

# New Inverter Testing Supports Solar in Hawaii

## CHALLENGE

Electric power systems are designed to operate within specific voltage ranges, but when the grid experiences a fault, the maximum voltage could be temporarily exceeded. This condition, known as “transient overvoltage, can damage power system equipment and loads.

Solar power generation that is coupled to the grid through an inverter can result in two types of transient overvoltage: load rejection and ground fault. Because inverter operations under fault conditions are not well characterized, concerns about both overvoltage conditions led to a temporary moratorium on solar installations in Hawaii.

## SOLUTION

National Renewable Energy Laboratory (NREL) partnered with SolarCity and the DOE Solar Energy Technology Office to quantify the impacts of both ground fault and load rejection overvoltage. Results from modeling and testing of commercially available inverters showed that load rejection overvoltage was not as big of a risk as the utilities feared. Based on the results from the testing, the Hawaiian Electric Company lifted the interconnection ban and began allowing inverter manufacturers to self-certify, provided they use the same test methods as NREL.

## IMPACT

In addition to expediting the connections of solar power in Hawaii, the Hawaiian Electric Company raised limits on distributed solar power from 120% of minimum daytime load to 250%, specifically citing NREL’s report as a reason for the change in policy. Nationally, NREL’s load rejection overvoltage test method is being incorporated into IEEE 1547 and UL 1741 standards.

These standards provide interconnection requirements for all distributed energy resources connected to electric power systems. Continued testing of transient overvoltage, specifically ground fault overvoltage, is expected to further improve solar technologies and reduce barriers that increase the cost of installing solar power.

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Results from inverter testing and optimization will ultimately enable greater deployment of solar PV on homes and buildings across the country.

*Photo from SolarCity*

In November 2014 the U.S. Department of Energy launched the GMLC, a strategic partnership between DOE and the national laboratories to bring together leading experts and resources to collaborate on national grid modernization goals.

This integrated effort builds on prior individual projects at the national laboratories to deliver grid-related advancements, such as **inverter use in Hawaii**.