

North America

Alternative Energy| Smart Grid

California Strengthens Renewable Energy And Energy Efficiency Goals

SB 350 Builds On California's Competitive Advantage As A Technology And Policy Leader In Developing Pathways To A Low-Carbon Future

Key Takeaways:

- California Senate Bill 350 requires 50% of utility power to come from renewable sources and 50% increase in energy efficiency in existing buildings by 2030
- Requirement to halve statewide petroleum use by 2030 was dropped after intense lobbying by the oil and gas sector
- Implementation will require enhanced transmission, energy storage, and demand infrastructure to accommodate increasing intermittent generation
- Transformation of California ISO will leverage the benefits of geographical diversity of load and resources

Entities Mentioned:

- Advanced Energy Economy
- California Energy Commission
- California Independent System Operator
- California Public Utilities Commission
- Environmental Protection Agency
- Solar Energy Industries Association
- State Energy Resources Conservation and Development Commission
- Western States Petroleum Association

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Policy Brief

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Insight for Industry – California SB 350 Expands Renewable Energy and Energy Efficiency Goals, Promotes Electricity Markets across Western States

On September 11, 2015, the California State Legislature approved the Clean Energy and Pollution Reduction Act of 2015 (SB 350) which aims to increase the state's Renewable Portfolio Standard (RPS) to 50 percent by 2030 from the present goal of 33 percent by 2020, in addition to increasing energy efficiency in existing buildings by 50 percent by the year 2030. On the grid side, the bill seeks to transform the California Independent System Operator (ISO) into a regional organization to encourage electricity trading across the west.

SB 350 calls for a broader strategy of renewables procurement under RPS, which relies on the California Public Utilities Commission (CPUC) to approve contracts between project developers and utilities based on the lowest cost. In addition to increasing the amount of wind, solar, biomass, geothermal and other renewable sources, California must enhance energy storage and demand response to ensure that the grid is capable of managing the influx of intermittent renewables. While SB 350 has the potential to spur the market and increase the demand for renewable sources, successful implementation will require renewables, storage, demand response to play a central role in the grid rather than performing ancillary services.

SB 350 does not include distributed solar generation under the mandatory component of RPS. Under the current RPS, California utilities can purchase energy and renewable energy credits only from utility-scale solar plants. Utilities and solar installers have sought to expand the scope of eligible renewable resources to include distributed generation facilities such as rooftop solar to facilitate additional means to meet the 50 percent RPS goal.

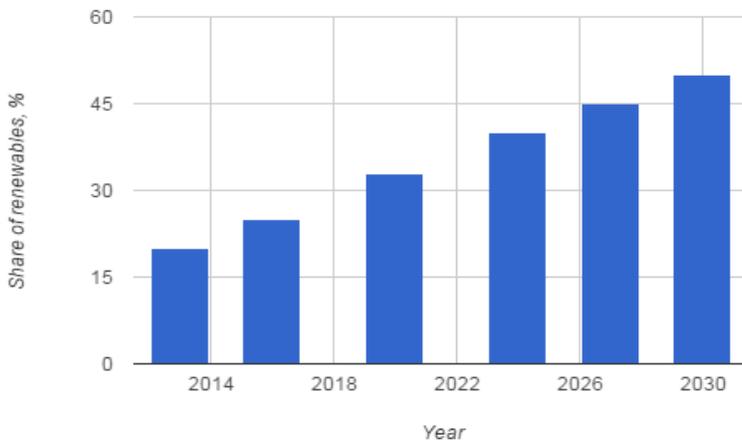
Bill Codifies Governor Brown's Proposal to Extend Goals on Renewables but Petroleum Use Reduction is Omitted

SB 350 is a part of the California Climate Leadership bill package, announced by Senator Kevin de León in February, to support the state's RPS and establish objectives beyond its 2020 emissions reduction targets. It codifies Governor Brown's goals to procure 50 percent of the state's electricity from renewables by 2030 and achieve 50 percent increase in energy efficiency for existing buildings.

