Painesville Municipal Power
Vanadium Redox Battery
Demonstration Project

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Funded in part by the Energy Storage Systems Program of the U.S. Department Of Energy through National Energy Technology Laboratory
US Produced Vanadium Redox Flow Battery for Bulk Storage, Peak Shaving

- 8 MWh redox flow battery (1MW 8 hours)
- To be installed at Painesville Municipal Electric Plant (PMEP), a 32 MW coal fired facility
- Most efficient PMEP operation is steady state at 26 MW (lowest emissions, lowest operating cost)
- Nominal PMEP power demand ranges from 19 MW to 37 MW
- 8 MWh battery to demonstrate benefits of energy storage at PMEP
Painesville Battery Layout
Project has Multiple Related Objectives

- Establish/Use US Manufacturing Base
  - Stack components/stack fabrication
  - Electrolyte
  - Power Conditioning System
- Demonstrate Efficacy/Reliability of latest Redox Flow Battery Design
- Cost Reduction
- Platform for Commercially Viable Product
US Based Producers

• GrafTech International – Plates/Felt
• Strategic Minerals Corporation – Electrolyte
• DuPont and/or Ohio Producers – Membrane
• Innoventures – Stack Components/Stack
• American SuperConductor - Inverter
Targeted Improvements

• Vanadium Electrolyte from 1.75 M to 3.12 M
• Stack Size from standard 5 kW to 30 kW
• Power Inverter Efficiency (2% increase)
• Process System Efficiency (5% increase)
• Reduced foot print
Progress To Date

• Recent work released
  – Prototype battery stack fabrication
  – Battery process system & test bed design
  – Preliminary building design
  – New membrane
  – Improved flow frame design

• Full contract definitization expected end October
Summary/Conclusions

• Project is essentially on schedule and on budget
• Test bed confirmation of higher molar electrolyte is key to storage time target
• Test bed confirmation of process design changes will demonstrate round trip efficiency improvements
Future Tasks

• Battery process system & test bed installation
• Electrolyte Production
• Prototype Testing
• Inverter Design Modifications