective, mass-produced solar hot water and solar space heating technologies.

Other states are recognizing solar thermal's potential and are providing significant incentives.

Specifically:

CALIFORNIA. "The California Solar Water Heating and Efficiency Act of 2007 (AB 1470), creates a 10-year program aimed at installing 200,000 solar water heaters in homes and businesses using a $250 million fund. The law authorizes the California Energy Commission to "impose the surcharge at a level that is necessary to meet the goal..." The surcharge will be applied to natural gas consumption on a per Btu basis and is estimated that it will cost the average residential natural gas user an additional 13 cents per month.

The rebates for the systems established by the Commission "shall decline over time" providing early adopoters with larger incentives. Similar to California's incentives for solar electric projects, the declining incentives are structured in an effort to increase demand and drive down the cost of the solar water heating technologies. The payments are paid out as a performance-based incentive basis so that they are earned based on the actual energy savings, or on predicted

energy savings as established by the commission." *http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1451-1500/ab_1470_bill_20070905_amended_sen_v92.html*

ILLINOIS. The State of Illinois recognizes the potential of Solar Thermal systems and provides a grant of 30% of the system costs: "Under the Solar Thermal Grant Program, the Department may provide … a grant award equal to 30% of eligible project costs per project for Solar Thermal Energy Systems, with a maximum grant amount of $400,000." Illinios Dept of Commerce and Economic Opportunity.
http://www.illinoisbiz.biz/dceo/Bureaus/Energy_Recycling/Energy/Clean+Energy/03-Solar_Thermal_Grant_Program.htm

Solar thermal products have wide acceptance in other markets such as Germany - which has an inferior solar resource, but installed 140,000 solar thermal systems in 2006, supporting over 18,000 jobs with more than $1.6 million into local economies and offsetting 4.3 TERAwatt hours of fossil fuel usage.

Over 15% of detached houses in Austria already use solar thermal, providing a clear statistical documentation of solar thermal's capability to help meet NYS's 15 x 15 EPS goal.

According to the European Solar Thermal Industry Federation in their "Solar Thermal Action Plan for Europe" – "*The most successful countries have supported solar thermal over longer periods – thus avoiding a destructive stop-&-go of the market – and have implemented a coherent mix of measures, which address not one but several barriers to growth. Most of these barriers are directly related to the small size of the market.*

As soon as a critical mass is reached, these barriers vanish:

- *People know about solar thermal and find it natural to use it*
- *Standard training of craftsmen includes solar thermal*
- *Architects foresee solar thermal as a standard feature in buildings"*

Some examples of solar thermal impacts from "Best practice regulations for Solar Thermal" by the EUROPEAN SOLAR THERMAL INDUSTRY FEDERATION:

Israel was the first country to make solar thermal obligatory in new residential buildings in the 1980's, with the aim of reducing the country's dependence on imported energy. Today Israel saves circa 8% of its electricity consumption thanks to solar heating systems.

"In less than five years, Barcelona multiplied by twenty times its solar thermal use per capita. After the first Ordinance entered into force, 21.7 MWth (31,050 m2) solar thermal capacity have been added in Barcelona, producing 24,480 MWh of solar energy per year , equivalent to the hot water demand of circa 45.000 inhabitants. The solar thermal systems allow for savings of 4.368 ton CO2."

These impacts were created by codes and regulations that required a percentage of solar thermal in new and remodeled buildings. However, as the Barcelona Energy Agency noted: *"Since its first adoption, we experienced a qualitative conceptual change, as the solar thermal installation is not anymore perceived as an «obligation», but rather as a «guaranteed right»: a norm that guarantees the right to be supplied with solar energy."*

This type of market transformation can also be achieved through non-regulatory mechanisms. Specifically, Germany - as noted by the European Solar Thermal Industry Federation:

"Germany's experience - the solar thermal market in Germany was boosted by other means: strong awareness raising campaigns, R&D funds and above all the Marktanreizprogramm (MAP), a financial incentive scheme that has been running since 1999. For several years, Germany alone has made up half of the solar thermal market in Europe, and benefits from around 40% of the total solar capacity in operation."

Solar Thermal technologies have already had field demonstrations in New York State and are ready for early adoption. Solar Thermal already has a manufacturing base in Canada and Europe that is ready to be utilized for NYS sales and installations. With the right NYS programs, increased sales in NY can result in widespread deployment with mass market acceptance, and create NYS manufacturing to service the entire Northeast U.S. within 3 to 5 years.

The technologies have excellent TRCs (calculated as between 1.39 and 13.65 in EarthKind Energy's *"Comments on the Staff Proposal")* and a lifespan of 20 to 25 years. Paybacks on new construction can be as fast as 0 to 3 years, while retrofit application gain payback in 5 to 10 years at current energy prices.

With NYSERDA documented average annual increases from 1971 to 2000 of over 7% per year for oil, natural gas, and propane users – with 5% annual increases for electricity in that same period – solar thermal's 25 year lifetime measures can provide dramatic energy savings and carbon reductions, as well as consumer and low income cost benefits (especially since fossil fuels prices have increased at a 10% annual rate from 2000 – 2005, with another 30+% increase in oil prices this year alone).

