Southwest Power Pool

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

August 16 - 17th, 2017

Grand Hyatt – Denver, CO

• SUMMARY OF ACTIONS TAKEN •

1. Approved the consent agenda
2. Approved using Lazard High Cost CC prototypes and low cost CT prototypes and adding large scale reciprocating engines as a prototype option, and eliminating nuclear and coal as options.
3. Accepted the results of the 2017 Regional Review study as having met the approved scope.

Southwest Power Pool

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ECONOMIC STUDIES WORKING GROUP

August 16 - 17th, 2017

Grand Hyatt – Denver, CO

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:00a.m., welcomed those in attendance, and asked for introductions.

There were 24 in-person participants and 45 web conference participants, representing 12 of 14 ESWG members. (Attachment 1 – August 16th-17th, 2017 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; three proxies were identified. (Attachment 2 – Proxy Statements)

- Eric Burkey (SCMCN) proxy for Jody Holland (SCMCN)
- Ryan Yokley (SUNC) proxy for Al Tamimi (SUNC)
- Josie Daggett (WAPA) proxy for Gayle Nansel (WAPA)

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – August 16th - 17th, 2017 ESWG Agenda).

Kurt Stradley (LES) made a motion; seconded by Tim Owens (NPPD) to adopt the agenda. The motion was approved unanimously.

Agenda Item 2 – Review of Past Action Items

SPP Staff will get conformation from the RARTF secretary in regards to RARTF action items 165, 166, and 167. These may need to be removed from the action items list until RCAR discussion have completed. Confirm continuing working on action items or hold until RCAR discussion has completed. Amber Greb informed the group that item 184 should be completed in the last quarter of 2017, we are waiting on a final date from the regulatory department. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

Meeting Minutes – April 20th, 2017 (Attachment 5 – April 20th, 2017 ESWG Minutes)

Meeting Minutes – May 17th, 2017 (Attachment 6 – May 17th, 2017 ESWG Minutes)

Meeting Minutes – May 17th, 2017 (Attachment 7 – May 17th, 2017 TWG.ESWG Minutes)

Meeting Minutes – June 15th, 2017 (Attachment 8 – June 15th, 2017 ESWG Minutes)

Meeting Minutes – June 29th, 2017 (Attachment 9 – June 29th, 2017 TWG.ESWG Minutes)

Meeting Minutes – July 20th, 2017 (Attachment 10 – July 20th, 2017 ESWG Minutes)

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

The consent agenda was approved unanimously.

Agenda Item 4 – 2019 ITP Schedule

Juliano Freitas (SPP Staff) gave an overview of the 2019 ITP draft schedule. He presented a flow chart showing milestone dates and dependencies. SPP Staff is intending to bring a final schedule to the ESWG in October, including the final dates for each milestone, as well the time and dates for members to review and approve items. Staff is evaluating the possibility of extending the two windows designated for members to submit estimated costs for projects. (Attachment 5 – 2019 ITP Schedule)

Agenda Item 5 – 2019 ITP Load and Generation Review

Nikki Roberts (SPP Staff) presented an update on the progress of the load and generation review milestones for the 2019 ITP Study, providing Staff findings on ABB data, and reminding stakeholders of the generation resource inclusion criteria and the RAR/Waiver process. Tim Owens (NPPD) asked for SPP Staff to provide information on the origin of the hourly profiles in the ABB data. Staff stated they would email the following day. Throughout discussion on the generation review the following topics were discussed:

- The maximum capacities for generating units will be gross maximum capacities since moving forward SPP Staff will utilize the ITP models for TPL compliant sensitivity cases, and those models must include aux loads in the generating unit maximum capacities.
- SPP Staff reminded stakeholders that RARs allow generators to be included that may not have gone through all of the appropriate tariff processes, and that the window for the RARs to be submitted is September 15th through October 11th.
- When submitting RARs, Stakeholders should state which criteria they believe they are meeting, and the necessary working groups will determine if it meets the criteria

Nikki concluded the presentation by reminding the ESWG of Stakeholder expectations regarding the ABB data to be reviewed during the generation review feedback period. (Attachment 12 - 2019 ITP Load and Generation Review)

Agenda Item 6 – Economic Model Data Guidelines

Juliano Freitas (SPP Staff) presented an example of the Load and Generation Data submittal workbooks to the ESWG. These workbooks have an instructions tab that explains what information is being requested and how it will be used. Staff is working to develop the guidelines and stakeholders are welcome to provide feedback on the data submittal workbooks.

