



Illinois Institute of Technology Smart Grid Lab Partnership

Information Deck

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Illinois Institute of Technology (IIT) Campus Smart Grid Lab Partnership

Purpose

- To build a partnership of leading technology companies, a local utility, and a university and research institution in the Chicago area for the expressed purpose of furthering the progress of smart grid technology and applications.
- The collaboration must provide benefits for electricity consumers through the advancement of understanding around new smart grid equipment, support processes, and data analysis associated with smart grid equipment.



Project Partners

◆ Illinois Institute of Technology (IIT)

- A national, technological, Ph.D.-granting research university, with world-renowned programs in engineering, architecture, the sciences, humanities, psychology, business, law, and design.

◆ Common Wealth Edison (ComEd)

- The largest electric utility in Illinois, serving the Chicago and Northern Illinois area. ComEd provides electric service to more than 3.7 million customers across Northern Illinois.

◆ Silver Spring Networks (SSN)

- An industry leader in smart grid technology and networking with open, standards-based networking solutions that enable all energy devices, from in-home energy devices to smart meters to load control devices, to connect together.

◆ West Monroe Partners (WMP)

- A business and technology consulting firm focused on guiding organizations through projects that fundamentally transform their business with an Energy and Utilities practice specializes in facilitating smart grid development and efficient, productive operation.



Background

IIT Distributed Generation (DG)

Solar

Total ~80kW generation capacity in three locations

Expansion of 218kW capacity in progress

Wind

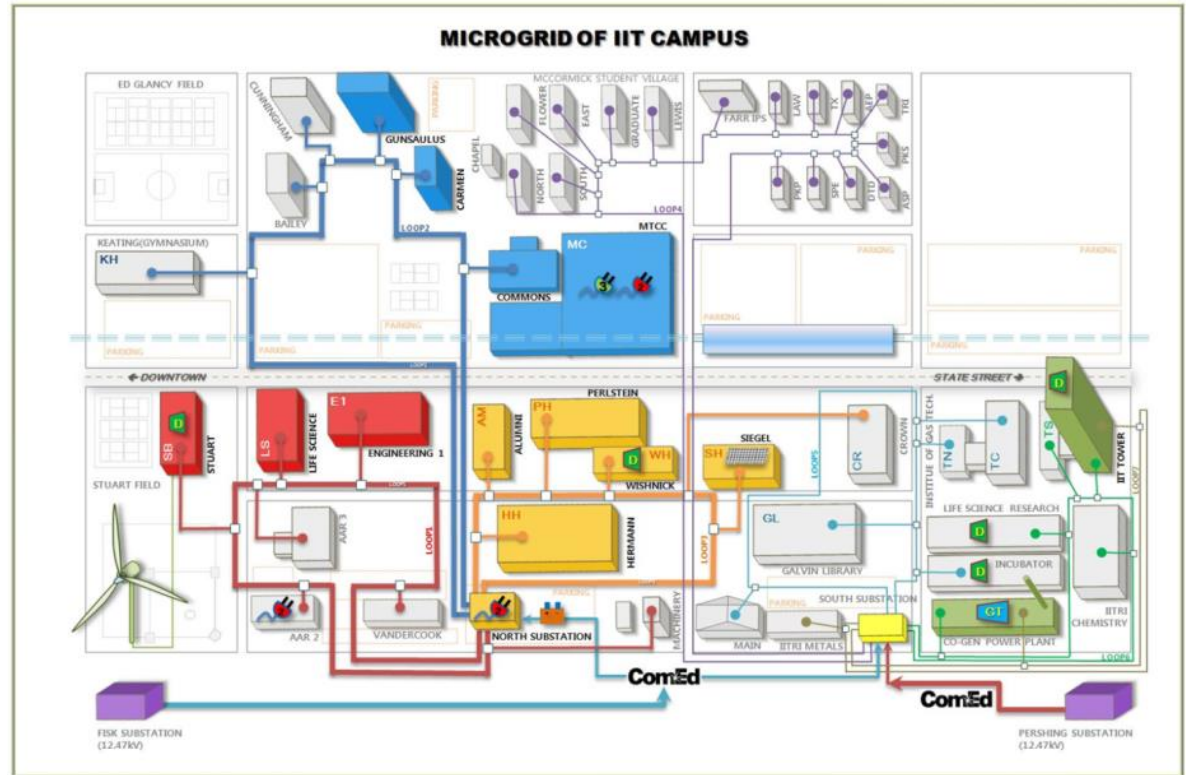
Viryd wind turbine (8kW)

Grand Ridge wind turbine (1.5MW)