Relationship to Staff's Fast Track? Proposal

Solar hot water is specifically mentioned in five parts of the Staff's Proposal:

1. Residential New Construction - Single and Multi-family Housing (electric and gas)
...Incentives for incorporation of proven, cost-effective renewable technologies such as geothermal applications and solar hot water systems (pg. 37, attachment 1 pg 2)
...Doing more to promote efficient appliances, lighting, and advanced energy systems (such as solar and geothermal heat pumps) as a means to increase energy savings and customer value (pg 38, attachment 1 pg 3)

3. Residential ENERGY STAR HVAC, Including Efficient Gas Equipment (mostly gas, some electric)
...Description of Fast Track Program: This program will promote efficient furnaces, boilers, water heaters, central air conditioners, clothes washers (most of their energy use is for hot water), solar hot water technology... (pg 41, attachment 1 pg 6)
...Offer incentives for the purchase of high-efficiency furnaces, boilers, furnace fans, central air conditioners, and advanced water heaters (instantaneous, condensing, and solar). (pg 42, attachment 1 pg 7)

6. Multifamily Building Home Performance with an Emphasis on New York City (electric and gas)
...Customized incentive for the installation of a combined heat and power unit, where a minimum of 60% of the waste heat can be utilized, on average, or for solar installations (pg 48, attachment 1 pg 11)

The staff Fast Track proposal did not address the ability of Commercial Solar Hot Water systems to be deployed in the market, or the suitability of either Residential or Commercial Solar Space Heat technologies (which have some of the highest TRCs, are also widely used throughout the world, but currently have only a minimal adoption in NYS and the US). These technologies have reached a level of maturity that matches that of residential solar hot water systems and should be included in programs

Barriers, challenges, gaps, and recommendations:

We have identified the barriers/hurdles that are preventing these products from reaching widespread market acceptance in New York State and provide recommendations.

HURDLE 1. There is a lack of public awareness of Solar Thermal products.

RECOMMENDATION 1. NYS should create a statewide marketing campaign similar to Germany's "Solar Na Klar" ("Solar Is the Clear Choice") - that created a self-sustaining solar thermal market over a 7 year period. A NYS campaign would raise public awareness of the technologies and their impacts. This could be done through NYSERDA PONs which could pay for performance (sales and/or kwh/therm savings) for both residential and commercial applications.

RECOMMENDATION 1a. NYS should create deep enough rebates (initially 25% to 50%, up to $4,000 per residential system, scaling down over 7 years) that would incentivize solar thermal results by offsetting enough costs to overcome the initial marketing expenses. As a standard 2 panel solar hot water system creates 4,000 Kwhs per year of solar thermal output for about an $8,000 installed cost, a 50% level of support is only ¼ the amount currently provided by the state for PV systems (i.e. – a 4 KW PV system generates about 4,000 kwh per year – and gains a $16,000 NYSERDA PV incentive).

RECOMMENDATION 1b. NY State should initiate solar thermal projects (where ever feasible) on NYS buildings, with 20 year contracts to showcase the technologies as case studies on the state website. Twenty year pay-for-performance State contracts would demonstrate the technology, contribute to the 15x15 goals, create long term stability for manufacturers and installers, and would reduce energy costs for NYS taxpayers.

HURDLE 2. Home builders, Architects, Engineers, and BPI Contractors are not aware of Solar Thermal products.

RECOMMENDATION 2. Builders should be given higher incentives (up to 50% of the installed cost) to include Solar Thermal as part of their construction. This would give builders a

clear incentive to provide a southern orientation for their buildings, consider solar thermal for every new building, and create customer awareness as customers or potential customers begin to see many new homes and commercial buildings being built with solar thermal as the new standard.

RECOMMENDATION 2a. NYS could create a focused educational effort would reach out to Builders, Architects, Engineers and Contractors. This could be included as part of either Recommendation 1 or 1a's efforts, but should recognize the fact that this impact will not be realized for at least a year after the effort is initiated.

RECOMMENDATION 2b. NYS codes and local permits should specify that every new construction project should have to include solar thermal as a percentage of their new construction.

RECOMMENDATION 2c. Energy Star criteria currently do not recognize buildings that go beyond the base requirements and achieve superior performance. NYSERDA should create Energy Star Silver, Gold and Platinum categories for buildings and recognize builders/owners who build beyond Energy Star minimum criteria.

HURDLE 3. Initial cash outlay is too high, customer are unlikely to make outlay.

RECOMMENDATION 3. Provide long term, low interest financing so customer's monthly payment is the same as or less than what it would be if they didn't make the change.

HURDLE 4. Paybacks are not fast enough for customers who are not yet familiar enough with the advantages of the product.

RECOMMENDATION 4. Follow Recommendation 1a.

RECOMMENDATION 4a. Provide statewide underwriting that would create 20 year financing for solar thermal projects. This would create a positive savings from day one for all potential customers.

HURDLE 5. Plumbing and HVAC Contractors who install hot water heaters have not embraced efficiency technologies.

RECOMMENDATION 5. Create a Statewide Training Program where manufacturer's representatives, the plumbing & HVAC trades, and the Workforce Development Institute create installation certification programs.

HURDLE 6. Customers are misinformed. They think they need to replace their current hot water system and depend totally on the sun. When people think solar, they think PV.

RECOMMENDATION 6. This could be included as part of Recommendation 1 and 1a, If the state pays 25% – 50% per system, customers would have a financial interest to listen to a message.

HURDLE 7. When people think solar, they think PV.

RECOMMENDATION 7. Include this educational effort as part of Recommendation 1 and 1a.

RECOMMENDATION 7a. Same as Recommendation 4: Create a Statewide Training Program where manufacturer's representatives, the plumbing & HVAC trades, and the Workforce Development Institute create installation certification programs.

HURDLE 8. Non-profits do not get tax incentives.

RECOMMENDATION 8. Provide additional funding for non-profits so they have an incentive to move forward. Provide incentives within EO 111.

HURDLE 9. 900,000 residential homes still heat their hot water with electricity, which is both costly and increase KW peak demand loads.

RECOMMENDATION 9. Enable residential customers that install solar thermal units to participate in peak loak reduction programs. Peak solar hot water production is coincident with summer peak generation.