Agenda Item 7 – EI-WECC Interconnections Seems Study Update

Jay Caspary (SPP Staff) gave an overview of the DOE Interconnection Seams Study. He explained the key inputs and the timeline of the study. Jay presented the preliminary results of the study and will bring the topic back to the working groups when detailed results of the study are available and have been reviewed. (Attachment 13 - Interconnection Seams Study update)

Agenda Item 8 – 2019 ITP Scope Items

Agenda Item 8a – 2019 ITP Futures

Steve Gaw (Wind Coalition) presented ideas and suggestion to be considered in the futures discussion to the group. His presentation focused on the amount of wind generation that should be included in the model, stating that SPP has underestimated the wind build in previous studies. Steve proposed that the 2019 ITP reference case should include 26 GW of wind by the end of 2024 and 31 GW of wind by the end of 2029. For the second future, his presentation suggested wind levels of 35 GW in 2024 and 43 GW in 2029. Amber Greb (SPP Staff) then showed the group a workbook outlining the results of the future drivers' survey that was sent out a few weeks before. The ESWG discussed the results and offered different opinions. Staff showed how the submission could be grouped into 6 possible future scenarios: Reference Case, Low Demand, Robust Economy, Emerging Technologies, Renewable Future, and Clean Energy Future. The ESWG took a straw poll, and requested that staff build a proposal for the reference case and two additional futures, emerging technologies and renewable future. The ESWG also decided to add an additional half day to the September meeting to finalize a recommendation for the SPC. SPP Staff will bring the details of the three futures to this half day meeting. (Attachment 14 – Futures Wind Coalition) (Attachment 15 – Future Drivers Discussion)

Agenda Item 8b – Renewable Resource Expansion Plan

Chris Jamieson (SPP Staff) gave an overview of the criteria to develop a renewable resource expansion plan for the ITP study. He talked about a number of things that should be considered in resource expansion planning such as: futures, government regulations, historical trends, natural gas prices, installation trends, integrated resource plan projections, and stakeholder feedback. Tim Owens (NPPD) commented that seasonal curtailment results, as well as any geographic variation in those results, if available, might also be valuable information. Chris will provide additional details at the September ESWG meeting. (Attachment 16 – Renewable Resource Expansion Plan)

Agenda Item 8c – Conventional Generation Prototypes

Amber Greb (SPP Staff) provided a presentation on conventional generation prototypes. Two data sources have been used in previous ITP studies, EIA Annual Energy Outlook (AEO) Report and Lazard Levelized Cost of Energy Analysis. These sources were used to create a chart comparing prices for prototypes for the following unit types: combined cycles, combustion turbines, coal generators, nuclear units, wind units, and solar. Stakeholders discussed the options and requested that reciprocating engines be added for comparison. Some members requested the addition of wind and solar as possible alternatives, Staff advised the group that it can significantly increase simulation time and that the ITP Manual states that wind and solar generation additions will be specified in our models. The amounts and methodology are being discussed and developed and will be included into the 2019 ITP Scope. (Attachment 17 – Conventional generation prototypes)

Leon Howell (OGE) made a motion; seconded by Tim Owens (NPPD) to approve using Lazard High Cost CC prototypes and low cost CT prototypes, adding large-scale reciprocating engines, and eliminating nuclear and coal as options. The motion was approved unanimously.

Agenda Item 8d – Renewable Accreditation

Chris Jamieson (SPP Staff) presented on renewable accreditation. Chris referenced the ITP manual language stating that renewable capacity accreditation feeds into the resource expansion plan. He talked about what was used in previous studies and SPP Planning Criteria 7.1.5.3. SPP Staff suggested that the ITP study count future renewable resources at a regional average of accreditation percentages submitted by stakeholders. Members questioned if the average would include units with a 0% accreditation and if we should assume the future wind will have firm service. Stakeholders also asked SPP Staff to consider using different criteria for the two futures. (Attachment 18 – Renewable Accreditation)

Agenda Item 8e – Must Run Criteria

Nikki Roberts (SPP Staff) reviewed Must Run Criteria. SPP staff recommended assigning must-run designations to co-generation and nuclear units only. Also, potentially implement must-run designations to additional units as a sensitivity during the Project Selection milestone. Chris stated average capacity factor was assumed 80%. The availability of historical capacity factor was questioned. (Attachment 19 – Must Run Criteria)

Agenda Item 8f – Operational Project Evaluation

Will Tootle (SPP Staff) reviewed SPP Staff's proposal for Operational Project Evaluation and selection of projects for operational needs. The proposed methodology includes Persistent Operational Solution Evaluations (Reliability, Economic), Persistent Operational Solution Screening, and Persistent Operational Portfolio Development. More details were requested for benefits calculations. The language needs to clarify how we validate the operational needs, and how to determine if the project is redundant with a project coming out of the planning model. The operational analysis will be performed parallel with the economic and reliability assessments. (Attachment 20 - Operational Project Evaluation)

Agenda Item 9 – Siting Manual Action Plan

[This item was not covered in the allotted time]

Agenda Item 10 – Transmission Outage Metric

[This item was not covered in the allotted time]

Agenda Item 11 – Renewable Pricing

[This item was not covered in the allotted time]

