

Seams Update

April 2017

RSC Meeting



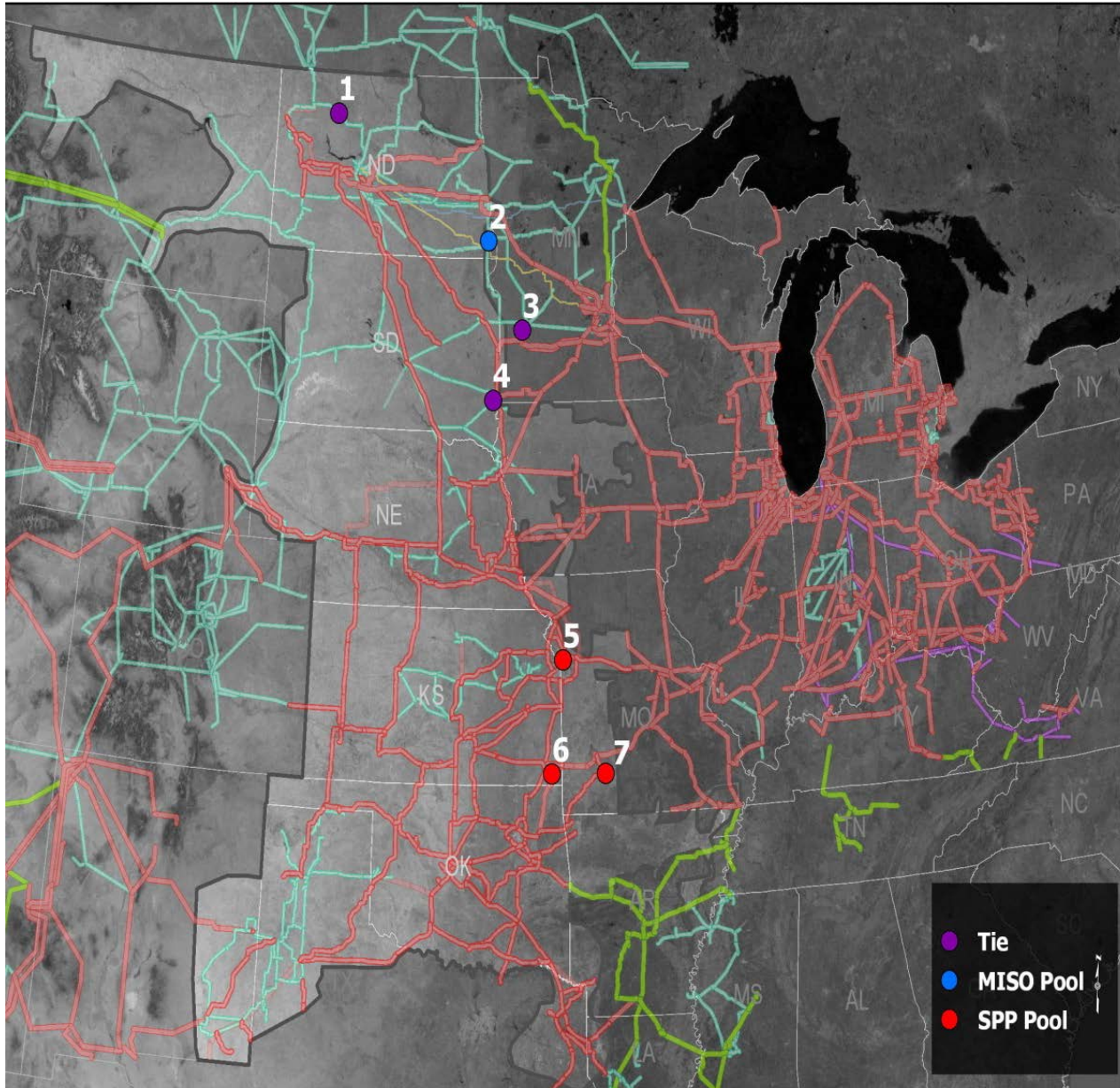
SPP-MISO CSP

2016 SPP-MISO CSP (Targeted Study)

- SPP and MISO began a new Coordinated System Plan (CSP) in March 2016
- Developed needs list by leveraging needs identified in SPP and MISO regional processes
 - SPP 2017 ITP10
 - MISO MTEP 16
- Built joint models that reflect a regional approach to carbon-constrained future to test projects for the needs chosen
 - 2020, 2025, 2030



