

Solar array going up

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When we started planning the rebuild of our house and the rest of the farm in West Dummerston, my wife and I knew that we wanted to produce all of our energy on-site. That meant a solar-electric or photovoltaic (PV) system that would generate as much electricity as the house and barn are consuming -- net-zero energy.

We also wanted to protect as much of the 10 acres of agricultural land as possible. That meant we wanted to avoid a ground-mounted PV system. Wherever land can be used for farming -- now or in the future -- I prefer to install PV arrays on buildings, keeping the land open for agricultural uses.

Fortunately, the 1812 barn has a long roof facing almost due south. That would be the perfect location for the solar array. Our builder, Eli Gould, spent several months restoring the barn, which involved replacing damaged posts, adding sturdy granite supports under those posts, rebuilding several dry-stone walls, lowering and leveling the floor, replacing some timber framing elements (including about a dozen joists that we cut on the land), and reinforcing the roof to hold the solar modules.

To maximize durability, we wanted the roof to be sturdy and not flex with wind or snow loads, so after stripping the layers of metal and asphalt roofing, we added a layer of 2-by-6 and 2-by-4 framing to the roof structure, flattening the roof plane at the same time. Zip sheathing went on over that, and then the roofing.

Standing-seam metal roofing

One of our goals for the whole project has been to maximize durability, so we spent quite a while debating different roofing materials. We wanted the solar panels to be able to attach to the roof without any penetrations, so that meant standing-seam roofing. Brackets for the solar array tracks clamp on to the raised seams of the roofing with absolutely no penetrations of the roof. If panels have to be removed down-the-road for some reason, that's relatively easy to do.

For the roofing itself, we chose a 24-gauge Englert galvalume 1301 roofing product with the company's low-gloss Ultra Cool coating. According to James Hazen of the company, Englert's paint line is one of the cleanest operations of its kind in the world, with 100 percent of solvent fumes from painting, drying and curing operations captured. The

captured paint fumes are burned with all the recovered heat used in manufacturing. The company expects a 150-year life for the roofing. Roofing contractor Travis Slade, of River Valley Roofing, has done an incredible job installing the standing seam roofing.

Group net-metered system

We have a great location that can hold 18 kilowatts of PV modules, but we don't need a system that large. So last fall we began investigating community solar options, and we found a neighbor who wanted to buy 6 kW out of the 18 kW system. In other words, this neighbor will actually own a third of the PV system that's on our barn roof.

This option for someone else to own part of a PV system in a different place is referred to as "group net metering," and Vermont is one of the few places where this can be done. Green Mountain Power bends over backwards to facilitate such systems, which is wonderful. Through this option, someone without a south-facing roof where PV modules can be installed can look elsewhere for a good south exposure. (Such a system has just broken ground in Putney, though that one will have many owners.)

Because the 12 kW system that we will own is still larger than we will need for our house and barn (at least until farm needs expand), we will plan to sell our excess capacity to another Green Mountain Power customer.

Selection of the PV modules

At the recommendation of our solar installer, Integrated Solar Applications, in Brattleboro, we are installing top-rated REC modules. The modules are rated at 250 watts, and they come with a 25-year warranty. REC is a Norwegian company with the silicon raw materials produced in the U.S. and silicon wafer, PV cell, and PV module manufacturing being done in Singapore.

Poor reliability and early failure of PV modules has been in the news lately, so I'm relieved that ours aren't simply commodity Chinese-made modules (though some Chinese products are no-doubt fine).

In future columns I will address other features of our PV system, including "islanding" capability that will provide us with some electricity even when the electric grid is down.

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