



THE GRID BATTERY FOR THE LONG RUN

EESAT Technical Conference



Company & ARRA Contract Status

PREMIUM POWER CORPORATION | VIONX ENERGY CORPORATION

Company Status

2013 PPC investors initiated exclusive technology license and commercialization agreement with UTC for their Vanadium Redox Flow Battery (VRFB).

2014 PPC signed UTC licensing agreement and transitioned from prior Zinc-Bromine technology to VRFB technology.

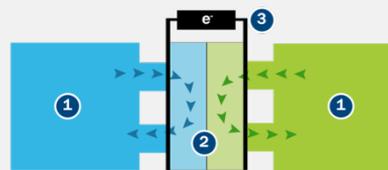
2015 PPC passed several key Technical and Manufacturing Go/No-Go Decision Points. PPC transferred all assets to Vionx Energy Corporation.

ARRA Contract Modifications

2014 In April a contract modification to extend the period of performance, modify the number of demonstration sites and deliver 1MW ESS capacity.

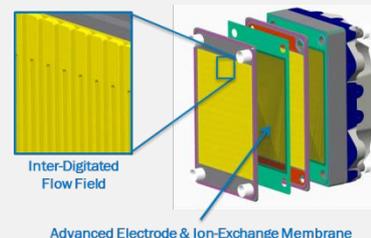
2015 In June DOE Novated the contract from PPC to Vionx Energy Corporation

Vanadium Redox Flow Battery



- 1 Electrolyte is pumped from two tanks to a cell stack
- 2 A membrane keeps the electrolytes from mixing
- 3 Electrons are transferred from the electrolyte through a current collector

Advanced Stack Technology



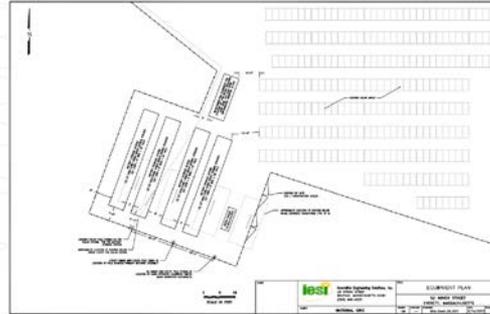
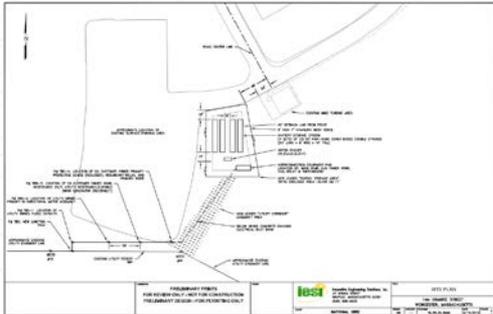
X-FLOW™ TECHNOLOGY delivers 2X the power and ½ the stack cost of conventional flow batteries

Program Overview

SITE LAYOUT

Worcester- Holy Name HS

Everett Solar Power Project



PARTNERS



Exclusive Technology License, R&D, Equity Partner



Manufacturing Partner



EPC & PCS Equipment Partner



Advanced Membrane Technology Partner



Demonstration Partners

Wind Integration

(Holy Name High School Worcester, MA)



500kW 6-hour VNX-C Series

- ✓ Wind Integration (600kW Wind)
- ✓ Time-of-Use Rate Reduction
- ✓ Demand Charge Reduction



Solar Integration

(Everett Solar Power Project Everett, MA)



500kW 6-hour VNX-C Series

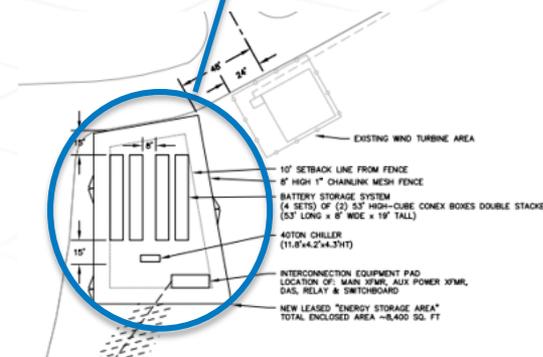
- ✓ PV Integration (605kW Solar)
- ✓ Voltage Support
- ✓ Load Following



