@lta energy

Case Study: System Performance Review
How Is Solar PV Impacted by a Heavy Snow Year?

"Even with heavy snowfall during the 2013/2014 winter, the system has offset over 41% of the energy demand at the site and has saved over $11,700 based on current electricity prices."

Aetna Building Maintenance
646 Parsons Avenue, Columbus, OH

September, 2014

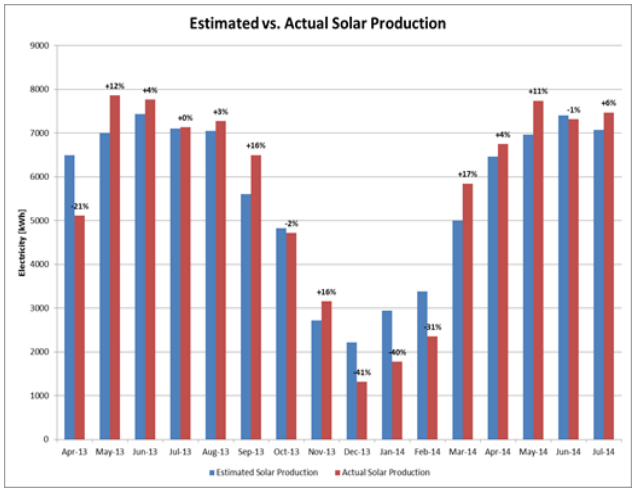
For investors and owners of PV systems, one of the main benefits is the predictable nature of energy production over a 20-25 year period. Predicted production is calculated using historical weather data, but actual performance is heavily dependent on weather events. Differences in actual vs. predicted production can affect realized return on investment for PV systems. For example, the winter of 2013-2014 produced a significant amount of snow across the U.S. Midwest. How this storm affected expected system performance is of keen interest to PV system owners. The following case study examines the performance of a PV system installed April 2013 in Columbus, OH. Although the performance data only spans a short period, given the harsh winter during that time period, the analysis yields some interesting results.

System Performance

As noted, the PV system has been in service since April 2013. The system performed better than expected in both years – 2013 and 2014 – beating the predicted generation by 0.7% and 0.1% in each year, respectively. On a monthly basis, results have been mixed. Late in 2013 and early in 2014, the system went through a three-month stretch where production was underperforming by between 31% and 41%. This is most likely due to the extreme snow Ohio received. However, strong performance in the spring and summer months was enough to ensure that the system overproduced on an annual basis.

	2013 [Apr-Dec]	2014 [Jan-Jul]	Total To Date
Expected Production [kWh]	50,470	39,225	89,694
Actual Production [kWh]	50,846	39,249	90,095
Guaranteed Production [kWh]	45,423	35,302	80,725
Actual vs. Expected	+0.7%	+0.1%	+0.4%

The system's production guarantee only comes into effect if the annual performance is 10% worse the expected. [Please note that if the annual system production were calculated from April 2013 (install date) through March 2014, a period of 12 months, the actual production would have been 98.4% of expected.] The measured production has been well within the bounds of the production guarantee.



@lta energy

Case Study: System Performance Review

How Is Solar PV Impacted by a Heavy Snow Year?

System Details:

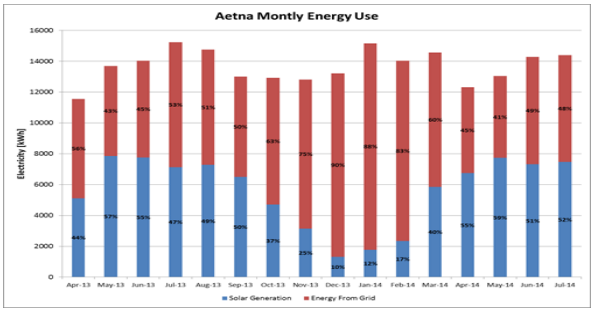
- **Installer: Dovetail Solar and Wind**
- **System Size: 54.145 kW-DC**
- **Panel Type: SolarWorld 245W Poly (No: 221)**
- **Inverter Type: Fronius CL 55.5 Delta, 55.5 kW, 230-500 kVA (No: 1)**
- **Layout: 17 Strings of 13 Panels**
- **Install Date: April 2013**
- **First Year Estimated Production: 61,796 kWh**
- **First Year Guaranteed Production: 55,616 kWh (90% of Estimated Production)**
- **Annual Production Drop: -0.5% (based on panel degradation)**

Energy Use and PV Generation Offset

Monthly on-site energy use being offset by the solar system has varied between 10-57% since the system was installed in April 2013. Solar production dipped to 1,400 kWh in the month of December, and peaked in May of 2013 with nearly 7,900 kWh. Since being installed, the solar system has offset over 41% of the energy demand at the site and has saved over $11,700 based on current energy costs.

(Note * Energy Savings Calculated using an avoided energy cost of $0.13/kWh)

	2013 [Apr-Dec]	2014 [Jan-Jul]	Total To Date
Solar Generation [kWh]	50,846	39,249	90,095
Energy From Grid [kWh]	70,383	58,563	128,946
Total Energy [kWh]	121,229	97,812	219,041
Energy Offset	42%	40%	41%
Energy Savings*	$6,610	$5,102	$11,712



Conclusion

In spite of abnormally heavy snowfall in the winter months, the system essentially performed as predicted, and even slightly exceeded expectations. This performance reinforces the fact that predicted generation is based on long-term system behavior. Over the system's lifetime, there will be weather events that deviate from the norm – in this case, an abnormally snowy winter – but the weather data used to create the production model account for these events. Over time, the system performance should "revert to the mean" and track the predictions – exactly what we see in the data.

About Alta Energy

Alta Energy is a solar analytics and procurement company that enables commercial property owners to identify and complete cost-effective solar projects with confidence. As an objective third party, Alta Energy helps owners of retail, industrial and office buildings evaluate the business case for solar using a consistent, comprehensive model, and then monitors market and policy conditions for the best solar deployment opportunities. Alta Energy's multiple bid process ensures that property owners select the right solar vendors and the best terms for each project. Alta Energy's proprietary solar analysis tools and auction-based procurement process are vendor- technology-, and financing-neutral. As a result, property owners get an unbiased view of their solar options across all properties and all markets, and can choose the most cost-effective, timely installation for every property in their portfolio.

Learn more at www.altaenergyinc.com or call 650-345-2582 (ALTA)