PAVILION

U.S. RENEWABLES MARKET
A BRIEF OVERVIEW

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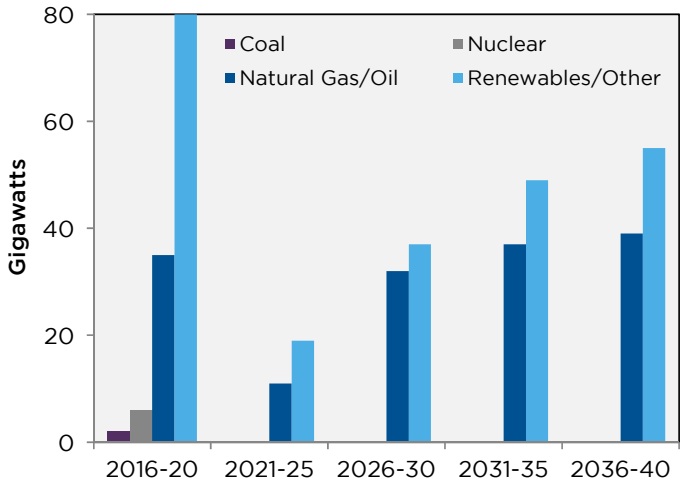
Electricity Supply and Demand Trends

According to the 2016 Annual Energy Outlook published by U.S. Energy Information Administration (EIA), U.S. demand for electric power is expected to grow by 1.0% per year. This is an increase over its 2015 outlook which projected demand growing at 0.8% per year. Demand is affected primarily by population growth and economic activity. Due to advancements in energy efficiency, demand growth has been slower than GDP growth in recent years and this is not expected to change.

Electricity generation capacity totaling 392 gigawatts (GW) is expected to be added from 2016 to 2040. In the near-term, capacity additions are replacing retiring coal-fired plants, largely due to low natural gas prices and implementation of the Mercury Air Toxic Standards. Coal-fired capacity will decline from 284 GW in 2015 to 215 GW in 2040, with much of that capacity gone by 2025. As seen in Figure 1, renewables will supply much of that growth, although natural gas will grow significantly as well. In the next 10 years, 97 GW of renewable and 44 GW of natural gas capacity will be added to the grid. The steady growth of natural gas capacity is necessary to maintain baseload generation and provide grid reliability, since wind and solar resources are not always available. The actual mix of future power generation will depend to a significant extent on future natural gas prices. Today, gas-powered plants compete with coal for dispatch decisions. Increasingly, in the longer term, they will compete with wind and solar capacity.

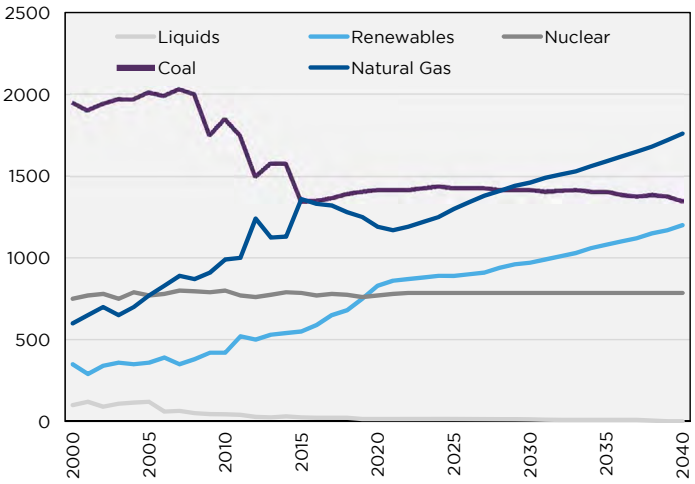
Despite the commonly-held view that coal is rapidly disappearing, power generation from coal actually will remain relatively flat over the next two decades. It is certainly true that few, if any, new coal plants will be built. As seen in Figure 2, however, coal will generate more electricity than renewables in the U.S., even in the year 2040. Of course, its share of the total will shrink—from 33% to 26%.

Figure 1: Projected Cumulative Additions to Electricity Generation Capacity by Fuel



Source: "No CPP" case, U.S. Energy Information Administration's Annual Energy Outlook 2016.

