

Non-Hydropower Renewables Surging in Power Sector Market

For engineering firms working in the renewable energy sector, it may seem that the stars have aligned. Several converging factors—government incentives, increasing demand, and technological advances—have made renewables the fastest-growing market in the power sector.

Non-hydropower renewables are the only power generation type that will grow through 2022, says the U.S. Energy Information Administration (EIA).

“We’re in the midst of what Stantec refers to as the energy transition,” says Sohrab Sobhani, regional sector leader for wind energy at Stantec. “Some of the more traditional sources of power will remain, but they will provide a foundational support role going forward.”

Up until now, renewable sources have been an alternate source of energy. As we progress through the “energy transition,” green energy will become the primary source from a volume production standpoint.

Renewables still have a long way to go to become the dominant source, but they are moving rapidly in that direction. In EIA’s “Short-Term Energy Outlook,” released in January, renewables other than hydropower accounted for 12 percent of total power generation in 2020, and that share is forecast to rise to 14 percent in 2021 and 16 percent in 2022.

In EIA’s “Annual Energy Outlook 2020,” which looks forward to 2050, “the relatively sharp growth in renewables seen during the past 10 years will continue through the projection period. Total renewable generation [including hydropower] exceeds natural gas-fired generation after 2045...and renewable generation grows faster than overall electricity demand.”

“Over the past few years, we’ve seen steady growth in our renewables practice,” says Tetra Tech President Leslie Shoemaker. “We expect this growth to accelerate with the alignment of climate change priorities and increased focus on renewables.”

Or, as Black & Veatch Senior Vice President and Solar Lead Paul Skurdahl says, “The future is so bright, I gotta wear shades.”





BLUE PLANET STUDIO/GETTY IMAGES

GETTING TO COST PARITY

Renewable energy generation has been growing for decades, but it has long relied on considerable financial assistance at both the federal and state levels to compete with thermal generation systems. At the national level, the investment tax credit for solar and the production tax credit (PTC) for wind and other forms of renewable power generation have helped the industry attract investors, but they came at a cost as Congress often dithered over extensions.

“Historically, when the PTC in wind was discontinued, development in the following year in onshore wind fell by up to 90 percent,” says Sobhani. “I don’t think that will be the same going forward because wind has become more self-sustainable without the requirement for subsidies.”

Both subsidies remain, however, as they were extended in the huge stimulus package passed at the end of 2020.

“That will be a near-term boost to the market,” says Erin Toelke, vice president of energy programs at Tetra Tech. “Projects that were going to be rushed to start construction in 2021 will have a little more time, and we’re also seeing smaller clients pick up activity in the past couple of weeks because they’re going to have more access to capital from people looking for the tax equity.”

While the tax credits have supported the supply side of the market, the demand side was largely driven by the states’ renewable portfolio standards (RPS) program, which requires that a specified percentage of the electricity that utilities sell come from renewable resources.

According to a 2019 Berkeley Lab report, “roughly half of all growth in U.S. renewable electricity generation and capacity since 2000 is associated with state RPS requirements.”



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Sobhani points out that the states that have the most aggressive RPS programs—Nevada, Texas, New York—“have the lion’s share of development in the U.S. in the solar market.”

In recent years, however, the RPS programs have had less of an impact because solar and wind generation have become increasingly cost-competitive with carbon-based power.

“The International Renewable Energy Association has stated that 56 percent of new renewable power sources are cheaper than the cheapest form of new coal,” says Sobhani. “The proof is in the pudding; if there wasn’t cost parity, we would not be seeing this tremendous explosion in renewable development.”

One final accelerant for the market is the Biden Administration’s stated commitment to achieving net-zero emissions on the power grid by 2035 and economy-wide by 2050.

“We haven’t had that overarching policy in the past several years,” says Toelke. “More consistent federal policies could be the catalyst that brings it all together.”

RAPIDLY IMPROVING TECHNOLOGIES

As much as the renewables market will grow over the coming years, even more so will it change. Not only are solar and wind technologies rapidly improving, but other forms of renewable generation are coming online, and energy storage is becoming mainstream.

“Wind and solar technologies continue to improve every year,” says Matthew Thibodeau, senior vice president of consulting services at Sargent & Lundy. “We will continue to see both efficiency and cost improvements.”

“On solar photovoltaic panels, we see the price curve continuing to go down,” says Skurdahl. “And that provides indirect benefits as well. As wattage goes up, the proportion spent on support systems goes down.”

The same is happening on the wind side, he adds. “We’re seeing larger capacity factors for wind farms. Larger turbines produce more power, so the price per megawatt of wind projects is lower.”

Toelke says when she entered the field in the early 2000s, “it would have been hard to imagine the large turbines we are permitting now.” Offshore wind turbines today can generate up to 14 megawatts (MW) of power.

One of the challenges, says Skurdahl, is “a lot of the great wind farm sites have been built already, so where the projects are now is rocky or wet. You might make up some ground by having newer advanced designs going in, but it might cost a lot more money to build and construct on those lands.”

