THE GRID BATTERY FOR THE LONG RUN

VIONX ENERGY

EESAT Technical Conference
**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.
Program Overview

SITE LAYOUT

- Worcester- Holy Name HS
- Everett Solar Power Project

PARTNERS

- Exclusive Technology License, R&D, Equity Partner
  - United Technologies
- Manufacturing Partner
  - Jabil
- EPC & PCS Equipment Partner
  - Siemens
- Advanced Membrane Technology Partner
  - 3M
- Demonstration Partners
  - National Grid
  - Leidos
  - WPI

Wind Integration
(Holy Name High School
Worcester, MA)

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

Solar Integration
(Everett Solar Power Project
Everett, MA)

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

500kW 6-hour VNX-C Series

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## Application and Benefits

### HOLY NAME HIGH SCHOOL - WORCESTER, MA

<table>
<thead>
<tr>
<th>Site</th>
<th>Application</th>
<th>Benefit</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Grid, Worcester, MA</td>
<td>Demand Charge Management</td>
<td>Reduced electricity losses (utility/rate payer)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced electricity cost (consumer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time-of-Use Energy Cost Management</td>
<td>Reduced electricity losses (utility/rate payer)</td>
<td>An optimal energy storage dispatch schedule will be developed based on a TOU tariff. The schedule will include both charge and discharge.</td>
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<tr>
<td></td>
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<td>Reduced electricity cost (consumer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Renewables Capacity Firming</td>
<td>Reduced CO₂ Emissions (society)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced Soₓ, Noₓ, PM-2.5 Emissions (society)</td>
<td></td>
</tr>
</tbody>
</table>
### Application and Benefits

**EVERETT SOLAR POWER PROJECT - EVERETT, MA**

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</tr>
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<tbody>
<tr>
<td>National Grid, Everett, MA</td>
<td>Renewables Capacity Firming</td>
<td>Reduced ( CO_2 ) Emissions (society)</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced ( So_x, No_x, PM-2.5 ) Emissions (society)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Load Following</td>
<td>Reduced ( CO_2 ) Emissions (society)</td>
<td>Energy storage will be dispatched to follow the variations in the combined output power of solar PV and distribution circuit load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced ( So_x, No_x, PM-2.5 ) Emissions (society)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Voltage Support</td>
<td>Reduced electricity losses (utility/rate payer)</td>
<td>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</td>
</tr>
</tbody>
</table>
## 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

### Phase IV
- Project Closeout: 4/26/2018