



## 2018 outlook on renewable energy

My take: Marlene Motyka

Heading into 2018, the renewable energy industry faces an unusual degree of policy uncertainty, but it's also riding some strong tailwinds. Topping the list of proposed policies or rulings contributing to uncertainty are tax reform and the solar trade case, which have slowed wind and solar deal activity as they wind their way through the federal legislative and executive branches.<sup>1</sup> At the same time, solar power growth has eased off the breakneck speed of recent years, as developers seek new customers beyond the eager early adopters that helped launch the industry. But to put these issues in perspective, as of this writing in early December, the most potentially impactful policies have not yet been finalized. And despite short-term uncertainty, renewable power sources are riding some very strong tailwinds that will likely continue to promote growth in the longer term. Among these are declining wind and solar prices, rising demand in most segments, an expanding array of technology advances, the trend toward greater decarbonization of the economy, and a promising slate of new and growing demand sources.

## Policy uncertainty is casting a shadow on renewable investment in the short term

While observers from outside the renewable industry might expect the administration's intention to withdraw from the Paris climate accord and dismantle the Clean Power Plan (CPP) to pose roadblocks, the industry is more likely concerned about a trio of policy proposals and federal actions that have yet to be resolved as of early December. These include federal tax reform legislation, the Section 201 solar trade case, and the US Department of Energy's (DOE) proposed grid resiliency pricing rule. The tax reform legislation currently being considered contains provisions that would likely be unfavorable to the wind and solar industries if they end up in the final bill and it becomes law. Among these is the Base Erosion Anti-Abuse Tax (BEAT) provision, which would limit many renewable financiers from monetizing tax credits and would likely dampen tax equity investment in the industry.<sup>2</sup> Other provisions that may concern the industry include potentially reducing the value of the production tax credit (PTC) for wind beyond the current phase-down, toughening eligibility requirements for PTC benefits, and limiting interest expenses and allowable deductions.<sup>3</sup>

Overall, reducing corporate tax rates could cut the value of depreciation benefits for renewables and other industries. Lower tax rates could also reduce the supply of tax equity financing, on which many renewable developers have depended.

Another source of uncertainty is the Section 201 solar trade case, which could result in a tariff or quota on imported solar panels. The proposed tariff would increase utility solar system prices by 33 percent, potentially jeopardizing current project development pipelines and slowing new development.<sup>4</sup> A final decision is due in late January. And finally, the DOE's proposed grid resiliency pricing rule would favor coal and nuclear over all other energy sources in wholesale markets, since most of those plants could store a 90-day supply of fuel on-site.<sup>5</sup> The Federal Energy Regulatory Commission's decision on whether to implement the rule is expected to be announced in January.



## Paris Agreement and Clean Power Plan challenges are unlikely to derail clean energy transition

Much has been written about the pending US withdrawal from the Paris Agreement on climate change mitigation, announced in June 2017, and the administration's campaign to dismantle the CPP, which was designed to uphold US obligations under the Paris Agreement. But withdrawing from these initiatives doesn't happen overnight; the United States can't officially quit the Paris Agreement until 2020, and the fate of the CPP, which was stayed by the courts even before repeal attempts began, may be litigated for years. And even if these policies could be unwound quickly, it's unlikely to stop the electric power industry's ongoing transition to cleaner energy sources. Polls showed nearly 60 percent of Americans opposed the US exit from the climate agreement;<sup>6</sup> in response, various leaders of cities, states, businesses, colleges, and other organizations across the country formed a network representing more than 127 million Americans and \$6.2 trillion of the US economy to demonstrate continued US commitment to climate action and tally ongoing progress.<sup>7</sup>

## Customer demand is increasingly underpinning renewables growth

In fact, robust customer demand is one of the key factors likely to bolster renewable development in the near term. Corporations, in particular, have been rapidly expanding renewable procurement in recent years. By early December 2017, 117 companies had committed to 100 percent renewable power as part of the RE100 campaign.<sup>8</sup> And the movement is spreading from large companies to small and mid-sized companies, as many larger companies begin to require sustainability measures be met across their supply chains.<sup>9</sup> In [Deloitte's 2017 Resources Study](#) of business and consumer attitudes on energy, about half of business respondents said they are working to procure more electricity from renewables.<sup>10</sup> Many cities are also going green. By late 2017, 170 mayors had pledged their support for a community-wide transition to 100 percent renewable energy in cities, towns, and communities across the United States<sup>11</sup>—and a handful of US cities have already reached that goal.<sup>12</sup>

