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# **Ameren Illinois**

## **2<sup>nd</sup> Quarter 2016 Smart Grid**

### **Test Bed Report**

August 14, 2016

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## Executive Summary

Ameren Illinois Company (AIC) submits the following Smart Grid Test Bed Quarterly Report in accordance with the Energy Infrastructure Modernization Act (EIMA), 220 ILCS 5/16-108.5 et seq. This report provides updates on the steps Ameren Illinois has taken to implement its test bed plan during the fourth quarter of 2015. The report includes information on activities Ameren Illinois has undertaken to further develop its “primary” test bed location, discussions with potential test bed customers, and on the testing application process.

## DOE Funding Opportunity Projects

Technology Applications Center (TAC) personnel continue their work on the following Department of Energy (DOE) funded projects.

- **(CODEF) - Collaborative Defense of Transmission and Distribution Protection and Control Devices Against Cyber Attacks**

Primary Investigator – ABB

Partners – University of Illinois – Urbana/Champaign (UIUC)

This project will advance the state of the art for cyber defense methods for transmission and distribution grid protection and control devices by developing and demonstrating a distributed security domain layer that enables transmission and protection devices to collaboratively defend against cyber-attacks in an International Electrotechnical Commission (IEC) 61850 environment.

A CODEF abstract for a publication to the Protection Automation & Control World (PACW) America’s conference was successfully accepted. The Ameren Illinois team assisted in authoring the conference paper and will participate in presenting the paper at the conference that will take place in Rayleigh N.C between August 29<sup>th</sup> and September 1<sup>st</sup>. The Ameren Illinois team participated in the CODEF quarterly meeting that took place in June 2016.

- **(SDN) – Software-Defined Networking**

Primary Investigator: Schweitzer Engineering Laboratories (SEL)

Partners –UIUC, Pacific Northwest National Laboratory

SDN allows a programmatic change control platform, which allows the entire network to be managed as a single asset, simplifies the understanding of the network, and enables continuous monitoring in more detail. Control system networks are often more static, while the corporate world is more dynamic.

The Ameren Illinois team participated in the SDN bi-weekly team meetings. The Ameren Illinois team showed interest and support for a publication initiative that would highlight the success story of the project. Ameren Illinois plans to continue to work with project team members to create the final report that will be submitted to the Department of Energy

### Other Current Test Bed Projects

- TAC personnel continue the testing of Light Emitting Diode (LED) Street lights that are comparable to 250 watt sodium vapor high-intensity discharge lamps to provide testing results that will assist AIC leadership in making the determination of whether or not to develop a new lighting tariff offering to AIC customers. Testing completion is anticipated by the end of 3Q, 2016.
- Ameren Illinois continues the testing of Home Area Network (HAN) devices through AIC's Smart Device Validation testing process. This testing process allows AIC to validate that vendor devices operate correctly with Ameren Illinois' Advanced Meter Infrastructure (AMI) system. During the 2Q, 2016, Ameren received two additional vendor devices as a result of the vendor outreach initiative.
- EPRI's Field demonstrations of the ANSI/CEA-2045 Modular Communication Interface Standard - Four field demonstration devices (Controllable Thermostat, Heat Pump Hot Water Heater, Pool Pump, and Electric Vehicle Supply Charger) are presently being developed by research partner vendors, to enable demand response testing of devices utilizing the modular socket communications platform. During the 2Q, 2016, Ameren began its testing of the universal control module that is being utilized to control the Heat Pump Hot Water Heater device. TAC employees were trained on EPRI's Open Advanced Demand Response (Open ADR) System that will enable testing of each devices demand response capabilities. Ameren also received and successfully installed a CEA 2045 equipped Electric Vehicle Charging Station. Testing the new Electric Vehicle Charging Station will begin as soon as Ameren receives the appropriate Universal Control Module (UCM) from EPRI.

