

Zero Emission Ferry and Onshore Battery Energy Storage System

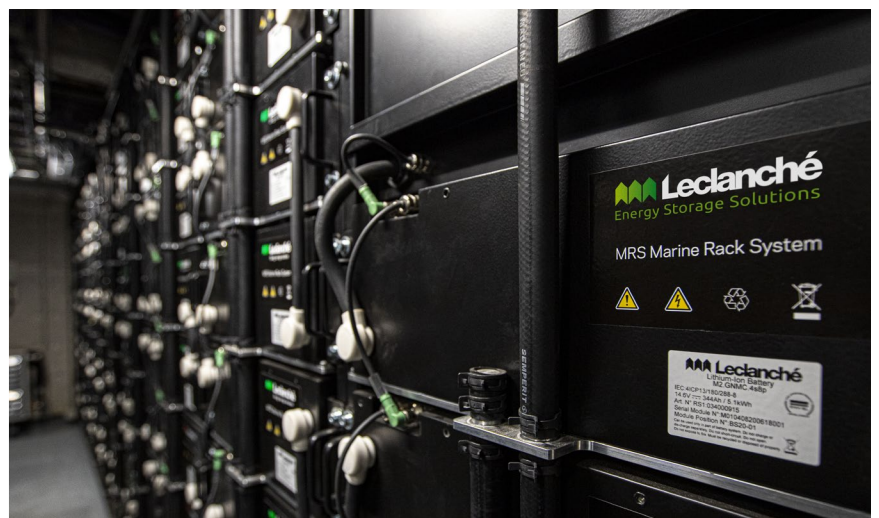
Amherst Islander II & Wolfe Islander IV



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Combined onboard and onshore energy storage system for the first electric newly built passenger and car ferry in North America.

The Challenges



The electrification of transportation is expanding at a fast pace and that includes the maritime sector where a growing list of countries are requiring the electrification of ferries.

Fully electric ferries reduce emissions – and noise (especially important within the harbor) – as well as operational costs. Passenger ferries, which travel relatively short distances, are ideal for fully electric operation.

To meet tight travel timetables, ferries are docked for only a limited time. For electric ferries, this means they require high-power charging, however, the electric grids in harbor communities are often limited and unable to cope with the required high loads for vessel-charging. This was the situation at Millhaven and Stella harbors, both on the Lake of Ontario, Canada.

The Solution

The solution was the development of a first-of-its-kind, combined onboard and onshore energy storage solution enabling hybrid and fully electric vessels to recharge quickly when returning to port.

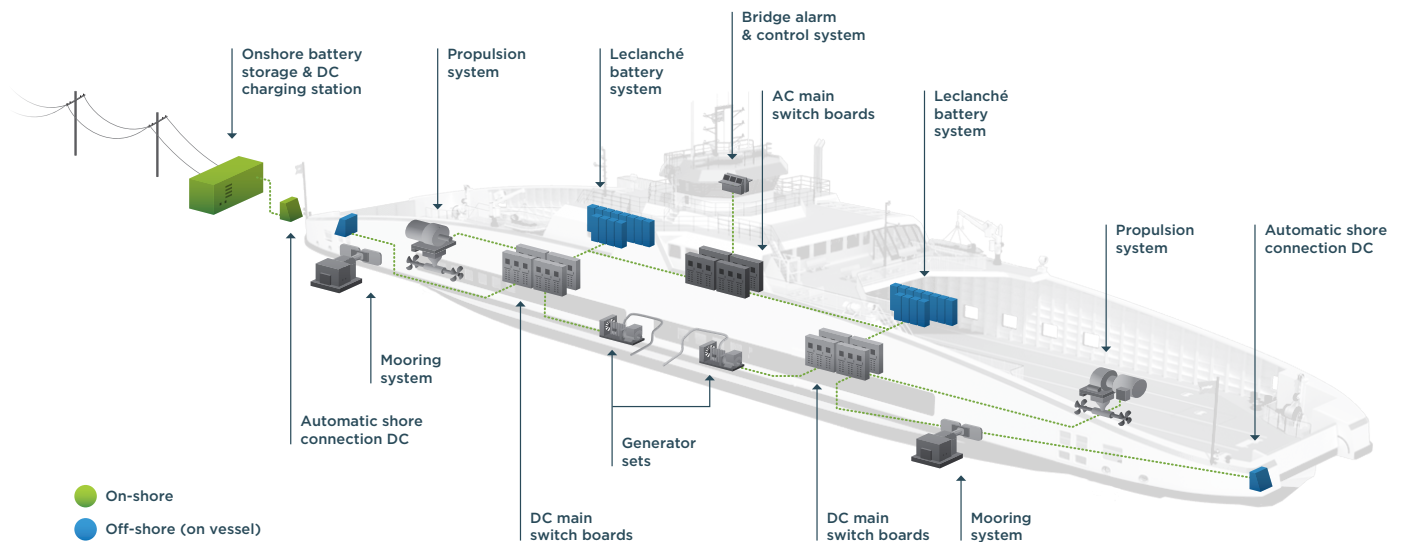


Vessel

The Amherst Islander II & Wolfe Islander IV will be the first newly built passenger/car ferries in North America with the ability to operate in a fully electric manner. The main propulsion is provided by an array of Leclanché marine battery systems, with 1.9 MWh (Amherst Islander II) and 4.6 MWh (Wolfe Islander IV) energy capacity. The Amherst Islander II will travel, silently and without emissions, at 9 knots and the Wolfe Islander IV at 11 knots, which matches conventional propulsion.

