Introductory disclosure to members considering the installation of a net metering solar facility.

Carroll Electric exists to serve the Cooperative's members with safe, reliable, and affordable electricity. The following information is intended to take a brief look at how solar power fits into this mission.

Safe?

Safety is purposely mentioned first in the Cooperative's mission statement because it deserves top priority. One can reasonably assume a solar array will be installed safely, if a qualified installer does the work. Choosing a trustworthy installer is, of course, very important.

Additionally, members should remain aware of how their solar system is performing once their system is interconnected to the electric grid. Solar system malfunctions such as inverter failures *can* and *have* occurred. These malfunctions hold the potential for harm beyond a member's own property by energizing anything which might be in contact with an otherwise deenergized power line. Because of a paramount concern for safety, the Cooperative presently performs routine inspections at no cost to members who are interconnected to the grid. Even though these inspections are routinely performed, the Cooperative does not assume any liability should any of these systems malfunction.

Liability insurance should be given strong consideration by members who interconnect their systems to the grid.

Reliable?

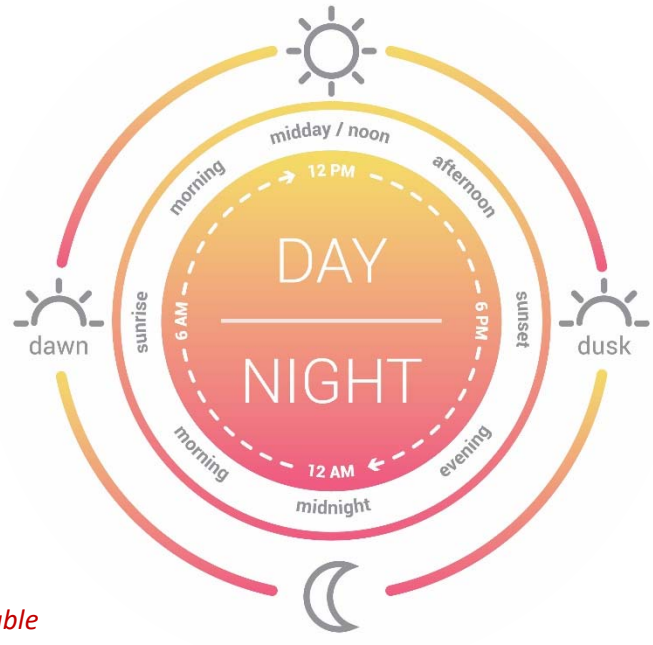
Is solar reliable? The short answer is, ***"It depends."*** Dividing this answer over various **time periods** offers a better understanding of what to expect.

1st Time Period: 24 Hours

It is well understood that a solar array's production will generally have maximum production[1] in the middle of the day and no production at night.

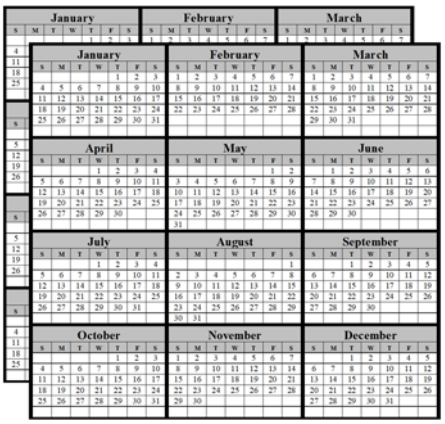
By contrast, the maximum demand experienced by the Cooperative occurs early in the morning (during the winter) and late afternoon (during the summer). For 2018, the maximum peak demand at the Cooperative occurred on Jan. 17 at 8:00 a.m. when the Cooperative's solar lab was producing 0.03% of its rated capacity.

Until large scale battery storage is advanced, existing power plants, transmission lines, and distribution lines are essential to providing reliable electricity 24 hours a day.



[1] Production of a solar array will vary subject to clouds, snow/ice accumulation, shade, dirt, and equipment performance.

2nd Time Period: 24 Months



The Cooperative's *Solar Demonstration Lab* experienced **six performance problems** (some of which might have gone undetected without close monitoring) in the first 24 months of its existence. Each issue took *weeks*, and for some, *months* to resolve. All the while, solar production was being lost. These types of problems and follow up repairs continue to occur and are not limited to the first 24 months. It appears monitoring and repairing the system will be an ongoing endeavor.

All innovation must have a starting point. Believe it or not, there was a time, early in the Cooperative's existence (1940s) when members would actually report outages on postcards delivered to the Cooperative by the U.S. Postal Service.

