
SPP
75th Anniversary
75
SEVENTY-FIVE YEARS OF
RELIABILITY THROUGH RELATIONSHIPS

SPP PMU
Project Overview for NASPI

Cody Parker
Supervisor Operations Support

Outline

1. Background
2. Project Overview
3. Working with our Members
4. Project Team

Background

OUTLINE ITEM 1

Our Beginning

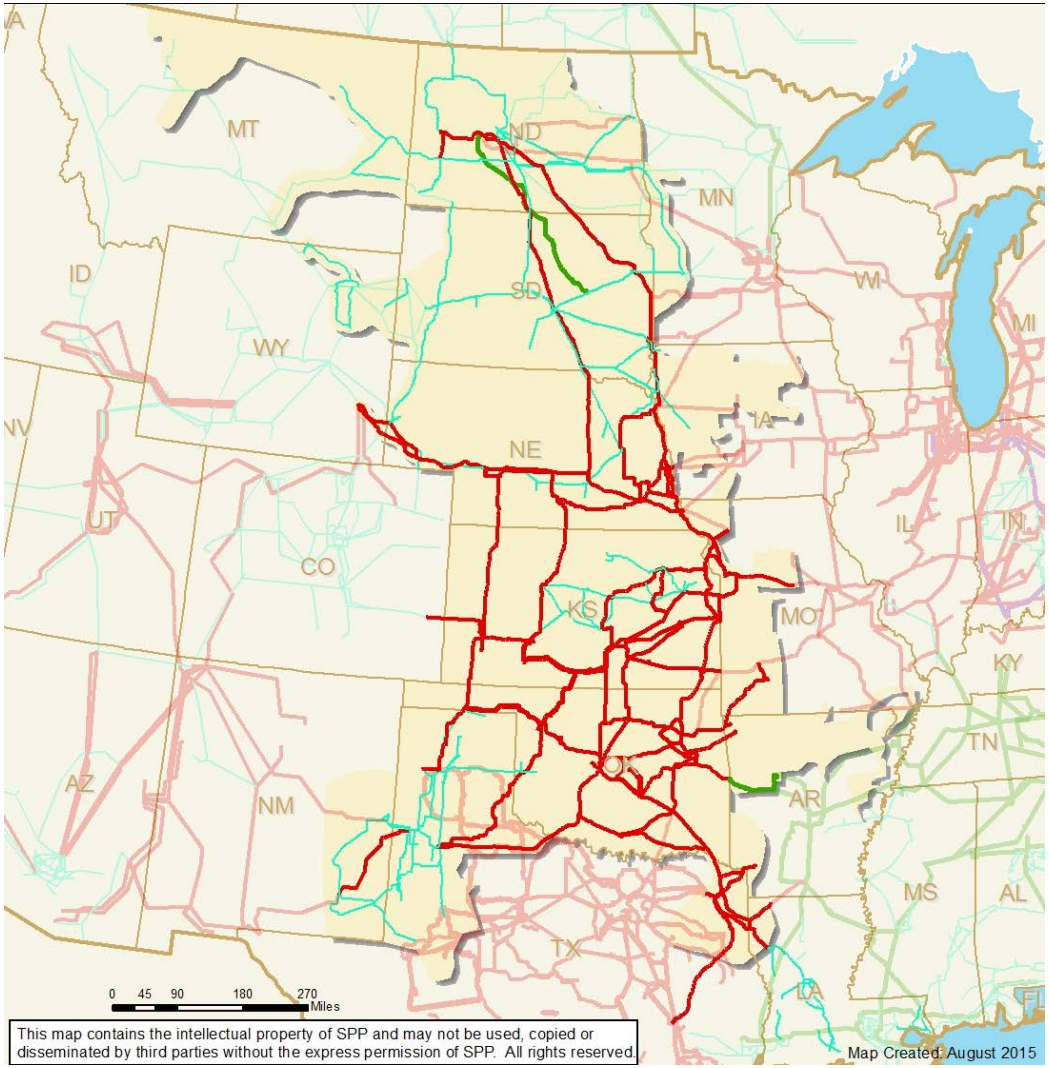
- Founded 1941 with 11 members
  - Utilities pooled electricity to power Arkansas aluminum plant needed for critical defense
- Maintained after WWII to continue benefits of regional coordination