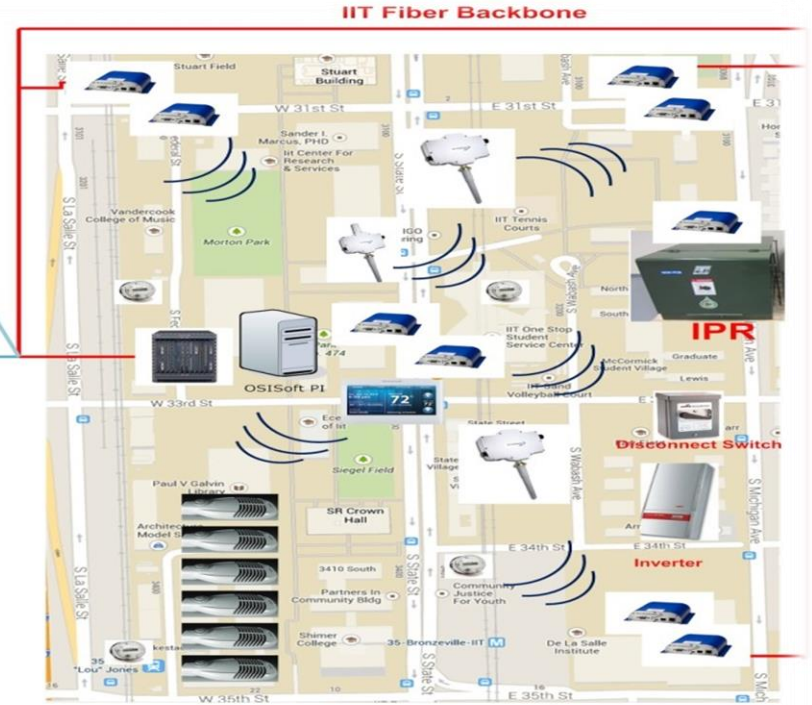
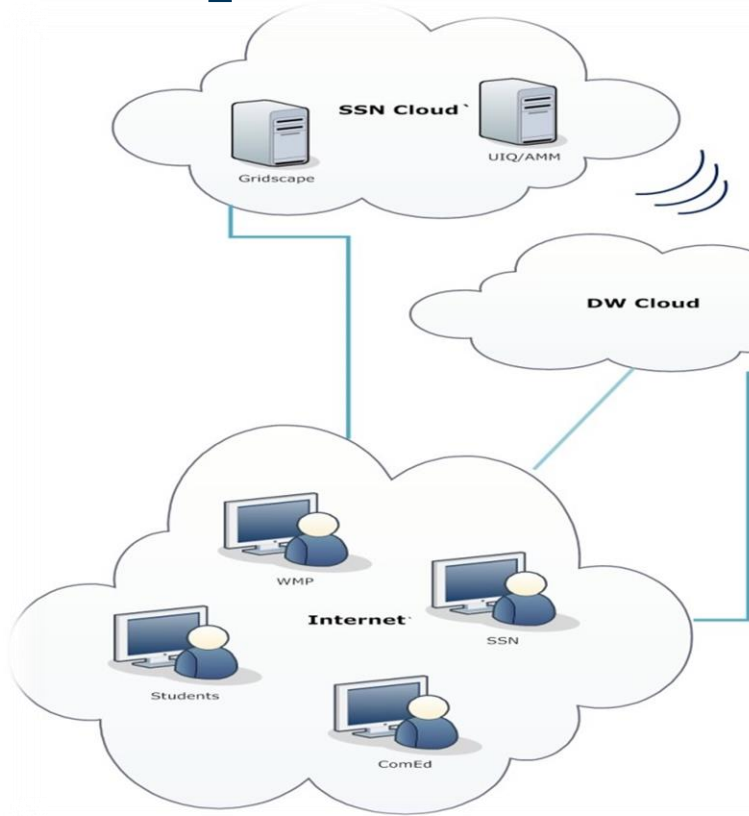
Gas Turbine

Two 4MW turbines for a total of 8MW capacity (IIT's peak load is ~10MW)

IIT has the unique benefit of owning and operating their entire electrical system, starting with the low voltage side of the transformers.



Concept



Proposed IIT Smart Grid Lab v1.5

Phases

- ◆ **Phase 1: Build Smart Grid Lab and Execute Initial Tests**
(Summer – Fall 2014)
- ◆ **Phase 2: Data Validation** (Fall 2014 – Summer 2015)
- ◆ **Phase 3: Expansion of Test Lab** (2015 and beyond)

Partnership Goals

- ◆ **Build** out a representative environment of the ComEd smart grid network and associated components
- ◆ Conduct **Testing** of new grid devices/technologies/software applications
- ◆ Examine **Convergence** as new/upgraded system components are added to the network
- ◆ Evaluate **Performance** of the network and systems before/after upgrades
- ◆ Maintain **Configuration Controls** as new devices are integrated
- ◆ Ensure **Cyber/Physical Security** across the smart grid infrastructure and network
- ◆ Perform **Data Analytics** to achieve data-driven grid intelligence and insights
- ◆ Demonstrate **Advanced Customer-side Technologies** that are enabled and enhanced through smart grid technologies
- ◆ Provide an **Education Showcase** at the IIT campus for ComEd and its Partners to publically display the Lab environment
- ◆ Provide a **Research** environment for IIT students and the Lab Partners