Agenda Item 12 – SPP-MISO CSP Regional Review

Clayton Mayfield (SPP Staff) presented the final results of the 2017 SPP-MISO CSP Regional Review to the ESWG and requested the approval of the 2016 SPP-MISO CSP project, Loop One Split Rock-Lawrence 115kV ckt into Sioux Falls (I18), as an Interregional Project. Stakeholders asked if the CSP study considered system impacts to MISO and Generation Interconnection costs as a result of this project and Clayton responded that only SPP benefit, as a whole, was considered in the analysis. Jeremy Severson (Basin) expressed concern that the 2016 SPP-MISO CSP study did not reassess needs after the model merging, and instead used previously identified needs from SPP and MISO regional processes. Alan Myers (ITC) asked what MISO's recommendation was and Clayton informed the ESWG that MISO was recommending to continue operating Sioux Falls – Lawrence 115kV as open, Jordan Schmidt (EXCEL) also confirmed the MISO recommendation. Jim Jacoby (AEP) informed the group that the SSC was relying on ESWG's expertise before recommending I18 as an Interregional Project and asked the ESWG to make their recommendation based on how the project impacts SPP and not based on MISO's recommendation. Questions were asked about what's next for this project and Kelsey Allen (SPP Staff) informed ESWG that despite I18 not being indorsed by ESWG, staff could still make a recommendation to MOPC to approve I18 as an Interregional Project.

Jeremy Severson (Basin) made a motion; seconded by Josephine Daggett (WAPA) to acknowledge that the ESWG accepts the results of the 2017 Regional Review study as having met the approved scope. The motion was approved with one no vote, Alan Myers (ITC)

Agenda Item 13 – 2018 ESWG Meeting Schedule

[This item was not covered in the allotted time]

Closing Items

Chair Alan Myers (ITC) requested other items meriting discussion.

The meeting was adjourned at 11:45 PM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Participant	Name	Email
	Alan Myers	ITC
	Amber Greb	SPP
	Anita Sharma	AEP
	Bennie Weeks	Xcel/SPS
	Brian Johnson	AEP
	Calvin Daniels	WFEC
	Eric Burkey	SCMCN
	Jarrod Wolford	NTEC
	Jason Davis	SPP
	Jason Shook	GDS/ETEC
	Jeremy Severson	BEPC
	Jim Jacoby	AEP
	John Fernandes	Invenergy
	Josephine Daggett	WAPA
	Juliano Freitas	SPP
	Kelsey Allen	SPP
	Kurt Stradley	GSEC
	Michael Wegner	ITC
	Natasha Henderson	GSEC
	Ryan Yokely	
	Steve Gaw	Wind Coalition
	Tim Owens	NPPD
	Walt Cecil	Missouri PCS
	Wayne Penrod	SUNC
42	Adrienne Blaine	adrienne.blaine@wfec.com
15	Al Tamimi	atamimi@sunflower.net
39	Ben	hammer@wapa.gov
9	Ben Abing	babing@itctransco.com
8	Ben Bright	bbright@spp.org
36	Betsy beck	bbeck@awea.org
35	Brian Rounds (AESL)	brian.rounds@aeslconsulting.com
	Chenal WebEx	awhite@spp.org
38	Chris Cranford (SPP)	ccranford@spp.org
20	Chris Jamieson	cjamieson@spp.org
37	Chris Matthes	camatthes@aep.com
11	Clayton Mayfield (SPP)	cmayfield@spp.org
47	Dee Edmondson	dedmondson@spp.org
3	DTewari	diwakar.tewari@leidos.com
	ed pfeiffer (quanta)	epfeiffer@quanta-technology.com
27	Evan Racine-Johnson (GSEC)	eracine-johnson@gsec.coop
30	Gayle Nansel	nansel@wapa.gov
18	James Bailey	jbailey@spp.org
19	Jamie Hajek	jamie.hajek@northwestern.com
7	Jason Mazigian	jmazigian@bepc.com
14	Jeff Knottek	jeff.knottek@cityutilities.net
43	Jeremy Harris (Westar)	jeremy.harris@westarenergy.com

34	John Bell (KCC)	j.bell@kcc.ks.gov
25	John Boshears	john.boshears@cityutilities.net
4	Jon Iverson	jiverson@oppd.com
6	Jordan Schmick	jordan.h.schmick@xcelenergy.com
17	Josh Tupper (EDE)	jtupper@empiredistrict.com
	Kenny Hale (CUS)	kenny.hale@cityutilities.net
40	Kevin Foflygen (SPRM)	kevin.foflygen@cityutilities.net
	Kirk Hall	khall@spp.org
16	Leon Howell	howelllc@oge.com
	Liz Gephardt (SPP)	lgephardt@spp.org
13	Marisa Choate	mchoate@spp.org
41	Michael Watt (OMPA)	mwatt@ompa.com
26	Nikki Roberts	nroberts@spp.org
23	Randy Collier (CUS)	randy.collier@cityutilities.net
	Richard Seide	richard.seide@apexcleanenergy.com
48	Ross Hohlt	dhohlt@ameren.com
45	Ryan Baysinger	ryan.baysinger@kcpl.com
28	S Maxey	smaxey@spp.org
	Shawnee Claiborn-Pinto	shawnee.claiborn-pinto@puc.texas.gov
21	Steve Hohman	shohman@oppd.com
	Tim Hall (Southern Power)	timhall@southernco.com
46	Will Tootle	wtootle@spp.org
29	Zac Hager	hagerzc@oge.com

Attendance
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1. Eric Burkey (SCMCN) proxy for Jody Holland (SCMCN)

From: Holland, Jody
Sent: Wednesday, August 16, 2017 2:17 PM
To: Alan Myers (amyers@itcgreatplains.com) <amyers@itcgreatplains.com>; Amber Greb <agreb@spp.org>
Cc: Eric Burkey <EBurkey@gridliance.com>
Subject: **External Email** proxy

Alan/Amber,
Eric Burkey has my proxy starting at 3 today and running through the completion of the meeting tomorrow. Thanks.

