Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP / TRANSMISSION WORKING GROUP

March 8th, 2017

Net Conference

• SUMMARY OF ACTIONS TAKEN •

1. Approved the Resource Inclusion Process and Criteria for the ITP manual.
2. Approved the Transmission Topology Modeling methodology for the ITP manual.

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ECONOMIC STUDIES WORKING GROUP / TRANSMISSION WORKING GROUP

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• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chairs Alan Myers (ITC Great Plains) and Travis Hyde (OGE) called the joint meeting of the Economic Studies Working Group (ESWG) and Transmission Working Group (TWG) to order at 2:00p.m., welcomed those in attendance, and asked for introductions.

There were 59 participants, representing 13 of 17 ESWG members and 18 of 24 TWG members. (Attachment 1 – March 8th, 2017 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC Great Plains) asked for any ESWG proxy statements; three proxies were identified. Jody Holland (SCMCN) named Eric Burkey (SCMCN) as his proxy, Kurt Stradley (LES) named Tim Owens (NPPD) as his proxy, and Leon Howell (OGE) named Zac Hager (OGE) as his proxy. (Attachment 2 – ESWG Proxy Statements)

Travis Hyde (OGE) asked for any TWG proxy statements; four proxies were identified. Scott Benson (LES) named Alan Burbach (LES) as his proxy, Noman Williams (SCMCN) named Eric Burkey (SCMCN) as his proxy, John Fulton (SPS) named Rene Miranda (SPS) as his proxy and Dan Lenihan (OPPD) named Josh Verzal (OPPD) as his proxy. (Attachment 3 – ESWG Proxy Statements)

Agenda Item 1c – Review of Agenda

Chairs Alan Myers (ITC Great Plains) and Travis Hyde (OGE) presented the agenda for review and asked for any additions or corrections. (Attachment 4 – March 8th, 2017 ESWG.TWG Agenda).

> **Natasha Henderson (GSEC) made a motion; seconded by Tim Owens (NPPD) to adopt the agenda for ESWG. The motion was approved unanimously.**

> **Richard Dahl (MRES) made a motion; seconded by Alan Myers (ITC) to adopt the agenda for TWG. The motion was approved unanimously.**

Agenda Item 2 – Consent Agenda

The consent agenda included the following items:

ITP Scope Standardization – Resource Inclusion Process and Criteria

(Attachment 5 – Resource Inclusion Process and Criteria)

ITP Scope Standardization – Transmission Topology Modeling

(Attachment 6 – Transmission Topology Modeling)

Alan Myers (ITC Great Plains) and Travis Hyde (OGE) asked if any items should be removed from the consent agenda.

> **The consent agenda was approved unanimously by ESWG and TWG.**

Agenda Item 3 – Potter-Tolk 345kV Additional Analysis Scope Discussion

Chris Jamieson (SPP Staff) reviewed the proposed analysis to further evaluate the proposed Potter to Tolk 345 kV line. The suggested sensitivities involve adjustments to load and gas price forecasts, resource expansion and siting plan assumptions and a review of the project cost estimate and potential avoided reliability project costs. These were developed by SPP staff with support of those directly impacted load serving stakeholders in the West Texas/New Mexico area. The group was generally supportive of the intended direction and asked that additional details be provided moving forward. SPP staff requested that stakeholders review the proposed scope and provide feedback leading up to the ESWG meeting on the 16th. (Attachment 7 – 2017 ITP10 Potter-Tolk 345 kV Additional Analysis)

Closing Items

Chairs Alan Myers (ITC Great Plains) and Travis Hyde (OGE) requested other items meriting discussion.

The meeting was adjourned at 3:45 PM.

Respectfully Submitted,

Kelsey Allen

ESWG Secretary

Kirk Hall

TWG Secretary

Name	Email	Attendance
A. Barber	abarber@spp.org	Webex
Aaron Pupa	apupa@lspower.com	Webex
Adam Mummert	amummert@burnsmcd.com	Webex
Al	atamimi@sunflower.net	Webex
Alan Burbach	aburbach@les.com	Webex
Alan Myers	amyers@itctransco.com	Webex
Amber Greb	agreb@spp.org	Webex
Ben Abing	babing@itctransco.com	Webex
Bennie	bennie.weeks@xcelenergy.com	Webex
Bethany King	bking@empiredistrict.com	Webex
Bob Burner	g.burner@duke-energy.com	Webex
Brian Johnson - AEP	bajohnson1@aep.com	Webex
Brian Rounds (AESL)	brian.rounds@aeslconsulting.com	Webex
Bryan Ramler (Xcel)	bryan.ramler@xcelenergy.com	Webex
Bryan Rushing	brushing@quanta-technology.com	Webex
Carroll Reddick	c_reddick@wfec.com	Webex
Chris Matthes	camatthes@aep.com	Webex
David Binkley	dbinkley@itctransco.com	Webex
Eric Burkey	eburkey@gridliance.com	Webex
Gayle Nansel	nansel@wapa.gov	Webex
Gimod Olapurayil	golapurayil@itctransco.com	Webex
Harold Wyble (KCPL)	harold.wyble@kcpl.com	Webex
Jarrod Wolford (NTEC)	jwolford@ntecpower.com	Webex
Jason Mazigian	jmazigian@bepc.com	Webex
Jeremy Severson	jseverson@bepc.com	Webex
Joe Fultz	jfultz@grda.com	Webex
John Boshears (SPRM)	john.boshears@cityutilities.net	Webex
John Knofczynski	jknofczynski@eastriver.coop	Webex
John Krajewski	jk@jkenergyconsulting.com	Webex
Jon Iverson	jiverson@oppd.com	Webex
Jon Shipman	jeshipman@oppd.com	Webex
Josh Verzal	jverzal@oppd.com	Webex
Kelsey Allen	kallen@spp.org	Webex
Kirk Hall	khall@spp.org	Webex
Liam Stringham	lstringham@sunflower.net	Webex
Matt McGee	mcmcgee@aep.com	Webex
matthew stoltz	mstoltz@bepc.com	Webex
Michael Mueller	michael.mueller@aecc.com	Webex
Michael Watt (OMPA)	mwatt@ompa.com	Webex
Michael Wegner (ITC)	mwegner@itctransco.com	Webex
Natasha	nhenderson@gsec.coop	Webex
Nathan McNeil	nathan.mcneil@westarenergy.com	Webex
Nitesh Mishra	nmishra@aep.com	Webex
Pat McCool		Phone
Randy Collier (CUS)	randy.collier@cityutilities.net	Webex
Randy Lindstrom	rrlinds@nppd.com	Webex