The SPP Difference

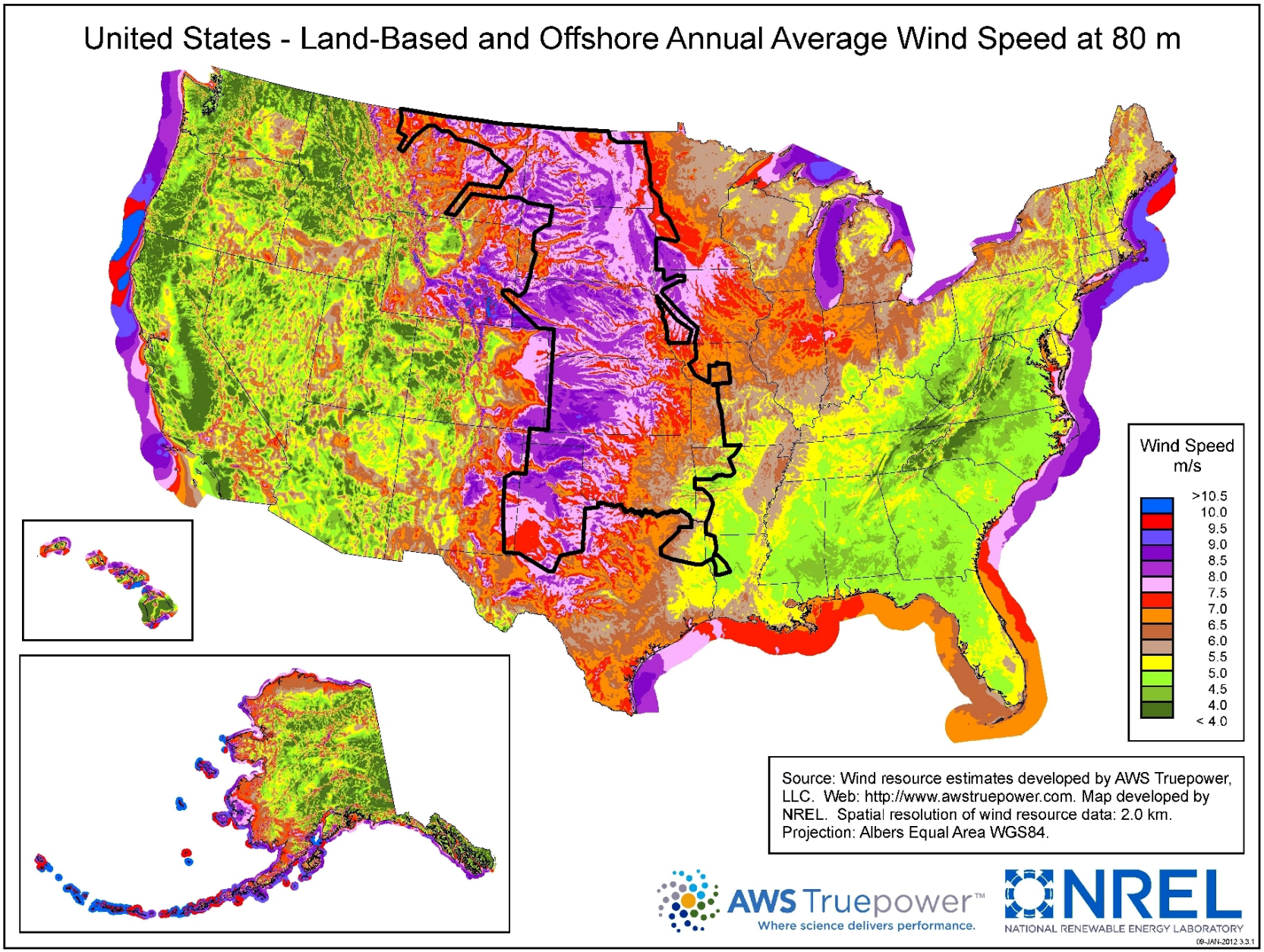
- Relationship-based
- Member-driven
- Independence Through Diversity
- Evolutionary vs. Revolutionary
- Reliability and Economics Inseparable

Operating Region

- Miles of service territory: 575,000
- Population served: 18M
- Generating Plants: 825
- 12.4 GW in-service wind capacity
- Substations: 4,729
- Miles of transmission: 56,142
  - 69 kV 14,970
  - 115 kV 15,261
  - 138 kV 9,376
  - 161 kV 5,480
  - 230 kV 7,838
  - 345 kV 10,158
  - 500 kV 391

