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More renewable energy brings new challenges

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Since Gov. Jerry Brown has been in office, California has more than doubled in-state renewable capacity. As of Jan. 1, California leads the nation with an electricity mix composed of one-quarter renewable electricity from sources like the sun and wind.

On some days, the state almost meets its 2020 renewable energy goals. For example, in the 24-hour period on April 12, 2014, renewable generation served almost 32 percent of the ISO power grid load. Between 2 and 3 p.m. that day, a whopping 42 percent of the demand was met with renewable generation.

That success, however, is accompanied by a new set of challenges. Overgeneration, or producing too much power at certain times of the day when demand for electricity is low, is one of the most significant. And as more renewables are blended into the power mix, the challenge of effectively integrating renewables will grow. Overgeneration sounds like a non-problem, but when there is more electricity being generated than places to store or export it, it must be turned off or it threatens reliability of the grid.

Another challenge we face is ensuring there are enough resources in densely populated areas where there are few transmission lines. When the San Onofre nuclear power plant dropped off the grid, renewable energy continued to flow from places like the Imperial Valley into San Diego, but there was a risk that there were insufficient local resources closer to where it's needed in Orange County and northern San Diego to maintain grid reliability.

Challenges tend to foster creative solutions. California excels at innovation to meet new needs; it's a vital part of job creation and prosperity.

One efficient and cost-effective solution to deal with overgeneration is through the Energy Imbalance Market, a regional marketplace that balances supply and demand with a five-minute economic dispatch over six Western states. It allows California to share its successes by sending excess renewable energy to our neighbors.

Recently, a new set of “preferred resources” has emerged to enhance grid reliability. These include paying customers to meet the cooling needs of their buildings when power demand is high by using technologies that allow air to be cooled by ice and cold water. Another innovative solution is enhancing buildings with batteries and control systems that can reduce their electricity usage during critical times. We need more new zero-carbon resources that help us get the most out of our surplus renewable electric power while also giving customers more choices to meet their energy needs.

The challenges will also drive the development of leading-edge technology. The Energy Commission’s Electric Program Investment is focusing much of its research and development to improve renewables integration, from more precise forecasting, dynamic demand management and energy storage. The ISO already has invested in forecasting software that will better anticipate renewable output for dispatch of complementary power. Rate incentives at the utility level are being explored to encourage consumers to conserve or use energy to match supplies at different times of the day or year. The state’s energy agencies are also working together to get major energy storage systems developed and into the commercial market.

These changes will not be easy – finding power sources that customers can own; meeting needs that change by the day and time of the year; fitting a range of new innovations together for the best fit and the least cost; and putting them in the specific locations where they do the most good. Overall, we must make sure that our investments focus on reducing greenhouse gas emissions, improve reliability and keep costs competitive.

We are committed to work with legislators and stakeholders to understand these emerging trends and to design programs that reduce greenhouse gas emissions from electric power generation, improve the reliability of the grid and keep costs competitive. With the right policies, California can not only meet, but someday, exceed the governor’s 50 percent goal.

One thing is sure – the next few years of electric power will be as different as the past 10 years of renewable energy development was from the past 50 years of fossil fuel power plants. More of the same policies will not do the trick. We can be successful and meet our goals for reducing the impacts of climate change, but only if we can match our fast-changing, ever-cleaner power grid to the growth of electric transportation and reducing greenhouse gas emissions, and if we can reduce the inefficient use of gas for cooling and heating.