The current RPS requires retail sellers, investor-owned utilities (IOUs), electric service providers and community choice aggregators (CCAs) regulated by CPUC to procure 33 percent of their annual retail sales from eligible renewable sources by 2020. It sets intermediate targets of 20 percent by 2013 and 25 percent by 2016 for the compliance periods 2011-2013 and 2014-2016, respectively. The new legislation expands the current 2030 RPS goal, establishing multi-year compliance periods: 2014-2016, 2017-2020, 2021-2024, 2025-2027, and 2028-2030. It includes interim procurement targets of 40 percent by 2024 and 45 percent by 2027 (Figure 1).

In addition to increasing the amount of wind, solar, biomass, geothermal and other renewable sources, California must enhance energy storage and demand response to ensure that the grid is capable of managing the influx of intermittent renewables.

Figure 1 - Targets for the Share of Renewable Electricity Generation in California under the Extended RPS (% by year)



Source: California State Legislature

A new goal of 50 percent renewable energy share of retail electricity sales would boost the annual RPS growth rate by 60 percent for the years 2020 through 2030. The CPUC and the California Energy Commission (CEC) are jointly responsible for implementing California’s RPS program.

Current law requires CPUC to identify cost-effective energy savings and establish efficiency targets for electrical and natural gas corporations. It requires the local publicly owned electric utility to establish annual targets for energy efficiency savings and demand reduction for the next 10-year period. In addition to this, SB 350 also requires the State Energy Resources Conservation and Development Commission to set annual energy efficiency and demand reduction targets to achieve a cumulative doubling of statewide efficiency in retail customers’ use of electricity and natural gas by January 1, 2030. The CPUC and local publicly owned electric utilities would establish targets consistent with this goal.

The original version of SB 350 also sought to reduce petroleum use in cars and trucks by up to 50 percent by 2030, but the provision was dropped in response to opposition from oil and auto industries, warning about impending losses should the provision be passed. For example, the Western States Petroleum Association, a petroleum trade association with members in the states of Arizona, California, Nevada, Oregon, and Washington, has criticized the provision as unrealistic and requiring the removal of eight billion gallons of gasoline and diesel from California’s fuel supply with no guarantees to replace them.

Meanwhile, groups supporting clean energy, such as the Advanced Energy Economy, have commended the passage of SB 350 citing its potential to drive innovation and growth, but expressed disappointment at the inability to take action on 2030 transportation goals, which would have sent a clear market signal for continued growth of electric vehicles and alternative fuels over the next decade.

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California Investor-Owned Utilities are Well on Track to Meet the 2030 RPS Goal, Efficiency Improvements to Be Achieved Through Standards and Programs

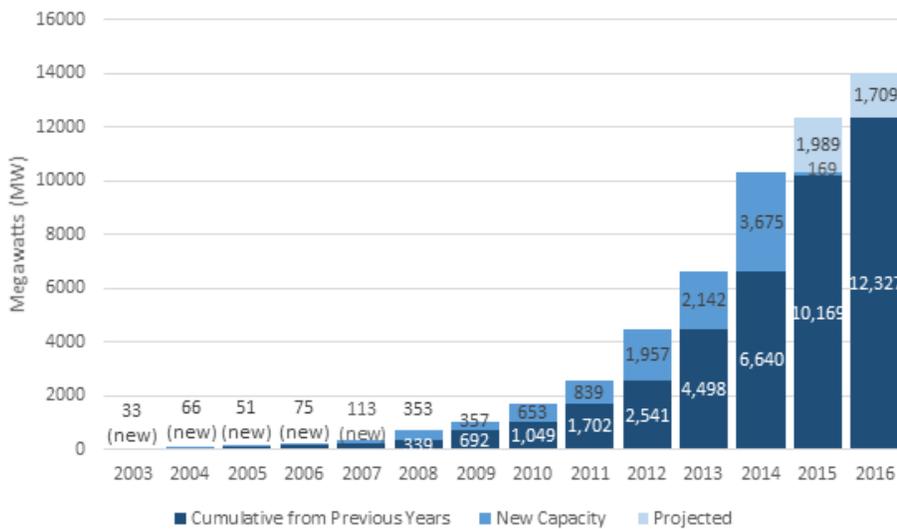
The CPUC’s first quarter 2015 RPS report shows that the state’s investor-owned utilities (IOUs) are on track to meet the RPS requirement of 25 percent renewables by 2016 and are well-positioned to meet the 33 percent requirement by 2020.