reene miranda	rene.miranda@xcelenergy.com	Webex
Richard Dahl (MRES)	richard.dahl@mrenergy.com	Webex
Robert Safuto (Customized Energy Solutions)	rsafuto@ces-ltd.com	Webex
Ross Hohlt	dhohlt@ameren.com	Webex
Ryan Yokley	ryokley@sunflower.net	Webex
Scott Mijin	scott.mijin@swpa.gov	Webex
Shane McMinn	smcminn@gsec.coop	Webex
Shaun Golden (WFEC)	shaun.golden@wfec.com	Webex
Shelly-Ann Maye	smaye@bhetransmission.com	Webex
Tim Owens (NPPD)	tjowens@nppd.com	Webex
Travis Hyde	hydetd@oge.com	Webex
Yohan Sutjandra (TEA)	ysutjandra@teainc.org	Webex
Zac Hager	hagerzc@oge.com	Webex

ESWG Proxy Statements

1. Jody Holland proxy to Eric Burkey

From: Holland, Jody
Sent: Wednesday, March 01, 2017 11:43 AM
To: Alan Myers (amyers@itcgreatplains.com); Kelsey Allen
Cc: Eric Burkey; Williams, Noman
Subject: **External Email** FW: TWG/ESWG 3/8/17 Joint Net Conference Meeting Registration

Alan and Kelsey,
My calendar changed, and I'm now unavailable from 2-4 on 3/8, so I'm giving my ESWG proxy to Eric Burkey. Thanks.

Jody Holland
Director, Transmission Planning
South Central MCN, LLC
Midcontinent MCN, LLC
MidAtlantic MCN, LLC
Gridliance West Transco, LLC
Cell: 501-681-5950
jholland@gridliance.com

GridLiance, a Blackstone Portfolio Company
2 N. LaSalle Street, Suite 420
Chicago, IL 60602
www.gridliance.com

GRIDLIANCE

Blackstone Portfolio Company

Striving to be the world's best energy company.

2. Kurt Stradley proxy to Tim Owens

From: Stradley, Kurt
Sent: Monday, March 06, 2017 8:43 AM
To: Myers, Alan; Kelsey Allen; Owens, Tim
Subject: **External Email** Proxy Vote for the March 8th ESWG Conference call

Alan and Kelsey –

I will be in training all day Wednesday March 8th and will give my proxy vote to Tim Owens for the ESWG conference call that day.

Kind Regards,

Kurt Stradley | Engineer III
Lincoln Electric System
Phone: 402-473-3376
Fax: 402-473-3208
Email: kstradley@les.com
PO Box 80869
Lincoln, NE 68501-0869
www.les.com

POWERING50YEARS

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3. Leon Howell proxy to Zac Hager

From: Howell, Leon
Sent: Monday, March 06, 2017 4:42 PM
To: Myers, Alan; Kelsey Allen
Cc: Hager, Zac
Subject: **External Email** proxy for April 8 ESWG

Kelsey,
Please recognize Zac Hager as my proxy for the April 8 ESWG meeting.

Leon Howell
Director Resource Planning and Investments
Oklahoma Gas and Electric
405 553 3296

TWG Proxy Statements

1. K

Kirk Hall

From: Lenihan, Dan
Sent: Sunday, March 05, 2017 2:57 PM
To: Kirk Hall
Cc: Hyde, Travis; Verzal, Josh
Subject: **External Email** OPPD Proxy for TWG/ESWG 3/8 mtg

Kirk,

Josh Verzal will be my TWG proxy for this joint TWG/ESWG meeting on 3/8/17.

