# True Partnerships and the Oneida Energy Storage Project

***BEV Mines to Mobility Conference, Sudbury***

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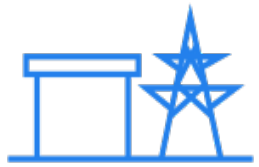
# About NRStor

## NRStor works closely with Indigenous partners, communities, utilities and energy consumers to identify opportunities and deliver world class projects

- NRStor was founded in 2012 to develop low cost, reliable energy storage projects that provide value-add services to customers

- Our success stems from our:
  - **Woman-Led Management Team.**
  - **Proven Track Record Deploying First of Kind Projects.**
  - **Partnership-First Business Model.**
  - **Diversified Value Streams and Monetization Strategy.**
  - **Trusted Relationships.**
  - **Impact Investments.**



**Utilities**

Enabling clean, flexible and reliable electricity systems through large-scale energy storage projects

**Microgrids**

Partnering with remote communities and mines to reduce dependence on diesel fuel using clean energy microgrids

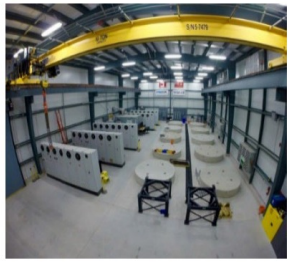
**Distributed & Residential**

Empowering residential customers to take control of their energy supply

# About NRStor - Portfolio

- NRStor's operating portfolio consists of a diverse mix of utility-scale, commercial, and residential storage technologies including batteries, flywheels and compressed air energy storage projects
  - **Minto Flywheel Facility:** First commercial flywheel facility in Canada (contracted in 2012)
  - **Goderich CAES Project**: Largest fuel-free compressed air energy storage ("CAES") project in the world (contracted in 2015)
  - **C&I BESS Projects:** Over 100 MW of behind the meter commercial & industrial battery projects in Ontario (pipeline sold to Blackstone in 2020)
  - **Tesla Powerwalls:** Largest deployment of residential Tesla Powerwalls (>1 MW) in Canada (first deployed in 2016)
  - **Strathroy BESS Facility:** First commercial battery facility in Ontario (commercial operations in 2014; NRStor acquired this project in 2019)
- NRStor is currently in partnership with Indigenous communities across Canada to develop various projects
- NRStor's current development pipeline includes well over 4,000 MWh of projects across Canada

**Minto Flywheel Facilities**



**Project:** First commercial flywheel facility in Canada (2 MW)

**Goderich CAES Project**

**Project:** Largest fuel-free CAES project in the world (2 MW)

**C&I BESS Projects**

**Project:** >100 MW of behind the meter battery projects contracted in Ontario

**Tesla Powerwalls**


**Project:** Largest fleet of Tesla Powerwalls in Canada (1 MW)

**Strathroy BESS Facility**

**Project:** Ontario's first utility BESS Project (4 MW)

**Arviat Microgrid Facility**

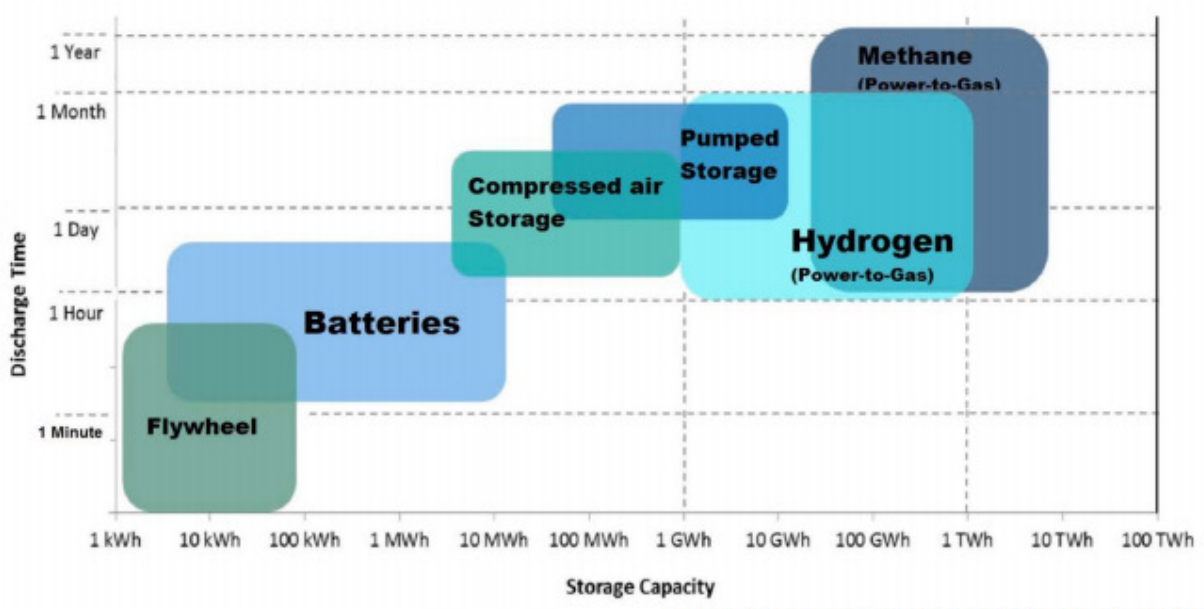
**Project:** Microgrid including a 2 MW BESS, 2 MW of wind and 200 kW of solar in the Hamlet of Arviat, Nunavut

# Grid Scale Energy Storage - Overview

– Grid Scale Energy Storage assets store electrical energy from the grid by acting as a **load**, and give the energy back to the grid by acting as a **generator**.

