

The California Market: Fraught With Promise

Largely credited with launching the industry in the 1980s, wind energy in the state is poised for a resurgence.

By Nancy Rader & Dariush Shirmohammadi

California's landmark 2015 climate change legislation – requiring that half of the state's electricity come from renewable energy by 2030 – represents the creation of a market approaching 20 GW in size and the lion's share of renewable portfolio standard (RPS)-related projected growth. Based on recent history, one might expect most of that market to go to solar energy. But the tide is turning back to wind energy.

Wind energy was the big winner in the RPS market in the policy's first decade, from 2002 through 2012, when contracts totaling more than 5.4 GW of greenfield wind projects were approved by the California Public Utilities Commission (CPUC). But over the past several years, the investor-owned utilities have favored solar photovoltaic projects, with 10 MW of solar approved for every 1 MW of wind through 2015. Further, the utilities procured far more solar than was needed to satisfy their near-term RPS requirements – in some cases, buying enough to take them beyond 2020. As a result, today's California RPS market is thin.

Solar's market success owes itself to the rapidly falling prices of solar photovoltaic projects, combined with a utility rush to capture federal tax credits that were initially set to expire this year. Another major factor,



Rader



Shirmohammadi

however, was the regulatory lag in assessing the rapid decline in the value of solar energy as its market penetration increases. Fortunately, this latter factor is now getting significant attention; if that attention turns into

policy changes fast enough, wind energy should be a hot commodity again very soon.

Apart from repowering the pioneer wind fleet from the 1980s, which presents its own challenges, most of this wind energy will have to come from beyond the state's borders, given several reactionary land-use decisions within the state. And yet, potential political opposition to importing wind energy could stymie the clear consumer benefits that would follow from continuing a healthy balance of wind and solar resources. Threading this





A panoramic shot of EDF Renewable Energy's 140 MW Pacific Wind Farm.

Photo courtesy of Joan Sullivan

needle is the job at hand for the wind industry.

Indirect costs and benefits

Impressively low in-state solar contract prices – now commonly below \$0.05/kWh – have given wind projects located in California (including repowered existing projects) a run for their money, given wind resources that pale in comparison to those in other regions of the western grid. In addition, solar projects benefit from a California property tax exemption, representing roughly a half-cent advantage against in-state wind projects. (Geothermal and biomass costs are significantly higher than both.)

What has not been taken into account – so far – are the direct and indirect costs and benefits of renewable resources as those costs and benefits change with increasing grid penetration. These values fall into three categories: integration costs, capacity value and curtailment costs.

Integration costs. These costs encompass the fixed and variable costs associated with the system flexibility necessary to integrate renewable resources into the electricity system (i.e., regulation and intra-hour, load-following costs). The requirement to include indirect cost impacts in the

competitive procurement process was included in the initial RPS legislation adopted in 2002, yet well over a decade later and after the addition of over 10,000 MW of renewable energy resources to the system, the CPUC still has not developed a meaningful methodology for determining these costs, having adopted only a temporary placeholder value in 2014 reflecting the results of studies specific to other states, not the present and specific circumstances in California. Due primarily to the significant ramping requirements associated with solar energy, the California Wind Energy Association (CalWEA) expects integration costs to favor wind.

Capacity value. Improving the accuracy of capacity valuation is also on wind's side. Although the CPUC has recognized that the "effective load-carrying capacity" (ELCC) methodology is a more reliable and accurate measure of renewable energy capacity value than the methodology currently in use, and that the inaccuracies of the current approach "are magnified as renewable penetration increases," the ELCC methodology has yet to be put in place. Indeed, studies have shown for years that the capacity value of solar – which is concentrated during midday hours – plummets with in-

creasing penetration, while the decline in value for wind occurs far more gradually. Recent studies indicate that the solar energy already procured has saturated the need for capacity during the day, bringing its capacity value down to par with wind energy (and it continues falling).

Curtailment costs. There is only so much demand for power during daytime hours. As a result, the concentrated output profile of solar projects is expected to lead to very significant curtailment of energy at high solar penetration levels, assuming that the utilities continue to heavily favor solar in meeting their 2030 RPS requirements.

The research consulting firm Energy and Environmental Economics (E3) has found that marginal curtailment in a solar-heavy 50% RPS scenario would be a whopping 65%. Due to current operational protocols in California, the marginal curtailment would, in practice, be spread across all generators that would otherwise be operating during these saturated hours. Thus, on average, almost 9% of all renewables are shown to be curtailed in a high-solar future, which will fall hardest on solar.

As CalWEA has explained in CPUC filings, however, these costs are currently falling through the cracks of utility procurement. That is, solar bid prices are not being adjusted for this phenomenon on either the seller's or the buyer's side. And the phenomenon gets worse as rooftop solar installations increase, as they will – dramatically – under a very favorable January CPUC decision on net metering.

Because these costs and values are not yet fully factored into procurement, if factored in at all, solar is largely prevailing in the market on the basis of price alone. But as they are taken into account, the competitive scales will begin to tilt toward wind energy. This has been demonstrated in studies recently conducted by E3 for the CPUC and the California Independent System Operator (CAISO) that take most (but still not all) of these changing values into account.



With some tinkering, the advocacy group maintains that wind energy can reach its potential. Photo courtesy of Joan Sullivan

The results show that in 2030, the 50% renewables portfolio is most cost-effective overall when it includes up to 6 GW of additional wind, accounting for some 40% of the incremental renewables required, under status-quo policy and grid conditions.

