The Case for Renewables in Utility Boardrooms

Venki Venkateshwara
Vice President, Pace Global, a Siemens Business
venki.venkateshwara@siemens.com

Continued technological innovation and increasingly stringent CO2 reduction requirements are persuasive reasons for utility managements to begin planning for a future with significant renewables on their systems. Over the last decade, technological innovation and customer preference for clean energy, on the one hand, and state and federal incentives, on the other, have combined to create a robust market for renewables. Much of the activity has been driven by non-utility players, while traditional owners of franchised service territories have been vilified for highlighting the real challenges of incorporating renewables rather than being perceived as supportive. But traditional utilities should not be seen as naysayers, even as they deal with the challenge of identifying the best methods to accommodate the momentous and rapid impacts of renewables. We believe that now is the time for utility managements to start planning for a future that can deal with the operational challenges of renewable penetration and put in place the regulatory changes necessary to pave the way for efficiently building renewables into future plans.

Robust Market for Renewables
The last decade has witnessed large reductions in the installed cost of solar photovoltaic systems through technological innovations. Just since 2010, the Department of Energy reports that the cost of solar panels has dropped over 60%, and the total cost of solar power has dropped by about 50%. At the current pace of technological innovation, it is conceivable that utility scale solar power will reach grid-parity, in numerous territories, by the 2020s, without any state or federal subsidies. In addition to solar photovoltaics, technological innovation has made possible advanced inverters that will ease the challenges of interconnecting direct current (DC) power from solar systems to the alternating current (AC) grid. Innovation is also playing a big role in the ever improving cost and performance of battery storage systems. The economics of wind power systems have also been improving steadily. Today, utility scale wind systems are already at grid-parity at the most attractive sites without subsidies.

State-Level Actions
At the state level, there has been growing support over the last decade for mandates to ensure that a certain portion of consumption comes from renewable sources – also known as Renewable Portfolio Standards (RPS). A wide range of states spread across the nation’s regions have been active in putting mandates in place. Hawaii, has recently established the most aggressive with a target of 100% renewables by 2045. In addition to mandates, states have also responded with regulatory proceedings to modify the electric grid to become more accommodating to distributed resources, notably distributed solar and distributed storage. New York, for example, launched a major proceeding, Reforming the Energy Vision (REV) that “will lead to regulatory changes that promote more efficient use of energy, deeper penetration of renewable energy resources such as wind and solar, wider deployment of distributed energy resources, such as micro grids, roof-top solar and other on-site power supplies, and storage.”
Federal Actions

At the federal level, tax-related benefits (e.g., production tax credits, investment tax credits) have provided a major impetus for renewable development for over a decade. While there is some uncertainty over whether they will continue in the future, there appears to be wide support for federal actions to continue to incentivize renewables. The federal Clean Power Plan (CPP), for example, undertaken in response to global concerns over climate, will have a major impact on the future of renewables. The Clean Power Plan provides considerable implementation flexibility to the states, many of which may use that flexibility to encourage renewables.

Not surprisingly, the combined effect of technological innovation as well as state and federal incentives has led to substantial renewable penetration. In 2014, the U.S. added 6,250 MW of solar photovoltaic capacity, accounting for about 30% of the electric capacity added in that year, second only to natural gas. While wind additions have seen volatility from year to year because of the uncertainty over production tax credits, over the last five years, wind has accounted for 28% of electric capacity additions in the U.S.

Franchised Utilities – Nay-sayers? Not So

As the renewable train has gathered steam, traditional utilities, with franchised service territories, have been perceived in some quarters as raising system operational and cost concerns and not being adequately supportive. Utilities have had two principal concerns relative to renewable penetration, particularly distributed solar:

- **Costs:** Utilities have been concerned about being compelled to procure renewables at above-market prices either through power purchase agreements or because of inefficient net metering policies for behind-the-meter generation. In either case, their concerns center on the need to pass-through above-market arrangements in rates to their franchised customers, at a time of lackluster load growth. In addition, the utility grids require investments to accommodate distributed renewables, which consists primarily of solar PV. The utilities have voiced concerns about the fairness of spreading these new solar PV driven grid costs to customers without Solar PV.