– Energy Storage facilities store the energy in a limited capacity medium. As a result, facilities have a nameplate **power rating**, as well as an **energy capacity**. Sometimes, the asset will be defined by its **duration**, which is typically defined as the amount of time the facility can provide its rated power during charging or discharging.

– Energy storage technologies can range from having a duration on the order of **seconds** (i.e. capacitors), **minutes** (i.e. flywheels), **hours** (i.e. batteries), and even **days** (i.e. pumped hydro, compressed air energy storage).




*Source: School of Engineering, RMIT University (2015)*

**Figure 3. Available storage technologies, their capacity and discharge time.**

US Battery Storage Market will be $7.6B by 2025 and continue growing with electrification

# Grid Scale Energy Storage – Why Storage?

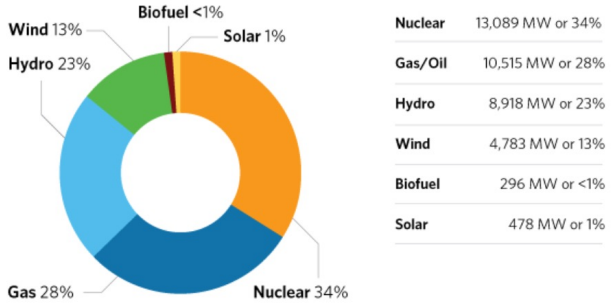
- Storage relies on available power from the grid to charge. As such, there are typically no direct GHG emissions from operating an energy storage plant.

- In Ontario, the primary source of carbon emitting generation comes from natural gas which is used as a peaking resource. Storage can displace this generation by charging at night using primarily hydro and wind, reducing the overall GHG emissions from operating the electricity grid.

- The price of electricity in Ontario drops significantly at night due to excess wind generation and lack of demand. Storage can reduce the cost to rate payers by buying electricity at night and reselling it during peak periods in the day.

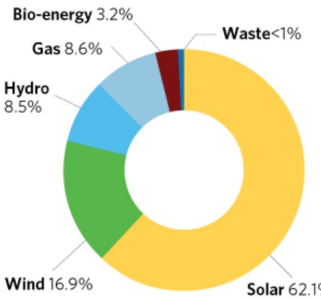
- Energy storage often leverages other power technologies such as AC inverters which can provide energy to the grid extremely quickly (<100ms) and reliably.

## Transmission Connected Gen.




| | |
|---|---|
| Nuclear | 13,089 MW or 34% |
| Gas/Oil | 10,515 MW or 28% |
| Hydro | 8,918 MW or 23% |
| Wind | 4,783 MW or 13% |
| Biofuel | 296 MW or <1% |
| Solar | 478 MW or 1% |

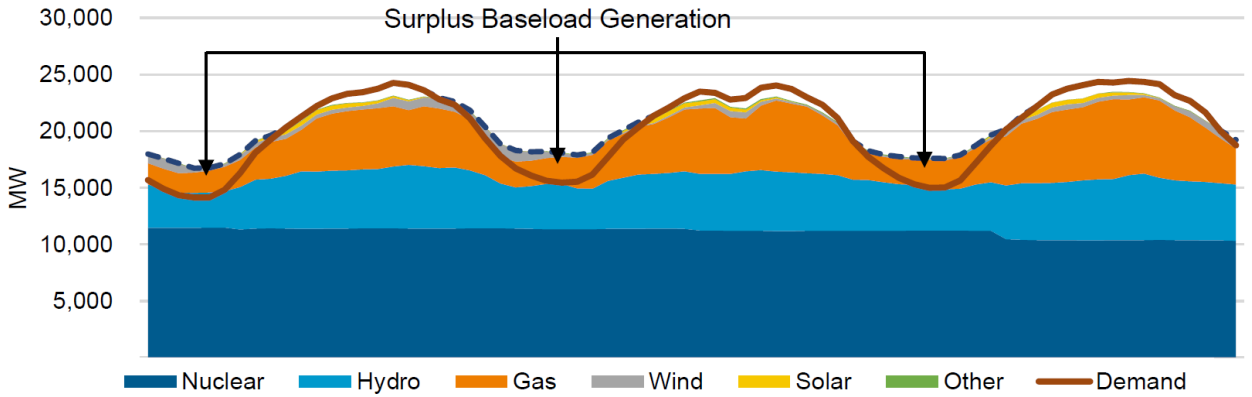
## Distribution Connected Gen.




