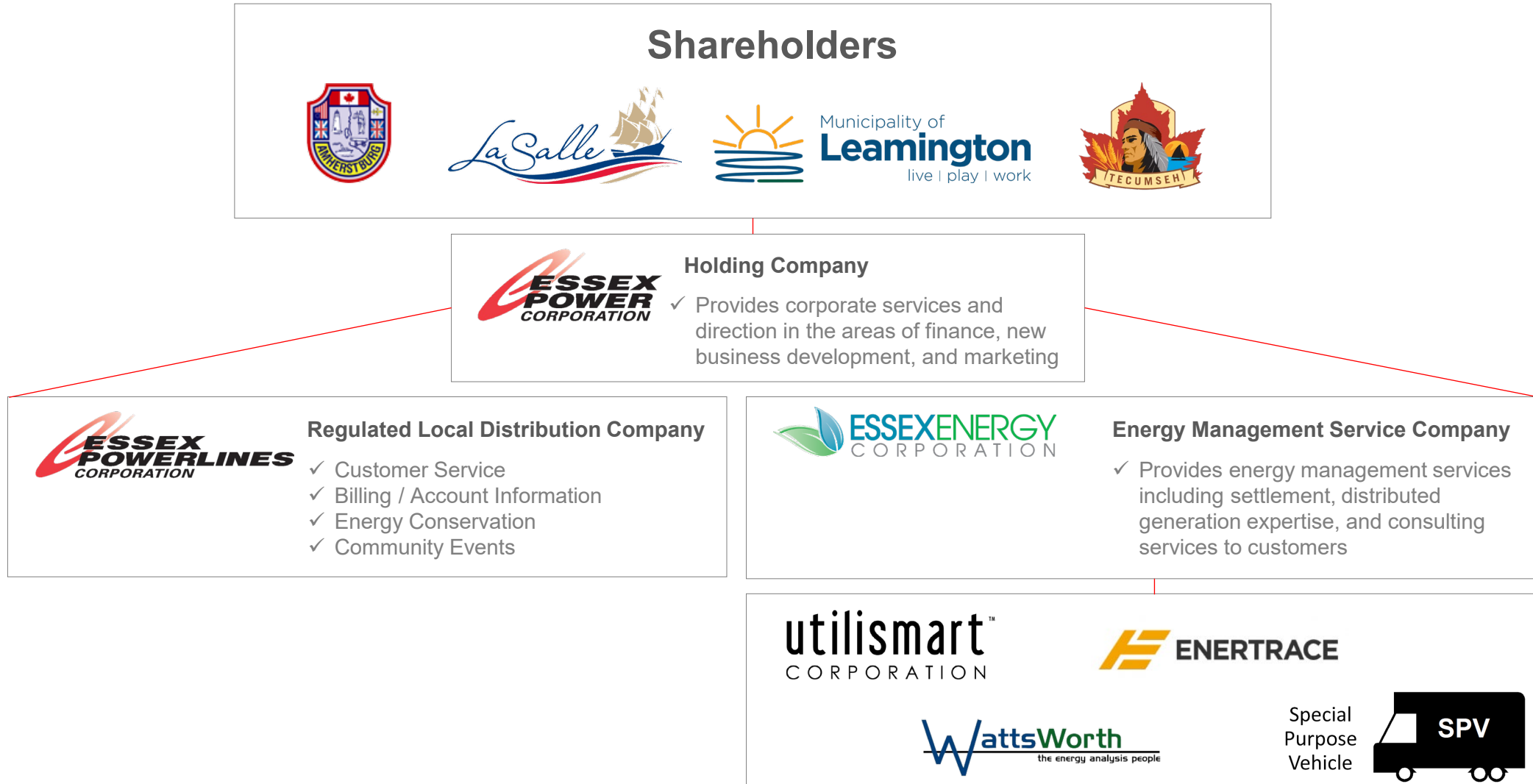




OPPORTUNITIES FOR ENERGY INNOVATION

AUG 21ST, 2023

Who is Essex Power Corporation?



Community- Based Energy Innovation Projects...



- Green Share Initiative
- EV Charging Incentives (ZEVIP)
- On-Bill Financing of Renewables and Storage
- Waste-to-Energy
- Virtual Net Metering
- Distribution System Operator (“DSO”)

PowerShare

PowerShare

A DSO Transformation Project



This project was made possible through the financial support of the Independent Electricity System Operator.