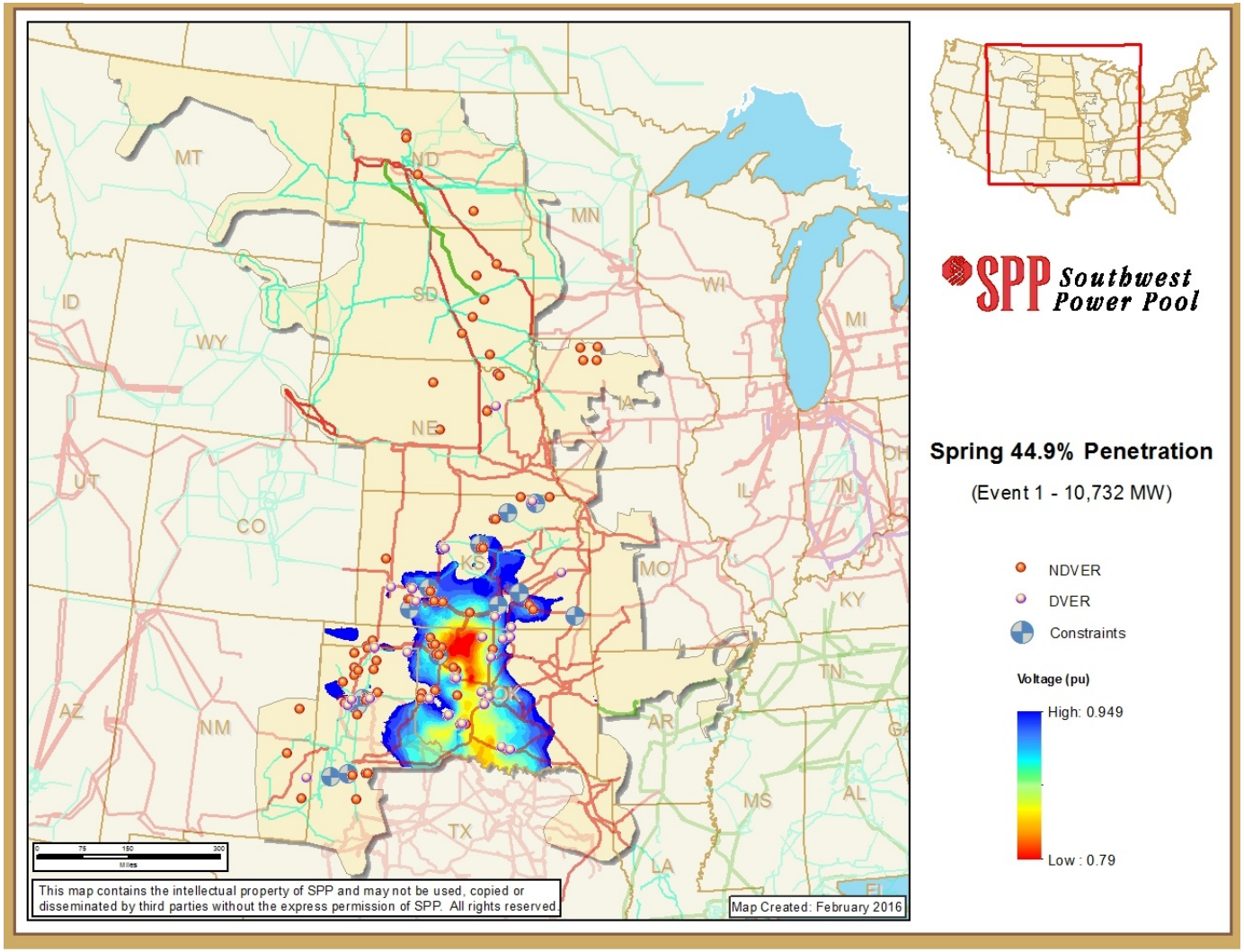


Annual Average Wind Speed

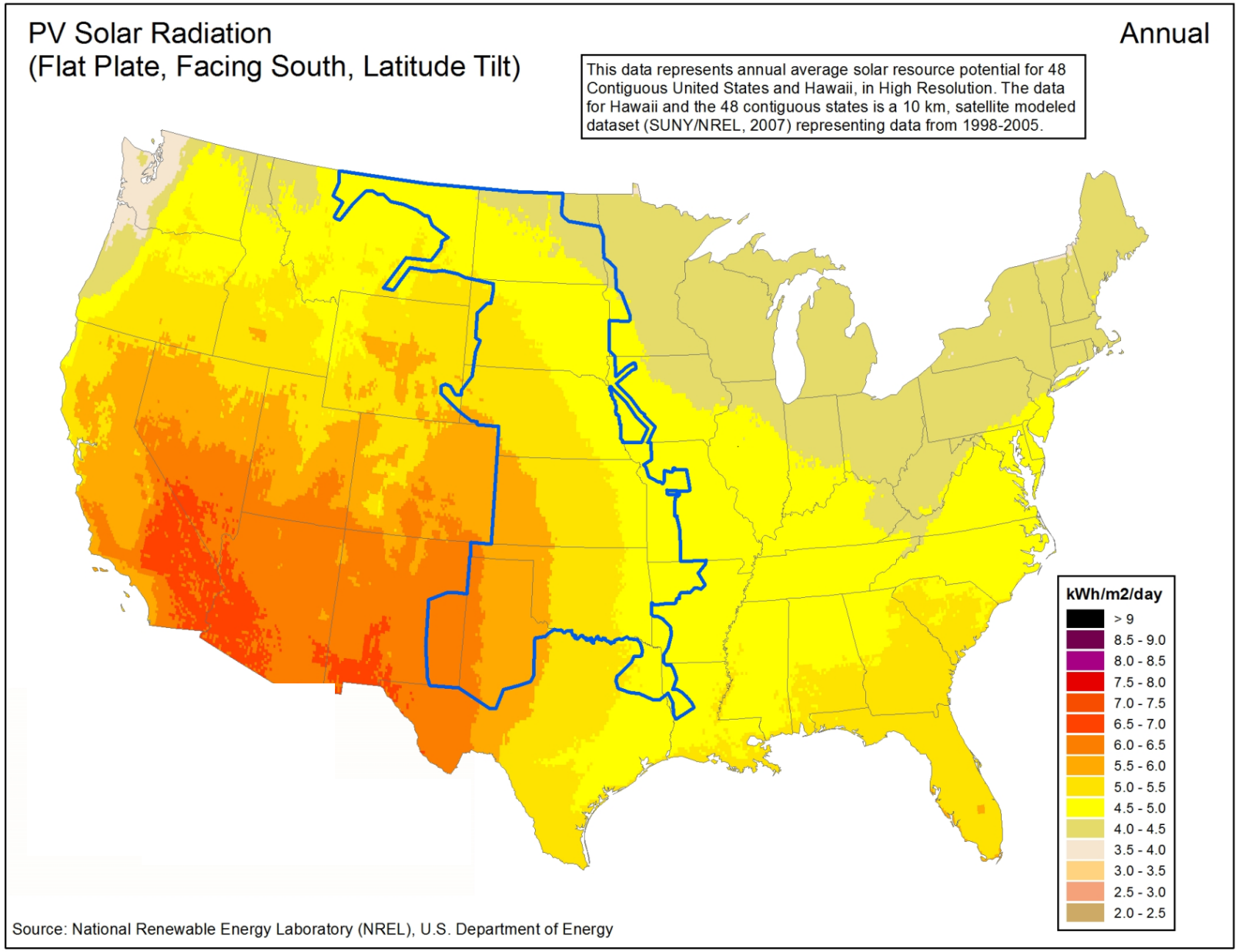


WIND INTEGRATION STUDY

NDVER and DVER site locations with Constraints and Voltage Contour



Solar in the U.S.



Synchrophasors at SPP

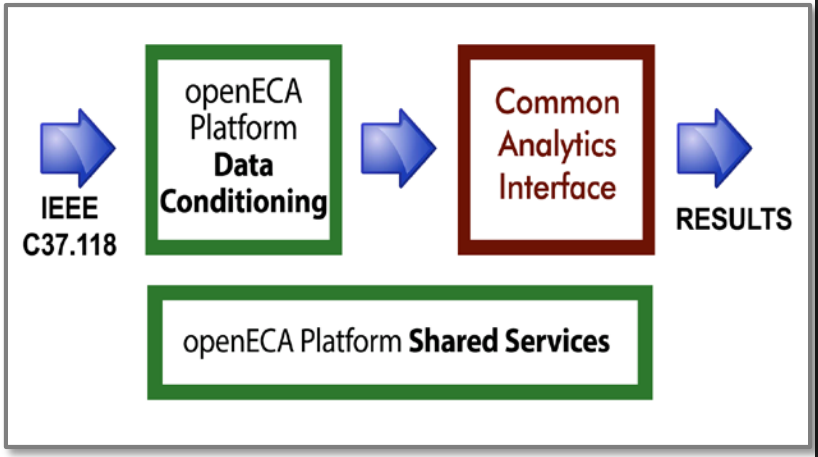
- Research projects in process include
  - EPRI/Baylor PMU pilot with KCPL, NPPD, OG&E, Sunflower & WAPA,
  - DOE-funded FOA970 openECA project to develop and test new open source synchrophasor applications with GPA, OG&E, BPA, Dominion/Virginia Power, Northwestern Energy and others
- 3 Year project approved in SPP budget for 2016-2018