| | |
|---|---|
| Solar | 2,166 MW or 62.1% |
| Wind | 590 MW or 16.9% |
| Hydro | 297 MW or 8.5% |
| Gas | 299 MW or 8.6% |
| Bio-energy | 110 MW or 3.2% |
| Waste | 24 MW or <1% |

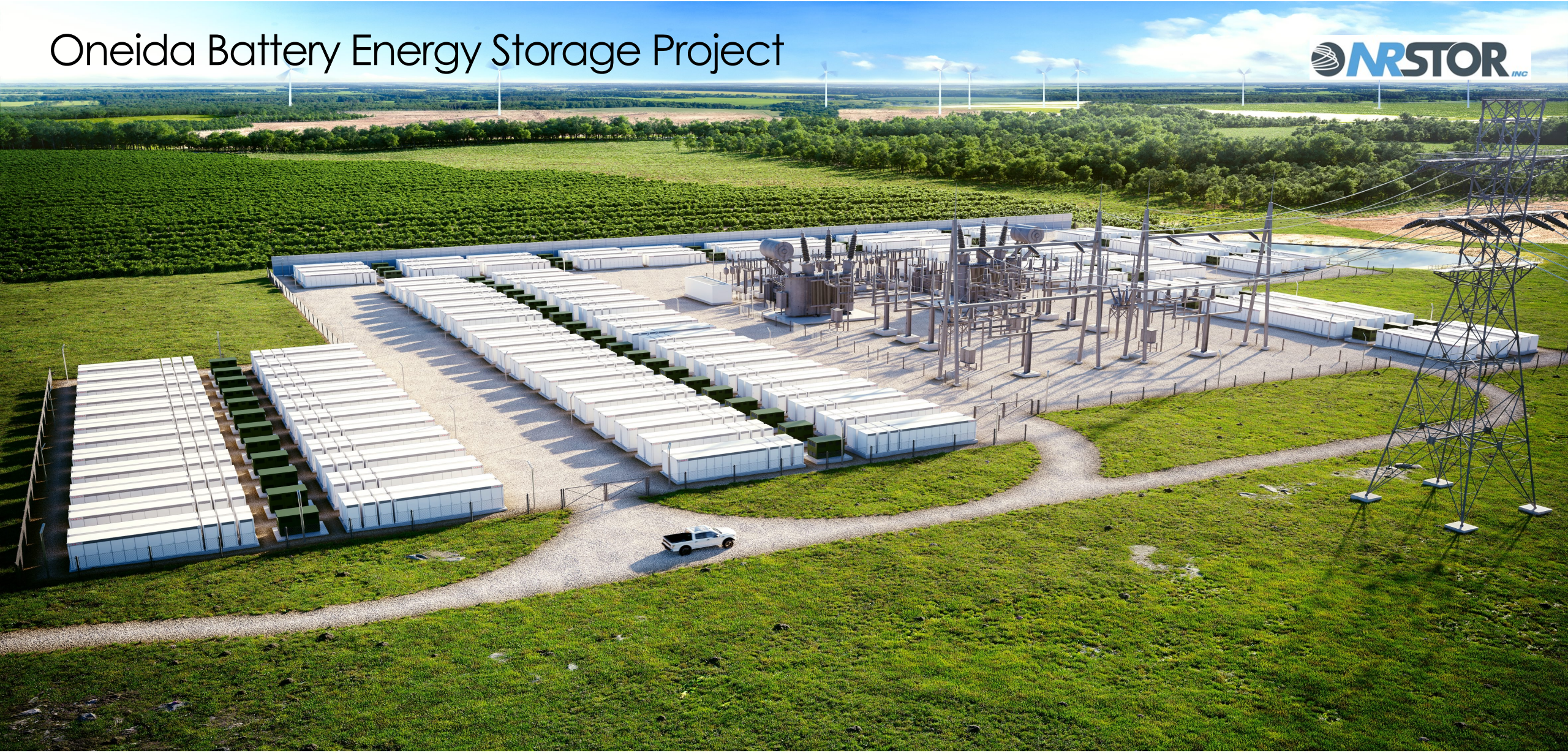
*Source: https://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Ontario-Energy-Capacity*

## Surplus Baseload Generation




Typical operation of Ontario power system over 72 hours in the Summer (actual data from July 7-9, 2020)

