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2020: Energy Storage Developments in the Last Twelve Months

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Each year, we highlight the growing prominence of the energy storage market. This article is our annual update on the topic of energy storage in Canada, the United States and beyond since our post last summer.

According to data supplied by Enel X, energy storage resources for commercial and industrial classes are being used five times as much this year as they were last year to help reduce peak electricity demand across Ontario, New York, California, and Massachusetts this summer.

Ontario

The regulatory landscape in Ontario related to energy storage has seen modest activity this past year. The challenges of the current COVID-19 pandemic appear to have slowed the progress of some important initiatives.

In March 2019, the Ontario Energy Board (OEB) announced a consultation process to evaluate how the electricity sector in Ontario should respond to distributed energy resources (DERs) and encourage utilities and regulated service providers to “embrace innovation” in their operations and customer services (the Responding to DERs Consultation). This initiative aims to develop “a more comprehensive framework that facilitates investment and operation of DERs” (see our previous post). The OEB added a second related consultation process in August 2019, “to identify any barriers to the connection of DERs, and where appropriate to standardize and improve the connection process” (the “DER Connections Review”). Through late 2019 and early 2020, the OEB solicited comments from stakeholders and held stakeholder meetings to discuss the issues that the DER consultations should address. The role of energy storage is clearly a topic of interest. The presentation for the stakeholder meeting in February 2020 indicates that OEB Staff see that the OEB’s role in responding to sector evolution should be to engage and support the sector during a time of accelerating change; help utilities adapt to change so consumers continue to be well-served; focus on removing unwarranted barriers so the market can evolve; and take steps to adapt the regulatory framework. Following the last stakeholder session, the OEB sought further submissions and comments on OEB staff’s preliminary proposals for the scope of each initiative. Almost 30 parties (industry groups, consumer groups, utilities and environmental groups) submitted comments in April 2020. The next step in these consultations will be to have the OEB define the scope of the consultations and prescribe a process for relevant issues to be discussed and determined, so that direction about the role of the OEB in enabling the adoption of DERs in Ontario can be provided to stakeholders.

In October 2019, Ontario’s Independent Electricity System Operator (IESO) launched an engagement to develop the design for how energy storage will be able to participate and operate in IESO-administered markets (IAMs). This engagement will help identify the necessary updates to market rules and IESO tools and processes that would enable storage to compete in IAMs and to move towards a technology neutral marketplace. The IESO stated that it believes allowing storage facilities to register as self-scheduling and to apply the existing 10MW threshold to energy storage is appropriate. This approach offers consistent treatment for storage resources relative to generators, providing storage resources with an equal opportunity to compete in today’s wholesale markets. The current target dates indicate the beginning of a technical panel review process in September 2020, and the beginning of the baseline process in Q4 2020. Market Rules and Manuals are targeted to be in effect in Q1 2021. In August 2020, IESO sought stakeholder feedback on whether the State-of-Charge Management Lite proposal offered a pragmatic solution for the participation of energy storage in the IAMs in the long term. A stakeholder considered IESO’s proposed long-term vision to be incomplete as it did not contemplate the role of hybrid energy systems or energy storage co-located with variable renewable energy generators.

In January 2020, the OEB issued a decision in a Toronto Hydro rate case indicating that utilities wishing to include behind-the-meter storage in their regulated operations should seek policy changes in the OEB's ongoing Responding to Distributed Energy Resources (DER) consultation (see here). Since that time, in August 2020, OEB Staff issued a Staff Bulletin suggesting that local distribution companies (LDCs) may own and operate behind-the-meter (BTM) energy storage, and treat the assets as part of regulated operations, if the purpose is to remediate poor service reliability (see here). This Staff Bulletin may signal that LDCs could provide certain BTM energy storage services without the need for regulatory changes.

In July 2020, Energy Storage Canada (ESC) released a report titled "Unlocking Potential: An Economic Valuation of Energy Storage in Ontario." The report stated that the introduction of at least 1000MW of energy storage can provide as much as \$2.7 billion in total savings for Ontario's electricity customers as a result of more efficient utilization of the province's long-term generation assets. In particular, energy storage can provide wholesale market savings, maximize transmission and distribution investment, and help electricity customers manage individual costs. According to ESC, although energy storage can offer savings immediately, many barriers prevent its full value in Ontario. First, energy storage cannot be fully integrated within Ontario's electricity market. For full integration, the IESO must contract for the full suite of services energy storage can deliver. In parallel, the IESO, the regulators and utilities should establish enduring, cost-effective and competitive methods to integrate energy storage. ESC recommends that the OEB launch a consultation to better incent rate-regulated utilities to deploy non-wire solutions.

In the past year, there have been many developments in energy storage projects in Canada. Here are some interesting examples:

In April 2020, the Alberta Utilities Commission approved a solar and battery storage project combining 13.5MW of solar PV generation with 8MW/8MWh of batteries in Alberta. The project will be built in a rural area of the province as a joint venture between developer Longspur Developments and a local businessman. This will be one of the first major solar-plus-storage projects in Alberta. While the batteries will be connected to the local distribution grid, the onsite batteries will be charged solely from the fixed-tilt installation photovoltaic panels onsite.

