

Comparison of Tracked vs. Fixed Mounts

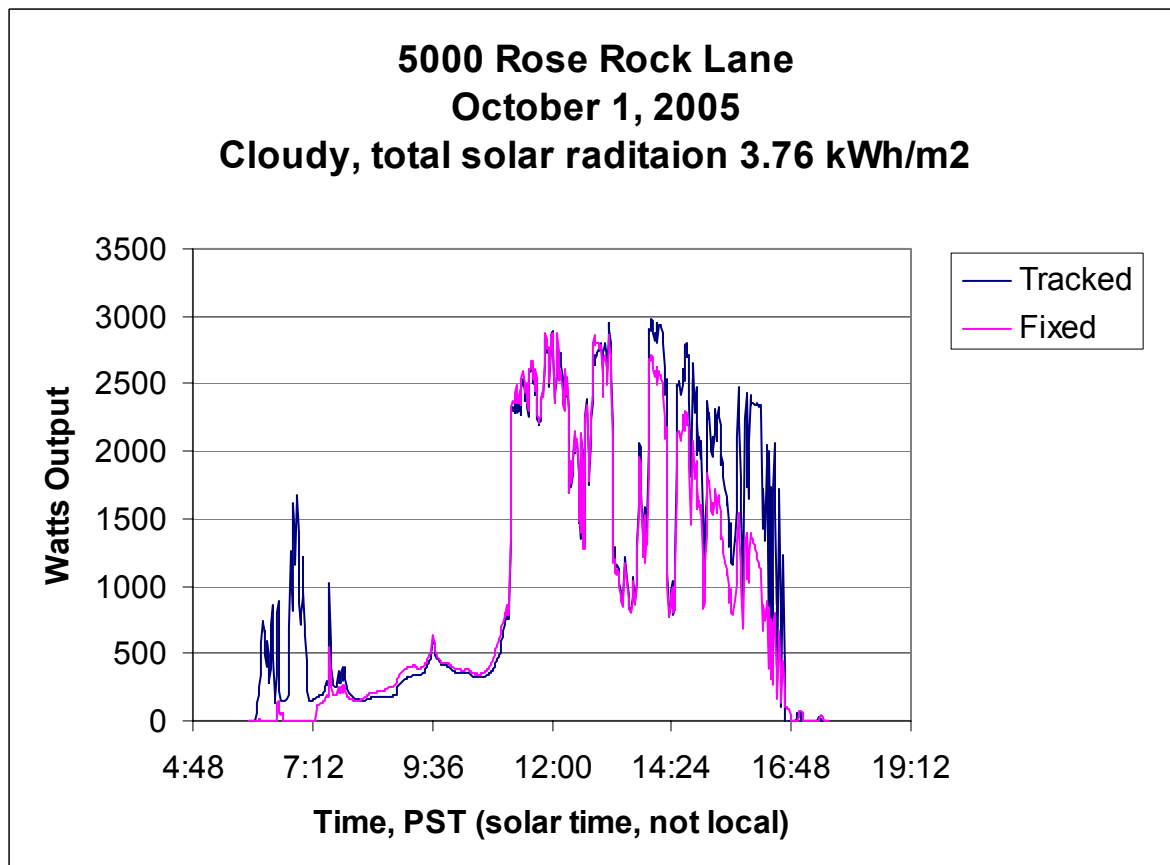
John C. Sagebiel, 5000 Rose Rock Lane, Reno, NV 89511

This comparison is based on my system which consists of two identical arrays each with 18 KC-120 panels tied in series and a PV Powered 2800-XV inverters. The inverters each are separately datalogged and thus the power outputs can be compared.

