



News Release

For immediate release | Jan. 11, 2017

Media Hotline | 888.516.6397

For more information, contact:

Anne Gonzales | agonzales@caiso.com | 916.351.2311 | 916.671.0863
Steven Greenlee | sgreenlee@caiso.com | 916.608.7170 | 916.990.4295

Tests show renewable plants can balance low-carbon grid

California ISO releases breakthrough findings for renewables expansion

FOLSOM, Calif. – As the global trend toward carbon-free power accelerates, the California Independent System Operator (ISO) today posted results of tests conducted on a large solar plant, findings that could lead to better management and reliability of a grid at the vanguard of renewable energy integration.

In the most extensive testing of its kind, the ISO, the U.S. Department of Energy’s National Renewable Energy Laboratory (NREL), and First Solar analyzed a 300-megawatt photovoltaic (PV) plant for performance in three critical areas: frequency control; voltage control; and ramping capacity. These services have been identified by the North American Electric Reliability Corp. (NERC) as essential for expanded integration of renewable resources into the power grid.

The testing, conducted on a First Solar unit in August 2016, demonstrated that renewable energy plants with smart inverter technology can offer these electric reliability services similar, or in some cases superior to, conventional power plants.

“These findings mean renewable energy in the ISO footprint – and beyond – could be integrated into power grids at a much higher level and faster pace than once believed, giving a glimpse at the future green and sustainable electric networks,” said Clyde Loutan, ISO’s senior advisor for renewable energy integration. “With these results, the electric industry can expect one day to realize ambitious goals of using primarily renewable sources to power our economy.”

The test findings bring new tools to the challenge of ensuring system reliability while operating systems at a high level of renewable penetration. While the smart inverter technology is widely available, First Solar designed an advanced plant-level controller that is not commonly used in the industry currently.

Perhaps the most unexpected and significant benefit is the agile voltage support offered by the solar plant both when it is generating during the day, and at night when it is not generating power. At night, the plant can absorb a small amount of power from the grid to provide reactive capability needed to support grid voltage.

The ISO published the findings in a report, “Using Renewables to Operate a Low-Carbon Grid.” The ISO Board of Governors in December noted the findings as



groundbreaking for advancing renewable integration in California, where a dramatic rise in solar power in recent years puts the state at the forefront of operating a low-carbon system.

The Board directed staff to develop market mechanisms to take commercial advantage of advanced inverter technology with the specialized controllers for reliable grid operation.

Mahesh Morjaria, vice president of systems development at First Solar, said the test results could be applied and leveraged throughout the industry.

“This game-changing demonstration of reliability services, some of which even outperformed conventional resources, represents a significant milestone in the development of grid-friendly features in utility-scale photovoltaic plants,” he said.

According to Vahan Gevorgian, chief engineer in NREL's Power Systems Engineering Center, “These tests demonstrated how controls can leverage the value of solar photovoltaic plants from being simply a variable energy resource to providing services that range from spinning reserves, load following, voltage support, ramping, frequency response and regulation, to power quality.”

The ISO plans similar testing on a large wind plant. Because wind farms use similar smart power-based technology, it is anticipated they will also be able to provide these types of grid reliability services.

Drawing reliability services from solar and wind plants helps balance the grid during times of high renewable production and allows more clean energy to move onto the system. This is essential for the state to be able to reach its goal of getting half its energy from renewable sources by 2030.

“The capabilities demonstrated in this study urge us to change the way we think about renewables,” said ISO Board of Governors member David Olsen. “Up to now, we’ve looked to renewables only to provide energy. On low-carbon systems, we’ll need them to provide a full range of power services to ensure reliable grid operation.”

The ISO plans to present its test results to NERC and other technical review committees.

Next steps for the ISO will be to evaluate the grid’s solar fleet to determine the amount of existing capacity capable of providing essential reliability services and to explore additional opportunities for these variable energy resources to join ISO’s power and ancillary services markets.

Click [here](#) to view the final report, and fact sheets on smart inverter technology and the test highlights.



California ISO

California ISO Media Hotline | 888.516.6397

250 Outcropping Way | Folsom, California 95630 | www.caiso.com

Thanks for re-posting!



The California ISO provides open and non-discriminatory access to one of the largest power grids in the world. The vast network of high-voltage transmission power lines is supported by a competitive energy market and comprehensive grid planning. Partnering with over a hundred clients, the nonprofit public benefit corporation is dedicated to the continual development and reliable operation of a modern grid that operates for the benefit of consumers. Recognizing the importance of the global climate challenge, the ISO is at the forefront of integrating renewable power and advanced technologies that will help meet a sustainable energy future efficiently and cleanly.