Thanks,

Dan Lenihan, P.E.
Director – Planning & Strategy
Energy Delivery
Omaha Public Power District
Energy Control Center, ECC-5
Voice: (402) 552-5126
Email: djlenihan@oppd.com

From: bounce-56303-118681@spplist.spp.org [mailto:bounce-56303-118681@spplist.spp.org] **On Behalf Of** Audrey White
Sent: Wednesday, March 01, 2017 5:12 PM
To: Transmission Working Group <twg@spplist.spp.org>
Subject: TWG/ESWG 3/8/17 Agenda & Background Materials

External Email Notice
Think before you click!
Email sent from bounce-56303-118681@spplist.spp.org

TWG/ESWG 3/8/17 Agenda & Background Materials have been posted to the SPP website for your review at the link shown below:

TWG Meeting Materials

TWG/ESWG 3/8/17 Online Registration

Audrey White | Administrative Assistant | awhite@spp.org|501-688-2531|C-501-350-1158
201 Worthen Drive | Little Rock, AR 72223-4936
Southwest Power Pool | SPP.org | twitter.com/SPPorg | facebook.com/SouthwestPowerPool
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From:	Fulton, John
Sent:	Thursday, March 02, 2017 6:20 PM
To:	Kirk Hall; Hyde, Travis
Cc:	Weeks, Bennie; Miranda, Reene'
Subject:	**External Email** Proxy for Joint ESWG/TWG Conf Call March 8, 2017

Kirk and Travis, I will be out of town Mon-Weds, Mar 6-8, attending a PUC hearing in Austin. Rene Miranda will have my proxy and can vote for SPS on any matters that come up.

John S. Fulton
Xcel Energy | Responsible By Nature
Manager, Transmission Planning South
600 South Tyler, 27 Amarillo, TX 79101
P: 806.378.2193 C: 806.679.0801 F: 806.378.2702
E: John.Fulton@xcelenergy.com

Kirk Hall

From: Benson, Scott
Sent: Thursday, March 02, 2017 8:22 AM
To: Kirk Hall
Cc: Burbach, Alan; Hyde, Travis
Subject: **External Email** 3/8/17 TWG Proxy

Kirk,

I will be in training on March 8th, so please accept Alan Burbach of LES as my proxy for the TWG conference call that day.

Thanks,

Scott J. Benson, P.E. | Manager, Resource & Transmission Planning
Lincoln Electric System
Phone: 402-473-3390
Fax: 402-473-3208
Email: sbenson@les.com
1040 O St.
PO Box 80869
Lincoln, NE 68501-0869
www.les.com

Kirk Hall

From:	Williams, Noman
Sent:	Wednesday, March 01, 2017 11:49 AM
To:	Kirk Hall; Hyde, Travis
Cc:	Eric Burkey; Holland, Jody
Subject:	**External Email** TWG/ESWG 3/8/17 Joint Meeting

Guys I will be on an airplane returning from the NERC meetings so will not be able to attend the meeting. I will provide my proxy to Eric Burkey.

Thanks

Noman Williams
Senior Vice President Engineering & Operations, COO
South Central MCN, LLC
Midcontinent MCN, LLC
Phone: 816-492-2014
Cell: 785-259-5110
Nwilliams@gridliance.com

GRIDLIANCE

A Blackstone Company

From: bounce-56283-119244@spplist.spp.org [mailto:bounce-56283-119244@spplist.spp.org] **On Behalf Of** Audrey White
Sent: Wednesday, March 01, 2017 11:00 AM
To: Transmission Working Group <twg@spplist.spp.org>
Subject: TWG/ESWG 3/8/17 Joint Net Conference Meeting Registration

TWG/ESWG 3/8/17 Joint Net Conference meeting registration:

TIME: March 08, 2017 2:00PM - 4:00PM

TWG/ESWG 3/8/17 Online Registration

This meeting is specific to discuss the scope for the further evaluation of the Potter - Tolk 345 kV line requested by the SPP Board during their January meeting.

Audrey White | Administrative Assistant | awhite@spp.org|501-688-2531|C-501-350-1158
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Southwest Power Pool | SPP.org | twitter.com/SPPorg | facebook.com/SouthwestPowerPool
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ECONOMIC STUDIES WORKING GROUP/TRANSMISSION WORKING GROUP

March 8th, 2017

Net Conference

• A G E N D A •

2:00pm – 4:00pm

1. Administrative Items
   a. Call to Order, Introductions..Alan Myers/Travis Hyde
   b. Receipt of Proxies ....Kelsey Allen/Kirk Hall
2. Consent Agenda[1] (Approval Item)..Alan Myers/Travis Hyde
   a. ITP Scope Standardization - Resource Inclusion Process and Criteria
   b. ITP Scope Standardization - Transmission Topology Modeling
3. Potter – Tolk 345kV Additional Analysis Scope Discussion .... SPP Staff

1 Background Materials Included

Certainty	Year 2	Base/Econ&BA Year 5
1	Existing	Existing
	Existing, no TSR	Existing, no TSR
2	(No dispatch in Base*)	(No dispatch in Base*)
	Approved TSR+GIA	Approved TSR+GIA
3	(Dispatch in Base)	(Dispatch in Base)
4	TWG Waiver Criteria	TWG Waiver Criteria
	SPP Developed Solution	SPP Developed Solution
	to develop solvable model	to develop solvable model
	(WG Approval)	(WG Approval)
5	(N-0, N-1)	(N-0, N-1)
	RAR to SPP Staff	RAR to SPP Staff
6	GI, No TSR, PPA	GI, No TSR, PPA
	RAR to ESWG/TWG	RAR to ESWG/TWG
7	Company Planned with siting	Company Planned with siting
	RAR to ESWG/TWG	RAR to ESWG/TWG
8	Company Planned w/o siting	Company Planned w/o siting
9	N/A	SPP Staff Resource Plan

Definitions

Base: base powerflow model. The common planning model replacing the scenario 0 and scenario 5 powerf

BA: SPP balancing authority powerflow model. The AC powerflow model developed from market dispatch s

Econ: economic model. The model developed for annual market dispatch simulations.

