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# MANAGER'S *Report*

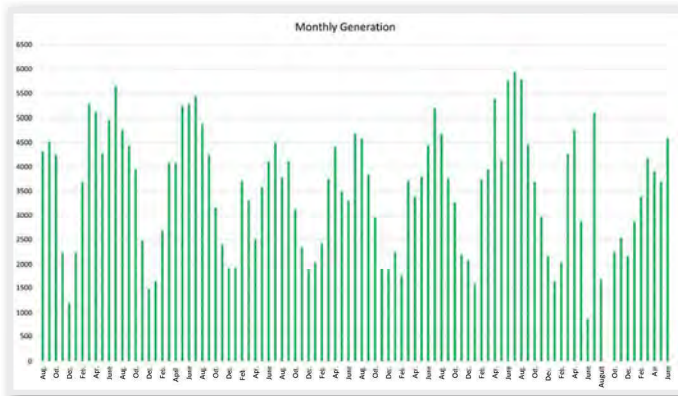
## Solar Demonstration Project Reaches 8 year Anniversary

It's hard to believe, but July was the eight year anniversary month of when we installed our solar demonstration project at our Orange City office location. This solar array is a 34 kW AC system. The solar array is interconnected to our headquarters electric service and provides a portion of its electric supply.

As we stated at the outset, our purpose for doing this demonstration project was to learn more about how solar generation performs in our area, how the solar generation peak times compare to the peak usage times of our members, what types of maintenance issues there are, etc. We have learned a lot over the last eight years and we thought it would be timely to provide our members with an update.

### How has the solar array performed?

We have learned that one of the most noticeable and predictable things about solar generation is that it changes significantly on a daily and seasonal basis. The best months for solar generation are clearly April, May, June, July, August and September, as you can see from the graph below. For example, typically the solar generation output in July is more than double the generation output in the month of December.



One of the other important things about solar generation is that there is no generation output during the nighttime hours and it drops significantly when

it is cloudy. The graph below shows how the solar generation increases throughout a clear morning and then when the clouds start rolling in during the afternoon, generation output drops off and then increases again when it's sunny. This demonstrates the intermittency of solar.



### Does the solar generation match up with our peak times?

We are a winter peaking system, which means that our highest peak demand periods occur during the winter months. This is largely due to the amount of electric heat load that our residential and commercial and industrial customers have. As I mentioned in the previous section, the solar generation output is lowest during the winter months, so this is not ideal. The other important fact is that our typical peak times during the winter months are between 7:00 a.m. and 8:00 a.m. Since it is dark at that time, there is no generation output during our peak times during the winter months.

We do not have batteries installed with our solar system as that would have added significant costs. If we had the ability to store the generation in the afternoon when we see higher generation levels, and be able to discharge this stored energy during the morning peak times, it would have much more value to us and work much better. As battery technology improves and the costs of batteries declines over time, this may become a much better option in the future.

### How efficient is solar generation?

When we look at the efficiency of a certain type of generation, we look at the “capacity factor” of the generation. This calculation basically measures how often the generator is running at maximum capacity. If our 34 kW solar array generated at that level 24 hours per day, 365 days per year, it would generate 297,840 kWh’s per year. What we are actually seeing on an average annual basis the last eight years is 45,500 kWh’s. This results in a capacity factor of 15.3%. Again, there is zero generation during the nighttime hours and it drops significantly during cloudy conditions.

To compare this to other types of electric generation sources, wind averages between 40% and 50% capacity factor. Coal, natural gas, hydro and nuclear are all well above 50% and that is why they are considered “baseload” generation, because they are not intermittent like wind and solar.

### What about maintenance issues?

As with any kind of new technology, we have found that the solar arrays are not maintenance free. Our employees periodically check the inverters and panels to make sure they are performing as they should, and we have had to replace a number of inverters in recent years to get the output back up to where it should be. Unfortunately the company that we purchased the solar system from has gone bankrupt so it has been a challenge to get replacement parts.



### Is there a place for solar?

Yes. We believe in an “all of the above” strategy relating to electric generation resources. It is very important that we continue to have good baseload resources that are available to meet our electric needs during our highest “peak demand” periods such as hot summer days or cold winter days/nights. Intermittent renewable resources such as solar and wind are a piece of the generation resource puzzle, but it’s important that we don’t rely too much on these



types of generation sources or we will be faced with “rolling blackout” scenarios like some areas of the country have already been concerned about.

### Please contact us if you have questions about solar.

We know that many of our members have been contacted by solar vendors and have thought about possibly installing solar. We would encourage any member who is thinking about solar to contact us and we would be willing to answer your questions and share information about our solar demonstration project.

We also encourage you to ask good questions when you are contacted by solar vendors such as “What are the vendors including in the payback analysis for future rate increases?”. We have heard in some cases they factor in 5% or higher annual rate increases and it’s important to note that we haven’t had a rate increase in over 7 years. Obviously the projection for future electric rate increases would have a big impact on the payback analysis.

It’s important that we stress again that we are not “anti-renewable”. However, we believe it is important that we share the facts with our members about the limitations of this type of generation.

We are more than willing to work with any member who decides to install solar in terms of interconnecting to our system. We just don’t want you to have any surprises.