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2019: Energy Storage Developments in the Last Twelve Months

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Over the past few years, we have provided annual updates on the topic of energy storage in North America and elsewhere (see [here](#), [here](#) and [here](#)). Each year we have highlighted the growing prominence of the energy storage market - this year has been no different. In this article, we will explore storage developments in Canada, the United States and beyond since our post last summer.

Bloomberg NEF (BNEF) has suggested that the global energy storage market will grow to a cumulative 942GW/2,857GWh by 2040 and attract \$620 billion in investment over the next 22 years. BNEF predicts that the leading countries will be China, the U.S., India, Japan, Germany, France, Australia, South Korea and the U.K. This view is supported by GTM Research who predict that energy storage deployments will grow thirteen times larger between now and 2024, from a 12 gWh market in 2018 to a 154 gWh market in 2024. They also predict that the growth will be concentrated in the United States and China, followed by Japan, Australia and South Korea. As explained in a recent McKinsey article, the residential energy storage market is also seeing a rapid growth and outpacing expectations. They state that over the past few years, annual installations of residential energy storage systems in the U.S. have skyrocketed from 2.25MWh in 2014 to 185MWh in 2018. According to Convergent, a leading storage developer, between 2017 and 2022, the U.S. storage market is projected to grow 9x in power terms and 12x in energy terms.

Canada

While we have seen developments in energy storage installations in Canada in the past year, the regulatory landscape has been relatively quiet.

In December 2018, the Independent Electricity System Operator (IESO) published a report titled “Removing Obstacles for Storage Resources in Ontario.” The report explains the work that has been done by the IESO-sponsored Energy Storage Advisory Group (ESAG), and sets out a number of recommendations towards removing the regulatory barriers facing energy storage resources in Ontario. The IESO has indicated that in 2019, the ESAG will focus on creating and implementing a plan to ensure consistent treatment of energy storage facilities. See our earlier post for full details on the report.

In March 2019, the Ontario Energy Board (OEB) launched an initiative to identify ways to support the integration and expansion of distributed energy resources (DERs) in Ontario. The initiative, titled “Responding to Distributed Energy Resources,” was launched in March 2019 and aims to encourage service providers to “embrace innovation” and “secure the benefits of sector transformation.” As described in our earlier post, this initiative (which is also looking at utility remuneration) aims to develop “a more comprehensive framework that facilitates investment and operation of DERs.” The OEB recently issued a letter explaining its “refreshed” approach to stakeholder engagement for the consultation processes on Utility Remuneration and Responding to DERs. Among other things, the OEB’s updated approach is intended to “enhance the opportunity for stakeholder perspectives to inform subsequent steps.” The first step in that consultation will be a stakeholder conference to be held in September 2019.

In May 2019, Energy Storage Canada (ESC) released their presentation titled “Maximizing Value and Efficiency for Ratepayers through Energy Storage.” The roadmap sets out “a coherent plan to reduce barriers and deliver greater ratepayer value for Ontario consumers and businesses at the transmission level, distribution level, and behind-the-meter in commercial, industrial and residential settings.” ESC outlines six roadmap actions to maximize the value of energy storage. First, a coordinating committee to oversee Ontario regulatory framework updates for energy storage resources should be established. Second, there should be clear guidance on Global Adjustment cost allocation options for all customer types including energy storage resources when operating as a load for the benefit of the grid. Third, the

IESO should summarize and inform stakeholders of the capabilities and restrictions of the market tools for energy storage. Fourth, the IESO should identify the scope for energy storage inclusion in the Market Renewal Program. Fifth, treatment of energy storage resources in Ontario's regulatory framework should be clarified. And sixth, an expedited connection process for load displacement resources should be established. ESC also sets out a timeline for when these actions should be completed in order to advance the energy storage market in Ontario.

In our post on energy storage updates in 2018, we discussed the Alberta Electric System Operator's (AESO) "Dispatchable Renewables and Energy Storage" report in which AESO published its assessment of the potential need for dispatchable renewables and energy storage in Alberta and developed a recommendation as the province transitions to a lower-emission electricity system. As part of the report, the AESO recommended creating a roadmap to set a direction for integrating energy storage in the province. The AESO has recently released a notice in which they invite stakeholders to attend an information session to "provide an update on the development of the energy storage roadmap" and to provide an update on "its flexibility roadmap." The AESO considers these discussions essential to developing a "successful roadmap" for Alberta and to integrate storage projects in the province.

