NREL finds up to six-cent per kilowatt-hour extra value with concentrated solar power

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Concentrating Solar Power (CSP) projects would add additional value of 5 or 6 cents per kilowatt hour to utility-scale solar energy in California where 33 percent renewables will be mandated in six years, a new report by the Energy Department's National Renewable Energy Laboratory has found.

The report, "Estimating the Value of Utility-Scale Solar Technologies in California Under a 40% Renewable Portfolio Standard," finds that CSP, with its ability to store energy for several hours or more, helps maintain firm capacity in the hours when the sun is below the horizon. Compared to variable generation technologies this translates to an increase in value of 5 cents per kilowatt hour under a 33% renewable standard – the mandate for 2020 – or 6 cents per kilowatt hour under a 40% renewable

standard. The added value means that at peak demands, CSP can help lower electricity bills.

"CSP adds significant additional value when compared to less flexible generation sources," NREL CSP Group Manager Mark Mehos, co-author with Jennie Jorgenson and Paul Denholm of the study, said. "As the penetration of renewables rises, so does the relative value of CSP. CSP could also allow greater penetration of PV by making the grid more flexible and reducing curtailment of PV by generating energy after the sun sets. We intend to investigate this in more detail for the remainder of this year."

While photovoltaic modules capture the sun's light and turns it into useable electricity, CSP technologies concentrate the sun's energy and capture that energy as heat, which then drives an engine or turbine to produce electrical power. However, the thermal energy CSP generates can be held back for several hours via storage systems such as molten salts – and then used after the sun sets when demand is still high for, say, air conditioning, television, and lighting.

The new report, funded through the Energy Department's Office of Energy Efficiency and Renewable Energy in support of its SunShot Initiative, compares the total operating costs of a system with and without an incremental amount of CSP with thermal energy storage or solar PV. It also analyzes capacity value. The report is the second in a series of analyses of the value of CSP with thermal energy storage. The previous report was "Estimating the Performance and Economic Value of Multiple Concentrating Solar Power Technologies in a Production Cost Model.

Provided by National Renewable Energy Laboratory