Notes

*Applicable to **Base** model only. All resources included in **BA** and **econ** models will be eligible for market dis

All resources meeting criteria for **Base powerflow will be included in **BA** powerflow and **econ** models

Year 10	Notes
Existing	
Existing, no TSR	
(No dispatch in Base*)	
Approved TSR+GIA	
(Dispatch in Base)	
TWG Waiver Criteria	Submittal deadline January WG meetings
SPP Developed Solution	
to develop solvable model	
(WG Approval)	
(N-0, N-1)	Submittal deadline January WG meetings
RAR to SPP Staff	
GI, No TSR, PPA	Submittal deadline January WG meetings
RAR to ESWG/TWG	
Company Planned with siting	Submittal deadline January WG meetings
RAR to ESWG/TWG	
Company Planned w/o siting	Submittal deadline January WG meetings
SPP Staff Resource Plan	

low models.

simulations.

patch

SPP Southwest Power Pool

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ITP Scope Standardization – Transmission Topology Modeling

Background

- Economic assessments historically utilize a single transmission topology model during an annual simulation
- ITP reliability and TPL compliance assessments historically utilize multiple seasons within a year, potentially reflective of different transmission topologies
- Goal: determine methodology to accommodate an expected changing transmission topology within a single study year.
  - Consistency vs. status quo
  - Types
    - Modeled long-term transmission outages
    - Future transmission upgrades in-service mid-year

SPP

Consideration of Impacts

- Long-term transmission outages
  - Modeling could potentially drive the need for transmission projects in ITP assessments
  - Not modeling could potentially mask the need for a corrective action plan (CAP) in TPL assessments
- Future transmission upgrades in-service mid-year
  - Modeling could mask need to accelerate certain approved projects
  - Not modeling could drive needs that are expected to be resolved without adjustment of an existing NTC

SPP

Modeling Options - Consistency

- Build reliability models to reflect system topology utilized in annual economic assessment
  - Pros
    - Gain consistency between models
    - Avoid developing upgrades for long-term transmission outages
  - Cons
    - Will not identify potential violations requiring CAP for TPL
    - Will not identify potential project acceleration needs within year
    - No base consideration of late-year upgrades that could resolve identified needs
- Build economic model to reflect system topology of base scenario model seasons in a given year
  - Pros
    - Gain consistency between models
    - More accurate expected topology
    - Will identify potential violations requiring CAP for TPL
    - Will identify potential project acceleration needs within year
  - Cons
    - Time-intensive economic modeling effort
    - Increased economic simulation times
    - Potentially infeasable
    - Potentially recommend upgrades based on long-term outages

SPP

Modeling Option - Status Quo

- Pros
  - Best combination of consistency, feasibility and model accuracy
- Cons
  - Inconsistency of transmission topology between economic and base reliability models for a given year
  - Inconsistency of transmission topology between base scenario reliability and BA reliability models depending on selected hour (ITP10 process)
  - No consideration of late-year upgrades in base economic assessment
    - Historically not an issue due to economic assessments being performed in 10^{th} or 20^{th} year only (all planned upgrades in-service prior to 10^{th} year)
  - Developing transmission solutions for long-term outages
    - Historically, few long-term transmission outages have been identified
  - Other

SPP

Transmission Topology Modeling Recommendation

Modified Status Quo

- Long-term transmission outages
  - Include in base reliability models
    - Satisfies TPL requirements
    - Need to recognize when needs are driven by outages in ITP solution development
  - Do not include in economic and BA reliability models
    - Satisfies TPL requirements

- Mid-year transmission upgrades in-service dates
  - As expected in-service dates for base reliability models
  - Continued use of summer peak topology for economic and BA reliability models


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2017 ITP10 Potter to Tolk 345 kV Additional Analysis

March 8th, 2017

Purpose and Direction

- Perform additional analysis of the Potter – Tolk 345 kV solution in response to stakeholder concerns and action taken by Board of Directors
- Hold discussions with directly impacted stakeholders to acquire analysis input
- Vet scoping and results with ESWG and TWG prior to April MOPC and BOD meeting

Background

2017 ITP10 Analysis Conclusions

- Texas Panhandle (SPS North South)
  - The Potter to Tolk 345 kV was recommended because:
    - Resolves congestion
    - Provides economic benefit to SPP region
    - Provides strategic EHV transmission to manage risks and uncertainties in area
    - Improves thermal and voltage stability reliability margins in area
    - Facilitates transmission service and generation interconnection queues