# Oneida Battery Energy Storage Project



NORTHLAND POWER

SIX NATIONS OF THE GRAND RIVER DEVELOPMENT CORPORATION

NRSTOR INC
AN ENERGY STORAGE COMPANY

AECON

TESLA

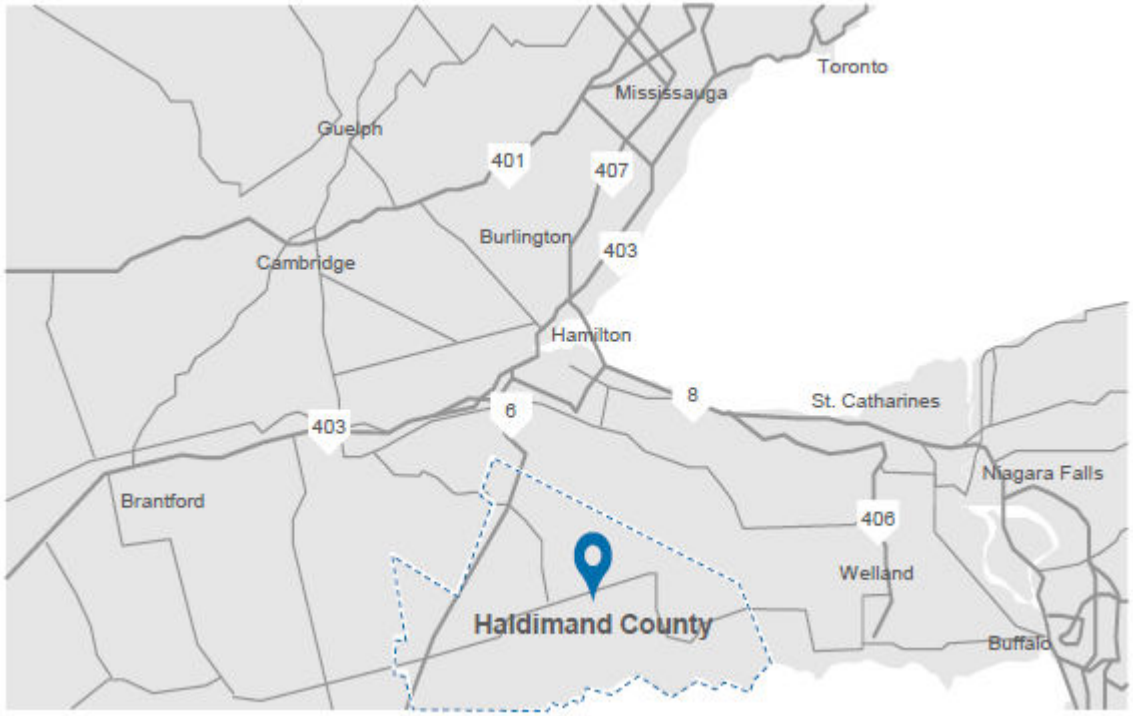
# Oneida - A True Partnership from Day 1

A partnership with the resources & experience to execute

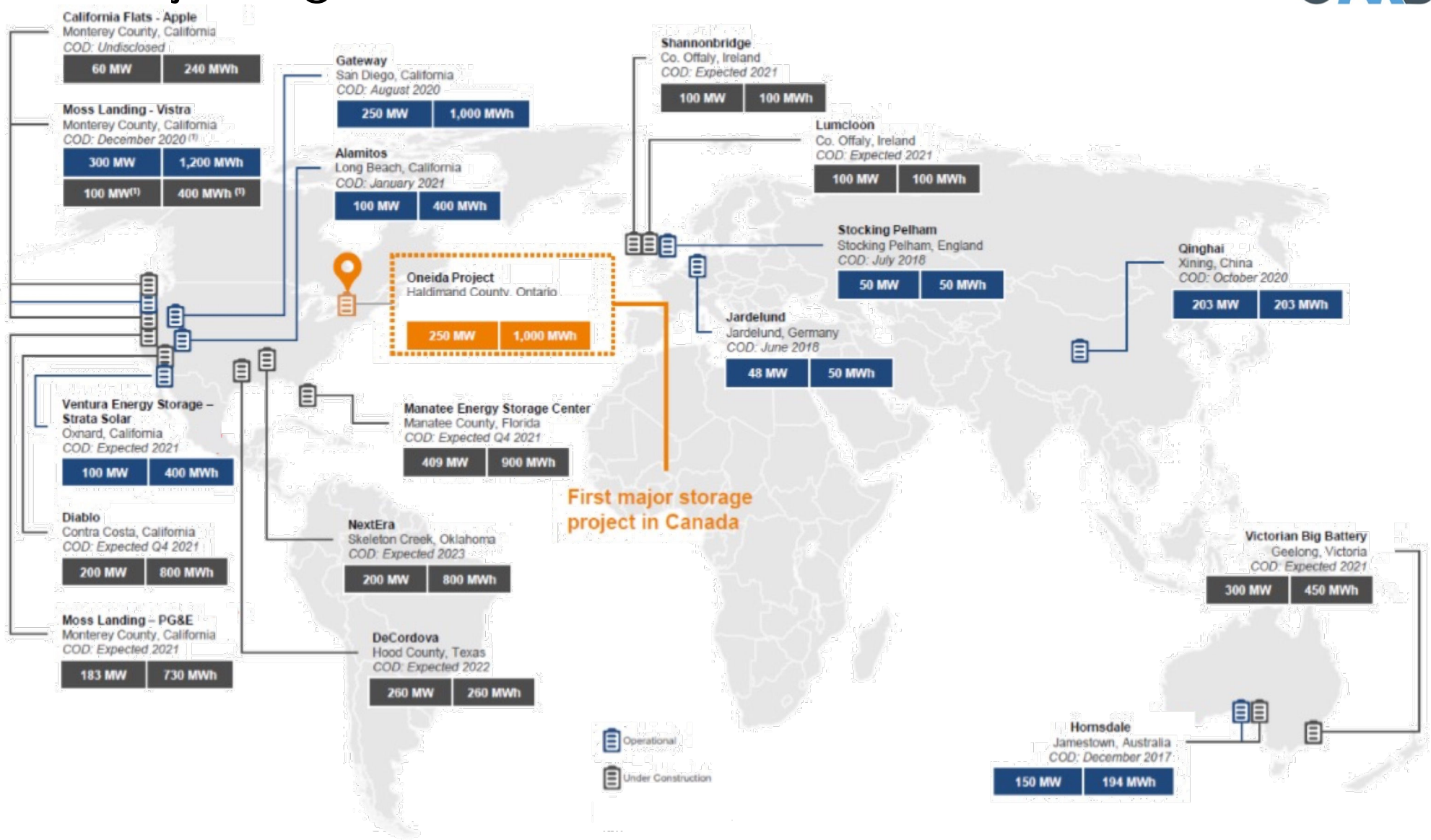
| NRSTOR INC | SIX NATIONS OF THE GRAND RIVER DEVELOPMENT CORPORATION |
|---|---|
| Ontario company founded in 2012 | Six Nations is the most populated First Nation in Canada with over 28,000 Band Members |
| Leader in the Canadian energy storage sector | A leading Indigenous corporation delivering economic impact with Ontario |
| Over 100MWh of energy storage projects under contract, construction or operations | Participated in the construction of over $2.4 B of infrastructure assets; including 892 MW of energy assets |
| Works closely with communities, utilities and energy consumers to identify opportunities and deliver world class projects | Employer of 200+ community members, and partner to several of Canada's best known publicly traded companies |
| Strong relationships with governments, utilities, customers, sources of capital and the business community | In 2019 and 2020, SNGRDC was selected as one of Canada's Best Managed Companies by Deloitte Canada |