Vessel Details

	Amherst Islander II	Wolfe Islander IV
Vessel Type	Damen 6819 E3 -	Damen 9819 E3
Battery System	Leclanché MRS9 (55Ah)	Leclanché MRS9 (60Ah)
Battery Energy (kWh)	1,900	4,600
Dimensions (L x W, m)	71.7 x 20.2	98.4 x 20.2
Passenger/Car Capacity	300 / 40	399 / 80
Operation date	2021	2021
CO ₂ saving per year (estimated vs previous vessel type)	7,000 tonnes	



On-Shore

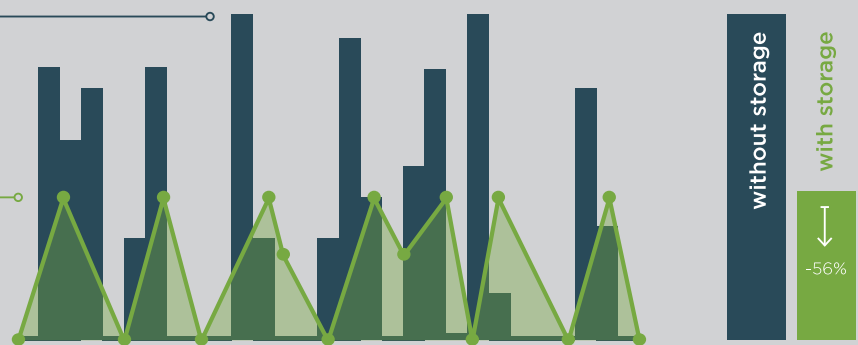
To support the local grid while fast-charging the electric ferries, each onshore charging station is equipped with a dedicated, 3.0 MWh Leclanché battery energy storage system (BESS).

The BESS will provide extra power required during fast-charging to cope with the required high loads for vessel-charging.

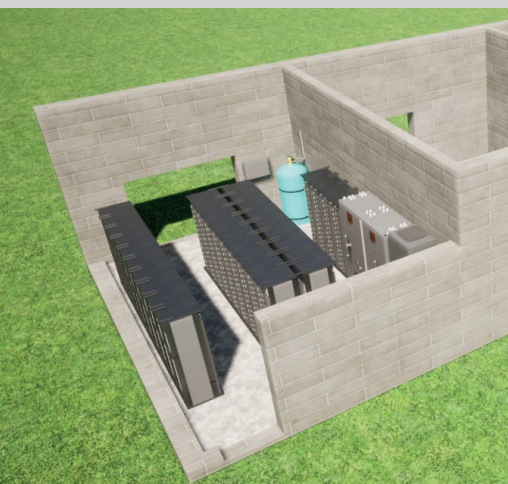
The BESS, which is charged by the harbor grid, is connected to the ferry charger via 1800 kW DC-DC converters.

Grid power without storage
peak 1800 kW

Grid power with storage
peak 1000 kW



Benefit of On Shore Energy Storage System while charging the electrical ferries



Stella harbour site layout

BESS will not only be used for peak-shaving during charging time, but for peak shaving of the harbor area during high consumption periods.

The complete harbor battery storage installation will help the local operating authority to save major capital expense in expanding and reinforcing the electrical infrastructure.

The Leclanché energy management system (EMS) controls the BESS and the Power Conversion System (PCS). It maximizes the availability of high power for fast-charging and the general harbor area.

Leclanché acted as the engineering, procurement and construction contractor for this installation.



Amherst Island Route

	Millhaven	Stella
BESS Energy (kWh)	5,900	4,400
Battery discharge Continuous DC Power (kW)	4,800	4,800
Battery discharge Continuous AC Power (kW)	1,400	800
Power Conversion System (DC/AC) between grid and battery (kVA)	1,500	1,000
Conversion system (DC/DC) between battery and ferry (kW)	3,600	3,600
Grid Voltage (V)	600	600

Wolfe Island Route

	Kingston	Marysville
BESS Energy (kWh)	5,900	4,400
Battery discharge Continuous DC Power (kW)	4,800	4,800
Battery discharge Continuous AC Power (kW)	1,400	800
Power Conversion System (DC/AC) between grid and battery (kVA)	1,500	1,000
Conversion system (DC/DC) between battery and ferry (kW)	3,600	3,600
Grid Voltage (V)	600	600

Certificates

The **Leclanche Marine Rack System** was first certified in 2017 by DNV-GL and was the first marine battery system to obtain this approval. Since then, it has received numerous additional class approvals from major certification authorities.

in progress:



Cover image shows DAMEN Road Ferry 9819 E3 «Wolfe Islander IV»

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