Jody Holland
Vice President, Planning & Engineering
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

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Blackstone Portfolio Company

2. Ryan Yokley (SUNC) proxy for Al Tamimi (SUNC)

From: Myers, Alan
Sent: **Wednesday, August 16, 2017 3:21 PM**
To: Tamimi, Al <atamimi@sunflower.net>; Kelsey Allen <kallen@spp.org>
Cc: Yokley, Ryan <ryokley@sunflower.net>; Amber Greb <agreb@spp.org>
Subject: **External Email** RE: [EXT] I will join ESWG at 3 pm Ryan Yokley has my proxy until 3 pm

Thanks Al. We will note for the minutes. For future reference, Amber Greb has assumed the ESWG secretary duties as of today's meeting. I've copied her on this reply so that you have her e-mail for the future.

Thanks,
Alan

-----Original Message-----

From: Tamimi, Al [mailto:atamimi@sunflower.net]
Sent: **Wednesday, August 16, 2017 4:08 PM**
To: Kelsey Allen <kallen@spp.org>; Myers, Alan K. <amyers@Itctransco.com>
Cc: Yokley, Ryan <ryokley@sunflower.net>
Subject: [EXT] I will join ESWG at 3 pm Ryan Yokley has my proxy until 3 pm

Caution - External Sender

Contact the ITC Helpdesk with any questions or concerns.
____

Sent from my iPhone

From: Tamimi, Al
Sent: Thursday, August 17, 2017 9:26 AM
To: Myers, Alan <amyers@itctransco.com>
Cc: Yokley, Ryan <ryokley@sunflower.net>; Amber Greb <agreb@spp.org>
Subject: **External Email** Ryan Yokley Has My proxy after 10 am today-i am on the conference call until 10 am today

Al Tamimi, Ph.D., P.E.
Sunflower Electric Power Corporation
V.P. Transmission Planning & Policy
Hays, KS 67601
785-623-3336
atamimi@sunflower.net

3. Josie Daggett (WAPA) proxy for Gayle Nansel (WAPA)

From: Nansel, Gayle
Sent: Wednesday, August 16, 2017 12:00 PM
To: Kelsey Allen <kallen@spp.org>
Cc: Josephine Daggett WAPA <Daggett@WAPA.GOV>
Subject: **External Email** ESWG Meeting

Kelsey:

I will be on the phone for the ESWG meeting today and tomorrow. However, I would like to give my proxy to Josie Daggett as she is attending in person and will be better positioned to vote. Thanks Gayle.

Gayle R. Nansel | Transmission Planning Manager
Western Area Power Administration | Upper Great Plains Region
(O) 406.255.2830 | (M) 406.698.6714 | nansel@wapa.gov
Western Area Power Administration

SPP Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

August 16th - 17th, 2017

Grand Hyatt – Denver, CO

• A G E N D A •

Wednesday 1:00pm – 5:00pm

Thursday 8:00am – 12:00pm

1. Administrative Items
   a. Call to Order, Introductions..Alan Myers (5 minutes)
   b. Receipt of Proxies ....Amber Greb (1 minute)
   c. Review of Agenda[1] ....Alan Myers (1 minute)
2. Review of Past Action Items[1] ....Amber Greb (5 minutes)
3. Consent Agenda ....Alan Myers (1 minute)
   a. Meeting Minutes – April 20th, 2017 (ESWG)
   b. Meeting Minutes – May 17th, 2017 (ESWG/TWG)
   c. Meeting Minutes – May 17th – 18th, 2017 (ESWG)
   d. Meeting Minutes – June 15th, 2017 (ESWG)
   e. Meeting Minutes – June 29th, 2017 (ESWG/TWG)
   f. Meeting Minutes – July 20th, 2017 (ESWG)
4. 2019 ITP Schedule[1] ....Juliano Freitas (15 minutes)
5. 2019 ITP Load and Generation Review[1] ....Nikki Roberts (15 minutes)
6. Economic Model Data Guidelines ....Juliano Freitas (15 minutes)
7. EI-WECC Interconnections Seems Study Update[1] ....Jay Caspary (30 minutes)
8. 2019 ITP Scope Items[1]..SPP Staff (180 minutes)
   a. 2019 ITP Futures[1] (Amber Greb) .... (60 minutes)
   b. Renewable Resource Expansion Plan[1] (Chris Jamieson) ....(30 minutes)
   c. Conventional Generation Prototypes[1] (Amber Greb) ....(30 minutes)

[1] Background Material Included

d. Renewable Accreditiation[1] .... (15 minutes)
e. Must Run Criteria[1] (Nikki Roberts) .... (15 minutes)
f. Operational Project Evaulation[1] (Will Tootle) .... (60 minutes)