2016 CSP Needs



NEED	CONSTRAINT
1	Rugby WAUE-Rugby OTP Tie
2	Hankinson - Wahpeton 230kV FLO Jamestown - Buffalo 345kV
3	Sub3 - Granite Falls 115kV Ckt1 FLO Lyon Co. 345kV Ckt1
4	Sioux Falls - Lawrence 115kV FLO Sioux Falls - Split Rock 230kV
5	Northeast - Charlotte 161kV FLO Northeast - Grand Ave West 161kV
6	Neosho - Riverton 161kV FLO Neosho - Blackberry 345kV
7	Brookline 345/161kV Ckt 1 Transformer FLO Brookline 345/161kV Ckt 2 Transformer

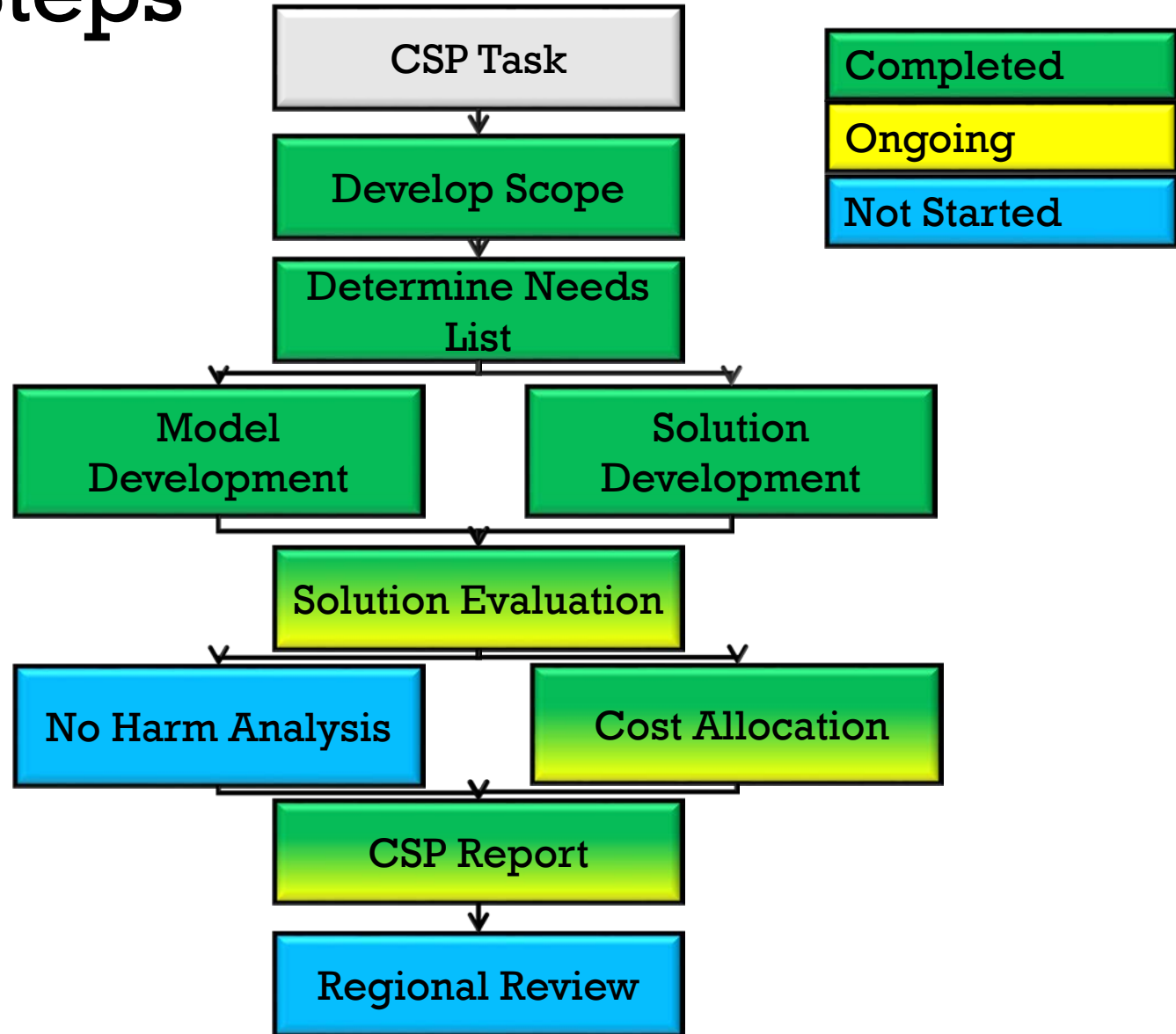
Potential Projects

- No beneficial Interregional Projects were identified for needs 1 or 6
 - Rugby WAUE-Rugby OTP Tie
 - Neosho - Riverton 161kV FLO Neosho - Blackberry 345kV
- Potential projects still in consideration