# Oneida - Project Information

- **Power Rating.** 250 MW.
- **Duration / Energy**. 1000 MWh 4-hour duration battery.
- **Grid Services**. Capacity | Energy Arbitrage | Operating Reserve
- **Battery Technology**. Lithium-Iron-Phosphate Battery Cells (LFP). Chosen for their superior cycle life and safety characteristics.
- **Operating Life.** 20 – 25 Years.
- **Battery Vendor**. TESLA.
- **EPC Contractors.** AECON.
- **Equity Partners.** Northland Power, Six Nations, AECON, NRStor.
- **Federal Financial Support.** Canada Infrastructure Bank and NRCAN.
- **Location.** Nanticoke, Haldimand County, Ontario.
- **Expected COD.** 2025.

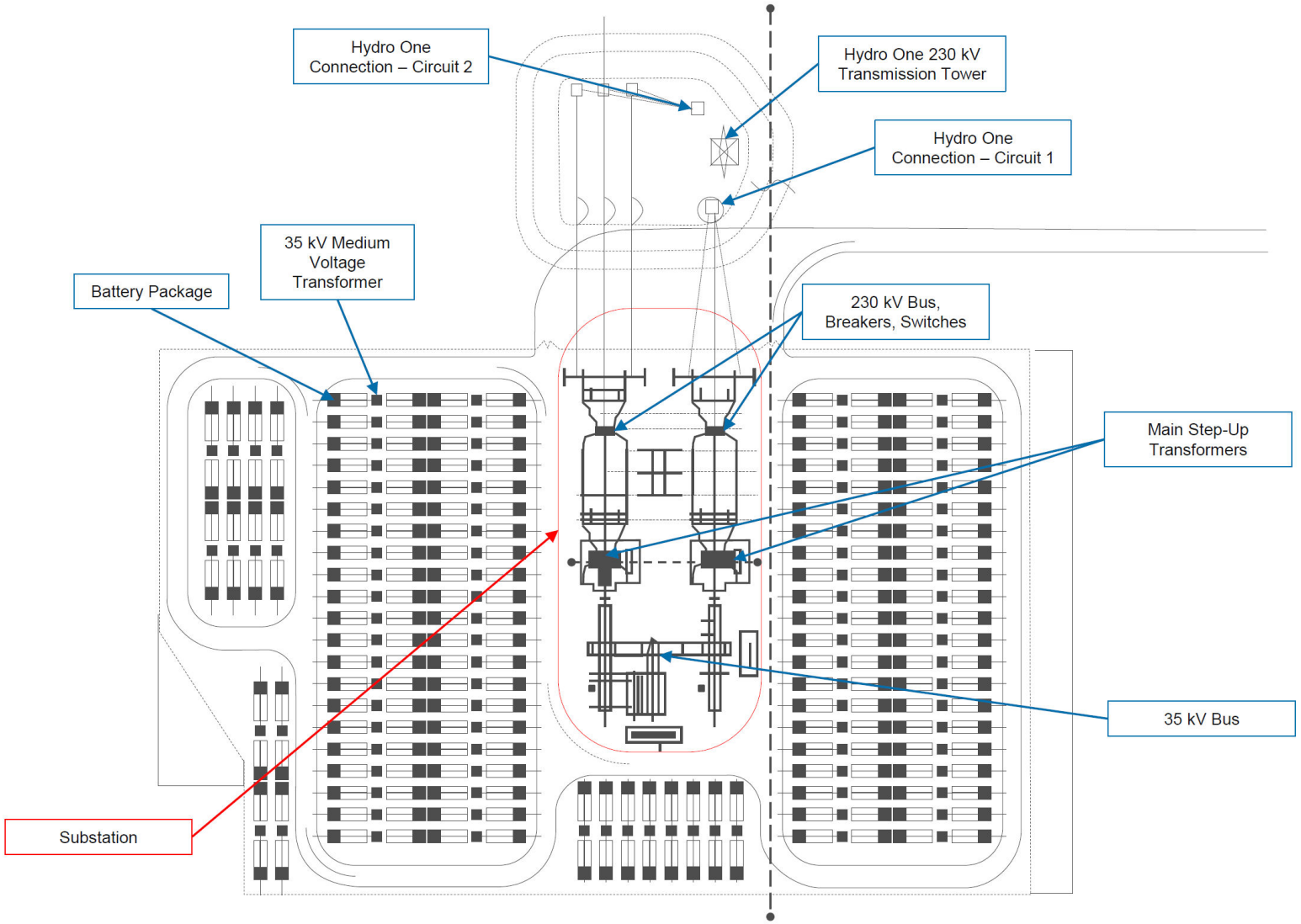


# Oneida – Project Significance




e: The projects represented comprise the largest battery projects underway globally in MWh terms, based on publicly available information
rce: Public News Sources, Company Filings