SPP

Summary of Discussion with Directly Impacted Stakeholder

- Future resource expansion and siting expectations
  - Generally more imports are expected by GSEC and WFEC
  - SPS expects wind and conventional additions in SPS South
  - 2017 ITP10 solar amounts are higher than expected
- Gas price variability and future expectations
  - Lower gas prices should be examined due to current gas forecasts
- Load growth variability and future expectations
  - 2017 Series MDWG load forecasts should be examined to account for more current load forecasts
- Other discussion items
  - Risks of delaying or not taking action
  - Additional costs associated with project
  - Concerns surrounding potential avoided reliability projects

Draft Scope

Draft Scope Overview

- Review of third party study estimate
- Economic model input assumption sensitivities
  - Load and gas price forecasts
  - Renewable additions
  - Conventional resource assignment and siting sensitivities
  - Constraint file adjustments
- Assess impact of line on Frequently Constrained Area (FCA) designation of Texas Panhandle
- 40-year benefit calculations
- (Optional) Substantiating future avoided reliability projects
  - SPS vetting
  - FCITC analysis
  - SPS load pocket trends

Third Party Study Estimate Review

- Currently working with third party to develop scope of work to get a range of potential project cost
  - Review feasibility of estimated line mileage
  - Evaluate other possible line routes and associated costs
  - Compare third party substation estimates and SPS substation estimates

Economic Sensitivities Focus

- Sensitivities specific to the Texas Panhandle
- Use 2017 ITP10 Future 3 economic model with model corrections and approved portion of portfolio included as baseline
- Determine range of projected benefits
  - Identify bookends and combine sensitivities
- Identify additional costs in the form of increased congestion

Load and Gas Price Forecast Sensitivities

- High/Low Demand using 2017 ITP10 forecasts without resource plan adjustments
  - 1 standard deviation
  - 67% confidence level
- Model SPS zonal load forecasts from the MDWG 2017 series with resource plan and siting adjustments
- High/Low Natural Gas Price using 2017 ITP10 forecasts
  - 2 standard deviation
  - 95% confidence level
  - Measured against latest ABB simulation ready reference case gas forecasts

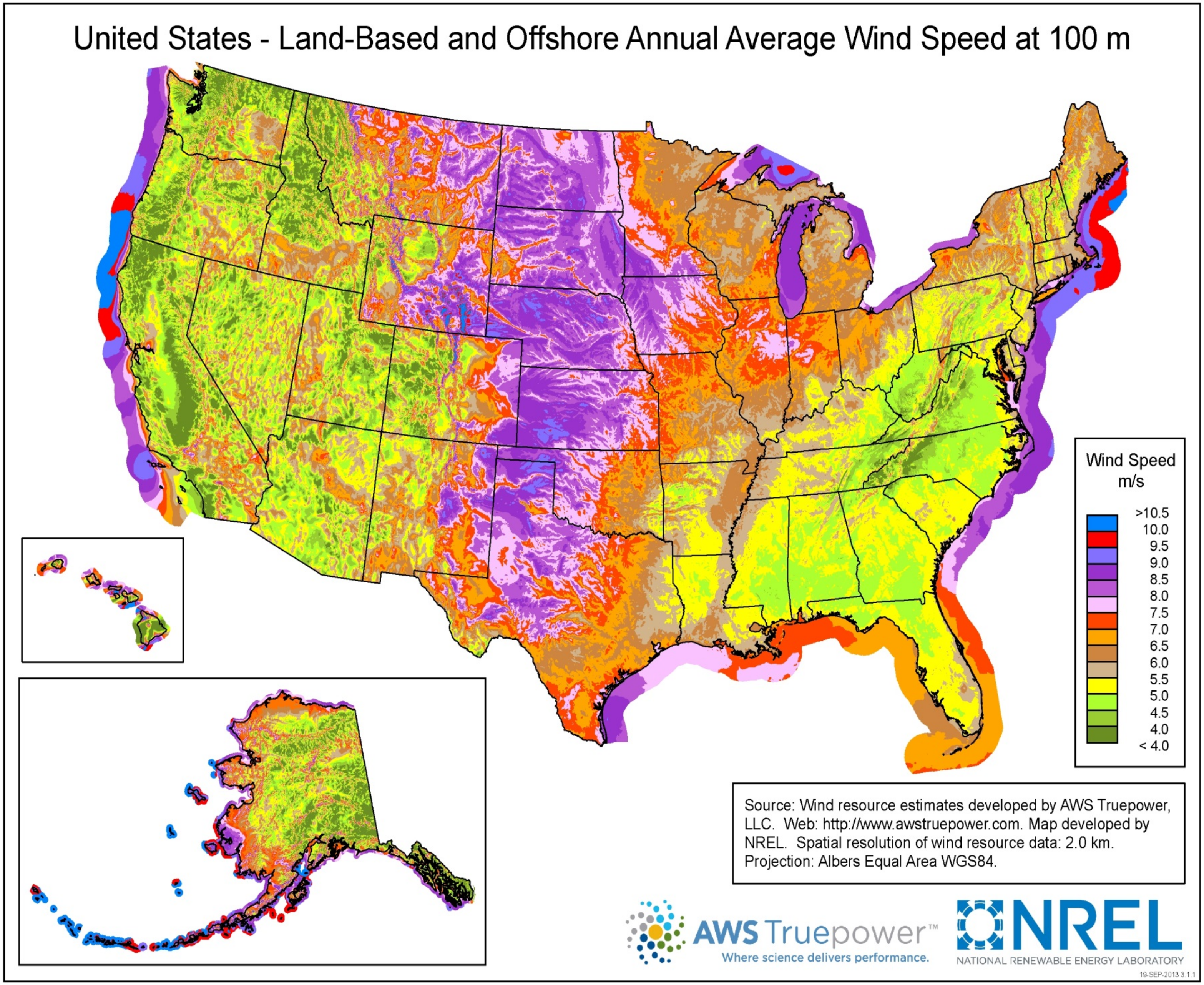
Renewable Generation Sensitivities Overview