Need Addressed	Project Description
2	Rebuild Hankinson - Wahpeton 230kV line
3	2nd Lyon County Transformer
4	Loop One Split Rock - Lawrence 115kV Ckt into Sioux Falls
5	Northeast - Charlotte 2 ohm series reactor
5	Crosstown - Blue Valley 161 kV line
6	Lacygne - Blackberry 345 kV line plus 345/161 kV transformer and Blackberry - Asbury 161 kV line
7	James River - Brookline 345 kV line plus 345/161 kV transformer
7	Morgan 345/161 kV Transformer plus Morgan - Brookline 161 kV uprate

Status and Next Steps

- All project evaluations and assessments are near complete
- Assess all aspects and challenges of each of the potential projects
- Work with MISO and the IPSAC to determine what projects should be recommended
- Finalize 2016 SPP-MISO CSP Draft Report



April 24th IPSAC Meeting

- SPP-MISO Interregional Planning Stakeholder Advisory Committee (IPSAC) Meeting
 - April 24th from 1:00pm to 4:00pm CT
 - Net Conference
 - [Registration Link on SPP Website](#)
- Potential Agenda Items
 - 2016 CSP Results / Potential Projects Recommended
 - 2017-2019 Joint Study Update
 - 2016 SPP-MISO CSP Draft Report

Brookline Reactor Project

Brookline Reactor Project

- Brookline Reactor Project was a recommended project out of the 2016 SPP-AECI Joint & Coordinated System Plan
 - [Link to 2016 SPP-AECI JCSP Final Report](#)
- Addition of a 50 MVAR Reactor at CUS' Brookline 345 kV substation addresses real-time high voltage issues
 - \$1.1M Conceptual Cost Estimate
 - Allocation of costs will be determined pursuant to Section 7.4 of the SPP-AECI JOA
 - SPP and AECI are still negotiating the details of the project including cost sharing
 - Project approval subject to the SPP Regional Review Process

2017 SPP-AECI JCSP Regional Review

- Regional Review Process is outlined by the Regional Review Methodology
 - Approved by ESWG, TWG, and MOPC in 2013/2014
 - TWG and SSC are the primary stakeholder groups responsible with reviewing the project
 - Reliability Projects – TWG & SSC
 - Economic Projects - ESWG & SSC
 - [Link to the Regional Review Methodology](#)
- TWG approved the 2017 SPP-AECI Regional Review Scope
 - [Link to 2017 SPP-AECI JCSP Regional Review Scope](#)