The Ontario Energy Board Innovation Sandbox is providing guidance to Essex Powerlines to test an innovative business model that has the potential to help meet distribution system needs.





Project Partners

Essex Energy Corporation

A dynamic energy company in the Essex Power Group. Essex Energy focuses on implementing a wide range of energy solutions that meet the needs of its consumers throughout and beyond Ontario.



NODES

An independent market operator based out of Norway addressing key trends and challenges in the energy system. NODES' mission is to facilitate optimal use of flexibility in the grid by offering an open, integrated marketplace to all flexibility providers and grid operators.



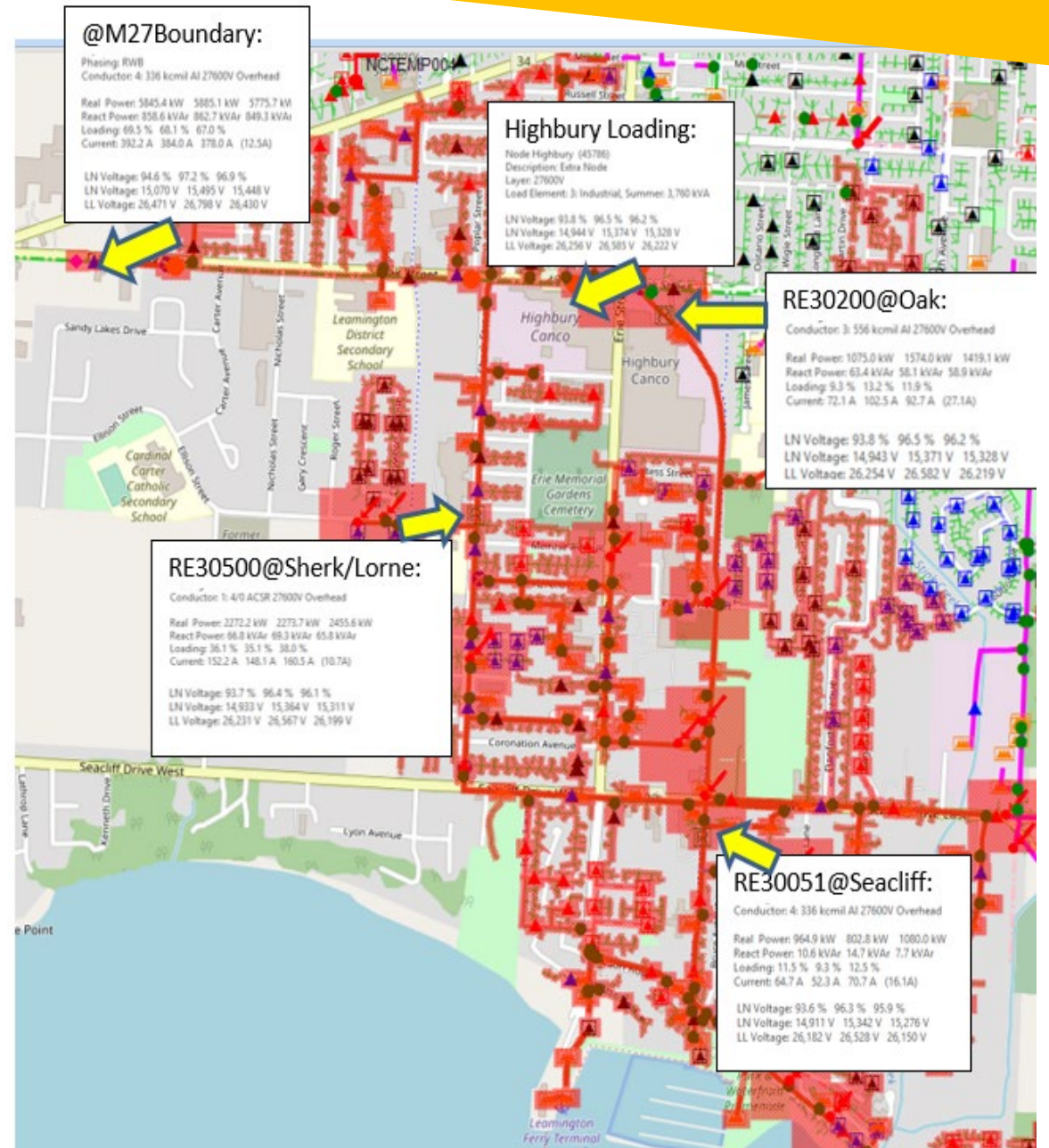
Utilismart Corporation

A leader in utility digitization, transformation, and advanced grid analytics, providing innovative solutions to utility customers in North America. Services include meter data management, outage management, grid visualization, rate analysis and more.

