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Insurance Investment Management

The Utility Industry's Role in Decarbonization

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Overview

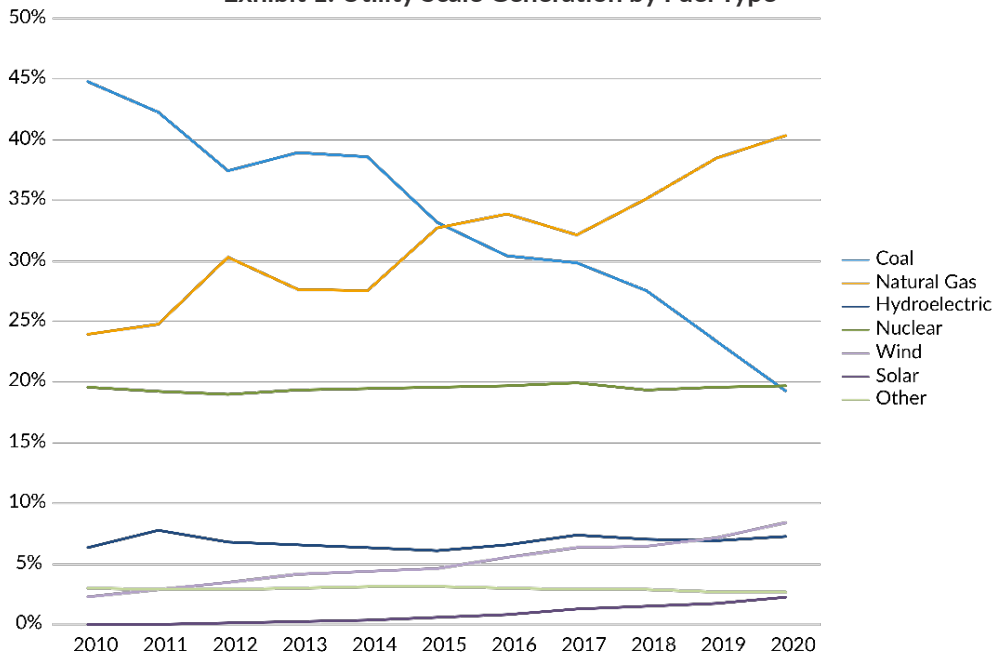
While ESG has been a prominent investment theme for years, the environmental component has recently exhibited significant momentum. In particular, decarbonization has become a goal that has impacted practically every corner of the investment universe. Increasingly, as part of this movement, many countries and companies have explicitly stated a variety of carbon reduction goals with the intent of reaching net-zero carbon anywhere between 2035-2050. While the practicality of these efforts can be debated, there is no denying that the effort is underway.

Ironically, the goal of reaching carbon neutrality hinges on a sector that has historically been shunned by ESG investors - utilities. Eventually, many industries will play a role in reducing carbon emissions, but most of them will rely on green electricity to be truly carbon free. For example, the auto industry is increasingly focused on producing electric vehicles (EV). If the electricity used to power EVs is generated from fossil fuels such as coal, then carbon emissions have not been effectively addressed. The recent attention given to the promise of hydrogen is another example. Hydrogen has enormous potential to help reach decarbonization goals, but the production of hydrogen uses a considerable amount of electricity. To be truly carbon free, this electricity will need to be from green or renewable sources. Ultimately, the ability to achieve carbon reduction goals depends on the ability to generate clean electricity. Then downstream users in energy intensive industries such as steel, transportation, mining, and commercial construction, will continue to innovate in order to capitalize on green sources of energy. The good news is that the utility industry is well down the road in addressing carbon emissions. Initially, the industry was slow to embrace the clean energy movement - even actively resisting external pressures to change. Now, however, practically every utility company has realized the necessity of investing in clean energy, and it is a major focus across the industry.

Evolution of the Generation Mix

As the following chart shows, the electric utility industry has invested heavily into the transition away from coal over the past decade. Over this time, coal's contribution to electrical generation production in the United States dropped from roughly 45% to around 19%. Initially, this transition was primarily due to increasing generation from natural gas. The primary driver behind this transition was not environmental concerns but rather the economic benefit from using the cheaper natural gas that was being unleashed by the shale revolution. While natural gas is effective at reducing carbon emissions, it still falls short in reaching the goal of zero-carbon emissions. In fact, more and more people are asking the question, "Is natural gas the new coal?"

