

Tortoise QuickTake

Sustainable Energy Podcast



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Welcome to the Tortoise QuickTake podcast. Thank you for joining us. Today, Tortoise provides a timely update on trending topics in the market.

Ed Russell: Welcome to our Tortoise sustainable energy year-end podcast. Today we're discussing global renewables for both listed and private companies. I am Ed Russell and today I'm joined from the U.S. by Jerry Polacek and from our Ecofin Platform in London by Jean-Hugues de Lamaze and Max Slee. Jerry, let's start with you. Looking at the U.S. solar market, what kind of year did the industry have in 2019?

Jerry Polacek: Ed, this year, U.S. solar achieved impressive growth with installed capacity reaching over 71 gigawatts in the third quarter. While large utility scale solar accounted for the majority of capacity added, it is worth noting that residential solar set record installations in Q3. Additionally, there has been increased interest from consumers in solar plus energy storage solutions following the rolling power shutoffs in California which were driven by the threat of wildfires. Looking at the full year results, the U.S. is expected to add 13 GWdc of solar capacity, according to a forecast from Wood Mackenzie. This equates to a robust 23% annual growth rate and supports a multi-year trend of U.S. power sector decarbonization.

Ed Russell: Jerry, that's really impressive growth for the solar sector. Can you provide some insights on what the drivers of this growth?

Jerry Polacek: Sure, looking back several years, both solar and wind were heavily reliant on state level regulatory mandates that compelled utilities to purchase renewable energy. Today, an increasing proportion of growth in U.S. solar and wind is driven by non-utility consumers that have a strong preference for sustainable energy sources and simultaneously seek to cap their long-term energy costs. While sustainable-minded tech companies such as Google, Facebook and Amazon have led the way in corporate procurement of renewable energy, this trend is rapidly expanding across a diverse set of commercial and industrial consumers. You may find it surprising that a new mini steel mill being constructed by Nucor in Missouri has elected to be 75% powered by wind energy through a partnership with the local utility. To put an exclamation point on the breadth of renewables adoption, there is a growing trend of oil and gas producers in West Texas who are signing long-term power purchase agreements with solar and wind projects to lower their operating costs and achieve their sustainability commitments. We expect this trend of solar and wind purchases by corporates, municipalities, schools and hospitals to accelerate in 2020.

Ed Russell: That's a great recap on 2019. Let's pick up on your last comment about the acceleration in 2020. Can you give us an outlook for U.S. renewables next year?

Jerry Polacek: Sure Ed, we are very optimistic on growth prospects for U.S. renewable energy not only in 2020 but for decades to come. We are entering a new phase of growth, where compelling economics of wind and solar assets combined with strengthening demand from consumers for sustainable energy is creating overwhelming momentum. Today, onshore wind and solar PV projects in many markets are able to compete on an unsubsidized cost basis with the most efficient forms of conventional power generation. Meanwhile, solar in the U.S. continues to benefit from the federal investment tax credit, which steps down from 30% of capital costs to 26% in 2020 as part of a planned multi-year phase down. The combination of declining equipment costs, policy support and strong investment appetite from renewable energy capital providers means developers can offer consumers an unbeatable value, reliable carbon free energy on a long-term basis, at the lowest fixed cost available in the market. Looking ahead to 2020, with the U.S. contracted utility solar (PV) project pipeline at a record high of over 45 GWdc and a similarly robust set of private renewable energy investment opportunities in our own pipeline today, we expect sustained growth in the U.S. over the next 12 months.

Ed Russell: Jerry, just to add onto your comment about the wind facility in Missouri, can you wind industry in general?

Jerry Polacek: Sure. The U.S. wind industry is more mature than solar and represents over 100 GWs of installed capacity and a sizable domestic manufacturing base. Onshore wind in the U.S. continues to benefit from larger scale, more efficient

wind turbines that offer consumers, particularly in wind rich Midwestern states, the lowest cost of power. Looking ahead, offshore wind is entering a dynamic phase of growth that has the potential to fundamentally reshape power markets along the East Coast and Great Lakes in the coming decade. While the U.S. presently only has a single offshore wind project totaling 30 MWs there is a project pipeline forming of over 26,000 MWs across 10 states. Given that offshore wind provides a large amount of manufacturing, construction, and operational jobs, there is increasing federal and state policy support for this nascent industry. As a harbinger of what is to come, on December 5th, the Connecticut Department of Energy and Environmental Protection (DEEP) selected Vineyard Wind's 804MW Park City Wind development as the successful project in its 2019 offshore wind solicitation. We expect to see many more offshore wind projects of this scale in the coming years as an effective solution to retiring coal and nuclear power plants that serve major cities where onshore development sites are limited and the permitting process is cumbersome.

Ed Russell: Thanks Jerry for that recap. Last question for you. How does battery storage fit into the energy transition storyline in the U.S.?