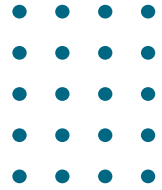


Problem/Constraint

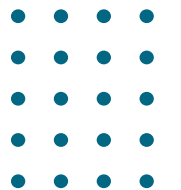
- IESO's Kingsville/Leamington Planning Forecast estimates a doubling of demand in the area by 2035, largely driven by Greenhouse growth.
- Two feeders currently service Leamington area. During high producing months, the load on one feeder exceeds a comfortable level (>50%).
- At present levels, unable to transfer load to the other feeder in the event of a failure, threatening reliability of service.



SmartMap™ diagram of large loads in Leamington service area and M27 at approx. 66% load



What is PowerShare??





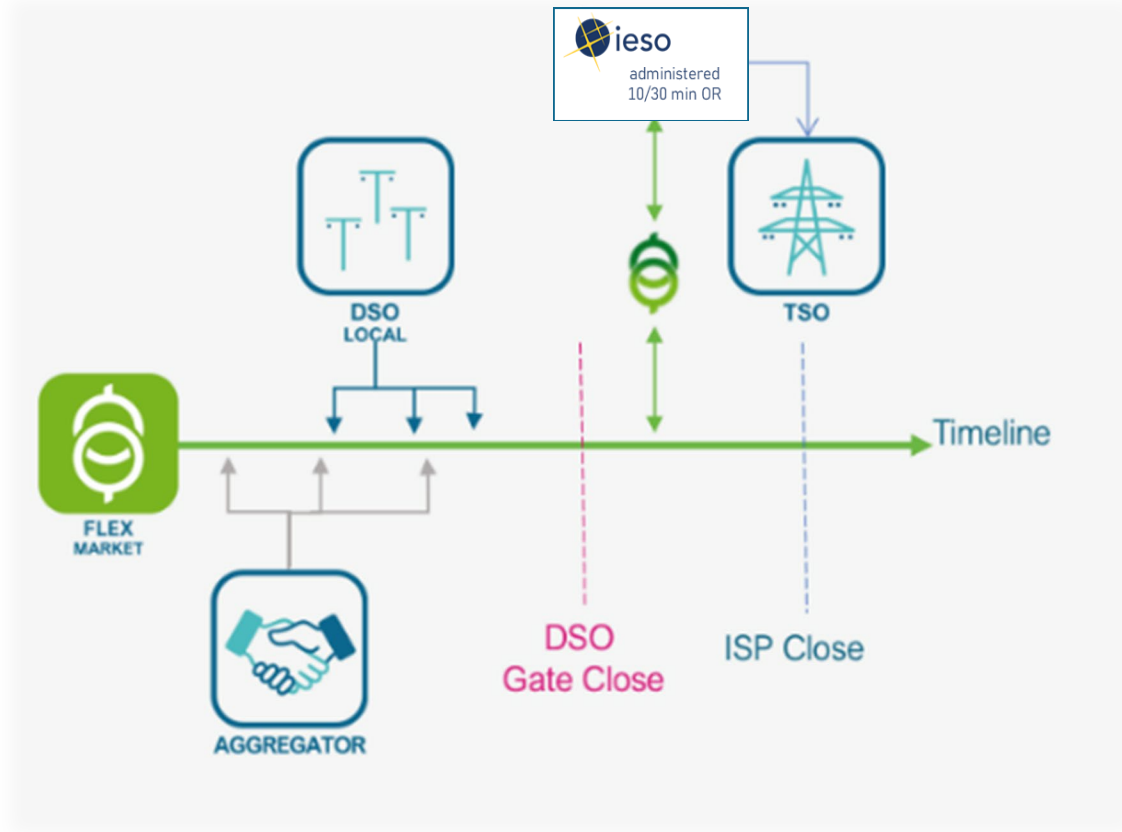
Project Summary

- Distribution System Operator (DSO) with a scalable market design for activation of DER flexibility in near real-time.
- DER owners in Leamington will be able to sell excess or stored generation in the pilot market, allowing Essex Powerlines to utilize DER assets to create flexibility in the distribution system & mitigate local constraints.
- DSO/IESO coordination will be explored to ensure that interoperability, coordination of instructions, and prioritization of services between the IESO, LDC, and DER asset owner are met.
- Produce valuable information in simulation of 'upper-level grid' needs.