Figure 2: Projected Net Electricity Generation by FuelCapacity by Fuel



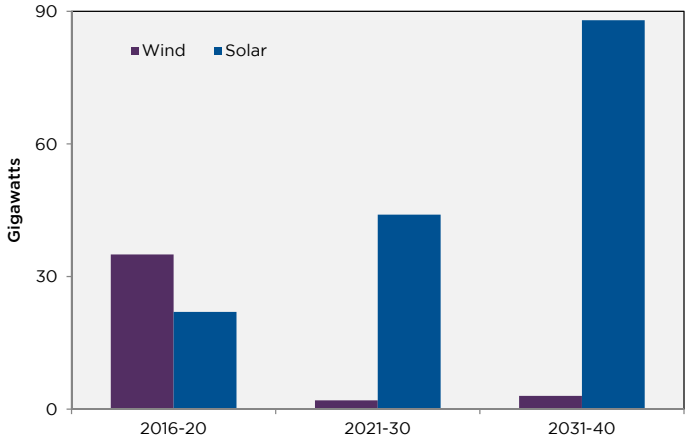
Source: "No CPP" case, U.S. Energy Information Administration's Annual Energy Outlook 2016.

In summary, renewable energy has grown rapidly and will continue to grow. But even two decades from now, renewables will provide less electricity in the U.S. than either natural gas or coal.

Wind and Solar

Wind and solar energy are the only two renewable sources adding meaningful capacity in the United States for the foreseeable future. The EIA expects wind and solar capacity to increase by 4% per year from 2016 to 2040, adding almost 230 GW of generating capacity over this period.

Figure 3: Projected Additions to Capacity



Source: "No CPP" case, U.S. Energy Information Administration's Annual Energy Outlook 2016.

Projected growth is a robust 10% per year for the next four years, but then slows to 3% annually from 2021 on. Many investors may find this modest level of growth surprising.

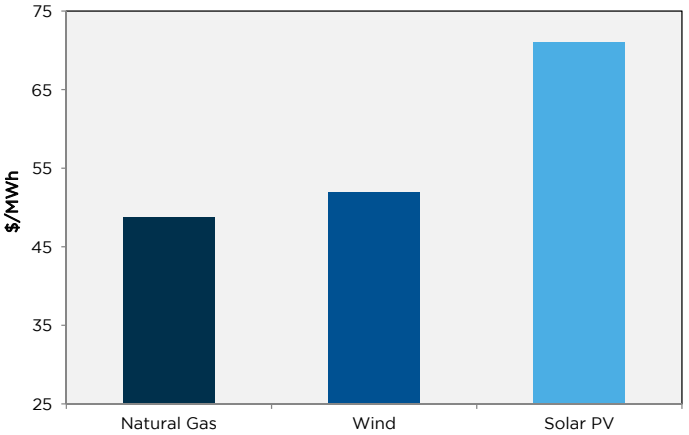
Solar power provides the largest increase in renewable capacity, from 25 GW in 2015 to more than 202 GW in 2040. Solar installations have benefitted from significant reductions in technology costs in recent years. Since 2008, the cost of solar photovoltaic (PV) panels has fallen about 80%. At the same time, the efficiency of the panels has risen, leading to greater solar energy production at lower costs.

Wind, however, has been trending in the opposite direction and the expected increases in wind capacity are much smaller. Wind will be hampered by the need to access wind sites farther from existing transmission lines or with less favorable development characteristics. In addition, wind subsidies phase out faster and sooner than solar (see Tax Credits below). With slowing growth in wind and faster growth in solar additions, solar capacity is expected to surpass wind capacity in 2033.

Price Competitiveness of Renewables

Levelized cost of electricity (LCOE) is often cited as a summary measure of the overall competiveness of different generating technologies. It represents the per-kilowatt hour cost of building and operating a generating plant over its assumed life. Key inputs to calculating LCOE include capital costs, fuel costs, fixed and variable operations and maintenance (O&M) costs, financing costs, and an assumed utilization rate for each plant type. The importance of the factors varies among the technologies. For technologies such as solar and wind generation that have no fuel costs and relatively small variable O&M costs, LCOE changes in rough proportion to the estimated capital cost of generation capacity.

Figure 4: Levelized Cost by Fuel Source for Plants Entering Service in 2018



Source: "No CPP" case, U.S. Energy Information Administration's Annual Energy Outlook 2016.

As Figure 4 demonstrates, the levelized cost (excluding tax credits) of both wind and solar remains above that of natural gas. Tax credits available today bring the cost of wind—but not solar—below that of natural gas. As noted below, however, current law phases these tax credits out over time.

