



## Commonwealth Solar Hot Water Performance Monitoring System Requirements For Installers

MassCEC is interested in collecting and analyzing information about the performance of solar hot water systems in Massachusetts.

**For the Commonwealth Solar Hot Water Commercial Program**, MassCEC requires all systems that receive a rebate install performance metering equipment on their system. The cost of the monitoring equipment may be included in the total project costs listed on the application.

Systems that receive a rebate through the **Commonwealth Solar Hot Water Residential Program** may install metering equipment and participate in the monitoring program, however MassCEC no longer offers funding to cover the costs of the residential monitoring system.

MassCEC will provide technical assistance to facilitate design, sourcing, and trouble-shooting of commercial monitoring systems. MassCEC intends to collect the performance data for a period of at least 12 months. The data will be used to demonstrate and communicate the effectiveness of solar hot water systems, and to further assist installers in building the solar thermal market.

### **System Requirements:**

- Indoor mounting location with accessible power outlet.
- “Always On” Internet connection such as cable modem.
- CAT5E cable that reaches from the performance monitoring unit to its internet hook-up destination, be it a router, modem, or PLC connection. Note: CAT5E cables run up to 300’.
- Sensors and measurement devices that reach the desired monitoring points.  
Note: Temperature cables typically reach 3-6 ft. Flow sensors are integrated with the performance monitoring device using an adapter cable that is often included with the system.

### Acceptable Data Point Configurations:

In order to calculate actual thermal energy production, acceptable configurations of monitored data points are listed below. Please note that the system must measure actual flow, and not use estimated levels or input a static flow rate; continuous monitoring of actual flow rate is typically accomplished using a vortex flow sensor (VFS) or similar equipment.

#### *Option 1: Primary Loop BTU Calculation (Solar Fluid)*

- T 1 – Temperature sensor on hot side of glycol / water mix from solar panels.



- T 2 – Temperature sensor on cold side of glycol / water mix to solar panels.
- Flow Rate 1 – Flow meter to measure actual water / glycol mix flow rate in the solar fluid loop.

#### *Option 2: Secondary Loop BTU Calculation (Potable DHW)*

- T 1 – Temperature sensor on DHW temperature out of solar hot water storage tank.
- T 2 – Temperature sensor on cold makeup water from utility into solar hot water storage tank.
- Flow Rate 1 – Flow meter to measure actual amount of cold makeup water feeding the existing domestic hot water (DHW) system. Be sure to only measure cold water being fed to the DHW tanks and not the total cold water flow to the home, which will result in an inaccurate BTU calculation.

All systems must record monitoring data at 5 minute intervals and store this data for at least 12 months. The features described above are standard in readily available performance monitoring equipment models.

#### **Remote Accessibility:**

Current performance monitoring systems are designed to take advantage of internet technologies for ease of integration and data access. The performance monitoring system should seamlessly connect to the internet and the customer should be able to immediately see his or her solar thermal energy production. Additionally, installers can create their own web-based “Installer Portal” where they’ll be able to see instantaneous and historical production from all of their installed systems.

Finally, there may be the option to automatically export performance data to social networking sites. This acts as a helpful marketing tool and an effective way to spread word-of-mouth understanding of solar hot water technologies and their benefits.

#### **Who Makes Performance Monitoring Systems?**

Please refer to the Commonwealth Solar Hot Water Awarded Projects Database (at [www.masscec.com/solarhotwater](http://www.masscec.com/solarhotwater)) for a list of monitoring equipment manufacturers and models that have been successfully used in the MassCEC performance monitoring program to date.

*For additional questions, sourcing support, or to participate in the MassCEC performance monitoring program, please contact [SolarHotWater@MassCEC.com](mailto:SolarHotWater@MassCEC.com).*