Residential consumers' enthusiasm for renewables is also increasing and holds promise for boosting demand. In [Deloitte's 2017 Resources Study](#), 37 percent of residential consumers identified "increasing the use of solar power" as a top energy issue and 25 percent cited "increasing the use of wind power" as a top issue, both up four points over the previous year.<sup>13</sup> And renewables are more accessible to most residential and business consumers than ever before, whether through purchasing green power from utilities, installing rooftop or on-site renewable generation, or buying shares in community solar projects—which are proliferating rapidly. According to GTM Research, community solar is driving a significant portion of nonresidential solar growth and is likely to comprise up to 30 percent of nonresidential installations in 2017.<sup>14</sup>

## Most renewable procurement is now voluntary rather than mandate-driven

Much of the US wind and solar development to date has been driven by state renewable portfolio standards (RPS). But mandate-driven procurement has been eclipsed by voluntary procurement due to plummeting prices in recent years. And this trend is likely to grow, as wind and solar increasingly undercut other resources.

The levelized cost of energy (LCOE) for a wind plant has fallen 66 percent since 2009, while the solar LCOE fell 85 percent.<sup>15</sup> And both have been regularly undercutting coal and nuclear energy in wholesale markets. In this environment, not only has most procurement become voluntary, but renewables are also expanding into states without RPS mandates. For new generation build, the LCOE for wind plants being built now is already lower than both coal- and gas-fired plants, and the LCOE of solar PV plants is currently below coal-fired plants and projected to undercut a typical combined-cycle gas turbine in the next five years.<sup>16</sup> One big caveat is that wind and solar are not considered dispatchable energy sources, like gas, coal, and nuclear plants, since energy production is intermittent. But advances in energy storage and grid modernization are helping to address some of those issues, as will be discussed below.

## Key solar market segments are maturing, while others grow and show longer-term potential

One final headwind has been the challenge of attracting the next tranche of buyers beyond the early adopters that fed growth until now, which has led to a solar deployment slowdown in 2017. While US wind power capacity added from January-September 2017 was up 78.6 percent from 2016, solar additions fell by 21.4 percent.<sup>17</sup> Residential and utility-scale solar deployment has slowed, while nonresidential solar, which includes corporate, government, and community installations, is expected to grow 9 percent in 2017.<sup>18</sup> Despite expansion into new states as prices continue to fall, new residential solar system sales do not seem to be enough to offset relative weakness in top markets such as California. In the utility industry, sluggish solar growth is expected to continue in 2017 and 2018 before potentially rebounding in 2019, as utilities focus on projects to come online in 2019 or later. Some projects have been delayed, as potential customers have hesitated to sign power purchase agreements until the trade case is resolved. The commercial sector appears to show long-term potential as energy managers across a variety of industries become more educated about solar opportunities and as more efficient financing structures emerge.



### Three emerging trends are likely to bolster renewable growth longer term

Some longer-term trends are bringing new sources of demand for renewables that could help offset some of these headwinds over time. Three of these are 1) utilities' increasing commitment to decarbonization, 2) burgeoning renewables deployment in emerging markets, and 3) sharpening focus on resilience, especially in response to increasingly severe weather events.

A growing number of electric utilities are announcing plans to actively support decarbonization of large sectors of the economy by electrifying them and powering them through zero carbon energy sources such as wind and solar.<sup>19</sup> The sectors targeted for electrification (if not already electrified) and carbon reduction usually include power as well as transportation (through electric cars, trucks, buses, ports, etc.), and may also include heating and cooling, the building sector, and industrial processes. Utilities are motivated by the prospect of driving electricity demand growth, while also responding to customer and

shareholder preferences for environmental stewardship. In addition, some utilities had already planned their paths toward decarbonization when developing strategies to comply with the Clean Power Plan.