- Wind Siting Sensitivity – Reprioritize 2017 ITP10 available wind sites to show incremental impact of wind sites not used more north of interface to be more in line with siting white paper recommendation
- Economic wind forecast sensitivity – Additional wind consistent with SPS expectations
  - (Optional) Re-trend wind levels and add additional wind amounts for the footprint for a more holistic look at the incremental impact of wind additions
- (Optional) Facilitating generation interconnection queue sensitivity - Measure the incremental APC benefit to the SPP footprint of additional renewable interconnections that is afforded by the line
- Assess impact of removing and reducing uncommitted solar generation in SPP region

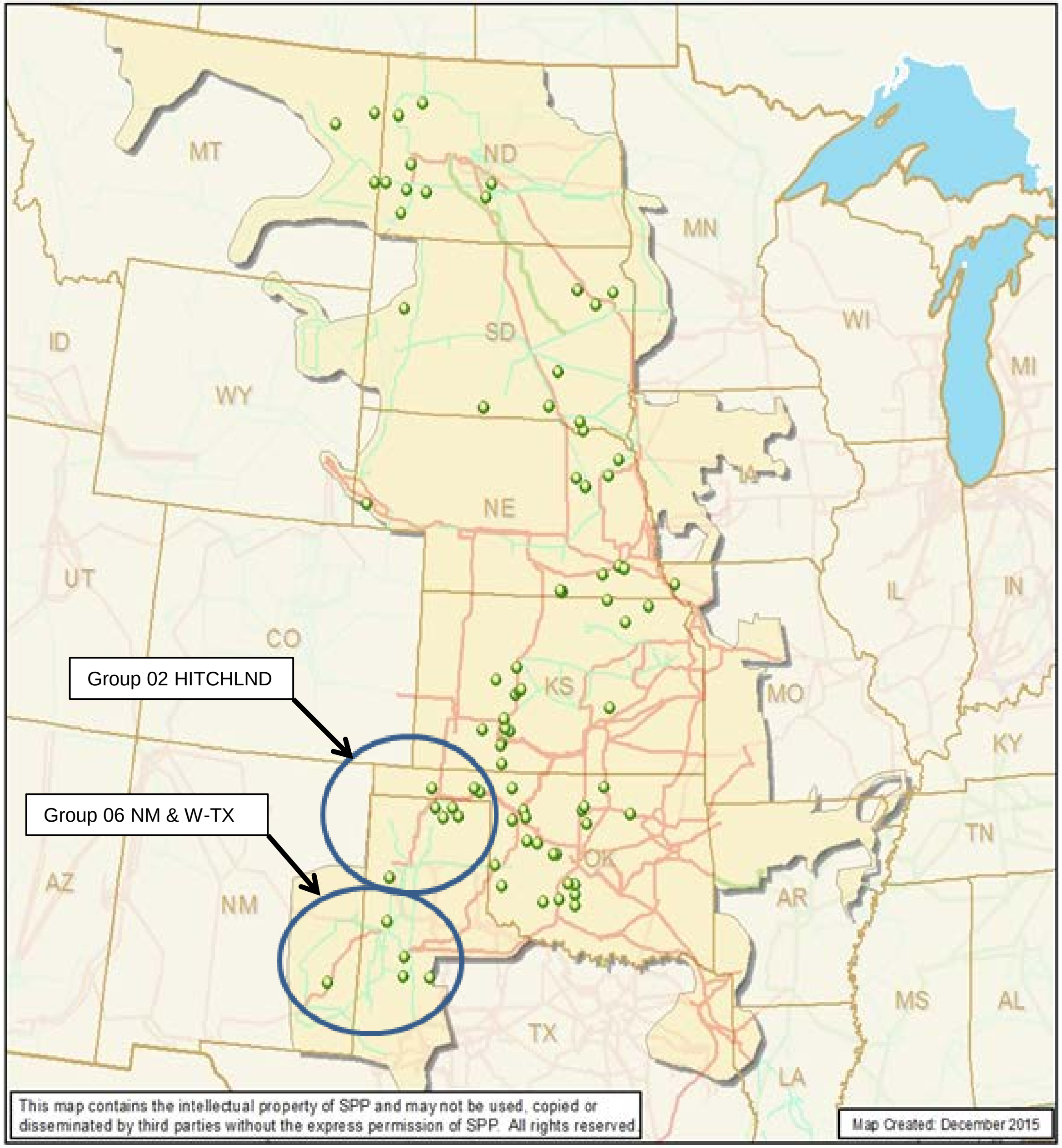
Wind Siting Sensitivity

- Reprioritize 2017 ITP10 available wind sites using original potential list
- Instead of status quo
  - First, sites ranked by generation interconnection queue status
    - IA on-schedule
    - IA on-suspension
    - **IA commercial operation not fully on-line**
    - IA Pending
    - Facility Study
  - Second, sites ranked by highest capacity factor
- Alternatively
  - First, sites ranked by generation interconnection queue status
    - **IA commercial operation not fully on-line**
    - IA on-schedule
    - IA on-suspension
    - IA Pending
    - Facility Study
  - Second, sites ranked by highest capacity factor
- Use same wind siting exceptions approved by ESWG
- (Optional) Increase proxy wind farms with higher than average capacity factors on a pro rata basis to achieve 25% capacity to load