- **Operation:** utilities have also been concerned by the operational issues associated with accepting rising amounts of renewable production. Renewable power production is highly variable on an inter and intra-hour basis and raises a host of operating concerns including maintaining voltage, impacts on equipment such as load tap changers, maintaining load and generation balance minute-by-minute, system safety, and maintaining power quality. Beyond a certain threshold, increasing distributed resources has an impact on the electric system for which compensating actions have to be taken (at a cost). The cost of accommodating distributed resources is lower for a given level of penetration, if that penetration is guided so as to occur in the “best” places, but can rise significantly if location choices are driven by the uncontrolled actions of individual customer decisions (Figure 1).

These concerns, while real, must be weighed against the substantial benefits of renewable energy, and utilities must address the cost of accommodating renewable generation on a more localized, system impact, basis.

Planning for a Long-term Future with Renewables

Utilities are aware of the benefits, especially over the long-term. In the case of solar photovoltaics, these benefits include: a technology that is very scalable, once the economics are established; short construction lead times; no need for cooling water; low maintenance needs; ability to locate “optimally” in congested areas of the grid, thereby avoiding costly and long lead time transmission and distribution infrastructure; no carbon footprint; (Figure 2).
As utility management, their Boards look to the future, the benefits of incorporating renewables into their plans can be very persuasive, particularly if technological innovation continues to drive renewables to grid-parity and companies have to comply with increasingly stringent CO2 reduction requirements, going beyond the CPP over time. In fact, an examination of utility plans and thinking in different regions show that this trend is already visible. As one example, Dominion, a large eastern utility showed in its 2015 Integrated Resource Plan that its “least cost plan,” which was dominated by gas builds, did not meet its CPP goals. The company proposed alternative plans, including a solar-heavy plan that meets its CPP goals and performed reasonably on total cost. Our ongoing work suggests that in the 2020s a large number of utilities are already indicating they will look closely at the competing merits of deploying increasing amounts of renewables versus moving to gas-heavy plans. This competition essentially between renewables and gas will become more intense, if states begin to go beyond the CPP, or if substantial zero emission nuclear capacity is retired based on economics. Importantly, this will require the utilities and their stakeholders to effectively address the rate and system impacts of renewable energy on a more localized basis and with adequate and consistent demonstration of cost recovery and prudent operational principles to their regulatory bodies.
We believe the benefits of incorporating renewables in future utility planning are demonstrable, and the time is now for CEOs and their Boards to start work earnestly on several related questions:

- Establishing the true cost of accommodating renewables, including location-specific impact analysis and a recommendation of the levers to be used to guide location
- Evaluating alternative long-term resource portfolios, and the role of renewables and energy storage in providing a degree of protection against gas price volatility, uncertainty of nuclear retirements, and potential for state actions to go beyond the current CPP and RPS requirements
- Alternative ownership and compensation models for renewable ownership and the role of traditional rate-basing of capacity and operating costs

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Source: Pace Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalable technology</td>
<td></td>
</tr>
<tr>
<td>Short construction lead time</td>
<td></td>
</tr>
<tr>
<td>No cooling water needs</td>
<td></td>
</tr>
<tr>
<td>Low maintenance needs</td>
<td></td>
</tr>
<tr>
<td>Avoid transmission and distribution infrastructure through optimal location</td>
<td></td>
</tr>
<tr>
<td>No carbon footprint</td>
<td></td>
</tr>
<tr>
<td>Direct cost of compensating actions</td>
<td></td>
</tr>
<tr>
<td>Operating and safety issues</td>
<td></td>
</tr>
</tbody>
</table>