Vistra is currently constructing a 100MW / 400MWh expansion at Moss Landing expected to be operational August 2021

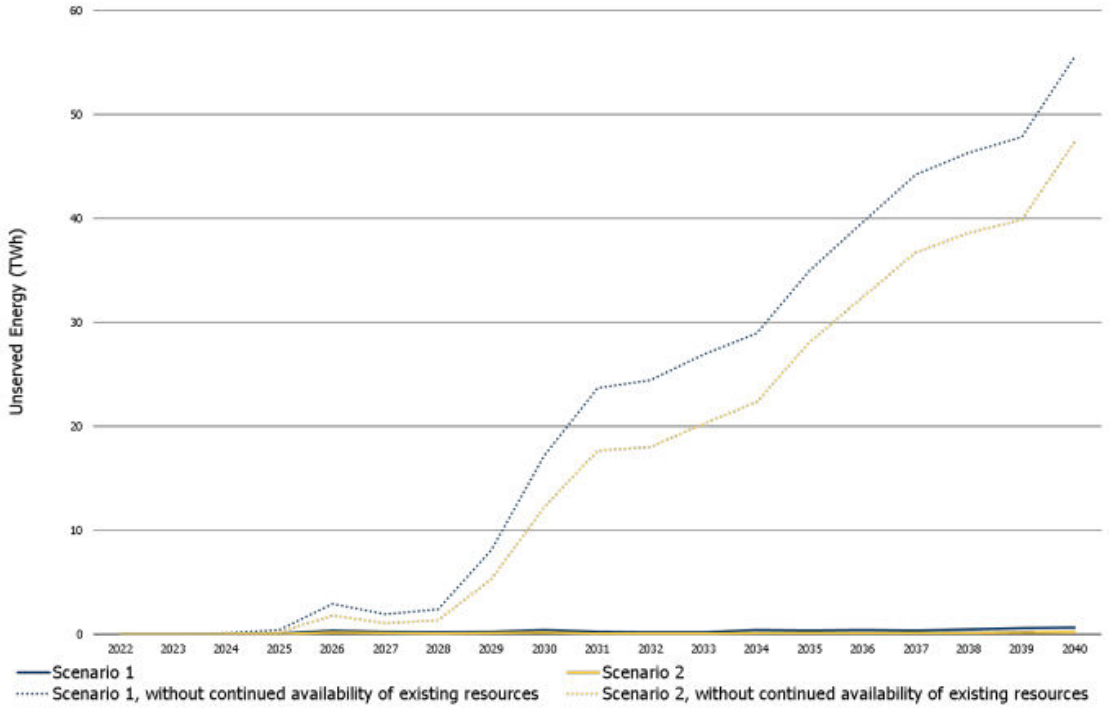
# Oneida - Site Overview



# Oneida - Capacity

- The IESO has identified scenarios where existing resources cannot serve the energy needs of the province around 2024.
- The Oneida Battery Storage Facility will offer a new 250 MW capacity resource to the Ontario market, reducing the shortfall.
- The facility will displace some of the need to call upon gas-fired peaker plants, and will avoid wasting clean energy when in surplus. This will reduce the $CO_2$ emissions in Ontario by **4.1 MM tonnes** over the 20-year operating life of the facility.
- The IESO has since launched a 4,000MW RFP to secure a lot more capacity to meet Ontario's needs (expected to be majority filled by battery storage projects), and the Oneida project provided a solid foundation and experience base from which to launch this procurement.