Regional Review Recommendations

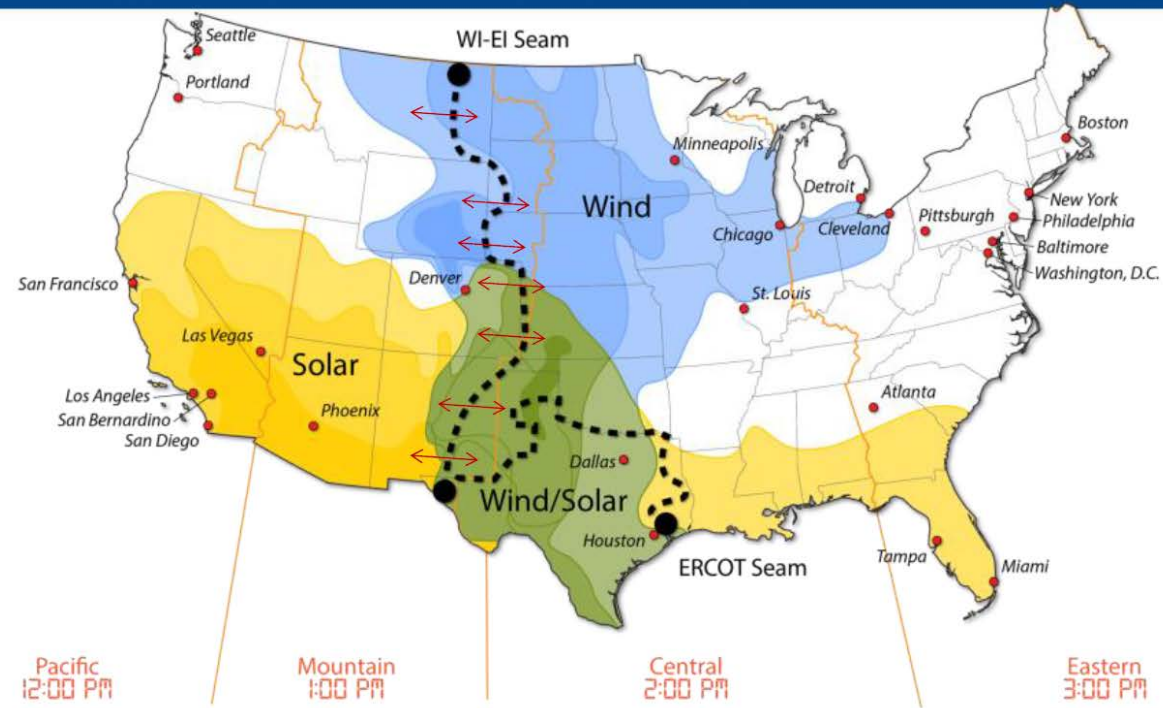
- SPP Staff recommends the approval of the Brookline Reactor Project out of the 2017 SPP-AECI JCSP Regional Review
- The TWG recommends the approval of the Brookline Reactor Project out of the regional review process
- The SSC approves the Brookline Reactor Project identified in the 2016 SPP-AECI JCSP and analyzed through the 2017 SPP-AECI JCSP Regional Review Process as providing benefit to SPP
- **Project will go to the MOPC and Board of Directors in April 2017 for final approval**

EI-WECC Seams Study

DOE-funded, NREL-led Seams Study

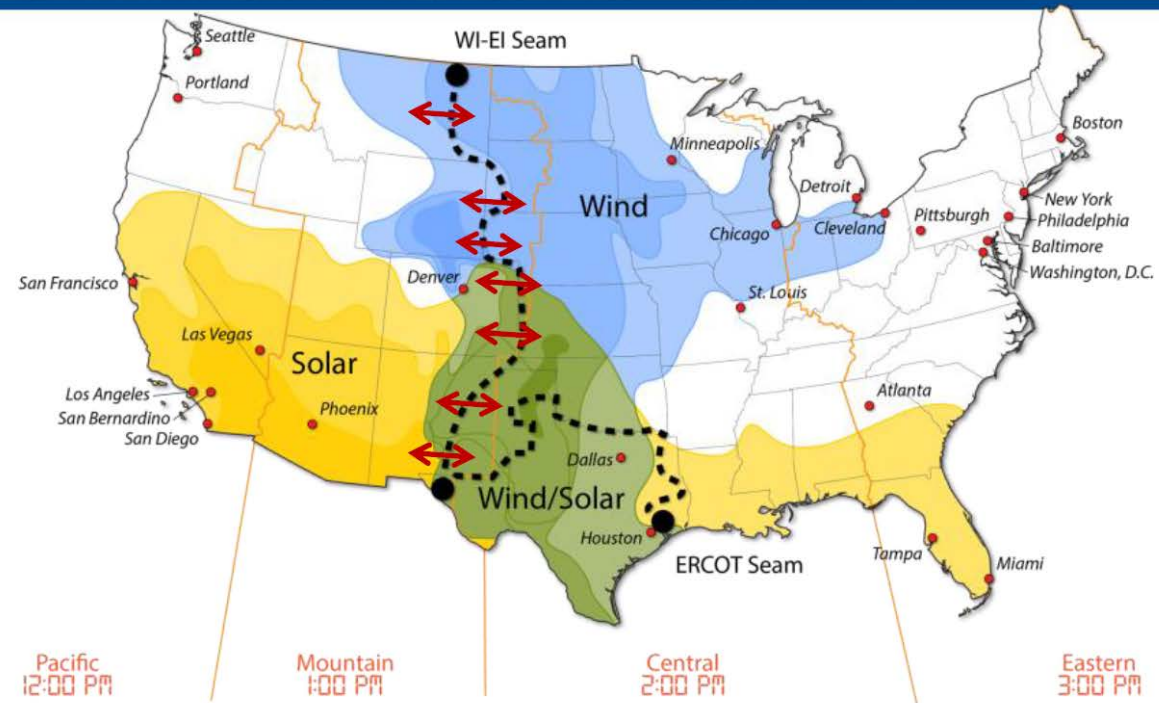
- \$1.2M, 18 month EI-WECC Seams and HVDC Overlay Study approved as part of GMLC
- Convene industry and academic experts in power systems to evaluate the HVDC and AC transmission seams between the U.S. interconnections and propose upgrades to existing facilities that reduce the cost of modernizing the nation's power system.
- Opportunity to not just replace in-kind the aging B2B HVDC Ties between EI and WECC
 - Three Scenarios
 - Status Quo
 - Modernized/Optimized Seam
 - HVDC Overlay
- Surveys completed by TOs for B2B HVDC Ties

