

# Solar Case Study

## Tri-County Electric Cooperative



## 1. Company Profile

Tri-County Electric Cooperative (Tri-County) serves approximately 13,000 meters in the southeastern corner of Minnesota. Tri-County is an all-requirements member of Dairyland Power Cooperative, its power supplier. Dairyland's policy allows an exception to its All Power Requirements Contract that affords its member cooperatives the opportunity to own or contract for a set capacity of utility-scale distributed generation. Tri-County's service territory has a challenging topography and is heavily wooded. The member composition is mainly residential and farmland, averaging about four members per mile of line, and agriculture is the primary economic driver in the area. About 20 percent of Tri-County's load is for resale to municipal utilities under contract.

## 2. Renewable Profile

The cooperative has constructed a community solar array of 73.8 kw. Tri-County selected tenKsolar's RAIS XT-28 photovoltaic system ([www.tenKsolar.com](http://www.tenKsolar.com)), an integrated system whose components are designed to work together. The reputation and Minnesota roots of tenKsolar played a large role in its selection.

This array consists of 180 modules of 410 watts each, and 10 6 kw RAIS inverter buses. They were ground mounted using Hubbell Helical Coil foundations on a tenKsolar-rail mount-system. The system is projected to produce 107,651 kwh annually. The footprint of the array is about 107 feet by 78 feet. The co-op had been considering a solar project for three years prior to the project's commissioning on July 22, 2014, and it took approximately one year from Board approval to final construction of the project.

## 3. Financing and Rate Design

Local control and ownership was a primary goal of the co-op. Tri-County considered various financing and ownership models before deciding on the tax equity flip model, facilitated by the National Renewables Cooperative Organization (NRCO). Federated Rural Insurance Exchange served as the tax equity investor.

Under the tax equity flip model, the cooperative forms a taxable subsidiary, and this subsidiary and the tax equity investor form a special purpose entity (SPE). The SPE constructs, owns and operates the array, and has a purchase power agreement with the cooperative for the output. In the first stage of five or more years, all distributions and tax benefits (investment tax credits, accelerated depreciation, etc.) from the SPE are distributed to the owners in a 99 to 1 split: 99 percent to the tax equity investor and 1 percent to the cooperative subsidiary. After the initial term, the split ratio "flips": 95 percent to the cooperative subsidiary and 5 percent to the tax equity investor. At that point, the cooperative subsidiary can buy out the tax equity investor at fair market value. For more detail on this model, please see the NRECA SUNDA Business and Financing Field Manual.

Tri-County, through the SPE, owns, maintains, operates and insures the array. Units are sold to members for \$1,400 each. Members do not own a specific module of 410 watts, but rather a 180th interest in the output of the total array. Members who purchase a unit receive a 1-to-1 kwh credit for their share of kwhs produced by the array against those kwhs consumed by the member. This credit will be applied monthly to the members' electric bill over the next 20 years. This is accomplished through software provided by the National Information Solutions Cooperative (NISC), which also provides the billing software to Tri-County. The member does not receive rebates or tax benefits for participating. Any Renewable Energy Credits stay with the cooperative to offset future costs associated with the array.

## 4. Project Development

Site visibility was of primary importance. The co-op's headquarters campus was a suitable location for the array. Winona Renewable Energy, LLC, a local PV contractor with experience in this type of project, performed a yield projection of the site. Star Energy Services, which is owned by a consortium of cooperatives, performed the engineering review.

Permitting and licensing required coordination with the local city regarding ordinances (zoning), as well as some discussion with the local electrical inspector about the need for running low-voltage cable through a conduit and for fencing the array. A compromise was reached to avoid fencing by relocating the low-voltage cables away from areas where someone could reach them. The array is a single-phase interconnection, which was interconnected directly to Tri-County's three-phase distribution feeder at a primary voltage of 12.47 kV and not net-metered to the adjacent headquarters building. The PV contractor was responsible for conducting acceptance testing and commissioning.

