RTCC SMART Series

Duke Energy’s Coalition of the Willing

March 18, 2016

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Presented By:

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Mission
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Panelists

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rti Your systems. Working as one.
Cristin Lyons
Partner and Practice Lead of Grid Transformation
ScottMadden
Jason Handley
Director of Smart Grid Technology and Operations in the Emerging Technology Office, Duke Energy
THE COALITION OF THE WILLING –
Leveraging the Vendor Community and the Principles of Open Source in the Utility Space

- Jason Handley, P.E.
Director – Smart Grid
Emerging Technology and Operations
Our Industry is Changing

- Customers want **choice and control** regardless of market structure
- **Increased penetration** of distributed energy resources (DER’s) will drive the need for **grid edge intelligence**
- **Internet of Things** drives connectivity to all things (utility and customer-owned)
- Current solutions are **proprietary**, designed for use in only one “silo,” and do not inter-operate with other systems without expensive, time-consuming integration efforts.
- Shift to more **distributed functions** and **advanced analytics**
- Heightened need for cyber **security and privacy**

**This generates:**
- Data; lots of it
- Different data than what you’re used to
- Data from new assets you may / may not own

**In order to meet use case requirements, decisions must be made:**
- Centrally
- Distributed
Why Interoperability is Important

• Distributed Energy Resources, Microgrids, and Advanced Demand Response require disparate field devices to work together remotely with little latency or delay.

• Key to more efficient, cost-effective, and secure grid

• Back office integration is expensive and time consuming

• Many solutions are packaged for a single “siloh” or ideal for only a single function

• Open Standards does **NOT** mean interoperable
Why is Distributed Intelligence Important for Duke Energy?

• Provides **accurate control and alleviates intermittency** of distributed energy resources

• Provides the ability to **scale independently**, as needed, without needing a system wide rollout

• Takes cost out of the business by **reducing integration time and effort**

• Allows Duke to be at the forefront of developing new regulations and policies
Coalition of the Willing Phase I

• Jan 2013 – Approached 60 companies at DistribuTECH event
• Jun 2013 – Secured 5 companies to participate and agree on scope of work for project
• Nov 2013 – Accomplished goal of sharing data locally between devices without the use of headends
• February 2014 – On floor demonstration at DistribuTECH
Coalition of the Willing Phase II

- June 2014 Announced Phase II plans to build an interoperable microgrid
- August 2014 – Approached by over 60 companies to participate in Phase II
- September 2014 – Picked 27 companies to work with on Phase II
- Oct-Dec 2014 – Secured NDA’s and SOW’s with each company
- Jan – Nov 2015 - Procured and install microgrid equipment
- Dec 2015 – Jan 2016 – Tested microgrid with three use cases
- Feb 2016 – On floor demonstration at DistribuTECH
Mount Holly Microgrid

Jason P. Handley, PE.
Director – Smart Grid Emerging Technology and Operations

Video
Duke Energy’s Interoperability Vision

• Committed to interoperability for a sustainable grid
• Collaborated with 25 Coalition partners to demonstrate the value of interoperability utilizing Open Field Message Bus (OpenFMB™)
• Developed at our innovation center in Mount Holly, North Carolina
• Showcases first OpenFMB plug-and-play integration and optimization of an islandable microgrid
• Introduces a modular and scalable alternative to federating data between grid edge devices for operational resiliency
OpenFMB

- Open Field Message Bus (OpenFMB™) is a reference architecture and framework for distributed intelligence.
- Leverages existing standards to federate data between field devices and harmonize them with centralized systems.
  - IEC Common Information Model (CIM) for semantic data model
  - Internet of Things (IoT) publish/subscribe protocols for peer-to-peer communications
    - DDS, MQTT, AMQP
- Allows scaling of operations independently, without a system-wide rollout.
  - Flexible integration of renewables and storage with the existing grid
- NAESB’s OpenFMB standard was led by utilities and developed by SGIP.
Mount Holly Microgrid Components

- Padmount Recloser
- 1200A Disconnect
- 250kW/250kWh Battery Energy Storage System
- 1000kVA Transformer
- Secondary Cabinet
- 275kVA Step-up Transformer
- 75kVA Transformer
- Meter Structure
Mount Holly Microgrid Components, Cont.
Mount Holly Use Cases

Duke Energy Microgrid in Mount Holly, NC
• Microgrid Optimization Use Case
• Unscheduled Islanding Transition Use Case
• Island-to-Grid Connected Transition Use Case

Distributech Demo in Orlando, FL
• Microgrid Optimization Simulation
• Wired and Wireless Communications
• IoT Publish/Subscribe Protocols for SCADA and Telecom
Key Lessons Learned

- Some technologies did not initially produce data to run distributed applications.
- Distributed control sequences need to be choreographed to reflect latencies.
- Time accuracy and synchronization are paramount when operating microgrids.
- Granular and accurate sensor data is important for microgrids.
- Most challenges associated with hardware were resolved with OpenFMB.
- Our vendor partners’ skills and insights refined our final solution.
THANK YOU!
Panel Participants

Howard Self
Smart Grid DA Program Manager
ABB, Inc.

Jason Handley
Director, Smart Grid Emerging Technology & Operations
Duke Energy

John Camilleri
Chief Technology Officer
Green Energy Corp.

Stan Schneider
Chief Executive Officer
Real-Time Innovations (RTI)
Panelists

ABB

Duke Energy

greenx Energy Corp

Scott Madden Management Consultants

RTI Your systems. Working as one.
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Presented By:
April 21, from 3:00 – 5:00 pm

NC State University’s McKimmon Center

[Website Link]
Final Competition

April 15 – 17

NC State University’s Centennial Campus

www.evchallengekids.org
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