The state’s three large IOUs – Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E) – currently provide approximately 68 percent of the state’s electric retail sales. In August 2014, the IOUs reported that they collectively served 20.9 percent of their retail electric load with RPS-eligible generation during the first compliance period from 2011-2013, surpassing the procurement requirement of 20 percent. For the second compliance period from 2014-2016, the IOUs expect to procure approximately 26.8 percent of retail sales in 2014, 29.7 percent in 2015, and 30.9 percent in 2016, exceeding the 25 percent procurement requirement.

Since 2003, 10,338 MW of renewable capacity achieved commercial operation under the RPS with 169 MW reaching commercial operation in 2015 (Figure 2). An additional 1,989 MW of renewable capacity is projected to come online in 2015.

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Figure 2 – California RPS Capacity Installed since 2003 by Year



Source: CPUC

The IOUs have the option to apply excess procurement in 2011-13 and 2014-16 toward meeting RPS obligations in 2017-20 or beyond and are also planning for additional procurement in 2015-20 and post-2020. In addition to the RPS targets, in 2013, the CPUC adopted energy storage procurement targets, requiring the state’s utilities to collectively procure 1,325 MW of energy storage by 2020 to be installed and connected to the grid by 2024.

The ambitious energy efficiency goal in SB 350, requiring a 50 percent increase by 2030, will primarily rely on the existing suite of building energy efficiency standards under the California Code of Regulations Title 24, Part 6. A rulemaking process is underway for the 2016 Standards which will continue to improve upon the current 2013 Standards for new constructions and modifications of residential and nonresidential buildings. The 2016 Standards will go into effect on January 1, 2017.

California state energy agencies already allocate more than \$1.5 billion per year on energy efficiency programs. The CPUC and utilities spend roughly \$1 billion through utility-sponsored programs such as rebates for high-efficiency appliances, heating ventilation and air-conditioning (HVAC) systems and insulation. In addition, Proposition 39 – California Clean Energy Jobs Act – has generated approximately \$500 million annually to assist schools in switching to clean energy and reducing energy use.

Low cost energy efficiency investments include building lighting, appliance, and HVAC upgrades, while costlier energy efficiency investments may include thermal or battery storage systems, comprehensive building energy management system upgrades, and large scale building envelope improvements.

Bill Helps Diversify Clean Energy Resources, Requires Measures to Tackle Growing Distributed Generation

SB 350 will open opportunities for renewables resources such as solar to work with other clean energy technologies to achieve the balance between supply and demand. New and modified electric transmission facilities may be necessary to facilitate the state achieving the 2030 RPS target. To advance the state's clean energy and emissions reduction objectives, the CPUC and CEC will consider using distributed generation (to the extent that it provides economic and environmental benefits in disadvantaged communities), opportunities to decrease costs and increase benefits, including emissions reduction and grid integration, and using renewable and nonrenewable low-emissions technologies. SB 350 will advance grid reliability services that minimize reliance on fossil fuel resources and increase the use of large- and small-scale energy storage technologies, targeted energy efficiency, and demand response. Energy efficiency efforts will include cost-effective activities to achieve peak load reduction that improve end-use efficiency, lower customer bills, and reduce system needs.

The legislation will allow electricity generation anywhere on the grid, including other states and areas of Canada and Mexico. Current RPS-eligible resources include geothermal electric, solar thermal electric, solar photovoltaics (PV), biomass, municipal solid waste, landfill gas, tidal, wave, ocean thermal, wind, hydroelectric, anaerobic digestion, and fuel cells using renewable fuels.

According to CPUC, the mix of technologies bidding into and receiving power purchase agreements (PPAs) through RPS solicitations has changed since the inception of RPS. In 2014, wind and geothermal supplied the majority of the state's renewable generation, contributing 36 percent and 25 percent of