Application and Benefits

HOLY NAME HIGH SCHOOL- WORCESTER, MA

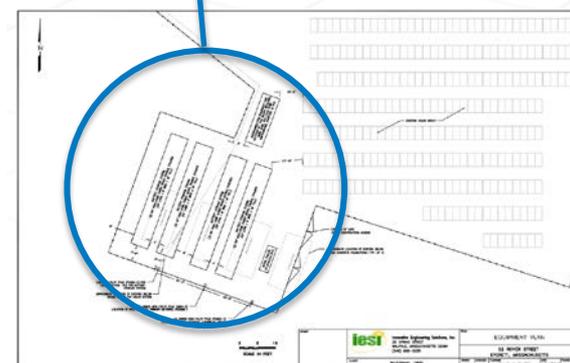
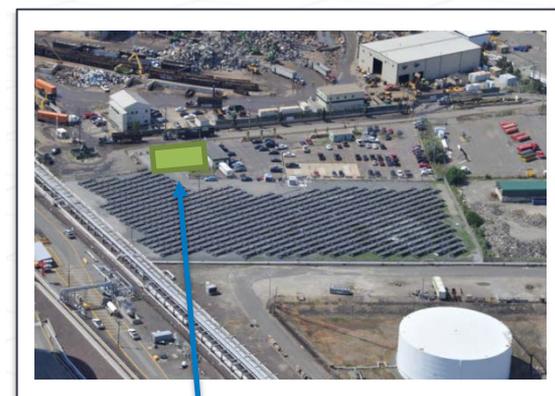
Site	Application	Benefit	Approach
National Grid, Worcester, MA	Demand Charge Management	Reduced electricity losses (utility/rate payer)	Energy storage will operate in concert with varying customer load to limit demand to a preset level. The customer load will be monitored and the storage unit dispatched to make up the difference between actual load and preset limit
		Reduced electricity cost (consumer)	
	Time-of-Use Energy Cost Management	Reduced electricity losses (utility/rate payer)	An optimal energy storage dispatch schedule will be developed based on a TOU tariff. The schedule will include both charge and discharge.
		Reduced electricity cost (consumer)	
	Renewables Capacity Firming	Reduced CO ₂ Emissions (society)	Energy storage output will be actively controlled to ramp up/down based on varying wind power generation, to keep the combined power output level constant over a specified period of time
		Reduced So _x , NO _x , PM-2.5 Emissions (society)	



Application and Benefits

EVERETT SOLAR POWER PROJECT- EVERETT, MA

Site	Application	Benefit	Approach
National Grid, Everett, MA	Renewables Capacity Firming	Reduced CO ₂ Emissions (society)	Energy storage output will be actively controlled to ramp up/down based on varying solar PV generation, to keep the combined power output level constant over a specified period of time
		Reduced SO _x , NO _x , PM-2.5 Emissions (society)	
	Load Following	Reduced CO ₂ Emissions (society)	Energy storage will be dispatched to follow the variations in the combined output power of solar PV and distribution circuit load
		Reduced SO _x , NO _x , PM-2.5 Emissions (society)	
	Voltage Support	Reduced electricity losses (utility/rate payer)	Energy storage unit inverters will be dispatched to inject reactive power into the distribution circuit based on scenarios including time based control, manual dispatch, and real-time active power



Project Status

KEY MILESTONES AND DATES- BOTH SITES

Phase I

- PMP, NEPA and MBRP Plans: Complete
- IC&S Plan: 9/30/2015
- PDCP Update: 9/30/2015

Phase II

- Go/ No-Go Decision Point- Completed: 5/29/2015
- Site 1. Prep- National Grid Everett Site: 12/23/2015
- Site 2. Prep- National Grid Holy Name HS Site: 2/5/2015
- Install and Integrate National Grid Everett Site: 2/22/2016
- Install and Integrate National Grid Holy Name Site: 4/18/2015
- Go/ No Go Decision Point (Operations): 4/27/2016

Phase III

- Commissioning and Operation – All sites: 4/19/2016
- Final Technical Performance Report: 4/23/2018
- Final Interoperability & Cybersecurity Assessment Report: 4/23/2018
- Final Technical Report: 4/23/2018

Phase IV

- Project Closeout: 4/26/2018