In addition to regulatory updates, we have seen developments in energy storage projects in Canada. Here are some interesting examples:

- Convergent Energy + Power, a leading independent developer of energy storage solutions in North America, has announced a joint venture with Royal Dutch Shell PLC to equip industrial plants in Ontario with battery storage. The joint venture will start with 21MWh of industrial battery storage systems at two Shell Canada Products facilities in Ontario, with the hope that the two companies will collaborate on future projects.
- Ontario Power Generation has joined forces with U.S. energy storage company Stem Inc. to provide a battery-based system to reduce electricity costs for industrial customers in Ontario. The parties plan to market the systems to industrial customers in the province to whom the IESO pays to cut their power use during peak times, when the strain on the electricity grid is at its highest. This is Stem Inc.'s first deal in Canada.
- In January 2019, the Alberta legislature approved the construction and operation of the Canyon Creek Pumped Hydro Energy Storage Project. This is the first hydro project to be approved by the Alberta legislature in 10 years and the first large-scale energy storage project to be approved in Alberta. The project will have a capacity of 75 MW and will be able to supply power for up to 37 hours.
- The Intelligent Feeder Project, delivered by Nova Scotia Power in partnership with Sustainable Development Technology Canada and Opus One Solutions, is testing the viability of Tesla batteries in Elmsdale, Nova Scotia. The project was launched in early 2018 and is expected to run until the end of this year. So far, ten homes in Elmsdale have Tesla Powerwalls installed, with the hope that more will be installed soon.

The United States

In the latest U.S. Energy Storage Monitor prepared by GTM Research, the U.S. energy storage market delivered record figures in 2018 and is expected to double by the end of 2019, with a tripling in 2020. Last year, the U.S. deployed a record 311 megawatts and 777 megawatt-hours of energy storage in 2018. According to McKinsey, annual installations of residential energy-storage systems in the United States have jumped from 2.25 MWh in 2014 to 185MWh in 2018. It is predicted that over the next few years, the growth of energy storage systems in the U.S. will be driven by California and other states that have gigawatt-scale energy storage deployment mandates such as New York and Massachusetts.

The United States has seen more updates in the regulatory and political sphere than Canada.

In February 2018, the Federal Energy Regulatory Commission (FERC) issued their landmark Order 841 which directed regional grid operators to "remove barriers to the participation of electric storage resources in the capacity, energy, and ancillary service markets operated by Regional Transmission Organizations (RTO) and Independent System Operators (ISO) (RTO/ISO markets)." Commentary from the Energy Storage Association indicated that "[b]y directing the regional grid operators to establish rules that open

capacity, energy, and ancillary services markets to energy storage, the Order affirms that storage resources must be compensated for all of the services provided and moves toward leveling the playing field for storage with other energy resources.” Under the Order, each RTO/ISO had “270 days from the publication date of the order to make a compliance filing and an additional 365 days to take action and implement revisions.” In December 2018, the RTOs and ISOs filed their responses, providing details on a wide range of tariff changes. However, the details were seen as insufficient and on April 1, 2019, the FERC asked for more detail from each operator, giving deficiency letters to all RTOs and ISOs under its jurisdiction. The letters ask for more information on “physical and operational characteristics, charging requirements and metering” as well as “the ability of storage to participate in both load and generation in wholesale markets.” The FERC denied rehearing requests for Order 841, but the Order is now being challenged in the U.S. Court of Appeals.

In December 2018, the New York Public Service Commission approved energy storage targets of 1,500 MW by 2025 and a long-term goal of 3,000 MW by 2030. This may be the most ambitious target in the United States so far. In line with this target, earlier this year, Andrew Cuomo, governor of New York, announced that New York will allocate \$280 million for energy storage projects across the state in order to accelerate industry growth and drive deployment. The funding has been administered by the New York State Energy Research and Development Authority’s Market Acceleration Bridge Incentive Program and is part of a \$400 million investment to achieve the state’s goal of deploying 3GW of energy storage by 2030.

At the federal level, in April 2019, the Energy Storage Tax Incentive and Deployment Act was introduced. Its goal is to extend to batteries and other electric storage systems the same 30% federal Investment Tax Credit (ITC) offered to solar PV systems. It would grant full ITC to investments in commercial, residential and utility-scale energy storage. It is yet to be seen whether this will be passed. In addition, the Trump administration Budget 2020 has requested \$158 million for the Advanced Energy Storage Initiative, a coordinated effort jointly led by the Office of Electricity and the Office of Energy Efficiency and Renewable Energy to advance energy storage R&D as a key to increasing energy security, reliability and resilience.