Japan's Itochu Corp. finalized its investment of \$5 million in Calgary-based energy storage systems developer Eguana Technologies in March. Eguana and Itochu have an existing relationship that integrates proprietary artificial intelligence software with Eguana's Evolve platform. The new product will be certified with a full suite of virtual power plant features supporting fleet aggregation and residential applications.

Wärtsilä will supply Georgian College in Ontario with a 2MW/5.4MWh GridSolv energy storage system to offset the facility's power costs during peak hours and energy costs. This will decrease the College's Global Adjustment charge, which is typically 60% of the total annual electricity bill. Wärtsilä's system is scheduled to be delivered, installed and commissioned in fall 2020.

Hydrostor, a leading developer of Advanced Compressed Air Energy Storage (A-CAES) projects, in partnership with NRStor, completed the Goderich A-CAES Facility in Goderich, Ontario. We have previously discussed new regulations in Ontario related to compressed air energy storage, which use solution-mined salt caverns (cavern CAES) or porous rock reservoirs (reservoir CAES). Hydrostor and NRStor's project provides 1.75MW of peak power output, a 2.2MW charge rating and 10+MWh of storage capacity. The plant is the first fuel-free commercial CAES facility in the world, and will be used for peaking capacity and ancillary services in the merchant energy market to support grid reliability.

Convergent Energy + Power (Convergent), the largest operator of energy storage solutions in Ontario, announced that 21MWh of industrial battery storage systems at two Shell Canada Products facilities in Ontario are now operational. The energy storage project was designed to reduce the consumption of energy for the facilities during grid peak periods.

TransCanada Energy (TCE) has announced plans for a large pumped storage facility near Meaford, Ontario, which would generate up to 1000MW of hydroelectric power. This would take advantage of time-of-use electricity pricing differentials. At night, when demand for electricity is low, the project would pump water uphill from Georgian Bay to a storage reservoir located on land owned by the Canadian military. When demand is high during the day, TCE would release that water back into the lake through turbines. If approved, the project would be complete by 2028.

United States

The U.S. Energy Storage Monitor by Wood Mackenzie and the Energy Storage Association found that 2019 marked the largest year of energy storage installations across the United States, with Q4 2019 setting the largest ever single quarter. U.S. energy storage installations reached 522.7MW and 1,113MWh in 2020, with 186.4MW/364.2MWh added in the fourth quarter alone. Moreover, the number of sites pairing renewable energy with energy storage in the U.S. more than doubled from 2016 to 2019, according to the U.S. Energy Information Administration (EIA). The EIA expects this trend to continue.

While U.S. energy storage deployments slowed slightly in the first quarter of 2020, Wood Mackenzie predicts that U.S. energy storage will be a \$6.9 billion annual market in 2025 and cross a \$1 billion annual threshold in 2020, even considering COVID-19 impacts. This growth will largely be driven by California and Massachusetts, which continue to implement gigawatt-scale energy storage deployment mandates.

This year has seen numerous energy storage policy updates across the United States. Here are some examples:

In January 2020, U.S. Secretary of Energy Dan Brouillette announced the Energy Storage Grand Challenge program to accelerate development and commercialization of next-generation energy storage technology. According to a statement from the Department of Energy, the program's goal is to "create and sustain global leadership in energy storage utilization and exports, with a secure domestic manufacturing supply chain that is independent of foreign sources of critical materials, by 2030." The Grand Challenge builds on the \$158 million Advanced Energy Storage Initiative announced in President Trump's Fiscal Year 2020 budget request, 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 July 2020, the U.S. Department of Energy released the Energy Storage Grand Challenge Draft Roadmap and a Request for Information seeking stakeholder input on the Draft Roadmap.

In a trade deal in early January, the Trump administration lowered the tariff on batteries from 15 per cent to 7.5 per cent. The U.S. imports the majority of its installed batteries, with about 40 per cent of lithium-ion battery storage projects imported from China. The tariff change came into effect in February.

On July 10, 2020, a Federal Appeals Court upheld the Federal Energy Regulatory Commission's (FERC) 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)." This decision allows transmission grid operators in the United States to open their markets to energy storage, including batteries connected to the distribution grid or directly behind customer meters. The Court ruled that the FERC has jurisdiction over energy storage in interstate transmission markets, even if those energy storage systems are regulated by individual states. Wood Mackenzie predicts that Order 841 will create new opportunities for energy storage developers, which, until now, have primarily relied on state-by-state energy storage mandates. Commentary from the Energy Storage Association stated that "This latest affirmation of Order 841 is especially important as it ensures energy storage can contribute all its values to the grid, regardless of its connection point. As our electric system becomes more modernized and distributed, we are seeing the regulatory frameworks at both the wholesale and retail levels adjust to that reality."

In state-level policy, California will direct more than \$500 million in behind-the-meter battery incentives over the next four years to customers most at risk of grid outages caused by wildfires. The state's Self-Generation Incentive Program will now direct 63 per cent of its \$830 million in new funding through 2024 to a new "equity resilience budget" to finance the battery incentive. In October 2019, Pacific Gas & Electric (the largest utility in California) cut electricity to more than 900,000 customer accounts in an effort to avoid sparking wildfires (see our previous post). While California law allows "de-energization" to protect public safety, PG&E outage appeared to be the largest to date by a wide margin.