Current and Future Lab Projects

- ◆ Smart Streetlight Initiative
- ◆ Real-Time Interactive Distribution Diagram and Alerts in Pi AF
- ◆ Data analytics of DG/DSM
- ◆ Convergence testing of DA/AMI data on same network

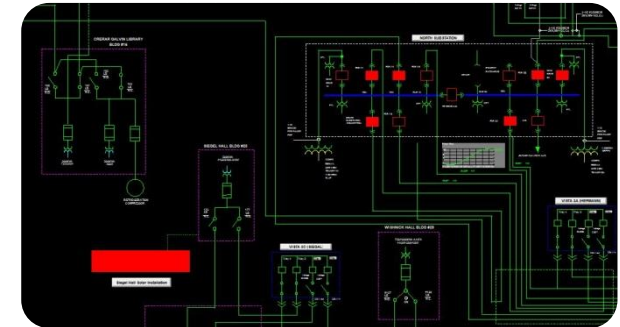
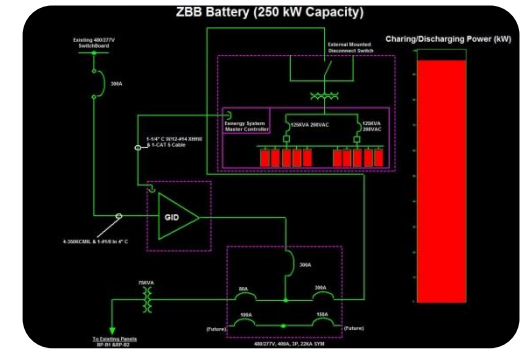
Smart Street Light Initiative

- ◆ Who
 - SSN to sponsor project
 - SSN/ComEd to provide hardware/software
 - IIT to install
 - IIT/WMP to analyze data
- ◆ What
 - 15 LRL (NXT) streetlights with special brackets that will enable mounting to existing streetlight poles
 - Back office software will provide remote access, scheduling, and event lighting
- ◆ Why
 - Demonstrate features and capabilities to stakeholders
 - Analyze Data with baseline and operational testing to assess energy and financial savings
- ◆ When
 - Already in progress
 - Final Acceptance set for 9/1/14
 - Demo/analytics project for next 12 months



Real-Time Interactive Dashboard for IIT Facilities

- ◆ Who
 - IIT to sponsor
 - OSIsoft to donate software
- ◆ What
 - Create a real-time, interactive one-line diagram of IIT electrical distribution system
 - Create real time alerts for designated events (IE if breaker trips, send email)
- ◆ Why
 - Better monitoring and diagnostics of IIT electrical system to assess status and address issues
 - Leverage capabilities of existing equipment to improve campus functionality
 - Students learn about the smart grid system and how to develop unique solutions using OSIsoft's Software Suite
- ◆ When
 - Already in Progress
 - Scheduled to deliver version 1.0 8/29/14



IIT Advance Metering Infrastructure

- ◆ Who
 - IIT to sponsor
 - SSN/ComEd to donate equipment
- ◆ What
 - Develop an AMI network of meters and communication at IIT
- ◆ Why
 - Better monitoring and diagnostics of IIT buildings for billing and functionality
 - Leverage capabilities of existing equipment to improve campus functionality
 - Building AMI network opens the possibility of DA/AMI convergence testing
- ◆ When
 - Already in Progress
 - Metering goal: Spring of 2015



Data analytics of DG/DSM

- ◆ Who
 - WMP to sponsor.
- ◆ What
 - Monitor, collect data, and analyze trends for DG resources on campus (solar/wind)
 - OSIsoft PI Historian and Asset Framework for analytics
- ◆ Why
 - Create models that can help utilities better understand and predict how DG sources affect their grid (IE for a given number of resources what would the DG contribution be for a given time of year or weather condition?)
- ◆ When
 - If we can access data through existing network we should be able to start this summer
 - Ongoing at least 12 months for seasonal, preferably over several years to create valid models

Convergence testing of DA/AMI data on same network

- ◆ Who
 - ComEd to sponsor.
- ◆ What
 - Currently ComEd DA and AMI data are routed on different networks, this pilot would route both over the same network
- ◆ Why
 - Networks could be simplified and costs reduced
 - Determine if DA reliability can be maintained and prioritized over AMI data
- ◆ When
 - Wait until after the South Substation work is completed this fall.