Solar Industry®

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California's Flirtation With 50% RPS Could Jilt Solar Generators

Renewables penetration could result in curtailment in the interest of grid management.

Henry Scott

Renewable portfolio standards (RPS) have been a key policy tool to incentivize renewable energy development, but increasing California's RPS from the current 33% requirement to 50% or higher could present grid management challenges that would lead to the curtailment of renewable energy generators and solar generators in particular.

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One possible result is over-generation of renewable energy, which occurs when renewable generators keep producing even when utilities have no demand for the resultant energy. Over-generation threatens grid stability and integrity, and policy responses such as curtailment of renewable energy sources could also threaten the economic viability of solar power plants.

The prospect of a 50% RPS by 2030 is certainly within the realm of possibility. In 2013, California Assembly Member Manuel Perez introduced A.B.177, a legislative bill that would have increased the RPS target to 51% by 2030. While A.B.177 did not move forward in the most recent legislative session, California Energy Commission Chairman Robert Weisenmiller expressed his belief that the state can reach 40% renewable generation by 2020. A recent study published in Energy Policy by researchers from Stanford University and the University of California suggests that 100% renewable generation by 2050 is possible.

How much?

Earlier in 2014, consulting firm Energy and Environmental Economics (E3) examined how the RPS policy in California leads to over-generation and resource curtailment. E3 concluded that if the existing 33% RPS were maintained until 2030, over-generation would occur during 1.6% of all hours, with 0.2% of available RPS energy contributing to such over-generation.

Under the hypothetical scenario of a 50% RPS and assuming widespread "large solar" development in the year 2030, E3's report indicates that over-generation would occur during 23% of all hours. Nearly 9% of available RPS energy would be considered over-generation. Over-generation may occur during hours of high renewable generation even if thermal generation were kept to minimum levels.

The direct consequence of over-generation to consumers is greater costs. Generators should be concerned about grid reliability, cost risks related to curtailment and policy consequences. For example, some policy commentators have recommended elimination of the federal production tax credit (PTC) because wind generators are incentivized by the PTC to continue to produce even when not serving load.

Understanding how regulators and regional transmission operators (RTOs) have attempted to prevent curtailment as well as examining other potential solutions can mitigate the risk in constructing more solar generation to meet ambitious RPS targets.

Currently, the California Independent System Operator (CAISO) reports that wind and solar curtailment is infrequent, although precise numbers are unavailable because to-date curtailment statistics are not tracked. However, CAISO believes that renewable resource curtailment is expected to rise in the coming years. The primary reasons offered for this increased curtailment are over-generation and grid congestion, which are problems that will only be exacerbated with the addition of new wind and solar installations under development.

Grid congestion can pose significant curtailment problems if transmission infrastructure does not develop quickly enough to support renewable energy development. This has been the case for some RTOs, such as the Midcontinent Independent System Operator, where wind generation proliferated and outpaced the development of necessary transmission capacity.

In Texas, wind energy curtailment has historically been a significant issue as well, but the recent completion of Texas' nearly $7 billion Competitive Renewable Energy Zones has significantly alleviated curtailment,

unlocked grid congestion and paved the way for increased renewable energy development.

A larger problem for California is the threat of an oversupply of intermittent renewable energy, particularly during low-load periods. CAISO has reported curtailments as a result of over-generation of wind energy during low-load periods. With a queue of solar projects being constructed and planned, California may face over-generation issues with both wind and solar.

Economic incentives play a large role in creating over-generation. The marginal cost of producing energy is low for solar and wind generators, and the marginal benefit of energy sales revenue is high, particularly when projects are able to monetize federal PTCs and renewable energy credits (RECs).

Existing rules incentivize utilities to obtain energy from the lowest-cost generators through a bidding mechanism that only includes the energy bid while excluding start-up and minimum load costs. To assist generators, CAISO administers a cost recovery tariff that allows some generators to recover their start-up, minimum load, and energy and ancillary services bid costs.

In response to an increase of over-generation events, CAISO instituted rule changes in 2013 that would provide economic incentives for utilities to curtail use of renewable generation. CAISO reduced its price bid floor from under $30/MWh to under $150/MWh and would consider another drop to under $300/MWh if the current price floor does not address over-generation issues. CAISO prefers this market-based approach over uneconomic dispatch instructions because it promotes efficient dispatch of resources.

Stay off the floor

The price bid floor is designed to cover opportunity costs for not producing renewable energy, primarily from wind resources where the combination of market revenues, PTCs, REC revenues and power purchase agreement (PPA) revenues adds up to about $130/MWh. The potential under-$300/MWh bid floor is the figure the solar industry will want to pay attention to because that is the price expected to cover the cost of solar generation. Under such a scenario, solar generators will likely not sell energy at an economic loss in order to obtain tax benefits.

So how can developers and financiers protect themselves from the economic risks that arise from curtailment?

Energy sellers can start by agreeing to PPAs that are sensitive to negative locational marginal prices and CAISO-directed curtailments. Sellers should ensure that there are contractual provisions to compensate generators for lost PTCs (for qualifying facilities, such as wind) and curtailed energy at the negotiated energy price during emergency and economic curtailments. A key function of any project financing is to allocate risk where it can be best managed and mitigated. For PPAs entered into between utilities and developers, that risk may be best delegated to utilities.

While a 50% RPS is not certain or imminent, the threats of curtailment resulting from over-generation by renewable energy sources nonetheless pose a real revenue risk for solar energy developers. To address the unintended consequences of expanding policies like the RPS that are designed to promote renewables, the solar industry must ensure that states will concurrently adopt complementary mechanisms that will minimize curtailments and allow renewable projects to continue generating energy or that will provide for project cost recovery or compensation for curtailed generation.

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