The University of St. Thomas Renewable Energy Facility (USTREF)

HIGHER EDUCATION BLOCK GRANT CONTRACT WITH THE MINNESOTA STATE COLLEGES AND UNIVERSITIES RENEWABLE DEVELOPMENT FUND – CYCLE 4 GRANT CONTRACT WITH UNIVERSITY OF ST. THOMAS HE4-2

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Grateful Acknowledgements

Project funding provided by customers of Xcel Energy through a grant from the Renewable Development Fund.
Outline

- Intro and Program Review
- Accomplishments
- Program Benefits
- Budgets and Schedule
- Questions??
Intro and Program Review
Executive HE4-2 Summary (1)

- Install a multi-purpose microgrid which is now referred to as the, “USTREF”

- The primary objective of this facility will be to promote industry/academic collaboration in the design/build/test and validation of near commercial concepts in the areas of electricity generation and microgrid/subsystem control.
Executive HE4-2 Summary (2)

- Incorporate real scale distributed energy resource and microgrid modeling experience into graduate and undergraduate electrical engineering curriculum;

- Develop an educational portal and curriculum for the K-12 grades showcasing sustainability and alternative energy systems in action.
Solar PV Array
50 kW

Smart Inverter + Switch

Genset (2)
Biofuel
50 kW

Switch

Storage Node
25 – 50 kW

Smart Inverter + Switch

Wind Turbine Emulator
25 – 50 kW

Smart Interface + Switch

3rd Party Test Bays
~ 50 kW; 2 of them

Device Under Test

EMS

480 V 3-Phase 4-Wire Bus

Switch

Custom Loads for control studies:
- Dump loads
- IMs
- Arcs, …

Xcel Energy Campus Feeder

UST Facilities and Design Center

Switch

13.8 kV
Accomplishments
Google Earth view of the UST μGrid location
FDC – the Facilities and Design Center
Accomplishments (1)

- Full funding release has occurred

- Nearing the finalization of the one-line diagram that will be used to drive all RFQs, procurements, and asset deployments
Near Final One-Line Diagram of the research Microgrid
Accomplishments (2)

- Several key vendor/partners:
  - Xcel Energy: grid tie and smart-substation interactions
  - Rhombus Energy Solutions: inverters & distributed EMS
  - Enersys: storage node

- Integration of preliminary R&D into both undergrad and graduate engineering curriculum at UST
Program Benefits
Program Benefits (1)

- Xcel Energy is being recognized as leading-edge and proactive in microgrid technology and deployment

- 4 invited microgrid presentations (completed or pending) with national visibility
  - National Society of Professional Engineers (done)
  - North Central Electrical League (done)
  - Xcel Engineering 2017 Technical Conference (done)
  - 7th Microgrids & Distrib. Gen. for Public & Private Sectors (pending)
Installed Solar-PV (Blue) & Storage Costs (Orange) - 50 kW
(Red = Cost of new car; Green = 50 kW PV costs scaled to 5 kW)
Program Benefits (2)

- Significant boon to the University of St Thomas’s School of Engineering power program: at both the graduate and undergraduate level

- The first graduate student with thesis/project work related to the USTREF has already graduate; Nathan Webster. He is now at ASU working on his PhD with a power focus
Program Benefits (3)

- Multiple grad and undergraduate research students will starting on the project in Spring 2017 semester as we move into the RFQ phase of the project.

- Significant recognition by 3rd party businesses in & moving into microgrid related markets
Program Benefits (3)

- Opportunities pending for other RDF recipients for Multiple grad and undergraduate research students will starting on the project as we move into the RFQ phase of the project.

- World-wide recognition of humanitarian microgrid outreach.
Will Steger – Ely, MN

STEGER COMPLEX POWERED BY RENEWABLE ENERGY AND ST. THOMAS INGENUITY

Doug Hennes ’77  October 14, 2015

The Steger Wilderness Center (Photos by John Ratcliff)

The Steger Wilderness Center is made of glass, native timber and stone, and recycled wood.
Will Steger – Ely, MN
Will Steger – Ely, MN
Budgets and Schedule
Questions??