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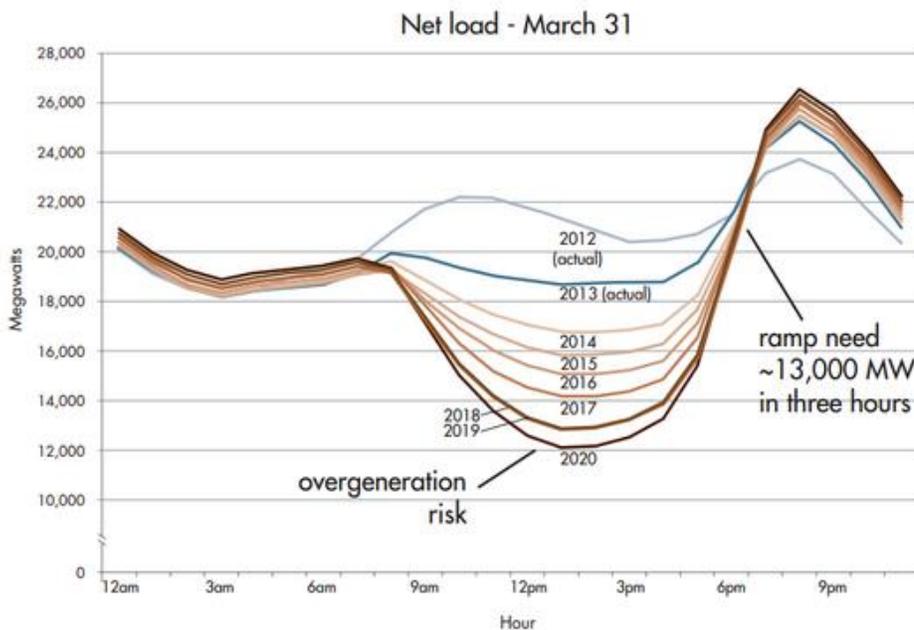
supply, respectively. The 2020 generation mix is expected to reflect a considerable increase in generation from new solar PV. Solar PV and solar thermal generation are projected to contribute 40 percent and 5 percent, respectively, of total renewable generation by 2020.

The average installed PV system prices in California reduced by 5 percent in the last year. While the RPS program is the primary initiative to spur new utility-scale renewable energy projects, there are other programs that promote customer-side renewable generation. The California Solar Initiative (CSI) and Self-Generation Incentive Program (SGIP) incentivize customers to install renewable distributed generation technologies that directly serve on-site load. The electricity generated from systems installed through CSI and SGIP may contribute to RPS if they meet the CEC-established RPS eligibility requirements. These facilities also indirectly contribute to the RPS by reducing demand when serving customer load.

As these technologies continue to proliferate, grid and load management will be a key challenge for the state. Increasing levels of distributed rooftop solar will continue to reshape the state’s daily load curve into the infamous “duck curve”, with a trough in net load during the day and a peak at around 9 pm, after the sunset (Figure 3). As the required power from generators plunges during peak distributed solar output, an over-generation risk arises, as many of these generators must maintain minimum output levels to meet a significant late-afternoon load demand. Energy storage and more west-facing solar panels — to shift power output to later in the afternoon — are two potential solutions to help mitigate the severity of the forecast late afternoon ramp-up.

Solar PV and solar thermal generation are projected to contribute 40 percent and 5 percent, respectively, of total renewable generation by 2020

Figure 3 - The “Duck” Curve: Actual and Projected Net Load in California ISO



Source: CAISO

Broader Regional Electricity Cooperation will Support Better Scheduling of Increasing Renewable Generation

SB 350 provides for the transformation of the California ISO, the nonprofit corporation that manages most of the state’s electricity grid, into a regional organization to promote the development of regional electricity transmission markets in the western states and to improve consumer access to those markets. The transformation would require modifications to the ISO governance structure and will take place only if it supports the interests of the state and its ratepayers. The voluntary transformation would occur through additional transmission owners joining the ISO with approval from their state or local regulatory authorities. While current law states the legislature’s intent to provide for the evolution of the ISO, it prohibits the ISO from entering into a multi-state entity or regional organization unless approved by the Electricity Oversight Board.

The process of connecting California’s electricity market to neighboring regions began in 2014 with the creation of an energy imbalance market (EIM), which allows members to purchase electricity from each other (Figure 4). The EIM intends to streamline scheduling through better management of increasing amounts of intermittent renewable generation. In November 2014, the California ISO opened its subhourly wholesale electricity market to PacifiCorp’s service areas in six states, marking the first time the ISO dispatched electricity to regions outside its service territory. The ability to use renewable resource output over a wider geographic area – such as using excess renewable generation in California for PacifiCorp’s territories – would also provide additional cost savings. Increasing generation from renewable resources in the future would facilitate pooling of geographically diverse renewable resources and alleviate the variability of overall renewable generation. PacifiCorp would experience cost savings from access to more frequent dispatch of lowest-cost generators and a much larger resource pool across the California ISO area.