9. Siting Manual Action Plan[1] .... Chris Jamieson (30 Minutes)

10. Transmission Outage Metric .... Antonio Barber (30 minutes)

11. Renewable Pricing .... Chris Jamieson (15 minutes)

12. CSP Regional Review[1] (Approval Item) .... Juliano Freitas (90 minutes)

13. 2018 ESWG Meeting Schedule[1] .... All (30 minutes)

14. Closing Items .... All (5 minutes)
    a. Summary of Action Items (Amber Greb)
    b. Future Meetings
        i. September 14th, 2017: 8th Floor AEP Offices, Dallas, TX
        ii. October 12th, 2017: 8th Floor AEP Offices, Dallas, TX
        iii. November 8th-9th, 2017: SPP Corporate Offices, Little Rock, AR
        iv. December 14th, 2017: 8th Floor AEP Offices, Dallas, TX

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

April 20th, 2017

8th Floor AEP Offices – Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the consent agenda
2. Approved standard percentages for the Renewable Policy Review
3. Approved the recommended public policy needs assessment methodology
4. Approved the recommended public policy project development methodology that will assess each project's ability to aid in meeting a public policy requirement and rank competing projects based on their APC benefit.
5. Approved the following methodology for modeling must run unit status in the economic model
    a. Must run statuses will be removed from all units at the start of the study
    b. Criteria to allow exceptions for must run status will be approved by the ESWG with each study scope
    c. Requests for exceptions will be approved by the ESWG during the generation review milestone
6. Approved the recommended economic and public policy staging methodologies that involve a linear interpolation of appropriate data between study years (APC benefit to cost ratio or progress toward public policy requirements)

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

April 20th, 2017

8th Floor AEP Offices – Dallas, TX

• MINUTES •

<u>Agenda Item 1 – Administrative Items</u>

<u>Agenda Item 1a - Call to Order, Introductions</u>

Chair Alan Myers (ITC Great Plains) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:00a.m., welcomed those in attendance, and asked for introductions.

There were 18 in-person participants and 42 web conference participants, representing 14 of 15 ESWG members. (Attachment 1 – April 20th, 2017 Attendance List)

<u>Agenda Item 1b – Receipt of Proxies</u>

Alan Myers (ITC Great Plains) asked for any proxy statements; one proxy was identified. Jody Holland (SCMCN) named Eric Burkey (SCMCN) as his proxy. (Attachment 2 – Proxy Statements)

<u>Agenda Item 1c – Review of Agenda</u>

Chair Alan Myers (ITC Great Plains) presented the agenda for review and asked for any additions or corrections. SPP staff requested that item 4h, covering the constraint assessment methodology, be removed from the agenda. (Attachment 3 – April 20th, 2017 ESWG Agenda).

> **Kurt Stradley (LES) made a motion; seconded by Pat McCool (KCPL) to adopt the agenda as modified. The motion was approved unanimously.**

<u>Agenda Item 2 – Review of Past Action Items</u>

Kelsey Allen (SPP Staff) reviewed the list of past action items and asked for any comments or questions. Juliano Freitas (SPP Staff) gave an update on the siting whitepaper. SPP staff is currently working towards posting a draft two weeks prior to the May 17th-18th meeting in St. Louis. (Attachment 4 – Past Action Items)

<u>Agenda Item 3 – Consent Agenda</u>

The consent agenda included the following items:

Meeting Minutes – March 8th, 2017 (Attachment 5 – March 8th, 2017 ESWG.TWG Minutes)

Meeting Minutes – March 16th, 2017 (Attachment 6 – March 16th, 2017 ESWG Minutes)

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

> **The consent agenda was approved unanimously.**

<u>Agenda Item 4 – ITP Scope Standardization</u>

<u>Agenda Item 4a – Policy Survey Standard Percentages</u>

Liz Gephardt (SPP Staff) updated the group on the investigation performed by Steve Gaw (Wind Coalition) and Walt Cecil (MOPSC) on their outstanding issues. Stakeholders have now come to consensus on the table of percentages, as presented. (Attachment 7 – Renewable Policy Review)

> **Tim Owens (NPPD) made a motion; seconded by Kurt Stradley (LES) to approve the standard percentages [by state and generation type] for use in the ITP renewable policy review. The motion was approved unanimously.**

<u>Agenda Item 4b – Public Policy Needs Assessment</u>

Clayton Mayfield (SPP Staff) reviewed the current methodology for defining public policy needs in the ITP assessment. SPP staff is proposing that this process remain a determination of deliverability by entity and state for needs driven by renewable public policy requirements that will now be defined in the renewable policy review. For any potential needs driven by other public policy requirements that may be considered in future ITP studies, SPP staff recommends that the needs determination be detailed in the study scope. (Attachment 8 – Public Policy Needs Assessment)

Pat McCool (KCPL) made a motion; seconded Tim Owens (NPPD) to accept SPP staff's recommendation to approve the methodology for Public Policy Needs Assessment as presented. The motion was approved unanimously.