Exhibit 1: Utility Scale Generation by Fuel Type



Source: U.S. Energy Information Administration

The next biggest factor in the displacement of coal is the more recent proliferation of renewable energy generation. This has been led primarily by wind with additional contributions from solar. While wind still only accounts for approximately 8.4% of total generation, this is up from 1.9% a little over a decade ago. Solar has been slower to catch on and still only accounts for around 2.3% of utility scale generation. When including an estimate of small-scale (i.e. residential) generation, solar accounts for an estimated 3.3% of the total.

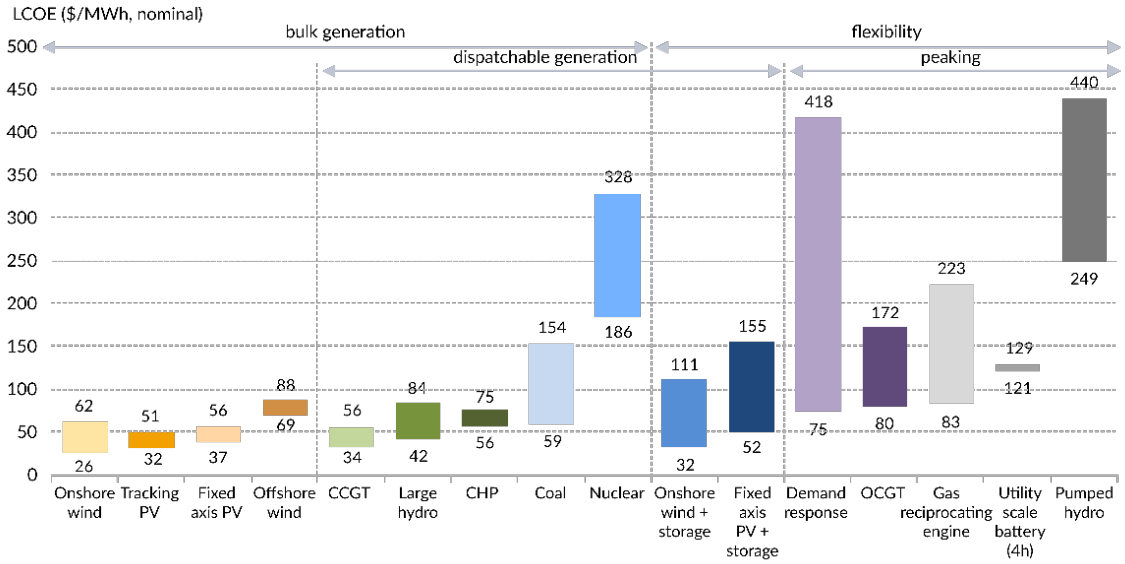
Two other sources of generation that play a role in decarbonization are nuclear and hydro. Notably, despite the growth of wind and solar, nuclear is still the largest source of carbon-free electricity. While both nuclear and hydro are considered zero-carbon emitters, they come with other environmental concerns. Nuclear also has the added drawback of being at a cost disadvantage relative to other sources. Both sources of generation have been relatively stable over the past decade, with nuclear accounting for roughly 20% and hydro accounting for roughly 7% of total utility generation.

Relative Cost of Renewables

The biggest factor in the acceleration of renewables growth has been the rapidly declining costs of building new generation facilities. The cost of building a new facility is often stated as the levelized cost of electricity (LCOE). LCOE reflects the revenue per unit of electricity generated that would be necessary to recover the building and operating costs of a generator for a specific life cycle. The LCOE calculation includes several assumptions, such as capital costs, financing costs, fuel costs, utilization rate and fixed and variable operations and maintenance (O&M) costs. When consistently applied, however, it allows for the useful comparison across different generating technologies.

The LCOE for renewables has declined dramatically over the past decade. While this has been aided by tax credits, renewables have increasingly become cost competitive on an unsubsidized basis. Since 2009, the unsubsidized LCOE of solar has declined 90% and the unsubsidized LCOE of wind has declined 71%, according to a study by Lazard Ltd. The primary contributor to this decline has been the significant decline in prices for photovoltaic (PV) cells and wind turbines. In addition, the LCOE for wind and solar also benefits from substantial O&M and fuel savings relative to coal, nuclear, and open/closed cycle gas turbines (OCGT and CCGT). Essentially, wind and solar generation has nearly zero marginal costs. The following chart shows the LCOE of various types of generation clearly illustrating the attractiveness of investing in renewable generation projects.

