New Policy

Developing a Mature Market for Solar Thermal Water and Space Heating

Policy summary: A policy framework will be established to achieve a mature and self-sustaining market for solar thermal water and space heating in both residential and commercial buildings. This support for the nascent solar thermal market is part of a broader goal of developing renewable heating technologies (such as clean biomass heating and efficient heat pumps), to facilitate a market transition to renewable fuels as the dominant fuels for heating purposes by 2050. The policy will also establish robust job and business growth in the renewable thermal sector in the Commonwealth.

Economy-wide GHG emissions reduced in 2020	0.1 million metric tons; 0.1%

Clean energy economy impacts: Large reductions in fuel costs in exchange for investments in solar thermal heating equipment will reduce the cost of living for residents and the cost of business for commercial customers. New installations will result in the growth of the solar thermal industry in Massachusetts, and to a lesser extent, local maintenance work. Directly offsetting spending on imported fuel will keep more money in the region and thereby create additional jobs in the broader state economy.

Rationale: Hot water and space heating are large energy users that do not require very high-grade fuels (unlike motor vehicles for example). This makes them excellent candidates for active solar heating, which has no fuel expense and can provide significant heating from a small roof, wall or ground-mounted system. Unlike in the 1970's, the technology for active solar thermal heating is now mature and comes with decade-long warrantees to protect the up-front investment in a solar thermal system. However, the market for solar thermal in New England is currently very small, and needs "infant industry" support to accelerate its growth to the scale needed to maintain continued growth and provide a realistic option to interested customers.

Design issues: Similar to the Solar PV industry in MA prior to its recent exponential growth in the last four years, the small size of the solar thermal market burdens it with high levels of "soft" costs in sales and marketing (finding customers and designing and installing well-sized systems). This forms a barrier to consumer awareness and competitive pricing in comparison to the dominant market share of fossil fuel-based heating systems. The "hard" costs of quality equipment are being driven down by global market growth, and so once Massachusetts can develop a significant demand entrepreneurial companies will likely be able to bring turn-key pricing down considerably. Solar thermal systems require a back-up system in the event of a cold and cloudy week in winter, so most customers will retain their pre-existing fossil fuel heating system and new construction will likely move to on-demand electric or much smaller backup fossil fueled boilers .

GHG impact: For purposes of this Plan, a modest 0.1 million ton reduction in emissions due to solar thermal is forecast. However, larger reductions could be attained through a broader program applying to all renewable thermal technologies, including heat-pumps, biomass/biofuels, and solar thermal. If the displacement of 20 percent of the fuel oil used for thermal energy and 50 percent of propane heating and electric water heating could be attained, this would reduce GHG emissions in Massachusetts by approximately 2 million tons, or slightly more than 2 percent

of total 1990 emissions. This 2020 goal would be for all renewable thermal technologies, including heat-pumps, biomass/biofuels, and solar thermal applications. GHG emissions from biomass and biofuels used for thermal energy are important to consider, but Massachusetts policies will limit the eligibility of feedstocks (advanced biofuels and residue woody biomass) to those which demonstrate real and rapid GHG benefits, such as advanced biofuels and residue woody biomass

Other benefits: Expanding solar thermal energy will create and expand businesses in Massachusetts in a manner similar to our early stimulation of the solar PV market. For solar PV, the Commonwealth has added 1,800 new jobs since 2008 when the solar PV programs were launched. PV installations grew from 3 MW to 35 MW between 2007 and 2010, with another 35 MW in the development pipeline. Jobs will include system marketing, design, finance, installation and maintenance, along with manufacturing and fabrication of solar thermal panels and system components. In addition a mature solar thermal market complements the utility energy efficiency and advanced building energy codes policies. For existing homes in particular, there is a large stock of buildings that are heated with hot water, and where solar exposure is available these distribution systems can be easily retrofitted to provide space heating from renewable solar heated water with the fossil fuel systems retained as back-up systems.

Costs: In order to accelerate the market for solar thermal systems a highly publicized state rebate program analogous to the successful Commonwealth Solar program for PV is recommended. Due to the lower per system costs of solar thermal the MassCEC has proposed launching a pilot program to explore the most effective way to implement such a program. Any state rebate would leverage existing incentives primarily from Federal tax credits and the utility managed zero-interest HEAT loan program.

Equity issues: As with any upfront capital intensive investment, the early adopters of solar thermal systems are often relatively affluent homeowners, large well capitalized businesses, and the public sector, that have the resources to take advantage of the long term benefits of renewable heating both for their bottom-line and co-benefits. However, these early actors catalyze the market, provide useful exposure and marketing, and bring down costs, all of which makes these technologies increasingly accessible and desirable to the broader market. Among the early adopters of solar PV in Massachusetts was the public housing and affordable housing sector, with a notable role played by Boston Community Capital.

Experience in other states: Solar thermal subsidies to support the industry are relatively widespread and have grown in use in U.S. states including: New Hampshire, California, Delaware, Wisconsin, New Jersey, and Arizona. Total state incentives typically account for 25 percent to 50 percent of the system installed cost, but are expected to fall substantially over time. In particular, Arizona, Nevada, North Carolina and Washington D.C. have added solar thermal to the "solar carve-out" of their Renewable Portfolio Standard (RPS) programs, which are primarily designed to support electric renewable energy sources. Massachusetts would also have this option once a pilot rebate period runs its course.

Legal authority: In order to add an incentive for solar thermal to the Massachusetts RPS regulations, new legislation would be required. In the absence of this, the Clean Energy Center is able to provide rebate funding and other incentives to thermal renewables as part of their enabling mandate in the Green Communities Act of 2008.

Implementation issues: The perceived barriers to solar thermal adoption can be summarized in the following four areas:

1. Upfront cost of system
2. Lack of consumer education and confidence
3. Shortage of experienced solar hot water designers
4. Permitting costs and inspections

All of these can be addressed in a well designed pilot, followed by a broader program.

Uncertainty: Projections of the rate of adoption of solar thermal systems in response to a well designed solar thermal incentive program are highly uncertain. The precise rate at which rebates or other incentives would be taken up by the private market is also unknown. However, the lessons of the Commonwealth Solar Rebate program for PV and the experiences of other states are instructive. As with any alternative to fossil fuels, the volatility in the price of oil and to a lesser extent the price of natural gas over the coming decade is a critical uncertainty.