Agenda Item 4c – Public Policy Project Selection

Liz Gephardt (SPP Staff) reviewed the current methodology for evaluating potential public policy projects by their ability to mitigate curtailments hindering an entity to meet its renewable policy goals. SPP staff recognizes the need to consider a methodology for evaluating projects to address potential non-renewable public policy in the future. SPP staff recommended that any projects selected to resolve a public policy need would be removed if that need could also be resolved by the selected reliability or economic portfolio. The group discussed the need to document consideration of co-optimization of reliability, policy, and economic projects and requested the presupposition that reliability and economic projects would be selected over a public policy project be removed from the manual language. Chair Alan Myers requested that the ITP Manual Task Force work with SPP staff to develop a general philosophical co-optimization statement for the manual. (Attachment 9 – Public Policy Project Selection)

Kurt Stradley (LES) made a motion; seconded by Tim Owens (NPPD) to accept SPP staff's recommendation for policy project selection, as modified, for language to be written by the ITP Manual Task Force. The motion was approved unanimously.

Agenda Item 4d – Economic Must Run Criteria

Clayton Mayfield (SPP Staff) staff reviewed the usage of must run designation in the production cost simulations and previous approaches to economic must run modeling. Clayton also reviewed the implementation detail of what the group previously approved, the usage of vendor data as a starting point. The group was not comfortable with the vendor approach to designating units as must run and leaned toward the 2017 ITP10 approach of not allowing any must run designations. With the changing outlook of generator operation including self-committing and seasonal operation, the group wanted the flexibility to develop criteria for allowing exceptions with each study scope. (Attachment 10 – Economic Must Run)

Bethany King (EDE) made a motion; seconded by Natasha Henderson (GSEC) to adopt the following methodology for designation of economic must run unit status:

- **Must run statuses will be removed from all units at the start of the study**
- **Criteria to allow exceptions for must run status will be reviewed by the group with each study scope**

Leon Howell (OGE) made a friendly amendment to change "reviewed" to "approved" for the exception criteria. Gayle Nansel (WAPA) made a friendly amendment to change "exceptions" to "criteria to allow exceptions". Tim Owens (NPPD) made a friendly amendment to change "group" to "ESWG" and add a third bullet regarding ESWG approval of any requests for exceptions.

- **Must run statuses will be removed from all units at the start of the study**
- **Criteria to allow exceptions for must run status will be approved by the ESWG with each study scope**
- **Requests for exceptions will be approved by the ESWG during the generation review milestone**

The amended motion was approved unanimously.

Agenda Item 4e – Economic Project Selection

Clayton Mayfield (SPP Staff) reviewed SPP staff's proposal for evaluation and selection of projects for the economic portfolio(s). The proposed methodology builds on previous approaches to project evaluation but considers some improvements based on previous lessons learned, feedback received, as well as requirements and opportunities given by the new ITP process. SPP staff proposed raising the 1-year B/C ratio screening threshold to 0.9 coupled with calculations to estimate a 40-year B/C afforded by the additional years being assessed in the new process. This suggested criteria change was met with some concern by the stakeholders and a request to rethink the purpose. Steve Gaw (Wind Coalition) expressed some concern regarding the potential seams project cost sharing assumptions and stated it should be in line with previous coordinated system planning studies and placed at equal to the projected benefit share between SPP and the seams entity. The group requested that the proposed methodology be refined and presented visually at the next meeting. Natasha Henderson (GSEC) commented on the 1-year cost calculations used by SPP and requested that the group hold a more in-depth discussion in a future meeting. (Attachment 11 – Economic Project Selection)

ACTION ITEM: ESWG to have a future agenda item for education and discussion of the derivation and use of the net plant carrying charge (NPCC) value used in the ITP process for project cost calculations.

Agenda Item 4f – Project Staging

James Bailey (SPP Staff) reviewed the proposed methodology for staging (need date) of economic and public policy projects. (Attachment 12 – Project Staging)

> **Bennie Weeks (SPS) made a motion; seconded by Kurt Stradley (LES) to approve SPP staff's recommendation for staging of economic and public policy projects. The motion was approved unanimously.**

Agenda Item 4g – Resource Siting Update and Issues Discussion

Chris Jamieson (SPP Staff) gave a progress update on development of the Resource Siting White Paper and reviewed some key issues being addressed in the document. Chris focused on questions related to allowable exceptions to the general approach, including siting conventional generation outside the assigned owner's zone and consideration of wind sites that have more potential that may not be reflective of the SPP GI queue. (Attachment 13 – Resource Siting Update and Issues Discussion)

Agenda Item 8 – 2016 Organizational Effectiveness Survey Analysis

Kelsey Allen (SPP Staff) reviewed the results of the 2016 Organizational Group Effectiveness survey, covering the company-wide results, results specific to the ESWG, and highlighted the highs and lows of the group. (Attachment 14 – 2016 Organizational Group Effectiveness Survey) (Attachment 15 – 2016 Organizational Effectiveness Survey Analysis)

Closing Items

Chair Alan Myers (ITC) requested other items meriting discussion.

List of action items from the meeting:

1. ESWG to have a future agenda item for education and discussion of the derivation and use of the net plant carrying charge (NPCC) value used in the ITP process for project cost calculations.