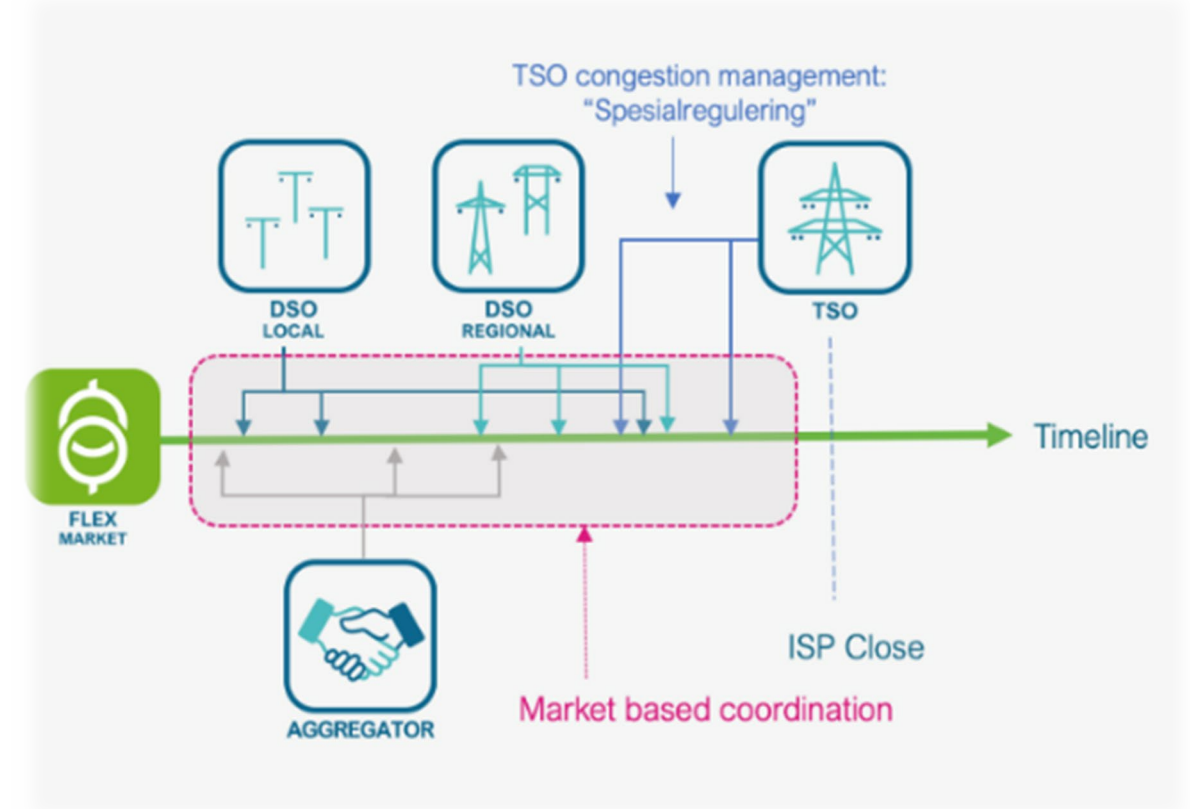


Potential Coordination Designs

Sequential



Integrated



Milestone 1

Project Implementation Phase 1

Milestone 2

Software Development &
In-Field Upgrades

Milestone 3

Establish DSO Market Design

Milestone 4

Project Implementation Phase 2

Milestone 5

Project Completion & Knowledge
Transfer



Participation



- Participants will include new and existing DER owners in Leamington.
- A proposed 1.2 MWh battery storage unit at the Leamington Pollution Control Plant will act as a participant in the pilot market.

What Technologies are Being Considered?