Exhibit 2: Levelized Cost of Electricity



Note: LCOEs exclude tax-credits (ITC & PTC) and curtailment. The LCOE range represents a range of costs and capacity factors. Battery storage systems (co-located and stand-alone) presented here have four-hour storage. In the case of solar- and wind-plus-battery systems, the range is a combination of capacity factors and size of the battery relative to the power generating asset (25% to 100% of total installed capacity). Categorization of technologies is based on their primary use case.

Source: BloombergNEF as of 12/10/2020

Not only has the LCOE of wind and solar fallen to levels substantially below that of older technologies, in many cases, new renewable projects are becoming cheaper than the marginal operating costs of many existing plants. This has been verified by anecdotal reports from companies, who find it increasingly attractive to invest in renewable projects while shutting down higher cost plants, particularly coal and nuclear. According to the EIA, since 2013, 8.4GW of nuclear generation has been retired early and another 5.1GW is scheduled to retire in 2021. The bulk (4.1GW) of the 2021 retirements will come when Exelon retires the Dresden and Byron plants in Illinois. In just 2020 alone,

9.2GW of coal plants have been retired. At the same time, 14.2GW of wind capacity, 10.1GW of solar capacity, and a net 4.5GW of natural gas generation came online.

Role of Tax Incentives

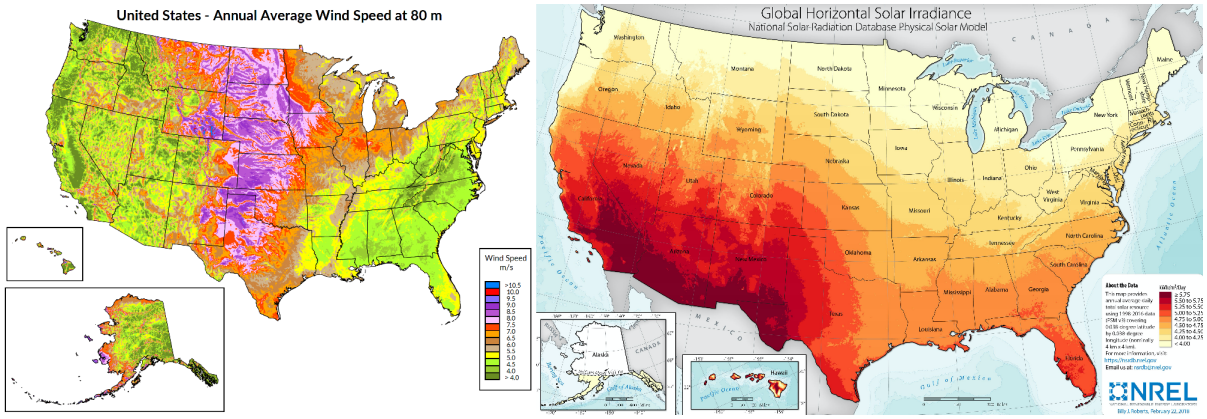
According to EIA estimates, 2020 was a record year for wind turbine installations. The total of 14.2GW surpassed the previous record of 13.2GW set in 2012. Both years benefitted from a year-end push to qualify for tax credits that were scheduled to decline or expire at the end of the year. As part of the spending bill that was passed just before the end of 2020, the tax credits were extended and enhanced. For solar projects, the investment tax credit (ITC) of 26% is extended for projects that begin construction prior to December 31, 2022 and is phased out for projects that start in subsequent years. For wind projects (and other qualifying facilities such as geothermal and biomass), the production tax credit of 60% was extended for projects that begin construction before December 31, 2021. In addition, a new ITC of 30% was created for offshore wind projects that begin construction by December 31, 2025. The extension of tax credits, along with increasing acceptance by regulators to include renewables investment in the rate base, will help the utility industry to continue making significant investments in wind and solar for the next few years. These tax incentives undoubtably make investment in renewables more attractive but they are increasingly unnecessary; many onshore wind and solar projects have now become the cheapest source of generation in certain locations, and the returns are now often attractive on an unsubsidized basis. While utilities certainly welcome the recently passed extensions, much of the industry's plans would have been pursued anyway.

While the year-end spending package included an extension of the tax credits and a few other incentives, it was not the comprehensive legislation that many decarbonization proponents are looking for. Things to look for in future legislation include carbon pricing/regulation and additional incentives for developing technologies such as battery storage, electric vehicles, and hydrogen infrastructure. Much of this agenda is addressed in the recently re-introduced Growing Renewable Energy and Efficiency Now (GREEN) act. The nuclear industry is particularly interested in any carbon pricing or regulation as it would likely improve the relative economics of carbon-free nuclear generation. President Biden's recent executive orders address many of these topics, and it remains to be seen how the legislative process will play out.