SPP


United States - Land-Based and Offshore Annual Average Wind Speed at 100 m
Wind Speed
m/s
>10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truepower, LLC. Web: http://www.awstruepower.com. Map developed by NREL. Spatial resolution of wind resource data: 2.0 km. Projection: Albers Equal Area WGS84.
AWS Truepower™
Where science delivers performance.
NREL
NATIONAL RENEWABLE ENERGY LABORATORY
19-SEP-2013 3.1.1

SPP



SPP Southwest Power Pool

2017 ITP10 Potential Wind Sites

Potential Wind Site

Voltage

230 kV

345 kV

500 kV

0 50 100 200 300

Miles

SPP

Economic Wind Forecast Sensitivity

From the ITP Manual draft

Renewable Resource Plan – SPP

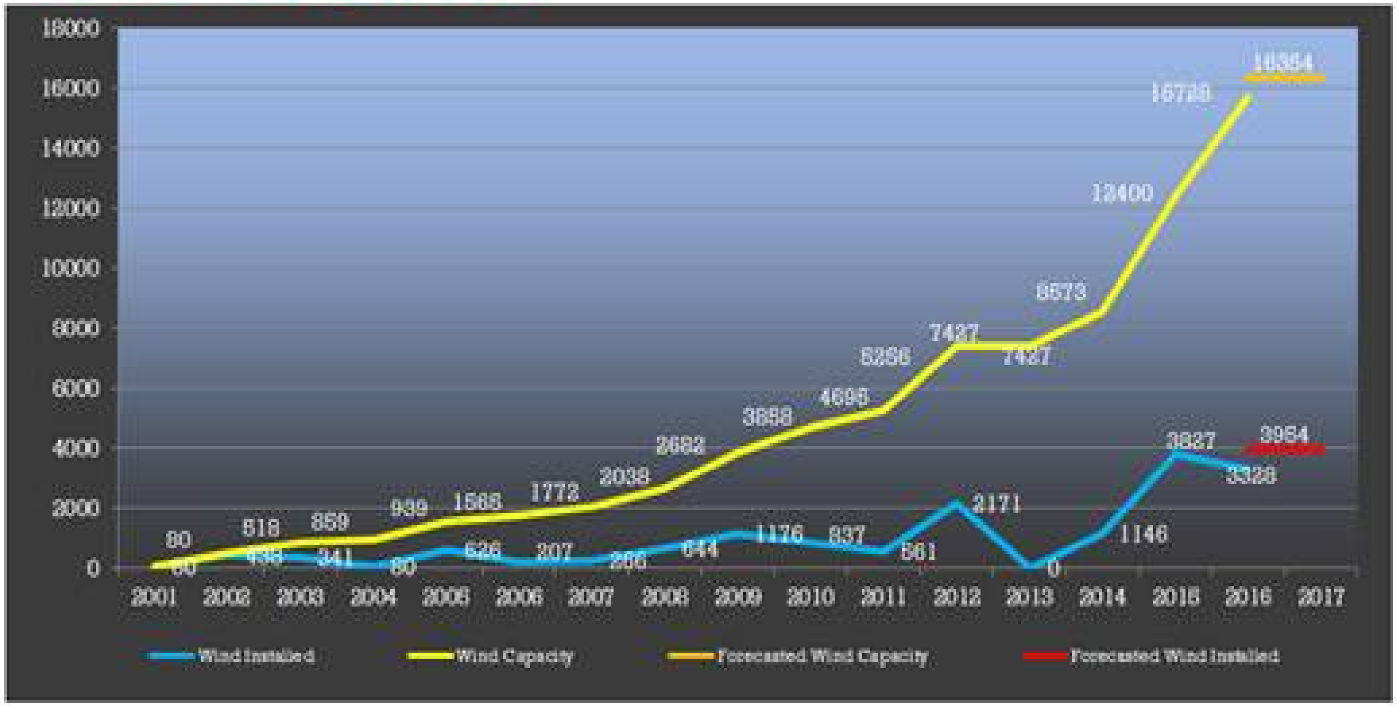
Existing load and generation submitted through the MDWG model development process will be analyzed in the development of the renewable resource plan. Wind and solar unit additions will be computed using criteria that can be applied uniformly across zones (for example, each zone shall have renewable capacity of at least X% of their peak load responsibility). In order to have modeling consistency across the region and to maintain some simplicity, renewable additions will not be determined through surveying different members for each's expected additions.

The criteria for renewable additions shall be developed by Staff and ESWG in each study with consideration of factors such as government regulations, historical trends, NG prices, installation trends, and IRP projections.