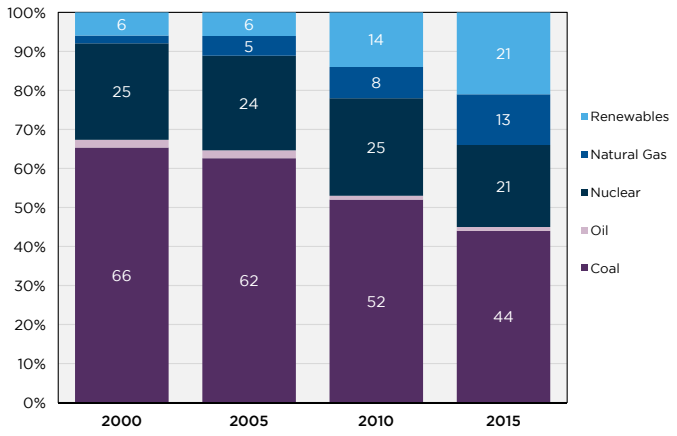
Regulatory Trends

Clean Power Plan - Dictates from Washington D.C. that would encourage the development of renewables will likely slow dramatically under the new administration. The best example of this is the Clean Power Plan (CPP), an ambitious effort by the Environment Protection Agency (EPA) to control greenhouse gas emissions under the Clean Air Act. It requires states to reduce carbon dioxide (CO2) emissions from existing fossil fuel generators, thus accelerating the shift towards less carbon-intensive (i.e. renewable) power generation. In early 2015, the U.S. Supreme Court granted a stay, halting implementation of the CPP pending the resolution of legal challenges to the program. Five separate lawsuits were filed by more than two dozen states and numerous industry groups. One prominent member of that coalition was former Oklahoma Attorney General Scott Pruitt, who is now the Administrator of the EPA. There are very few safe predictions in politics or energy markets, but we are confident in stating that CPP will not be implemented in its current form. Everything else being equal, this will slow the move towards renewables.

Tax Credits - Tax equity (i.e. investors investing solely for the tax benefits) is a very important component of financing most renewable projects in the U.S. Wind and solar development would slow dramatically if and when these tax credits disappear (at least at today's natural gas prices). In December 2015, the U.S. extended the production tax credit (PTC) for wind and a 30% investment tax credit (ITC) for solar. Unlike prior extensions, however, the current extension mandates a phase-out that reduces the value of these credits over time before final expiration at the end of 2019. The PTC retained its full value (2.3 cents/kWh) through 2016, but declines to 80% of the current value in 2017, 60% in 2018, and 40% in 2019. Commercial and residential solar ITCs were also extended, but also face declines in value to 10% and 0% respectively by 2022. Unless these tax credits are extended, the development and construction of renewables projects will certainly slow upon their expiration.

State Renewable Portfolio Standards - Renewable Portfolio Standards (RPS) or Renewable Energy Standards (RES) have been adopted by 29 states. These statutes require utilities operating in their state to source a minimum percentage or amount of renewable electricity. These legal mandates have been, and will continue to be, a driving force behind the development and construction of wind and solar farms.

Figure 5: MN Electricity Generation Mix (% Megawatthours)

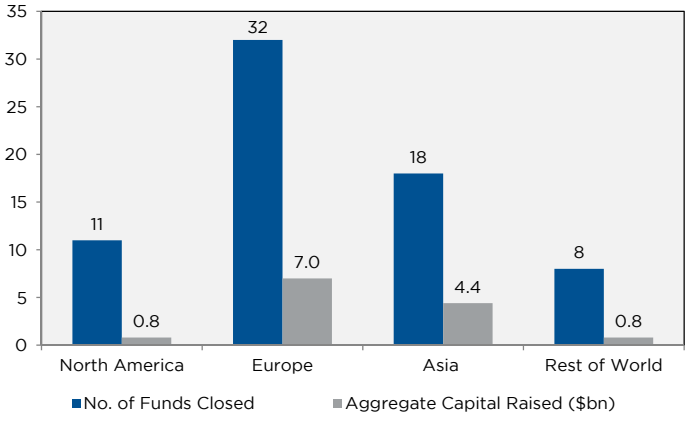


Source: EIA

Deal Activity

North America is still a relatively small market for private capital invested in renewable energy. As demonstrated in Figure 6, North America trails Europe and Asia by wide margins in both number of funds and aggregate capital raised. In addition, none of the 10 largest renewable energy deals completed in the first eight months of 2016 were located in the United States.

Figure 6: Renewable Energy Fundraising (2011 through August 2016)



Source: Preqin

These figures demonstrate that deal flow is somewhat limited in the United States. At the same time, though, private capital has not flooded into this country. Our view is that these two factors roughly balance each other and, on average, renewable assets in the U.S. are not overvalued or undervalued when compared to similar projects in other developed countries.

Return Compression

Because of the many investors who wish to invest in renewable energy for social, environmental, and political reasons, the returns available from investments in this sector will be, by definition, lower than their risk/return profile would otherwise dictate. Investors should be cognizant of, and willing to accept, this fact. Because of this significant demand by investors and their fund managers, expected returns are generally quite modest today. Infrastructure managers are reporting that returns for de-risked renewable energy projects in developed markets like the U.S. have been pushed down into the mid-single digits.

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