- Energy Storage (BESS & EV)
- Demand Response (Curtailment)
- Hydrogen Fueled Generation
- Natural Gas-Fired Generation

***50% of the procured energy must be non-GHG emitting.**



How the Market Works

HOME SHORTFLEX LONGFLEX TRADES ADMIN Western Power Distribution <small>Nodes Operator</small> 											
Tue, 6 Apr, 09:27:34 ShortFlex Western Power Dis... Western Power Dis... Up regulation Renewable types Any asset type CREATE ORDER 											
Time	Close	Best bids				Best offers				Total bid qty	Total offer qty
Today 17:00 - 17:30	15:30	0 MW £0.00	0 MW £0.00	1 MW £110.00*	2 MW £225.00*	0 MW £0.00	0 MW £0.00	1.0 MW	2.0 MW		
Today 17:30 - 18:00	16:00	0 MW £0.00	0 MW £0.00	1.2 MW £105.00*	0.001 MW £175.00*	2 MW £225.00*	0 MW £0.00	1.2 MW	2.001 MW		
Today 18:00 - 18:30	16:30	0 MW £0.00	0 MW £0.00	0 MW £0.00	1.5 MW £220.00*	2 MW £225.00*	0 MW £0.00	0.0 MW	3.5 MW		
Today 18:30 - 19:00	17:00	0 MW £0.00	0 MW £0.00	0.7 MW £120.00*	1.25 MW £195.00*	2 MW £225.00*	0 MW £0.00	0.7 MW	3.25 MW		
Today 19:00 - 19:30	17:30	0 MW £0.00	0 MW £0.00	0 MW £0.00	2 MW £225.00*	0 MW £0.00	0 MW £0.00	0.0 MW	2.0 MW		
Today 19:30 - 20:00	18:00	0 MW £0.00	0 MW £0.00	0 MW £0.00	2 MW £225.00*	0 MW £0.00	0 MW £0.00	0.0 MW	2.0 MW		
Today 20:00 - 20:30	18:30	0 MW £0.00	0 MW £0.00	0 MW £0.00	2 MW £225.00*	0 MW £0.00	0 MW £0.00	0.0 MW	2.0 MW		
Today 20:30 - 21:00	19:00	0 MW £0.00	0 MW £0.00	0 MW £0.00	2 MW £225.00*	0 MW £0.00	0 MW £0.00	0.0 MW	2.0 MW		

My orders Western Power... Western Power Dis... Regulation typ... All sides Status Completion types All fill types 												
Time	Regulation	Side	Status	Completion type	Quantity	Price	Fill Type	Grid Node	Renewable type	Asset type	Last Modified	Comments
Today 18:30 - 19:00	Up	Buy	Active		0.7 MW	£120.00	Normal	Western Power Distribution	Mixed		6 Apr 2021, 09:26	
Today 17:30 - 18:00	Up	Buy	Active		1.2 MW	£105.00	Normal	Western Power Distribution	Mixed		6 Apr 2021, 09:26	
Today 17:00 - 17:30	Up	Buy	Active		1.0 MW	£110.00	Normal	Western Power Distribution	Mixed		6 Apr 2021, 09:25	

Demonstration of ShortFlex market orderbook.

Price and Volume:
 DSO requests in green and FSP offers in blue, by half-hour interval.

Location:
 Determined by which orderbook is being viewed.

View of all bids/offers by current user.

Overall Project Deliverables



Assess of **costs and benefits** of procuring services from DERs outside of IESO Markets



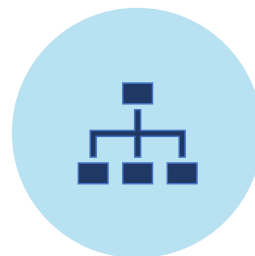
Assess operational efficiencies in DSO project, **including costs/savings to ratepayers**



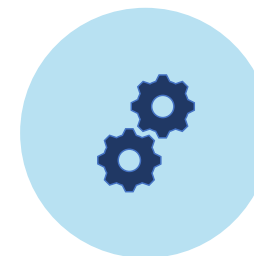
Analysis of mitigation of large build-out costs of assets by achieving flexibility (**Capex Deferral**)



Quantify **reliability and resiliency** gained from pilot



Coordination efforts/issues/resolutions between DSO and IESO



Assess integrity and reliability of the grid at **transmission and distribution levels**

Follow Our Journey



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DSO@powershare.energy



PowerShare: From Utility to Distribution System Operator



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