Upon retirement, Carol and Perry Hodgdon sold their 116-acre Randolph cow dairy farm to Evergreen Conservation Partners—a partnership of the Castanea Foundation, High Meadows Fund, and the John Merck Fund. Evergreen Conservation Partners then leased the land to Vermont Creamery, Vermont’s largest goat cheese producer. The vision of Vermont Creamery co-founders, Bob Reese and Allison Hooper, is for the new Ayers Brook Goat Dairy to serve as a catalyst for growing Vermont’s goat dairy industry. Ayers Brook milks about 230 goats in season—and has a goal of milking 500 goats—to supply the Vermont Creamery facility in Websterville with a steady supply of local goat milk. The number of farms raising goats and selling goat products in Vermont has increased 106% over the past 15 years, from 221 in 1997 to 457 in 2012. The vision for Ayers Brook also included permanently protecting the land with a conservation easement with the Vermont Land Trust, providing a national venue for teaching and training, and offering high-quality replacement stock to the region’s goat farms.

Large solar photovoltaic arrays on barns are unusual in Vermont because there is typically room on the ground that can be re-purposed for solar panels. Large ground-mounted solar PV systems (e.g., fixed rack systems like McKnight Farm has, or trackers) are increasingly common on land owned by Vermont farmers. For some projects, this means that the land is taken out of agricultural uses for the lifetime of the project. For others, the ground-mounted solar PV arrays are developed in a way that allows livestock to graze under and around the installation (e.g., sheep graze around the Ferrisburgh Solar Farm).

At Ayers Brook, the quality of the bottomland, the conservation easement, and the new 14,000 square-foot, south-facing barn roof all pointed to a roof-mounted solar array. With the federal tax credit—equal to 30% of expenditures—set to expire in 2016, Bob and Allison decided to move forward with the project and hired Aegis Renewable Energy (Waitsfield). However, the barn roof structure was designed to minimize roosting places for birds, and consists mostly of widely spaced rafters rather than trusses and purlins. Aegis worked with structural engineers to analyze the roof structure and develop a simple modification to the trusses to bring the roof into code compliance for the added load of the array. To mount the solar panels, Aegis designed a roof-mounted metal frame to span the 12-foot distance between each rafter. To account for the additional roof load of five pounds per square foot, the barn designer (Lester Buildings), with the builder (BCI Construction, Inc. of Orwell, Vermont) reinforced a small section of truss near the peak of the roof. The Ayers Brook 150-kilowatt array, installed in July 2014, is the largest barn-mounted solar project in Vermont.
Siting Considerations
When considering a new barn project, or even a significant expansion, you can work with structural specialists and the solar installer to find out what it would cost to make the roof’s supporting structure “solar ready.” Sometimes all it takes is putting the relevant people in touch early enough in the project. In general, if you are building a new barn you should try to have a clean, unpenetrated roof surface with good southern exposure and orientation.

For large projects over 100 kW you should consider bringing three-phase power to the site since it can maximize the investment in the solar array and will benefit the farm with all other electrical needs such as vacuum pumps and manure pumps.

In this case, payments on the loan are more than paid for by the savings. Some of the power is net metered to the adjoining farmhouse meter, and the rest goes to the Vermont Creamery facility in Websterville. The total cost of the project was $525,000, and that was reduced by 30% using the federal investment tax credit and by 7.2% by the Vermont business investment tax credit. Payback period is about 11 years.

Solar Energy and Energy-Efficiency — a Happy Marriage
Ayers Brook scoped out options for efficient lights and ventilation. With technical assistance and financial incentives from Efficiency Vermont, they installed LED (light-emitting diode) fixtures in the freestall and elsewhere, and incorporated as much natural light as possible. Over half of the estimated electricity savings will come from the lighting design. The other big savers are automated, insulated side curtains, along with “chimneys” that are weather-controlled and exhaust air out of the building. Altogether, compared to a typical barn scenario, this energy-efficient equipment and design is estimated to save Ayers Brook over $10,000 per year.

As with anything the Ayers Brook does, the point is to make the goats comfortable, with as much natural light as possible, and optimal temperatures, year-round. Ayers Brook found a way to marry this goal to state-of-the-art energy systems.

Solar Resources
► Background Information for Net Metered Projects:
  http://psb.vermont.gov/utilityindustries/electric/backgroundinfo/netmetering

► Find a Solar Installer in Your Area Through Renewable Energy Vermont:
  www.revermont.org/main/?s=Solar

► The Database of State Incentives for Renewables & Efficiency (DSIRE) is the best source of information on financing:
  www.dsireusa.org/incentives/index.cfm?re=Q&ee=Q&spv=Q&st=Q&srm=1&state=VT

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