Design 1--No Upgrades



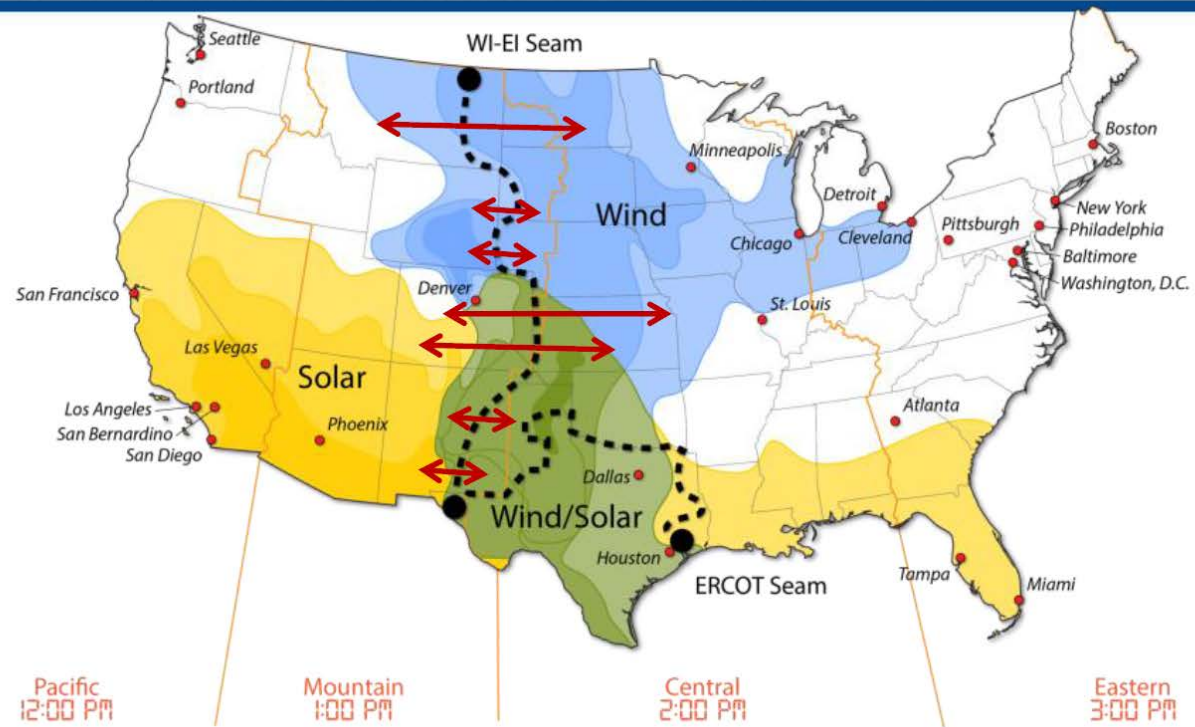
DOE GLMC Interconnection Seams Study Technical Review Committee Meeting #2, Golden, CO, Oct. 25, 2016.

Design 2a—Expand existing facilities



DOE GLMC Interconnection Seams Study Technical Review Committee Meeting #2, Golden, CO, Oct. 25, 2016.

Design 2b—Reconfigure size and/or location



DOE GLMC Interconnection Seams Study Technical Review Committee Meeting #2, Golden, CO, Oct. 25, 2016.

Next Steps

- Preliminary results look very promising
- Final results expected later this summer
- Significant expansion of existing B2B HVDC ties is showing NPV savings exceeded \$10B
- Production Costing and Reliability Analyses forthcoming
- Next TRC meeting scheduled for May 17 at NREL Offices
- Interest in leveraging harmonized EI and WECC models and datasets to look at supplemental solutions including synchronized operations to bypass select B2B HVDC Ties