In addition, we have also seen significant developments in energy storage projects across the United States. Here are some interesting examples:

- Florida Power and Light Co. have announced a plan to build the world’s largest solar-powered battery. The Manatee Energy Storage Center will have 409 megawatts of capacity as part of an “innovative modernization plan that will accelerate the retirement of two fossil fuel generation units.” The project hopes to save customers over \$100m, while also eliminating more than 1m tons of CO2 emissions.
- AES Corporation, along with Kauai Island Utility Cooperative, has launched the world’s largest battery plant paired with solar generation on the Hawaiian island of Kauai. The Lawai Solar and Energy Storage Project consists of 28 megawatt solar photovoltaic and a 100MWh five-hour duration energy storage system, allowing the island to power itself with clean, renewable energy more than half of the time at a fraction of the previous cost.
- Luminant, a subsidiary of Vistra Energy, announced that its Upton 2 battery storage system project has finished construction and began operating on December 31, 2018. The 10MW lithium-ion energy storage system is the largest energy storage project in Texas and the 7th largest in the United States. Vistra is also currently in the process of developing the world’s largest battery energy storage project in California, which is scheduled for operation in the fourth quarter of 2020.
- Boston Properties Inc., a leader in the commercial real estate space, and Stem Inc. have commenced operation of the largest indoor AI-driven energy storage system in the U.S. The Colorado Center is a 1.1 million square foot property on which Stem has installed a 3.9MWh Athena-powered storage system in order to lower energy bills for buildings on the property and to increase sustainability of the grid.
- The Los Angeles Department of Water and Power is expected to approve a utility-scale solar-battery project that could surpass U.S. records to date, in terms of both storage capacity and price. The project has been developed by 8minute Solar Energy and would consist of 200 megawatts of solar capacity, with at least 100 megawatts of battery capacity. According to the Department, it is the lowest solar photovoltaic price in the U.S. and the largest and lowest-cost combined solar and high-capacity battery energy storage in the country, possibly in the world.

- Utah has announced plans to build the country's first large-scale, long-duration storage initiative in recent years, with a project capacity of 1,000 megawatts. Mitsubishi Power Systems would provide the power equipment and they have decided that instead of opting for the traditional lithium-ion battery design, they will use compressed air energy storage, flow batteries, renewable hydrogen and solid-oxide fuel cells.

Worldwide

Elsewhere in the world, energy storage has also been at the forefront of the energy market. According to GTM research, China is set to become the leading energy storage market by 2024. The market is projected to grow from 489 megawatts in 2017 to 12.5 gigawatts in 2024, representing a 25-fold increase. According to the article, state-owned State Grid Corporation of China has 452 megawatt-hours of grid-connected FTM pilot projects, representing 83% of FTM market growth nationwide last year. On the other side of the world, Europe is expected to overtake North America in terms of battery manufacturing capacity by 2023. According to BNEF, there is expected to be more than a tenfold growth over the next few years in European nameplate lithium-ion battery production capacity.

In March 2019, the European Parliament adopted new electricity market design proposals. The new rules aim to make the EU's electricity market "fit for the future" and put the customer "at the centre of energy transition." In 2015, the EU proposed the adoption of an energy rulebook, titled the "Clean energy for all Europeans package," in order to move the EU away from fossil fuels towards cleaner energy. The new market design proposals mark the finalizations on the package. The directive aims to enhance the use of energy storage and encourage regulatory authorities to invest in energy storage facilities.

We are also seeing new energy storage projects being developed in Europe.

- Neoen has begun construction on the largest grid-connected energy storage system in mainland France. The 6MWh system is expected to be connected by February 2020 and Neoen has said that the project aims to help France's networks prepare effectively for "the arrival of this new breed of storage unit in the European balancing reserve market."
- Siemens has supplied the world's first lithium-ion battery solution for an offshore drilling rig in Norway. It is the first drilling rig to operate a low-emission hybrid power plant using the lithium-ion energy storage solution. The plant is estimated to operate with a 42% reduction in runtime and a reduction of 15% in CO2 emissions. Construction is expected to start in Q3 of 2019.

Conclusion

As can be seen, there have been significant updates in the energy storage market over the past year and we certainly expect more in the coming year. We will continue to cover developments in this area as they unfold.

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