Rooftop Solar Versus Centralized Utility Operated Solar

In the previous report I had estimated that each home would need 10 kW of solar panels at an installed price of $7/watt and an annual capacity factor of 15%. The rooftop solar panels cost $70,000 per house and produces (10 kW)(.77 DC-AC converter eff)(.15 annual capacity factor)(8760 hours/yr) = about 10,000 kWh annually.

If we wanted to invest in utility owned centralized solar and obtain the same amount of energy as our rooftop solar, how much would we need to spend?

The centralized solar cost is estimated to be $5/watt and have a 25% annual capacity factor. If 10 kW produces (10 kW)(.95 eff)(.25 annual CF)(8760 hr/yr) = 20000 kWh annually, we see that the centralized system produces twice as much energy as the roof top system. Therefore let us require only half the capacity or 5 kW per household to get 10,000 kWh annually for that home.

The cost per household is now (5000 watts)($5/watt) = $25000 versus $70000, which is a $45,000 savings per household. So why are we so interested in rooftop solar?

A recent announcement by DOW may change the rooftop economics. Refer to this link:
http://news.dow.com/dow_news/corporate/2009/20091005b.htm
The goal is to reduce the cost of the solar panels to $1/watt. Possibly the DOW shingles will achieve that goal. The second part of the cost is everything else other than the solar panels. This cost is currently $4/watt in the $7/watt estimates I have been stating in this and other papers in this series. I have been using the latest roof top solar estimate that has $3/watt for the solar cells and then $4/watt for the installation and the DC to AC converter box. We would like for the DOW shingles to cost $2/watt installed. However the DC to AC box is likely to cost $1/watt which would make up the entire $2/watt cost. This leaves no money for the installer. However DOW is planning to make up for this deficiency by the following statement they make in their advertisement. "The innovative product design reduces installation costs because the conventional roofing shingles and solar generating shingles are installed simultaneously by roofing contractors. DSS expects an enthusiastic response from roofing contractors since no specialized skills or knowledge of solar array installations are required." The key statement is the no skills or knowledge is needed. I.e. DOW plans to cut out the solar installers altogether to make their product the lowest cost solar in the industry.

So how does dropping the cost from $7/watt to $2/watt affect the economics? In the first scenario with wind and solar, and in the last scenario with solar and nuclear, the 10 kW rooftop solar drops from $70,000 to $20,000 installed cost, a $50,000 savings! As you can see, sales of this product are likely to go through the roof (pun) if the installed price can be made to be as low as $2/watt. Financing the panel with a 25 year loan at 6% interest is an annual cost of (20000)(.06)(1.06^25)/(1.06^25-1) = $1565 and the annual energy is (10 kW)(.15)(8760 hours) = 13140 kWh. The energy cost = 11.9 cents per kWh, which is very competitive. Let's hope DOW succeeds. Of course if DOW does this, the utilities can still create centralized solar using the same technology, however the difference in cost between rooftop solar and centralized solar may not be enough to justify the additional transmission line costs needed from the centralized solar. This is the vision of making solar rooftop a major energy source. However the specialized installers and labor unions will be left out of this lowest cost rooftop solar. Also, nuclear power will still be required in this system design to provide a source of reliable base load power.