

PRESERVATION OF AFFORDABLE HOUSING



Converting Sunshine into Money by Toby Ast, Manager of Energy Initiatives

At POAH our primary focus is on energy efficiency but we also try to take advantage of opportunities to install renewable energy systems whenever possible. To date we have installed several systems that use solar energy, both for electric generation and domestic hot water heating. We are about to install, through the help of a generous grant from the [TD Charitable Foundation](#), our first solar hot air project. That system will use the sun's energy to heat the makeup air that is introduced into the building during winter months, reducing the consumption of natural gas we currently use for that purpose.

Before I get into more detail, allow me a quick word about the economics of these technologies. I've heard it said that without the various grants, rebates, and credits available for renewable energy these projects would be impossible to justify from a financial perspective. This position contains an element of truth but ignores the reality that current energy prices, the critical component of any renewable ROI calculation, understate the social and environmental costs of traditional, fossil-fuel based energy. If you'd like renewable technologies to look better on paper, require traditional energy producers to account for these negative externalities in the price of energy. Since there seems to be little appetite for that, let's be thankful for the incentives that make renewables possible. (Dismounting soapbox).

Back to business. Our renewable energy projects have helped to inform our approach to using solar energy at portfolio properties specifically:

Photovoltaic Systems

Photovoltaics (PV) convert the sun's radiation into electrical current. These systems consist, primarily, of three main components: solar panels for capturing the sun's energy, inverters that convert the direct current (DC) generated by the panels into alternating current (AC), and racking/mounting equipment for holding the panels in place. PV system capacity is measured in terms of kilowatts (kW). A typical installation at a single family home would most likely be less than 10 kW. A kilowatt is equal to 1000 watts and current prices for PV are \$5-\$7 per watt, but prices can vary substantially depending on the complexity of the installation. POAH has installed two photovoltaic systems, a 43 kilowatt roof mounted system and a 27 kilowatt ground mounted system.

POAH's solar panels produce about 85,000 kWh of electricity a year. Unfortunately, there isn't a straight line between the capacity of the system and the amount of electricity it will generate. Solar panels vary in the efficiency with which they convert sunlight to electricity and, obviously, the amount of sun at your location impacts electric production. There is a [good online calculator](http://www.wunderground.com/calculators/solar.html) which estimates solar electricity production potential at <http://www.wunderground.com/calculators/solar.html>. PV systems don't have any moving parts making them essentially maintenance free (you may want to knock the snow off of them in colder climates). However, they do, require an area for installation that is in complete sun free of any shade. This area is often on roofs but we found that a ground mounted system worked at one of our sites where the roof was already cluttered with equipment.

Ground mounted systems are more vulnerable to vandalism, so security measures should be a considered both in designing the system and the budget.

We received funding for our PV systems through a grant program that, unfortunately, no longer exists. There are, however, quite a few mechanisms for funding PV. PV systems are eligible for the 30% renewable energy federal tax credit. If the panels are being installed as part of a LIHTC transaction they can be counted as part of eligible basis, essentially allowing you to capture both low income tax credits and renewable energy credits (it's a little complicated, so talk to your tax advisor, but it's been done). Many states also offer solar renewable energy credits (SREC)—for every 1000 kWh that your system generates you get a SREC which can be sold. In Massachusetts these can fetch up to \$600 each. This [website](http://www.dsireusa.org/solar/index.cfm?ee=1&RE=1&spf=1&st=1) provides info on solar incentive programs throughout the US: <http://www.dsireusa.org/solar/index.cfm?ee=1&RE=1&spf=1&st=1>

Solar Hot Water

The domestic hot water system can consume up to 25% of the energy used at a multifamily building, making it a good target for both efficiency and renewable energy measures. In the simplest terms a solar hot water system uses sunlight to preheat the water that flows into a building's hot water system. The warmer that water is when it goes in, the less fossil fuel or electric energy the system needs to use to bring it up to a temperature appropriate for showers, washing dishes, etc.

Solar hot water systems are made up of solar collectors, a storage tank, a pump to circulate the solar fluid, and piping. Systems are typically sized to provide about 100% of the hot water demand of the building during the summer months. This means that during the winter you'll use more fuel to heat your water but if you make the system any bigger you run into the challenge of producing (and having to dump) excess heat. POAH has installed four solar hot water systems and they supply about 45-50% of each building's annual domestic hot water demand.

The best candidates are buildings with central domestic hot water systems. If each apartment has its own hot water tank, solar hot water probably won't make sense. As with PV, you'll need a shade free area for your solar hot water panels. In addition, space for a large storage tank is necessary. In one instance we couldn't fit the tank in our mechanical room but were able to place it in a storage room across the hall. The system is low maintenance but the solar fluid and pump should be monitored. The installers we worked with offered annual maintenance for a couple of hundred dollars.

Like PV, solar hot water is eligible for the 30% renewable energy federal tax credit and counts toward basis. There isn't a SREC equivalent for solar hot water but several other grant programs are available (refer to the earlier link for solar incentives in your area). After rebates and incentives our solar hot water systems have approximately a ten year payback at current energy prices. We expect the systems to last at least twenty years, and we expect energy prices to go up, which will enhance the value of these investments.