Decarbonization and declining prices also appear to be boosting demand for renewables in many areas of the world—both in developed countries across Europe and Asia, and increasingly in emerging markets. In many developing countries, electricity demand is expanding rapidly with population growth and rising household consumption. But it may not be cost-effective for utilities or governments to expand electric grids to remote rural areas, so some countries are turning to off-grid energy systems based on wind, solar, small hydro, or biomass to provide electricity more affordably and sustainably. As wind and solar costs fall to unprecedented lows in countries such as Chile, India, and the United Arab Emirates, and renewables become the cheapest form of new power generation in key markets, governments are boosting deployment.<sup>20</sup> In fact, with China in the lead, emerging economies are expected to overtake developed countries in installed wind and solar capacity in the near future.<sup>21</sup>

Finally, due to increasingly severe weather events—such as the hurricanes that devastated Texas, Florida, and Puerto Rico in 2017, and the perception of mounting cyber and physical risk on the grid—many households, businesses, governments, and communities are looking more closely at systems built around renewable energy. Solar panels, battery storage, microgrids, and other distributed energy resources are often seen to add resilience. This is likely because while not immune to storm damage, they're decentralized, some can be islanded and run off-grid when necessary, and they're expected to come back online more rapidly.

### **Advanced technologies are transforming renewables from a grid integration challenge into a solution**

While sources of demand for renewables continue to expand and diversify, technological advances are paving the way for increased deployment by easing renewable integration into the grid. Two areas of rapid progress are energy storage and digitalization. First, storage; solar and wind have become more viable as replacements for traditional fuel sources when paired with storage capacity. And the cost of lithium ion battery modules has declined more than 70 percent since 2012, driving sharply increasing energy storage deployment in many countries.<sup>22</sup> According to IHS Markit, residential solar and electric battery storage could become cost-competitive with grid electricity by 2020.<sup>23</sup>

At the same time, digitalization is enabling smoother renewable energy integration by adding flexibility to the grid. Renewable plant owners and operators are using advanced analytics, cloud technology, robotics, and artificial intelligence (AI) to improve the value and reliability of renewable energy assets. Wind farms can increasingly enhance output by computing and performing analytics at the grid edge. Wind farms can be digitally integrated into more autonomous, self-learning systems in which turbines talk to each other, self-manage, and interact with the grid. The National Center for Atmospheric Research (NCAR) developed analytic software that applies AI to improve wind forecasting. The program helps utilities cut costs by enhancing system output and reducing requirements for backup generation. The NCAR is working on similar learning software for solar forecasting.<sup>24</sup>

Blockchain is another digital innovation that is already helping integrate renewable energy on the grid. The first pilot project in Europe using a networked fleet of home energy storage systems and blockchain technology recently began operating. The regional transmission system operator and storage provider are using an intelligent blockchain-enabled platform to absorb excess output from wind plants in northern Germany into a networked pool of home battery storage systems, and then discharge this energy when and where required. This solution reduces transmission bottlenecks, limits the need to curtail wind output, and helps decrease fossil fuel-fired generation, while also compensating home storage system participants with free electricity.<sup>25</sup> Through technologies like analytics, AI, and blockchain, digitalization could not only make it easier to integrate renewables into the grid, but can also help markets derive value from distributed renewables and begin compensating owners for providing services to the grid. So instead of being viewed as intermittent resources that can disrupt the grid, wind and solar may soon be seen as potential solutions.

**In sum, the renewable industry is experiencing a level of policy uncertainty that may be unprecedented even for an industry accustomed to the shifting sands of federal and state policy. But despite short-term uncertainty, renewable energy is well-entrenched and growing wind and solar markets are finally reaching the scale and scope to expand exploration of new technologies that show potential to further reduce costs and spark growth. The pace of growth will likely moderate as markets mature, and US policy uncertainty may cause additional challenges along the way. But longer term, powerful enablers such as robust customer demand across multiple business segments and global regions, declining prices, decarbonization, digitalization, and the drive to boost resiliency will likely underpin continued strong growth. From a business perspective, electric utilities and renewable developers will likely have to become increasingly adept both at working together and at navigating a complex ecosystem that also includes technology providers, new competitors from non-energy industries, system operators, newly empowered consumers who are providing energy to the grid (aka “prosumers”), and regulators. It may be a challenging landscape to navigate, but the potential for rewards could be substantial.**

## Let's talk



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