The meeting was adjourned at 3:00 PM.

Respectfully Submitted,

Kelsey Allen

ESWG Secretary

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

May 17th – 18th, 2017

Hilton at the Ballpark – St. Louis, MO

• SUMMARY OF ACTIONS TAKEN •

1. Approved the consent agenda
2. Directed SPP staff to conduct the 2017 Regional Review utilizing the 2017 ITP10 Future 1 and Future 3 2025 sidebar models to calculate a 1-year B/C ratio on the approved Interregional Project [from the 2016 SPP-MISO CSP study].
3. Accepted SPP staff's recommendation of proposed benefit metrics to utilize for the 2017 Regional Review [adjusted production cost and mitigation of transmission outages].
4. Approved the [economic] project screening and portfolio development methodology as presented.
5. Adopted the solutions for external transaction modeling, non-translated region powerflow modeling, and transmission loss assumptions [as improvements to the DC to AC model conversion process].
6. Approved the modeling of DC line limits [for the economic model] based on consideration of operational practice (current or expected future) and/or limit operation to a maximum of expected flows reflected in the AC powerflow models.

SPP Southwest Power Pool

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

May 17th – 18th, 2017

Hilton at the Ballpark – St. Louis, MO

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC) called the meeting of the Economic Studies Working Group (ESWG) to order at 1:00p.m., welcomed those in attendance, and asked for introductions.

There were 24 in-person participants and 36 web conference participants, representing 15 of 16 ESWG members. (Attachment 1 – April 20th, 2017 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; three proxies were identified. Anita Sharma (AEP) named Jim Jacoby (AEP) as her proxy, Jeremy Severson (BEPC) named Matthew Stoltz (BEPC) as his proxy, and Natasha Henderson (GSEC) named Evan Racine-Johnson (GSEC) as her proxy. (Attachment 2 – Proxy Statements)

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. An item regarding nomination and election of a vice-chairman was included after the consent agenda. (Attachment 3 – May17th-18th, 2017 ESWG Agenda).

Jim Jacoby (AEP) made a motion; seconded by Tim Owens (NPPD) to adopt the agenda as modified. The motion was approved unanimously.

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP Staff) reviewed the list of past action items and asked for any comments or questions. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

- Benefit Metrics Manual (Attachment 5 – Benefit Metrics Manual)
- Meeting Minutes – February 15th, 2017 (Attachment 6 – TWG.ESWG Minutes February 15, 2017)
- Meeting Minutes – April 3rd, 2017 (Attachment 7 – April 3, 2017 TWG.ESWG Joint Minutes)

Alan Myers (ITC) asked if any items should be removed from the consent agenda.

The consent agenda was approved unanimously.

Agenda Item 4 – Vice-Chair Nomination/Election

Alan Myers (ITC) opened the floor for additional nominations to the vice-chairman position of the ESWG. Tim Owens (NPPD) had previously been nominated for the position via email. With no further nominees, Tim Owens was unanimously supported to fill the position. Congratulations Tim!

Agenda Item 5 – SPP-MISO CSP Regional Review

Adam Bell (SPP Staff) gave a brief recap of the 2016 SPP-MISO Coordinated System Planning (CSP) study and the project that was approved by the SPP-MISO Interregional Planning Stakeholder Advisory Committee (IPSAC). Adam then reviewed the SPP Regional Review process and the proposed approach to the 2017 Regional Review of the approved project. SPP needs input from the group regarding the model and benefit metrics to use for evaluation of the project. SPP staff's original proposal was to utilize the CSP model developed with MISO for evaluation of the project and include any requested model updates. This would capture many of the model updates already captured for the SPP system and a more realistic representation of the MISO system (the CSP study utilized models containing both RTO's regional approach to the Clean Power Plan (CPP), whereas SPP's 2017 ITP10 model containing the regional approach to the CPP contained MISO's subregional approach). Gayle Nansel (WAPA) questioned the use of the CSP model as it would be a duplication of the work already completed and provide little new information. Zac Hager (OGE) questioned the use of Future 1 (Regional CPP) from the 2017 ITP10 and suggested Future 3 (Reference case) would be more appropriate. Steve Gaw (Wind Coalition) pointed out that the renewable assumptions in Future 1 were more appropriate for SPP, which was followed up by Tim Owens (NPPD) asking SPP how to handle the removal of CPP requirements in Future 1. SPP staff recommended removing carbon adders from Future 1 as additional analysis. Clayton Mayfield (SPP staff) mentioned that because SPP utilized MISO's subregional approach to the CPP in SPP's Future 1 model, their renewable assumptions were much higher than currently expected and were a major driver of benefit for the project in that model. After discussion, the group generally agreed upon utilization of the 2017 ITP10 models and did not want SPP staff spending a lot of time on model updates. Utilizing the 2017 ITP10 sidebar models would contain a majority of model updates but would only allow calculation of a 1-year B/C ratio since only 2025 models were developed. Also, due to concerns of some of the assumptions in the Future 1 model, the group suggested analyzing the project in both Future 1 and Future 3.