Jerry Polacek: Well, battery storage offers tremendous potential to accelerate the adoption of renewable energy. The current limitation on renewables such as solar and wind is that it is intermittent and generates power only when the sun is shining and wind is blowing. Solar and wind paired with battery storage is changing this limitation by enabling the battery to be charged by renewable energy and discharged when there is high demand. In 2019, the U.S. is expected to install about 500 MW of battery storage, primarily using the same lithium ion batteries that are powering electric vehicles. While the current installations are relatively modest, the energy storage market is expected to grow by over 12x in MW-terms between 2019 and 2024 according to the U.S. Energy Storage Monitor. We expect this growth to be achieved through dramatic reductions in the cost of batteries by leveraging the global manufacturing base that is supporting the rapid deployment of electric vehicles.

Ed Russell: Thanks Jerry. Let's turn to our London team, Jean-Hugues, climate change and sustainability have become central discussion themes worldwide. What type of political agenda should we expect in the next 12 months?

Jean-Hugues de Lamaze: In Europe, the political agenda will be driven this year by the Green Deal which was announced a few days ago by the new European commission Head Ursula Von der Leyen. The EU Green Deal suggests an acceleration in the existing emission reduction targets from the current 40% by 2030 to a 50-55% reduction over the period, so as to reach net carbon neutrality by 2050. So, while the concrete measures to achieve the decarbonisation objectives remain to be specified in the next few months, we do expect Europe to be at the forefront of the fight against climate change via a combination of incentives and additional taxation. We notably expect new subsidies for countries that remain highly dependent on coal - particularly in Eastern Europe - and a push towards offshore wind. So Europe is debating a possible reduction in the free carbon allowances of some sectors like airlines and even possibly a new carbon tax on imported goods from outside the EU zone. So overall we do expect a heavy political agenda in 2020, although some of those measures may take several years to get approval from all EU members.

Ed Russell: How do you expect this European Green Deal to impact the utilities sector?

Jean-Hugues de Lamaze: The implication of this ambitious deal will be broad across the economy and could even have effects on global trade. As far as the utility sector is concerned, we see the trend towards electrification of the economy to accelerate and the phase out of high carbon-intensive power plants to happen faster than what people have in mind. This should trigger large investments in renewable generation, network as well as storage technologies all supported by tighter carbon markets.

Ed Russell: Do you believe carbon neutrality is a realistic ambition?

Jean-Hugues de Lamaze: Oh definitely. The idea behind the carbon neutrality is to take actions to not only reduce greenhouse gas emissions but also offsetting an equivalent amount of any remaining emissions. To illustrate that, during 2019, many companies and countries around the world have made a commitment to being carbon neutral by 2040 or 2050. We expect to see even more companies to announce this objective driven by ESG consciousness. One of the most striking

announcements made this year was Drax in the UK. Drax used to be one of the biggest carbon emitters in the UK via its coal power generation and is now looking at becoming the world's first carbon-negative business by 2030, notably thanks to carbon capture technologies.

Ed Russell: Wow that's impressive. Max, turning to you for our last question, what technology developments are required to achieve net zero carbon goals?

Max Slee: Thanks Ed. Beyond the accelerated deployment of renewables which are already cost competitive in most regions the following technologies will need to be researched and developed further in order to make net zero carbon possible:

- Hydrogen is required for industrial processes like steel and cement, and as a feedstock for chemicals processes and heating for buildings. Hydrogen also has the potential to be used as fuel for transport and power. Hydrogen can be produced through steam reforming which is also CO₂ emitting, or through electrolysis. Both are currently very expensive and need major cost improvements.
- Carbon capture and storage is required for CO₂ emissions from hydrogen production, industrial processes and power generation.
- Battery technology improvements in energy density and cost are required for electric vehicles and storage. We expect these improvements to emerge as battery production capacity scales up in the 2020s in order to meet demand from the automotive industry.
- Electric vehicles and fuel cell vehicles are required in order to achieve zero tail pipe emissions. Falling battery costs and improving power semiconductor and electric motor efficiency will likely result in electric vehicle costs falling below combustion engine vehicle costs over the next 5-6 years. Fuel cell vehicles are still significantly more expensive and are potentially more suited to commercial vehicles than passenger vehicles.
- Smart grid upgrades are required for greater interconnection to allow both greater flexibility in the flow of intermittent renewables and demand side management.

Achieving net zero carbon in itself is quite energy intensive, if we consider the need to produce hydrogen and to use carbon capture and storage processes. This results in incremental demand for renewables beyond the actual underlying power demand.

Ed Russell: Okay thanks Jerry, Jean-Hugues and Max for participating in the podcast today, and thank for joining us today. We appreciate your interest in Tortoise. We look forward to sustainable energy podcasts in 2020. Happy holidays everyone!

Thank you for joining us. And stay tuned for our next cast. Have topics you want covered or other feedback to share? Write us at info@tortoiseadvisors.com.

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