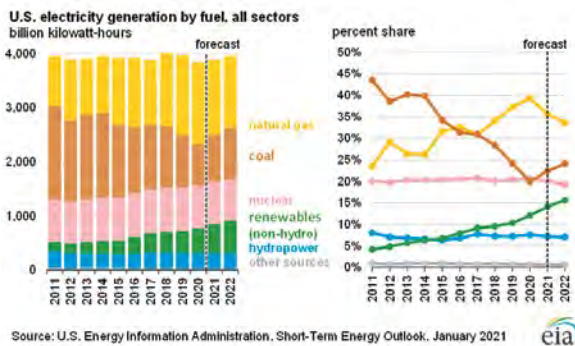
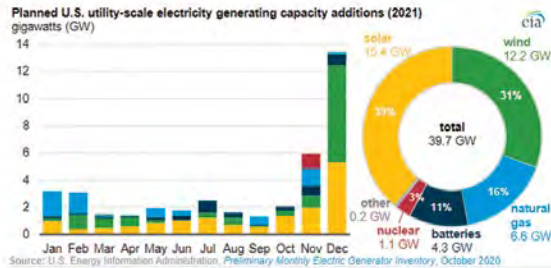
Enter offshore wind projects in the Atlantic Ocean. “We’ve been



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JANUARY 11, 2021

Renewables account for most new U.S. electricity generating capacity in 2021



hearing since 2005 that offshore wind is going to take off ‘next year,’” says Skurdahl. “Well, I think next year is finally here, and we’re going to see a flood of opportunity and activity in the space.”

Toelke concurs: “I see incredible potential in offshore wind.” Tetra Tech has supported various services and stages with 14 offshore wind projects in the Atlantic and is currently active on eight of them. “It’s one of the most exciting parts in the sector—new leases, new geographies, new technology, and a new frontier.”

Sobhani estimates that there are up to 30 gigawatts (GW) of renewable offshore wind developments slated to go into service by 2030, with New York accounting for 9 GW of the mix and New Jersey responsible for 7.5 GW.

“They are primarily being driven by aggressive legislated milestones for net-zero carbon production,” Sobhani says. “That’s not attainable for those states without offshore wind. They don’t have the real estate available for the kind of solar and onshore wind production they would need to achieve that.”

“These are massive, massive projects,” says Thibodeau. “The Dominion project off Virginia is 2.6 GW, and most of the others are around 800 to 1,300 MW. Getting them developed, financed, and built is a big undertaking.”

He adds that a big part of the work for engineering firms in the offshore wind sector is getting them connected to the grid. “One of the offshore wind projects we have worked on will connect into Long Island,” says Thibodeau. “It’s been quite a challenge figuring out how all that power is going to be integrated because of the difficulty of making grid improvements in New York City and Long Island.”

HERE COMES HYDROGEN

“Hydrogen has taken off in terms of the level of interest in the past 12 to 24 months,” says Thibodeau. “That’s using hydrogen as a fuel, blended with natural gas or burning hydrogen directly, but also using hydrogen as an energy storage medium.”

Most of the work on hydrogen right now focuses on feasibility studies. Sargent & Lundy is undertaking several projects burning a blend of hydrogen and natural gas in existing combustion turbine technology, and Stantec is working with an offshore wind developer.

“There’s a lot of power that can come out of that project, and one of the potential solutions for offtaking that much power is hydrogen production,” says Sobhani. “It’s an efficient way to store energy that demands a high level of mobility.”

While solar and wind will continue to be the big energy generators in the sector for at least the next decade, other renewable technologies, such as waste-to-energy or geothermal, will have a niche in the market. The unknown, of course, will be other technologies that may already be in the R&D stage or are just in some engineer’s musings.

“There will be a lot of creativity going into how the pieces are put together as utilities strive to meet customer demand and renewable goals,” says Shoemaker.

ENERGY STORAGE: THE FINAL PIECE?

“A renewable or carbon-free energy future cannot happen without energy storage as a large component,” says Sobhani. “Without it, it’s not possible to provide consistent, reliable energy output on a 24-hour demand cycle.”

Energy storage has come a long way in a short period. Sobhani calls it “the fastest-growing segment in the energy transition.” The reason behind that growth is that the primary storage technology right now, lithium-ion batteries, has become safer and cheaper. Sobhani estimates that the batteries are “up to 10 times cheaper than 10–12 years ago.”

That increased affordability has led to a surge in renewable energy projects that combine solar or wind with battery storage. “I would expect that 60–70 percent of our solar installations going forward would have batteries,” says Skurdahl. “The world is headed that way, and in the future, utilities and developers will do them with wind projects as well.”

The big drawback right now of lithium-ion batteries is their duration. “When the duration of the energy storage project exceeds four to six hours, a lot of competing technologies come into play,” says Thibodeau. “When you have to store a day’s worth or a week’s worth of energy, utilities are deploying longer-duration technologies, such as liquid-air energy storage, advanced-compressed-air energy storage, or other non-lithium battery technologies.”

“Energy storage companies have really lofty ambitions about cost reduction potential,” he adds. “Some of these are well-capitalized companies, and that space is moving quickly and is going to enable a lot more renewables to come online in the future.” ■

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