openECA Project Summary

A better way to connect phasor data to analytics

Objective

To develop an open-source software platform that enables the production use and facilitates the development of analytics that use high-fidelity synchrophasor data



2-Year Project Schedule

October 2015 – September 2017

- Final design – 6/30/16
- Alpha Version – 3/31/17
- Demonstration Begins - 6/30/17
- Version 1.0 released - 9/15/17

Project Status

Project Awarded Sept. 2015

Value of Award

$ 5.1 M

(< 3% funds expended to date)

Prime

Grid Protection Alliance

Synchrophasor Symposium Held Dec 15th

- Educational forum for staff and members involved with PMU deployments to date
- Key support from NASPI and OG&E staff
- Meeting agenda included highlights from NASPI Synchrophasor Starter Kit Training Sessions.
- Agenda and presentations are posted on our website at http://www.spp.org/spp-documents-filings/?id=18440 under our System Protection and Control Working Group.

PROJECT OVERVIEW

OUTLINE ITEM 2

Project Overview

- 3 Year Project Plan
- Leverage Lessons Learned from our Peers
- Leverage expertise from SPP members
- Big Drivers
  - Increase Reliability Capabilities
  - Enhance Situational Awareness
  - Event Analysis
  - Model Validation
  - Facilitate renewables integration

Project Overview – cont'd

- 2016 Overview
  - Receive PMU data from SPP members and MISO
  - SPP Member Engagement (addt'l coverage in footprint)
  - Education of staff on: benefits, technology and capabilities
  - Evaluate open-source technologies
  - Evaluate commercial vendor products
  - Start implementation