*Today, most of the Cooperative's outages are restored in **56 minutes** or less. During the entire year of 2018, each member (on average) was without power for 2¼ hours…or said another way…had reliable power 99.97% of the time. The Cooperative continues to improve reliability. Perhaps solar will also improve over time.*

3rd Time Period: 25 Years

Two points deserve attention here:

1) Availability of a solar array's warranty, as evidenced by the *Solar Demonstration Lab*, is very important. Many solar arrays have a 25-year warranty, at least on the panels.

   Sadly, two of the five solar panel brands represented in the *Solar Demonstration Lab*, **vacated their warranty in the first two years**. One company, Suniva, filed bankruptcy. Another, tenKsolar, ceased operations altogether. A third company, SolarWorld, filed for insolvency and was bought out by SunPower Corporation. Luckily, SunPower decided to honor existing SolarWorld warranties.

2) Solar array production is expected to drop over time. Many solar array warranties allow 3% panel degradation in the first year with an additional 0.7% per year (approximately 20% over 25 years). The *Solar Demonstration Lab* also supports this expectation, but actually indicates higher degradation rates than the manufacturers' ratings[2].

The Cooperative's reliability of service is subject to regulatory oversight from a number of institutions including the Arkansas Public Service Commission and USDA's Rural Utilities Service.

The reliability of solar arrays has no regulatory oversight. ***Members are encouraged to do their own research on the expected lifetime production, warranty terms, and the financial solvency***

[2] Over the last two years, the *Solar Demonstration Lab* has seen a 2% - 4% drop in production which does not appear to be explained by weather conditions or down time from performance problems.

of the companies offering the warranties. *Searching the internet for "solar bankruptcies" and the brand of the solar array(s) you are considering would be a simple place to start.*

Affordable?

Like conventional power plants, solar arrays are not cheap on the front end. Whether borrowing the money or investing your savings, making reasonable future assumptions can help determine when or if you will get your money back. **This type of approach is one of the reasons the Cooperative's residential rates are 25% below the national average**.

Assumptions which can easily be overlooked or projected inaccurately are:

- ☐ Interest charges, liens, or other long-term obligations.
- ☐ Liability insurance to protect members in the event of a harmful malfunction of equipment.
- ☐ Property insurance to protect a member's investment in their solar array from the same risks a homeowner's policy would cover.
- ☐ Any warranty which does not include the future labor for repairs.
- ☐ Product warranties which do not survive corporate bankruptcy or dissolution are impossible to predict or quantify…but should not be overlooked.
- ☐ The expected decline in kWh production as described above or in the warranty.
- ☐ Future legal/regulatory changes in how net metering customers/members are compensated seem to be inevitable. See Arkansas Public Service Commission Docket 16-027-R.
- ☐ **However, be especially watchful for the assumed value of savings per kWh**.
    - **!** The Cooperative has seen proposals to our members which do not use the correct amount of savings for each kWh. In 2017, the savings per kWh was 8.81 cents for residential members. The savings per residential kWh dropped to 8.70 cents[3] in 2018.
    - **!** The Cooperative has also seen proposals to its members that not only distort the initial savings, but then inflate the distortion by as much as 8%-10% per year. **Simply stated, this type of trend is historically inaccurate**.
    - **!** When members start with the correct amount of savings, 8.70 cents for 2018, applicable taxes should be added to this figure[4] along with a realistic increase for inflation. Based on the Cooperative's actual electric rate data since the 1990s, the historically accurate inflation rate is 1% per year.

[3] Commercial and industrial members interested in net metering should contact the Cooperative to determine expected savings based on their specific load characteristics.

[4] While this figure includes all charges per kWh, members should be aware that law and regulation governing the savings for net metering is still evolving. Specific tax rates will vary based on location and possible exemptions should be reviewed by members to ensure accuracy.

Recommended?

As of the end of 2018, only 0.33% of Carroll Electric members have invested in solar generation. Of that small percentage, some have been satisfied. Others have voiced their displeasure.

Given our experiences with the *Solar Demonstration Lab* and testimonies from dissatisfied members, we are hard pressed to present solar power as a reliable and affordable investment. As the technology improves and the industry stabilizes, our stance may change. However, for now, we advise you to proceed cautiously. The *Solar Demonstration Lab* has provided great data for potential solar users to review.

As explained in the beginning of this document, Carroll's first allegiance is to the Cooperative's members. It is our duty to share the facts of what we have learned about solar power. If you would like to discuss this further, you are welcome to contact Joey Magnini at 800-432-9720, ext. 1306.