Increasing generation from renewable resources in the future would facilitate pooling of geographically diverse renewable resources and alleviate the variability of overall renewable generation

Figure 4 - Participants in the Energy Imbalance Market



Source: CAISO

California Continues to Demonstrate Leadership in Clean Energy and Climate Policy Efforts

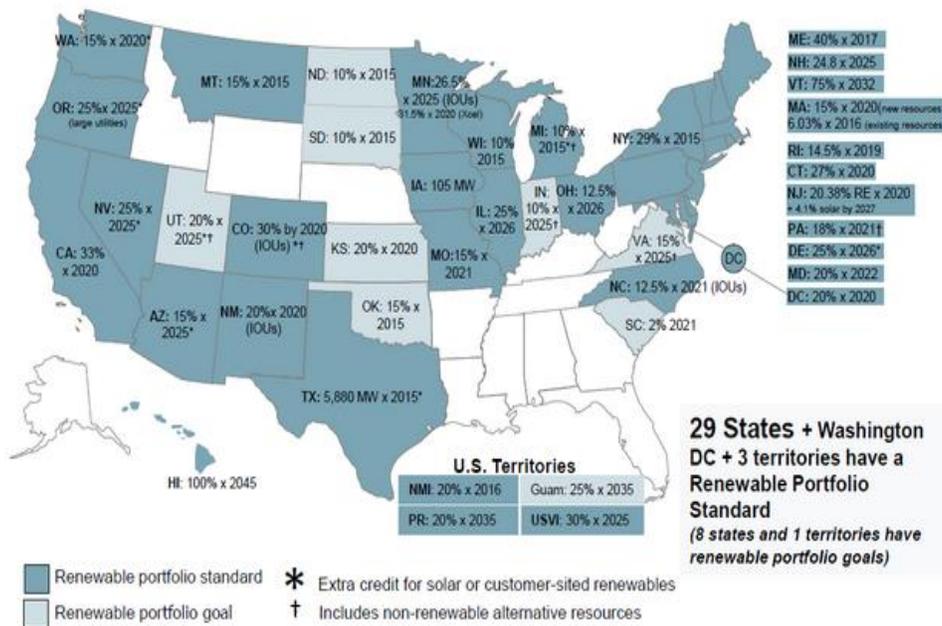
The RPS is a cornerstone of California's leadership effort to reduce greenhouse gas emissions by 80 percent by 2050. Once implemented, SB 350 would be among the most ambitious renewable energy laws in the U.S. The Solar Energy Industries Association, a trade group, applauded the passage of SB 350, stating that the current RPS and other leading policies like net metering have resulted in approximately 55,000 solar jobs and more than \$11 billion in annual state investment, while achieving significant cost reductions. With its more than 11 GW of installed solar capacity, California currently ranks first in the U.S.

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Among other recent legislative actions, on September 2, the legislature passed Sen. Leon's SB 185, which would require the state's two largest state pension funds, the Public Employees Retirement System (CalPERS) and the State Teacher's Retirement System and CalSTRS), to divest their portfolios from coal companies. According to CEC, roughly eight percent of the state's energy needs are met by coal resources, most of which comes from imports for Southern California municipal utilities. This dependence has been in steady decline.

Currently 29 states, the District of Columbia, and three territories have RPS goals (Figure 5). To incentivize the development of particular resources, several states have "carve-out" provisions that mandate a certain percentage of electricity generated by a particular technology. Currently, 18 states have carve-outs for distributed generation or certain renewable energy technologies, such as solar PV in their RPS programs and goals.

Figure 5 – States with Renewable Portfolio Standards, June 2015



Source: DSIRE

SB 350 builds on California's competitive advantage as a technology and policy leader as other states, the federal government, and international trading partners such as China and Mexico are developing pathways to a low-carbon future. With the Environmental Protection Agency's (EPA) regulations seeking individual state portfolios to reduce power plant emissions, other states could continue to look to California's policies, including its cap-and-trade program, as examples. However, along with the successful rollout of rooftop solar and other renewables, other states will surely pay close attention to how California solves the issue with net loads becoming more extreme across various times of the day.

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Disclosures Section

RESEARCH RISKS

Regulatory and Legislative agendas are subject to change.

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