### Test Bed Applications

- Ameren Illinois received an application from a Sensor solutions manufacturer. The manufacturer desires to have its application of smart partial discharge sensors tested inside an Ameren substation power transformer, to validate its functionality in capturing partial discharge waves and its ability to provide trending tools that allow for data analysis. Ameren Illinois and the vendor were able to finalize the testing and verification plans for the vendor product at an Ameren Illinois substation. Ameren Illinois continues its work to finalize its cost estimates and contract documents for execution by the vendor.
- Ameren Illinois received an application from a Sensor and Network devices manufacturer. The manufacturer originally desired to have its application of bi-directional current sensing equipped with a Supervisory Control and Data Acquisition (SCADA) communication package developed

and tested at the TAC's infrastructure. Ameren Illinois met with the vendor and learned that the vendor is now looking to develop a low cost transformer monitoring solution that will be supported with a Supervisory Control and Data Acquisition (SCADA) communication package. Ameren Illinois and the vendor plan to develop the testing scope and verification processes in 4Q, 2016, and then install and implement the solution at the TAC in 1Q, 2017.

- Ameren Illinois received an application from a Power Equipment manufacturer. The manufacturer desires to have its application of soft closing protective devices to be verified and tested on the TAC infrastructure. Ameren Illinois continued discussions with the vendor to develop scope of work involved in testing and developing the product.
- Ameren Illinois received an application from a Power Equipment manufacturer. The manufacturer desires to have its application of distribution automation protective devices be developed and tested at the TAC's infrastructure using the IEC-61850 communication standard. Ameren Illinois continued discussions with the vendor to develop scope of work involved in testing and developing the product.

## Test Bed Marketing

TAC staff presented an overview of the Technology Applications Center to representatives of the Southwestern Electric (SWEC) Coop during the Ameren Illinois a SWEC network operations committee meeting.

## Industry Participation

A member of the TAC staff provided a presentation to UIUC's power affiliates program that introduced the TAC facility to the audience as well as it highlighted Ameren's Distributed Energy Resource (DER) Integration Project.

Members of the TAC staff attended the MidAmerica Regional Microgrid Education and Training Consortium (MARMET) short course. The MARMET consortium, which is one of four regional training consortiums under the DOE SunShot initiative, is tasked with development of training curriculum to grow the expertise and preparedness of current and incoming electric utility industry sector professionals for high penetrations of solar and other distributed energy technologies.

Members of the TAC staff attended a meeting with Dr. Timothy Heidel, Program Director for DOE's Advanced Research Projects Agency - Energy (ARPA-E). This meeting allowed Ameren personnel to learn more about the research activities that ARPA-E has executed as well as future research initiatives that are being considered.

Members of the TAC staff continue work with UIUC to assist UIUC in the creation of a contract with the United States Department of Defense – Defense Advanced Research Program Agency (DARPA) - RADICS project. The project addresses the development of a Cybersecurity testing facility that would be located at UIUC. Ameren's engagement in this funding opportunity will be to

advise UIUC researchers on the components and systems that a generic utility requires to securely operate their electric transmission and distribution systems. On March 22, 2016, UIUC was notified by DARPA that their application had been accepted for negotiations of the DARPA contract.

### Test Bed Tours

- On June 15, 2016, TAC staff provided a tour of the TAC facility to representatives from Power Delivery Products (PDP) electric company.
- On June 22, 2016, TAC staff provided a tour of the TAC facility to Mr. Charlie Murray who is working with the Energy Foundry to research the development of an electric distribution system power flow controller.
- On June 24, 2016, TAC staff provided a tour of the TAC facility to representatives of Wolfram Corp.

### Smart Grid Test Bed Plan Success

Ameren Illinois' commitment to the successful implementation of its Smart Grid Test Bed plan is strong. However, as set forth above, Ameren Illinois reserves the right to modify, amend or alter this plan, as necessary and consistent with the law, to meet the requirements and objectives of the EIMA and other related provisions. Additionally, Ameren Illinois reserves its right to terminate this plan.