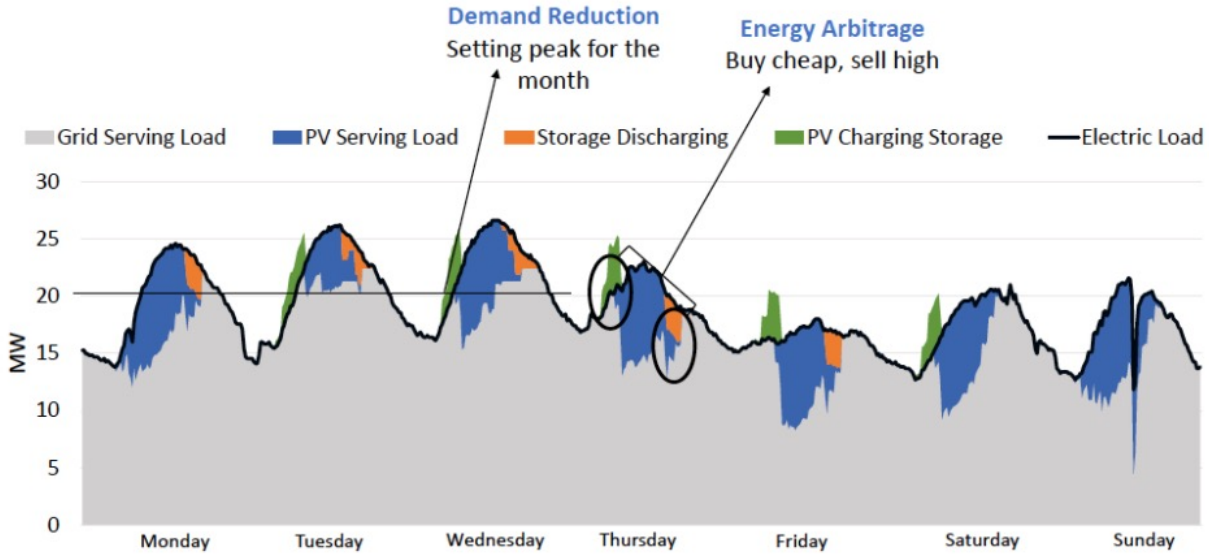
**Figure 22 | Potentially Unserved Energy**