## 5. Operations and Maintenance

Operations and maintenance procedures and schedules are still under development. Warranties on the components of the array are 12 years on the panels, 25 years on the inverter bus and 25 years on the panels for kwh production degradation below 92.5 percent. The only unscheduled maintenance issue was from a rock thrown by a lawnmower, which broke the glass on one module, which was replaced by the contractor. Given the loading of the feeder that the array was connected to, initial calculations showed that no operational issues would be anticipated, and none have been observed. No changes to the electric distribution system, mitigation techniques, or technologies were required.

## 6. Telemetry

The cooperative does not utilize SCADA technology, and none was required for this array. Output of the array is monitored and posted in real time on the co-op's website through the use of a third-party vendor, Solar Edge, using its eGauge system. Tri-County does have an advanced metering infrastructure system, but it is not currently being used to actively manage DG on its system.

## 7. Administrative Impacts

No additional personnel were required; however, the marketing and member services departments were overwhelmed at first by questions from members. That has since scaled back to a manageable level. Accounting personnel worked with their software provider, NISC, to accommodate changes needed in order to bill purchasers of units in the array; the changes related to being able to apply the kwh credit for production from the array. Some additional work on the cooperative's website was required to accommodate the program. Tri-County communicated this project through newsletters, press releases, social media, its website, and other normal communications channels.

## 8. Renewable Policy Development

Tri-County has had DG policies in place for some time. Minnesota has a mandated 25 percent renewable energy generation requirement by the year 2025. In addition, a state-mandated DG renewable connection policy was developed in conjunction with cooperatives in Minnesota. Cooperatives are required to net meter accounts up to 40 kw.

## 9. Member Interest in Solar

Over the years, the cooperative has used surveys to ask members about their interest in renewables. Recent surveys showed a 10 percent to 20 percent interest in solar. Small-scale solar is becoming more affordable with more installers to choose from and, as a result, member interest is increasing. The Board decided to move forward as a result of a strategic planning initiative. The board wanted member support and involvement, so the cooperative utilized its standing Member Advisory Committee as a sounding board for this project. The Advisory Committee endorsed it enthusiastically.

The initial plan was to develop a 40-kw array, but because of member interest, it was soon expanded to a 73.8-kw array prior to construction. So far, 88 percent of this new total array has been sold. Members pay \$1,400 per unit of interest in this array, which amounts to 180th interest in the output (kwh) of the total array on a pro-rata basis. The share is then credited against the consumption on their electric bill on a one-to-one basis. The cooperative currently has approximately 100 participating members, with several purchasing more than one unit, further indicating member interest in renewable energy. An expanded special section on Tri-County's website is devoted to the "Renewable Rays" program. The section includes background on the project, answers to a number of frequently asked questions and photos of the array both while under construction and upon completion.

As a point of reference, about 50 members (approximately 1 percent) of Tri-County have on-site DG systems.

## 10. Business Options

Tri-County decided to utilize a community solar concept to maximize visibility and to give members the opportunity to have solar without investing a lot of money or locating a panel at the members' location. Some members do not have the appropriate topography (too hilly or too many trees) or the right building type to accommodate a solar panel on site, yet they still want to participate in solar. The cooperative also determined early on that it would be beneficial to control the project and not utilize a third party to own or market the array. The final installed cost of the array was about \$2.76 per watt.

## 11. Lessons Learned

Co-ops do not need to start from scratch. There are many co-op-based models to choose from that can fit your needs, so find one that you are comfortable with.

Based on the installed cost, especially the soft costs associated with the contracts and agreements required, Tri-County would have opted for a larger array to leverage economies of scale. It is about the same amount of work to develop a 100-kw array as a 10-kw array.

The board kept it in perspective that a 74-kw array was going to be less than the cost of a new large bucket truck, and would provide value to the members over the 20-plus-year life of the project.

Location, location, location: The location of the cooperative's campus was also a big plus that solidified the tie between the co-op and the solar array, and it is suitable for another array expansion in the future.

In the end, Tri-County affirms that the array was a good decision, and that it has been a success for the cooperative and its members on many levels.

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