- Step 1 add SPS expected wind amounts
- (Optional) Step 2 add SPP expected wind amounts (without zonal ownership assignments) based on historical installation trends

SPP

SPP Wind Capacity and Yearly Installed Wind Capacity



- In 2001 SPP installed 80 MWs of wind generation and has experienced significant wind growth as wind turbine technology has advanced.
- SPP is one of the leading footprints for wind development in North America
- SPP at the beginning of the VIS had 15728 MWs of installed capacity, and was projecting to increase the total capacity to 16345 MWs by the end of 2016.
- SPP currently has 16,124 MW of wind generation.

(Optional) Renewable Interconnection Sensitivity

- Establish ranges of renewable generation amounts that are facilitated by the line addition
- Add project and additional renewable generation amounts to the change case only to assess the adjusted production cost benefit to the SPP region

Conventional Siting Sensitivities Background

ITP manual conventional generation siting philosophy - Site proxy generation by region: Site expansion of conventional model generation in zone with highest capacity needs.

SPP staff working on siting white paper recommendation that would include allowable exceptions for problematic load pockets

- **SPP Planning Criteria 4.4 Generation Planning 4.4.1 Design Futures** a) In order to maintain a balanced design of the electric system, excessive concentration of generating capacity in one unit, at one location, or in one area shall be avoided.

- **Trend SPS zonal firm imports**
- **SPS existing firm imports**
  - **210 MW from Lamar HVDC Tie**
  - **400 MW from IPP in AEPW expires 2019 with renewal rights***
  - **448 MW from Wind in OKGE**
  - **15 MW from BLKW HVDC Tie***
- **New Mexico Cooperatives firm imports**
  - **130 MW from WFEC zone**
  - **X MW of New Mexico cooperative load transitioning to WFEC**
- **GSEC existing firm imports**
  - **X MW from wind in AEPW**
- **Lubbock Power and Light firm imports**
  - **X MW from wind in AEPW**

***Not included in 2017 ITP10 resource plan calculations**

SPP

Conventional Generation Siting Sensitivities

- Remove all uncommitted generation from SPS pricing zone as a bookend
- Add back proxy generation for Lubbock Power Light based on exit study in progress
- Add back proxy generation for GSEC, SPS, and WFEC based on trends and conventional resource plan expectations
- Remove GOFs as necessary

Texas Panhandle Reliability Sensitivity Results Recap

- FCITC sensitivity for SPS South Imports from SPP
  - What is the cost of incremental least cost upgrades to address thermal overloads that could be addressed by Potter to Tolk 345kV for increased import levels?
    - Using a modified powerflow that includes the same Move 1 CC at Deaf Smith to a 2035 RCAR II site in SPS North
- Before Potter-Tolk 345 kV
  - F3 25 Light Load:
    - 1.5 GW of 2.5 GW Transfer Tested (Sum of Pgen 1.7 GW)
  - F3 25 Summer Peak:
    - 2.2 GW of 6.5 GW Transfer Tested (Sum of Pgen 5.8 GW)
- After Potter-Tolk 345 kV without additional Network Upgrades
  - F3 25 Light Load: At least 1.5 GW
  - F3 25 Summer Peak: At least 2.2 GW
- Incremental upgrades represent the potential avoided reliability upgrades

Substantiating Reliability Sensitivity Results

- Determine reasonability of import levels as a proxy to identify bottom/up incremental upgrades that might be identified in future studies due to changes in load forecasts, imports, resource additions and retirements
  - Sink subsystem does not include exclusions of any resource types
  - FCITC limitations in SPS relieved by Potter to Tolk 345 kV were not reported as avoided reliability upgrades for high transfer amounts that resulted in FCITC limitations in SPS that were not relieved by Potter to Tolk 345 kV
  - The Hereford-DS #6 115 kV FLO Potter to Tolk 345 kV flowgate occurs at the final reported transfer amounts.
- Correlate FCITC results to gen to load ratios in unconstrained economic sensitivities and in historic base reliability models
- Identify the high and low gen to load ratios from models and relate to FCITC results and resulting gen to load ratios
- Use High/Low Demand economic sensitivities and unconstrained 2035 model to help with timing
- Add uncertainty factors that might be representative of unexpected changes in assumptions

SPP

Other Items

- Economic sensitivities constraint review as needed with the intention not overstate or understate benefit of project
  - For example, if an SPS upstream, downstream, or relieved constraint is based on wavetrap limit then consider removing
- Calculate 40-year benefit
  - Baseline and reasonable sensitivities
  - Leverage RCAR 2035 model
  - Tolk retirement consideration
- Actions and reporting required for each economic sensitivity
  - Summary of model changes compared to base line
  - Any adjustments in constraints
  - Congestion reports
  - Cursory impact assessment on Frequently Constrained Area designation
  - Adjusted production cost
  - Marginal energy losses
  - Gen to load ratio of SPS south to correlate to FCITC analysis

SPP

Next Steps

- ESWG/TWG Meeting March 16th
  - Present scope and seek endorsement
  - Present preliminary results and seek feedback
- ESWG/TWG Meetings in late March TBD
  - Present results and seek feedback, and endorsement
- MOPC April 11
- BOD April 28