Current Limitations Facing Renewables

When analyzing the LCOE of renewable technologies, the wide range of electricity prices needed to produce an acceptable return for renewables projects is especially significant. As previously mentioned, there are many factors that affect the ultimate return for an investment in renewables. A major factor (if not the major factor) is the geographic location of the project. As the following wind and solar maps from National Renewable Energy Laboratory (NREL) show, the Midwest and Southwest are renewable resource rich while the Northeast and Northwest are noticeably resource poor. While the cost of renewable energy is decreasing everywhere, the utilities with footprints in the renewable resource rich areas have the highest potential benefit from replacing coal and natural gas generation with renewables.

Exhibit 3



Source: National Renewable Energy Laboratory (NREL). Wind resource estimates developed by AWS Truepower, LLC for windNavigator. Web: http://www.windnavigator.com, http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: Albers Equal Area WGS84.

While it may be debatable whether tax credits for onshore wind and solar are still necessary, the extension and improved terms of the tax credits were, however, necessary for offshore wind projects. According to American Clean Power Association, there are 14 offshore wind projects totaling 9.1GW expected to be operational by 2026. These projects have been challenged with permitting delays, and none of them were able to start construction before the previous ITC expiration of December 31, 2020. Unfortunately, offshore wind is still a few years behind onshore wind and solar on the cost curve. That said, offshore wind holds significant potential benefits for otherwise resource poor areas such as the Northeast.

What's Next?

While wind and solar have a clearly established role in decarbonization, other technologies must continue to develop in order to reach the zero-carbon goal. The primary drawbacks of wind and solar are the geographic limitations and the related intermittent availability of their output. As the NREL maps show, wind speed and solar intensity vary significantly across the United States. Fortunately, solar availability at least follows the daily and seasonal power demand cycle. Still, neither can be relied on to provide consistent and predictable availability. The utility industry is pursuing additional technologies to address this limitation, primarily focused on storage and hydrogen.

Adding battery storage to the existing grid is the most immediate way of addressing intermittent availability of wind and solar generation. Currently, the cost of adding utility scale battery storage is still uneconomical, but the cost is coming down rapidly. There are several companies integrating storage solutions into their operations, and growth is expected to accelerate as the cost comes down. Battery storage is bidirectional, meaning it can both distribute and absorb electricity, effectively making the switch within seconds. This attractive characteristic is particularly useful in meeting the increased demand during evening hours after the sun goes down. The drawback is that battery storage is finite, and it would require an enormous amount of storage capacity to keep the grid stable for an extended period.

Another potential longer-term solution to the intermittent availability problem is hydrogen. While the benefits of hydrogen have been known for decades, the attention given to it seems to have exploded

over the past year. The development of a hydrogen infrastructure is in the very early stages, so it will likely be well into the future before we find out if this attention is warranted. Hydrogen development has wide ranging impacts on a variety of industries. For the Utility industry, it holds the potential to replace coal and natural gas as dependable baseload generation. This would be accomplished by using excess green electricity to create hydrogen during off-peak hours and then using hydrogen to power a generator when renewables are unable to meet demand. Essentially, hydrogen could become a more effective long duration energy storage option.

Investment Implications

As the recent power outages in Texas highlighted, there is a strong need for investment across all areas of our electrical infrastructure. This is even more necessary as the electrification of our economy puts increasing demands on the grid. At times, the electric utility industry may find it difficult to balance the transition to green energy, the need to enhance reliability, and the pressure to keep customer bills low. Over the next few years, this environment will present both a significant challenge and an attractive opportunity for the industry. The funding needs will be substantial as companies look to grow their rate bases through investments in grid modernization and green electricity generation. While growing the rate base is a long-term net positive for the sector, the timing of investment recovery will continue to put upward pressure on debt levels in the near term. Although investors and rating agencies will likely continue to look through this period of high investment, this is a trend to be mindful of for the next year or two.

Historically, as a major source of carbon emissions, the utility sector has not screened well through the ESG lens. Not every company jumped on board initially, with some resisting the movement altogether. But in a distinct age of ESG prominence, most companies - if not all - have accepted that this is not a fleeting movement, going so far as to explicitly state decarbonization goals themselves. Many utility companies are still high emitters, but ESG investors are increasingly willing to look past the current absolute level of emissions and reward companies with clearly articulated plans to reduce emissions over time.

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