Town of Cumberland

Town Hall Solar Hot Water Project

The Town of Cumberland was recently awarded an EECDBG Grant of roughly $75,000 to replace portions of the Town Hall HVAC system with a more efficient version, and to install solar hot water tanks in the Town Hall and each of the Fire stations. The first of these projects is the tank for the town hall. Its construction is shown below in this document.

The collector panels are installed along the middle of the southern roof of the Town Hall. This gives the best sun exposure, and also happens to be right above the hot water tanks. In this photo, the installers are just beginning to set up the trusses for the collector array.

Once the trusses are up, the main channel for the heating fluid is added at the top. The collector does not actually pass hot water through the tubes on the roof. Instead, it circulates an anti-freeze mixture through these tubes, much like in a typical home heating system. This heated fluid is then circulated to coils in the tank below, which are used to heat the water.

In this photo, you can more clearly the input and output tubes on either side of the framework. Cold fluid goes up, hot fluid heads back down!

Next up is adding the actual heating tubes. Each one of these directs the heat from the sun right onto the liquid running through them, and produces a remarkable amount of heat very quickly.

Partial installation of the tubes.

The finished product! This installation took two partial days, probably slowed down somewhat by weather and the very long trips up and down the ladder.

And on an actual sunny day.

Of course, the real action occurs down below. This is the actual hot water tank. It looks a lot like any other tank, but there are some major differences. First off is that antifreeze line to the right. That is the line that goes to and from the roof, and runs through the tank itself in the form of heating coils.

The next big difference is the controller. This display shows the temperature of the fluid as it passes through the tubes on the roof. Any time the temperature up top is greater than the tank below, the pump will circulate, and the collectors will heat up the water in the tank itself. This is shortly after the sun came out on a March afternoon.

This display shows the water temperature in the tank itself. At this point, the water in the tank is hot enough that the main hot water tank needs no additional fuel at all to get up to temperature, and the town is running entirely on solar power. This is that same March afternoon.

At other times, the collectors may only be able to get the temperature partway to full temperature. This will still help immensely, as it will be this water that enters the main tank instead of cold tap water, and the system still won't have to work as hard. Even at night, the residual warmth from the tank will provide some boost to the system.

At all times, water will run first through the solar tank, and then into the "main" hot water tank. Depending on the amount of heat being generated by the solar array, the traditional hot water tank will have to generate heat normally, using less fuel than usual, or often not at all.

Next up will be solar tanks for the Fire Stations! We'll provide pictures and details of them as they go in as well.