The challenge for the wind industry, therefore, is to foster reform of the RPS procurement process so that these costs are fully taken into account – at long last, considering such reforms are on the CPUC’s agenda this year. With the production tax credit (PTC) fast phasing out, and the solar tax credit on a longer phaseout trajectory, there is no time to lose.

Not in my state

Sadly, despite California’s proud history of launching the commercial wind industry, wind energy projects are being banned or severely restricted in several California counties and, more significantly, across federal lands in the state. Over the past three years, sweeping restrictions have been adopted or are slated for adoption by Los Angeles, San Diego and Solano counties – areas hosting some of the state’s best remaining wind resources on private land. On top of that, the imminent adoption of the draft Desert Renewable Energy Conservation

Plan by the federal Bureau of Land Management (BLM) will put permanently off limits 80% of the high-quality wind resources on vast federal lands across the deserts of Southern California.

This is happening despite California’s strict environmental laws and modern industry practices, designed to ensure that any wind project will be built only if years of pre-construction surveys and careful project design demonstrate there will be very limited impact. Unfortunately, instead of carefully reviewing specific sites and using reasonable measures to address environmental, health, military and other concerns, these communities and the BLM have resorted to wholesale bans, or have established unattainable standards that amount to bans.

As a direct consequence, CalWEA estimates that, at best, California will see no more than 2 GW of new wind development within its borders. Given this very limited potential, it will be important to preserve and revitalize the 1980s-vintage wind fleet and foster wind imports from the western region.

Repowering

During Gov. Jerry Brown’s first ad-

ministration (1975-1983), California pioneered renewable energy development by successfully implementing the federal Public Utility Regulatory Policies Act (PURPA). Virtually all wind energy projects that were operating in California prior to the adoption of the RPS in 2002 – some 1,600 MW – were built under 1980s-vintage PURPA contracts. American Wind Energy Association data indicate that almost 1 GW of these projects still consist of 1980s-vintage wind turbine technology. Most of these contracts were 30 years in length and so have begun to expire; virtually all will expire within the next few years.

Although most of these projects admirably continue to churn out electricity at 30 years of age, they face increasing maintenance and repair costs. Thus, new long-term contracts are needed to support repowering. This timing is unfortunate for the reasons previously discussed: There has been a considerable slow-down in the RPS market, solar energy prices are very low, and the CPUC has lagged in assessing the indirect costs and values of renewable technologies and in requiring the utilities to account for them. Further, the wind PTC declines to 80% of its value next year – and continues to decline steeply after that while solar maintains its full investment tax credit value until 2020. Therefore, time is of the essence.

Given severe restrictions on new in-state wind energy development, preserving and enhancing California’s historic wind energy fleet is California’s best opportunity for obtaining high-value renewable energy and local economic benefits associated with wind energy in the 50% RPS portfolio. But to realize that value, fast action will be necessary by both the legislature and the CPUC so that power purchase contracts can be put in place by the end of next year.

Out-of-state challenges

Although in-state wind can provide some of the needed RPS resources, the greatest fraction will need to come from elsewhere in the western

region, given the in-state land-use restrictions previously discussed. However, numerous challenges face the entry of out-of-state wind energy projects into California's market, as well.

Currently, California law permits out-of-state resources to qualify for the RPS, but 75% of the RPS requirement must be met with renewable resources that are either directly interconnected to the grid controlled by a California balancing authority (BA) or "dynamically scheduled" by such a BA. (Dynamic transfer arrangements put projects located outside of the CAISO footprint under direct CAISO control as if they were physically located within the CAISO's BA.) Since these rules were adopted in 2011, very little out-of-state wind has been procured until very recently.

Meanwhile, CAISO, the predominant California BA, has proposed a merger with PacifiCorp's balancing area, which covers most of Utah, about half of Wyoming, and small sections of Idaho, Washington, Oregon and northern California. The benefit for out-of-state wind resour-

es is obvious, as CAISO expansion would greatly expand the reach of the grid, into which a project must be directly interconnected to qualify for what is known as "Bucket 1" RPS status.

Before CAISO expansion can move forward, the legislature must act to enable multistate governance of CAISO. The legislature has, however, indicated several concerns about the expansion. Even if utility bills would be substantially reduced by CAISO expansion, as is projected, for example, some are concerned about the impact that the expansion would have on California jobs and its economy. There is also a desire to see electric vehicles charged up with renewable energy rather than having the RPS energy that California has purchased physically serve the load outside of the state. Other concerns relate to ceding some control of the state's aggressive clean energy and climate policies to federal regulators.

Meanwhile, the approvals required by the five states that must sign off on the PacifiCorp side of the BA merger are also not without their challenges.

These states similarly worry about ceding control of their utilities to California, among other things.

Unless and until the CAISO expansion occurs, a promising path for wind would still remain. Out-of-state wind can be accessed under current law, as noted previously, through new transmission lines directly interconnecting those resources to BAs serving the state or through dynamic transfer arrangements. Such arrangements would meet the legislative interest in having renewable energy physically delivered to California and in maintaining control over CAISO while delivering the wind energy that will clearly benefit consumers. The promise of a robust market for wind energy under California's 50% RPS is clearly there, but, as always, the road is fraught with many possible twists and turns. *SNP*

Nancy Rader is executive director and Dariush Shirmohammadi is technical director for the California Wind Energy Association. Rader can be reached at nrader@calwea.org and Shirmohammadi can be reached at dariush@shirconsultants.com.