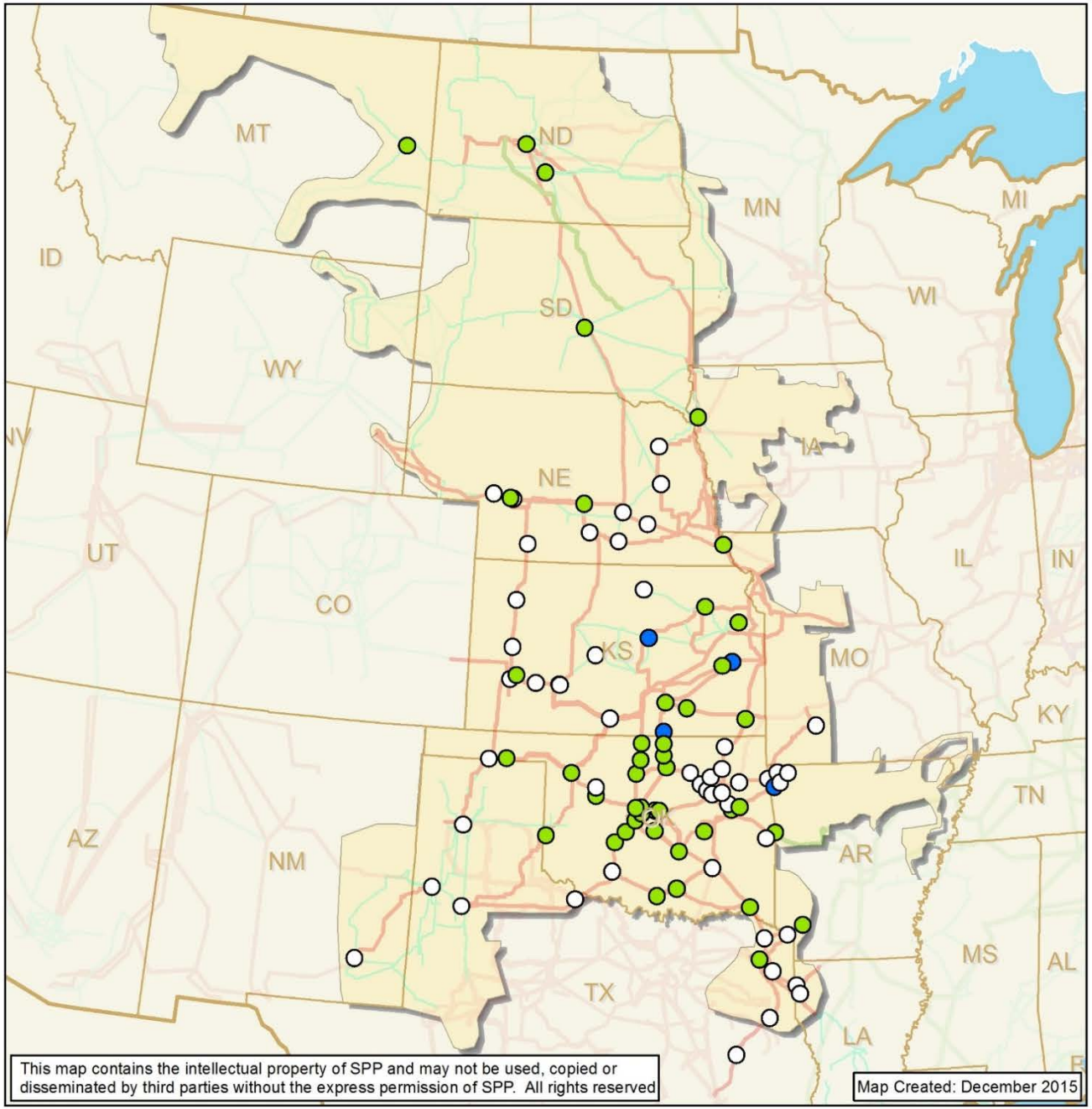
Project Overview – Future Scope

- 2017 Overview
  - Receive more PMU member data from SPP footprint
  - Develop historical data analysis capabilities
  - Develop optimal architecture
  - Develop system integration to better utilize PMU data
  - Test OpenECA capabilities
- 2018 Overview
  - Deploy the system in highly available configuration in production environment
  - Implement CIP controls
  - Deploy mechanisms for receiving PMU data for production usage

Working with our Members

OUTLINE ITEM 3

Existing/Potential PMU Locations



SPP Southwest Power Pool

EHV PMU Locations

Status

- In Operation
- Capable
- To Be Added

Voltage

- 230 kV
- 345 kV
- 500 kV

N

0 75 150 300

Miles

Synchrophasor Strike Team

- Synchrophasor Strike Team will help in the development of:
  - Member business case
  - Member roadmap for PMU deployments
  - Requirements and criteria for sending PMU data to SPP
  - Review SPP roadmap for synchrophasor applications

- Share results, recommendations and next steps at educational workshop in advance of MOPC in October

Strike Team – Key Questions

- How will Synchrophasor data be used in SPP (real-time monitoring, wide-area situational awareness, model validation, etc.) and shared among members?
- What are current and planned uses by members?
- What are the best locations for PMU equipment and priorities of installations?
- What are the data latency and quality requirements and other specifications?
- Who should install and own the PMUs?
- Who is responsible for communications from the PMUs and PDCs?

Strike Team – Key Questions

- Who pays for PMU equipment and communications, and how should costs be allocated?
- What reporting should be established for synchrophasor data?
- What data retention should be established?
- What are the CIP implications/requirements for the use of this data and how are they best addressed?
- What data can be shared and with whom?

PROJECT TEAM
Roles & Responsibility

OUTLINE ITEM 4

PROJECT TEAM LIST

Project Role	Team Member Name
Executive Sponsor	Bruce Rew, VP Operations
Director	Philip Bruich, Director, Markets
Business Owner	Cody Parker
Technical Owner	Hunter Austin
Architecture	Srinivas Kolluru
Leadership Team	Cody Parker, Scott Aclin, Hunter Austin, Jay Caspary, Srinivas Kolluru, Philip Bruich
Project Manager	Brenda Fite
Core Team Members	Cross-Departmental Ongoing Activities in: Operations, Engineering, IT and others
Requirements and Testing	Terry Rhoades
Impacted Departments	Customer Training, Legal…

Send SPP Synchrophasor Questions/Comments to:

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