Solar Roadmap Market Potential Methodology & Assumptions

As part of the Southwest Solar Transformation Initiative (SSTI) project, local solar market potential is being assessed for each participating jurisdiction. These statistics highlight the benefits and opportunities available to be captured via the solar market development and are customized for each municipality. Specific methods and assumptions that were used to calculate these numbers are shown below:

Population

Population was determined using the 2010 Census Demographic profile: http://www.census.gov/popfinder/

Land Area

Land area was determined using Census' State and County QuickFacts:
http://quickfacts.census.gov/qfd/index.html

Solar Energy Yield

Solar Energy production data was generated using the latest version of the National Renewable Energy Laboratory's System Advisor Model (SAM), which uses system design, technology, geographic location, DC to AC derate factor, performance ratios and over 30 years of weather data to predict solar energy production for a specific location. The system design included 180° azimuth and 15° system tilt using the agency zip code.

Total Market Size

In assessing the potential for solar PV, the SSTI team started by using Energy Information Administration (EIA) data to determine the total electric usage within each utility territory and jurisdiction from the latest dataset in 2011. This data can be found at http://www.eia.gov/.

Once the total electric demand was gathered, statewide renewable energy goals (RPS) were considered and the team developed a local deployment target that could be pursued. For SSTI states, the RPS goals are 33% for California, 30% for Colorado, 25% for Nevada, and 20% for Utah. The market sizing scenario used for SSTI participants targeted half of the relevant RPS goal as the target for development of local/regional solar PV projects. This yielded a ratio of 10% to 16.5% of the local energy consumption that could be redirected to locally produced clean energy, creating local economic and environmental benefits.

Cumulative Size (Residential) and Solar Viable Residences

In assessing the potential for residential rooftop solar, the SSTI team used the latest housing stock data, acquired from Census American Fact Finder (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml), and then applied factors to determine the fraction of buildings which can accommodate solar. These factors include estimated structural integrity of the roof, pitch and orientation of the roof surface, and potential shading concerns, which are outlined below.

In determining structural integrity, the SSTI team followed the methodology used in City of Austin's report: A Solar Rooftop Assessment for Austin (http://imaginesolar.com/wp-content/uploads/2012/01/A-Solar-Rooftop-

Assessment-for-Austin.pdf). The report concluded that 99% of all residential rooftops were structurally capable of supporting solar. Roof age and replacement were also considered, but for this long-term market evaluation, timing concerns would not have a material impact.

In regard to roof pitch and orientation, the SSTI team utilized National Renewable Energy Laboratory's report, "The Solar Deployment System (SolarDS) Model: Documentation and Sample Results" (http://www.nrel.gov/docs/fy10osti/45832.pdf) to determine the fraction of homes that have an appropriate roof surface for solar. Following the building assumptions in Table 1 in Appendix C, the SSTI team disregarded sloped roofs with orientation greater than 60deg off true south due to decreased solar production. This results in 87.4% of homes having a roof surface with viable orientation and tilt.

Lastly, for shading, the SSTI team used the same National Renewable Energy Laboratory report, "The Solar Deployment System (SolarDS) Model: Documentation and Sample Results" (http://www.nrel.gov/docs/fy10osti/45832.pdf). The report concluded that in California 65% of single rooftops have adequate solar access. In Nevada, Utah, and Colorado 60% of the rooftops are shade free.

These three factors are applied in series to determine the overall fraction of residential structures which can support solar as follows:

$$solar\ viability = structural\ integrity \times roof\ pitch\ and\ orientation \times shading$$

$$solar\ viability = 0.99 \times 0.874 \times \begin{matrix}(0.65\ for\ CA)\\(0.60\ for\ CO, NV, UT)\end{matrix} = \begin{matrix}56\%\ for\ CA\\52\%\ for\ CO, NV, UT\end{matrix}$$

Once the total number of viable residences has been determined, cumulative size (kW) is determined by applying the average residential system size to each residence. The average residential system size is calculated from the California Solar Initiative (CSI) database for all residential projects installed during the first 6 months of 2012. The average system capacity is 5.1 kW.

Environmental Benefit

The Environmental Benefit was calculated using U.S. Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator for each specific utility territory:
http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Job and Economic Impact

The Job and Economic Impact was estimated using National Renewable Energy Laboratory's Job and Economic Development Impact Photovoltaic Model: http://www.nrel.gov/analysis/jedi/about_jedi_pv.html
The following assumptions were used within the model:

- Installation Year: 2013
- Installed Cost: $3.50/Watt
- No local manufacturing of modules, racking and inverters
- No induced economic impact