

## Comparing Solar Output !!!Caution!!!

On this site, we publish a list of "Accepted Projects," which indicates the capacity of each project. Additionally, we publish monthly the "SPEED Production," which shows the monthly output from each Standard Offer Project that is currently on-line. Using this information, it is possible to compare the operation of one solar site against the operation of another solar site. **A simplistic comparison based on this information is most likely incorrect.**

The capacity listed on our website is the nominal capacity based on the Standard Offer Contracts originally issued. In trying to analyze the operations of a solar facility more specific information must be known:

- a. The total capacity of the panels actually installed in watts DC.
- b. The total capacity of the inverters actually installed in watts AC.
- c. For fixed arrays, the angle of the panels. (It can be assumed in the case of the Standard Offer Projects that the orientation is generally due south.)
- d. It also must be known whether or not "trackers" are used. Currently in the SPEED Standard Program only the South Burlington Solar Farm employs "Trackers."
- e. Lastly, the amount of available sun energy varies from location to location within the state.

The relationship of the capacity of the panels vs. the capacity of the inverters vs. the nominal capacity of the project is the most interesting variable. Initially in the Standard Offer Program, the actual capacity of the project had to be within 5% of the nameplate rating of the total number of panels in DC watts. As the Standard Offer Program matured the capacity requirement changed to become  $\pm 5\%$  of

the inverter nameplate in AC watts. As a result, most Standard Offer Projects are now being designed with significantly more DC wattage (panels) than AC wattage capacity of the inverter. This configuration allows for more "shoulder period" generation during the day, but "cuts off" peak output at the capacity specified in the Project's Standard Offer Contract.

Most solar projects in the Standard Offer Program are fixed arrays with an angle of 30 degrees. The 30 degree angle is somewhat of a compromise between the optimum angle for maximizing yearly output and a steep enough angle to allow the snow to shed in the winter. At least one of the Standard Offer Projects has a fixed rack angle in the low 20 degree range. Rooftop projects typically have an angle of 15 degrees or less. This low angle reduces wind-loading and ballasting on the roof, but also results in less output from the panels as they spend significant time in the winter covered in snow.

One of the Standard Offer Projects, the South Burlington Solar Farm, consists of 382 mast mounted panels with each mast having a dual axis tracker manufactured by AllEarth Renewables. The dual axis trackers maximize generation by continuously moving the panels at the optimum angle relative to the sun. This project was one of the first large scale solar projects in the Standard Offer Program and as such, was not able to "overbuild" the DC wattage of the panels as many of the later Standard Offer Projects have done.

Geographically there are significant differences in the amount of sun energy available for solar sites in Vermont. Some areas, particularly in the mountains of Vermont get more cloudy weather. The Connecticut River valley is often foggy in the mornings, particularly in the fall. The "banana belt" of Vermont, the Route 7 valley, gets less snow than other areas of Vermont. Projects in the Route 7 valley may have better wintertime output than other areas of Vermont.

All of the above factors make simplistic comparisons of project output inaccurate. Below, for those interested in project specifics, is a list showing the installed DC

wattage of the panels and the AC wattage of the inverters for all the Standard Offer Solar Projects.

<http://vermontspeed.squarespace.com/storage/SOLAR%20AC-DC%20ON%20LINE%20PROJECTS%20v2.pdf>

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