In April 2020, Virginia Governor Ralph Northam signed the Virginia Clean Economy Act (VCEA), mandating a 3.1GW energy storage target by 2035 and a goal to achieve 100% renewable and clean energy by 2050. This is the largest energy storage target of any U.S. state. In response to the Act,

Dominion Energy, a former coal company, started development of four large-scale battery storage plants totalling 16MW of output in Virginia.

Nevada passed a 1,000MW by 2030 target in March, meaning that seven U.S. states now have mandated energy storage deployment targets. A docket from the Public Utilities Commission of Nevada adopted as a permanent regulation the biennial targets, beginning at 100MW by the end of 2020, increasing to 1,000MW in 10 years. Nevada's targets are described as "goals, not mandates," and require that public utility provider NV Energy consider the targets in its integrated resource plans.

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

In August, Tesla and PG&E began construction on what is expected to be the world's largest battery storage facility in Monterey, California. The battery park, which is expected to begin operations in 2021, will be able to dispatch up to 730MWh at a maximum rate of 182.5MW for up to four hours using 256 of Tesla's lithium-ion Megapacks. Tesla and PG&E have the option to upgrade the facility's capacity to 1.2GWh. If this upgrade occurs, the facility's storage capacity will be approximately ten times more than Australia's Hornsdale Power station, the previous largest storage facility and another Tesla venture.

Technology provider Sinexcel successfully commissioned a 72MWh pair of lithium iron phosphate battery energy storage projects in Illinois and West Virginia to deliver frequency regulation services. Sinexcel provided containerised systems for two sites of 36MWh. Each site comprises 36 x 40 foot containers, each with 2MWh of battery storage output/capacity.

Quinbrook Infrastructure Partners signed a 25-year Power Purchase Agreement with NV Energy for the 690MW AC Gemini Solar + Battery Storage Project to be located in Clark County, Nevada. The Gemini Solar + Battery Storage Project is the largest solar-powered battery storage system in the world announced to date, featuring a 690MW AC solar array and a 380MW AC battery storage system capable of storing over 1,400MWh.

New York approved the construction of a 316MW battery storage plant that is expected to replace fossil-fuelled capacity in New York City upon completion. The plant will be the largest battery plant in the state. The project, which will supply power to the region during peak hours, could have capacity to discharge for up to eight hours.

Ørsted will begin construction on the utility-scale solar-plus-storage project, the 460MW Permian Energy Center in Andrews County, Texas. The project will begin operations in mid-2021. It will comprise 420MW of solar PV and 40MW of battery storage located on a 3,600-acre site alongside existing oil and gas installations, and will supply West Texas with electricity.

The Los Angeles Department of Water and Power plans to use green hydrogen to achieve its 100 per cent renewable energy target in 2045. The planned storage project will be the world's first power plant able to harness clean renewable hydrogen power. The project will be based in a unique salt dome in Utah, which permits the storage of renewable hydrogen in over 100 caverns, each the size of the Empire State Building, to achieve a potential capacity of 100,000MWh.

Global

Annual installations of energy storage across the world fell for the first time in almost a decade according to a report by the International Energy Agency. Grid-scale storage installations dropped 20%. BTM storage flat-lined despite a near-doubling of residential batteries. This is likely because of slow European growth, incidents of fire in South Korea and regulatory change in China. However, Australia's storage market remains strong and is expected to triple in growth in 2020.

The European Commission continues to strongly support energy storage. The 2019 European Clean Energy Package defines storage as an entity separate from generation, transmission or load, preventing it from being double-taxed when charging and discharging. The Clean Energy Package is a long-awaited overarching legislation that attempts to clarify how the 27 member states can achieve their shared goals on climate and energy system modernization.

We are also seeing new energy storage projects being developed throughout the world, for example:

The Abu Dhabi Fund for Development allocated about \$105 million for eight renewable energy projects in developing countries. Two of these projects include energy storage. In Cuba, a project will receive an Abu Dhabi Fund loan of \$20 million to install 8.5MW solar capacity, supported with 2 megawatts of energy storage. In Saint Lucia, a 10MW solar power station, battery storage and solar energy system will receive a loan of \$15 million.

LG Chem developed the first fully integrated battery gigafactory in Europe to produce all electric vehicle battery components with a long-term loan of €250 million from the European Bank for Reconstruction and Development. The project has a total investment of €2.8 billion and when completed in 2022, the factory in Poland is expected to reach a production capacity of around 65-70 GWh a year.

Shell and Gasunie plan to build the largest green hydrogen plant in the world. Once operational, the plant in the Netherlands is expected to produce 800,000 metric tons of hydrogen by 2040. The companies state that the plant will receive 3 GW of offshore wind power, possibly rising to 10 GW by 2040. This energy will be stored as hydrogen for direct industrial use or to be reconverted into power. The project is in the early stages, and still must secure investments partners and clear many regulatory hurdles.

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