*Source: IESO 2020 Annual Planning Outlook*

# Oneida - Energy Arbitrage

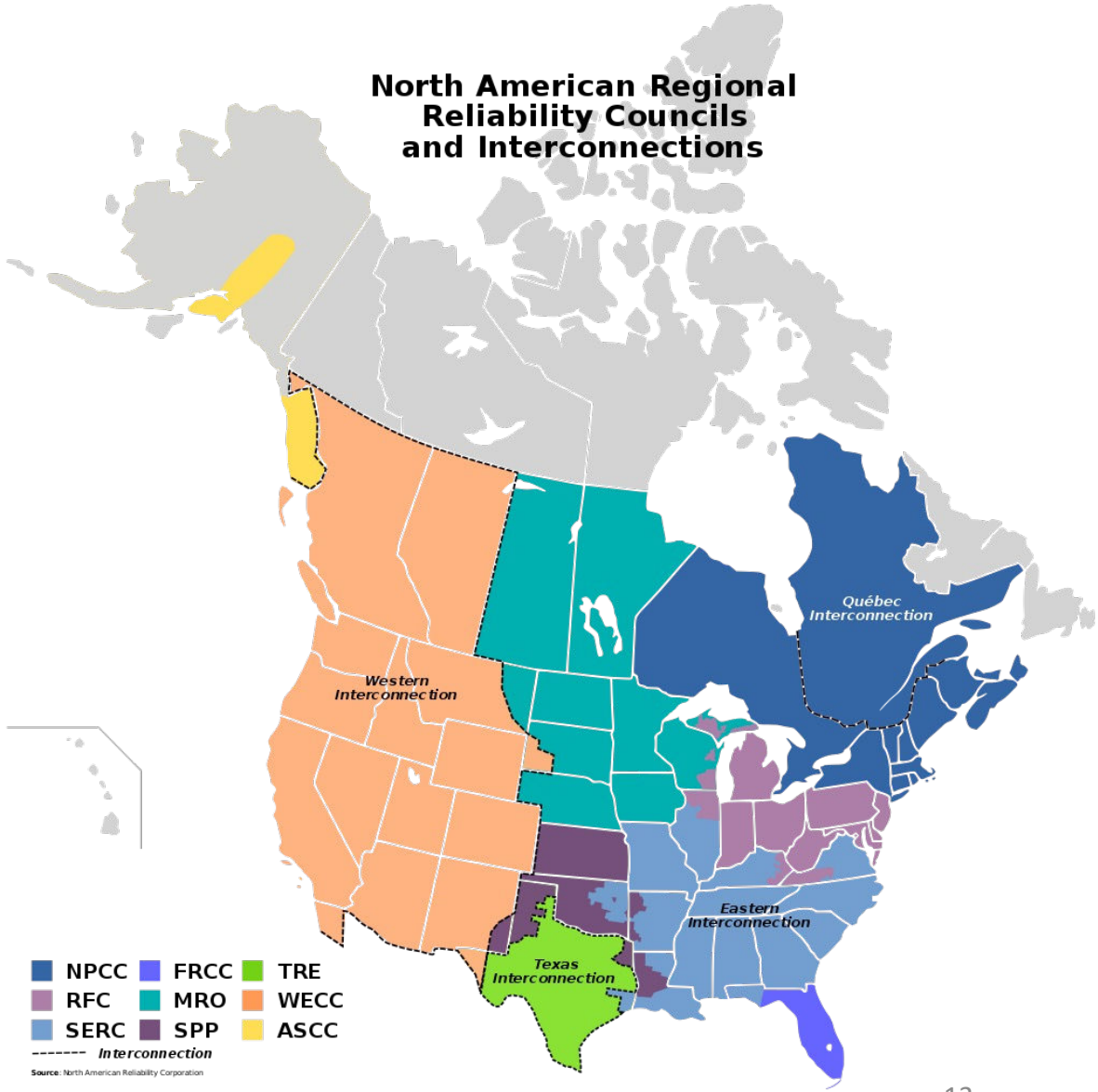
- In order to conduct the Capacity Services required by the IESO, the facility must buy energy in order to be fully charged during critical periods.
- The facility will strategically purchase energy at certain hours, typically at night or on weekends, when the price is lowest. The low price is reflective of the abundance of inexpensive generation sources coupled with low load.
- The facility will generate the energy back onto the grid during normal weekdays. The hours the facility chooses to generate will correspond to periods of high prices.
- The rate payers benefit from this activity as the grid can be more efficiently operated with less curtailment at low demand periods along with a reduction in expensive peaker plants needing to operate. The dispatching optimization is expected to **save rate payers $760M** over the 20-year life of the project.




*Source: https://www.dynapower.com/energy-storage-applications/*

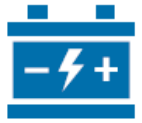
# Oneida - Operating Reserve

- The IESO is required to provide Operating Reserve (OR) for system reliability. OR is stand-by-power that can be called upon with short notice to deal with an unexpected mismatch between generation and load.
- The North American Electricity Reliability Corporation (NERC) and North East Power Coordinating Council (NPCC) set the requirements based on reliability and performance standards.
- The facility will provide up to 250 MW of OR to the IESO in order to support the grid during unexpected outages.
- OR participation will be provided to the IESO based on the market rules. The facility will offer OR services taking into consideration the Capacity / Arbitrage requirements.



# Oneida – Project Summary

## Key Oneida Benefits



*Oneida will provide 250 MW / 1,000 MWh of flexible, dynamic capacity to the Ontario grid as it undergoes its refurbishment and retirement cycle*

*Oneida allows for more efficient operations of Ontario's gas plant fleet, resulting in a reduction of 4.1 MM tonnes of $CO_2$ emissions over 20 years*

*Oneida reduces SBG by 30 – 90 GWh / year*

*Ratepayer savings of $760 MM expected by providing long-duration flexibility*

## Benefits to the System

- Clean peaking capacity
- Non-hydro renewable curtailment / hydraulic spill reduction
- Gas plant efficiency savings and Ontario ratepayer savings
- High performance frequency regulation
- Fast responding operating reserve
- Energy arbitrage
- Nuclear manoeuvre reduction
- Addresses future capacity shortfall caused by nuclear and gas retirements

# Oneida – Setting a new business standard

| What makes a true partnership? | Indigenous partner benefits |
|---|---|
| Start working together at the “Idea Stage" | Longer term thinking and perspectives, well beyond a typical project business case |
| Building trust, being generous, and lifting each other up | Learning by doing together, and listening to our communities |
| Assess options and make decisions together | Environmental stewardship founded by a special connection and history with mother nature |
| Real contributions from all parties (time, money, effort) | Sharing risk together |
| Real long-term ownership and equity, and working hard to optimize Indigenous partner’s stake during development and fully financed project stages | A focus on positive outcomes for future generations |