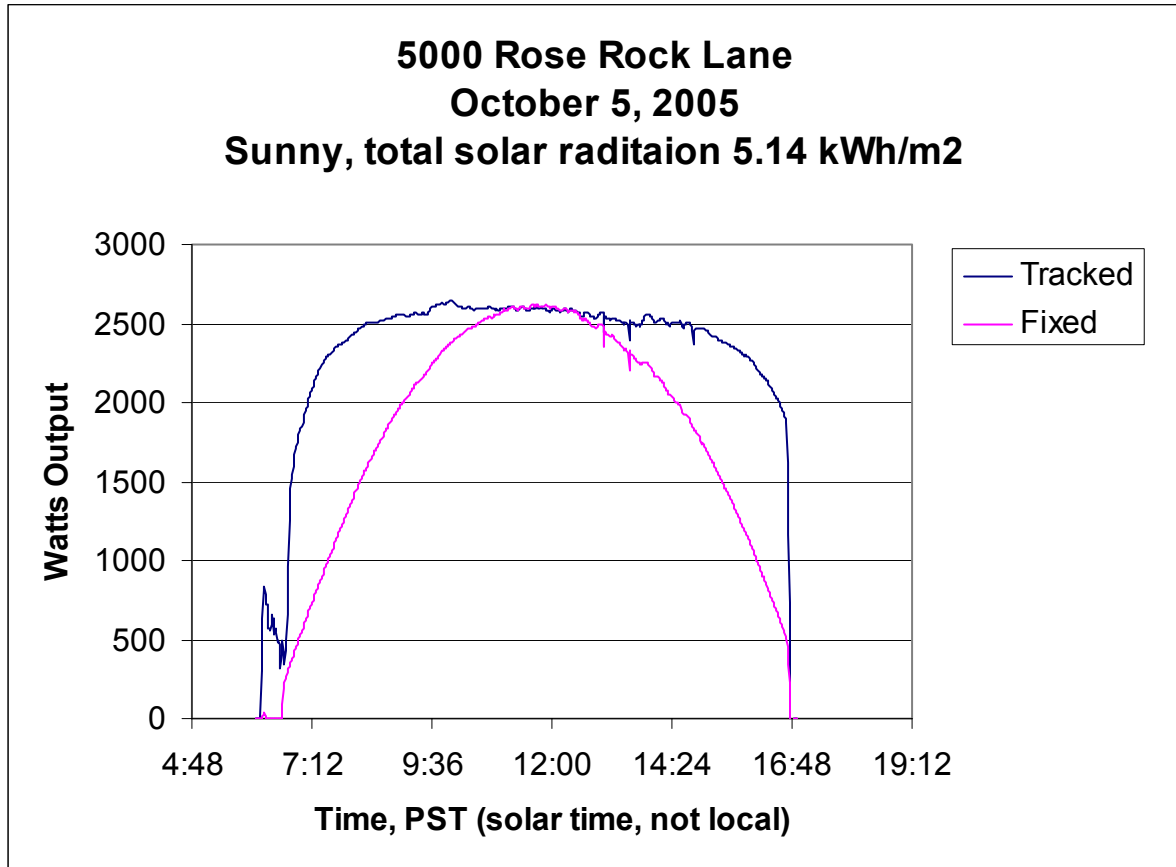
This comparison was run for one week, starting the morning of October 1, 2005 and ending October 8, 2005. This week offered some interesting weather with several bright sunny days and several with significant cloud cover.

In addition to the total power output for the week, details of two very different days will be presented. These days are October 1 and 5, 2005. On October 1 there was significant cloud cover and the total solar radiation totaled 3.76 kWh/m². In contrast, October 5 was sunny with 5.14 kWh/m² solar radiation.

On October 1, the tracked array produced 9.7 kWh vs. 8.3 kWh for the fixed array. This means that the “benefit” of tracking about 18%. That is calculated as the difference divided by the value of the fixed array. This is presented graphically in the following figure which graphs the output over time.



October 5th showed a very different pattern. The output of the tracked array was 19 kWh while the fixed array was 14 kWh. This represents a benefit from tracking of over 30%. This is presented graphically in the following figure. The two figures present two very different days. On Oct 1, most of the time the power output almost exactly matches between the two arrays. This makes sense since on cloudy days the light is very diffuse and the tracker probably cannot find a single strongest point in the sky since almost isn't one. In contrast, the October 5th graph shows a very clear advantage to the tracker. The fixed array shows a nearly bell shaped distribution of output over the day while the tracking array reached a nearly constant output earlier and holds it later.



Summary

Over the entire week the benefit from tracking was 27%. Several things affected this. This week had several very cloudy days which the above analysis shows decreases the advantage of tracking over fixed arrays. Secondly, this comparison was carried out near the equinox, which means the fixed array at latitude is at its most efficient during this time of year.

Comparing this to NREL's *PVWATTS* model provides some insight. If we look at the modeled output for the month of October, the model shows a benefit of 30% from tracking over fixed mount for the same array. This is very close to the actual value for the week of 27%. If we can trust the model, then on an annual basis, this system should

produce 42% more power than an identically sized fixed array. More importantly, the tracking array makes more use of the inverters. The fixed array only uses the full output of the inverter for a few hours per day while the tracking array uses the inverters at near peak use for a much larger part of the day.