> **Jeremy Severson (BEPC) made a motion; seconded by Gayle Nansel (WAPA) to conduct the 2017 Regional Review utilizing the 2017 ITP10 Future 1 and Future 3 2025 sidebar models to calculate a 1-year B/C ratio on the approved Interregional Project. The motion was approved with one abstention, Bethany King (EDE).**

SPP staff recommended that the 1-year benefit calculation consist of adjusted production cost and mitigation of transmission outages.

> **Tim Owens (NPPD) made a motion; seconded by Kurt Stradley (LES) to accept SPP staff's recommendation of proposed benefit metrics to utilize for the 2017 Regional Review. The motion was approved unanimously.**

(Attachment 8 – SPP-MISO CSP Regional Review)

Agenda Item 6 – SPP Staff and Stakeholder Accountability

English Cook (SPP Staff) reviewed the most recent document regarding SPP staff and stakeholder accountability for the new ITP process. (Attachment 9 – SPP Staff and Stakeholder Accountability)

Agenda Item 7 – ITP Scope Standardization

Agenda Item 7a – Economic Project Screening and Portfolio Development

Clayton Mayfield (SPP Staff) presented an updated version of SPP's proposed approach to economic project screening and portfolio development considering discussion from the April meeting. The group spent time discussing the process and the provided flowchart and was generally agreeable to the proposal. Jody Holland (SCMCN) raised concern regarding co-optimization of the different portfolios (reliability, economic, policy) and the potential for reclassification of a project type. (Attachment 10 – Economic Project Screening and Portfolio Development) (Attachment 11 – Economic Project Screening and Portfolio Development Flowchart)

> **Jody Holland (SCMCN) made a motion; seconded by Tim Owens (NPPD) to approve the project screening and portfolio development methodology as presented. The motion was approved unanimously.**

Agenda Item 7b – DC to AC Model Conversion

Kelsey Allen (SPP Staff) gave a recap of the DC to AC model conversion process, the issues identified in the 2017 ITP10 and the approach to address them, and potential adjustments to key parts of the process to help minimize issues in the future. SPP staff recommended that the proposed adjustments to the modeling of external transactions, modeling of non-translated region powerflow data, and approach to transmission loss approximations be adopted for future implementation. Kelsey Allen pointed out that the proposed improvements to modeling of phase-shifting transformers was already approved. Tim Owens (NPPD) recognized that many of these details would not be included in the ITP manual and requested that SPP staff ensure the issues and adjustments to the process are well documented internally to SPP. (Attachment 12 – DC to AC Model Conversion)

Kurt Stradley (LES) made a motion; seconded Pat McCool (KCPL) to adopt the solutions for external transaction modeling, non-translated region powerflow modeling, and transmission loss assumptions. The motion was approved unanimously.

Agenda Item 7c – DC Line Modeling-Economic Model

Kelsey Allen (SPP Staff) reviewed the historical practice of modeling DC lines in the economic model and proposed adjustments for the new process. He recommended that the language for the ITP manual contain less specificity but that the case-by-case details would be documented for internal processes. (Attachment 13 – DC Line Modeling)

Jim Jacoby (AEP) made a motion; seconded by Gayle Nansel (WAPA) to model DC line limits based on consideration of operational practice (current or expected future) and/or limit operation to a maximum of expected flows reflected in the AC powerflow models. The motion was approved unanimously.

Agenda Item 7d – Hydro Transaction Modeling

Kelsey Allen (SPP Staff) gave a brief overview of the purpose of hydro transaction modeling and SPP staff's progress on improvements to the methodology. James Bailey (SPP staff) added some specifics of the issues and potential solutions. After short discussion, Kelsey Allen suggested that the modeling of hydro transactions be removed from the list of items to be standardized and included in the ITP manual and that SPP staff would work with the impacted stakeholders directly to come to a resolution for the new process and create a process document that could be shared with interested parties. The group was agreeable to this approach.

Closing Items

Chair Alan Myers (ITC) requested other items meriting discussion.

List of action items from the meeting: None.

The meeting was adjourned at 11:30 PM.

Respectfully Submitted,

Kelsey Allen

ESWG Secretary

Southwest Power Pool

JOINT TRANSMISSION & ECONOMIC STUDIES WORKING GROUP MEETING

May 17, 2017

Hilton at the Ballpark – St. Louis, MO

• Summary of Action Items •

1. Approved the Consent Agenda
2. Approved the Constraint Assessment methodology for the new ITP process

Southwest Power Pool, Inc.

JOINT TRANSMISSION & ECONOMIC STUDIES WORKING GROUP MEETING

May 17, 2017

Hilton at the Ballpark – St. Louis, MO

• M I N U T E S •

Agenda Item 1 – Administrative Items

TWG Chair Travis Hyde and ESWG Chair Alan Myers called the meeting to order at 10:40 am. The following members were in attendance (Attachment 1a, 1b – In-Person Attendance, WebEx Attendance) or represented by proxy:

TWG
Travis Hyde (Chair), Oklahoma Gas & Electric
Daniel Benedict, City of Independence
Jerry Bradshaw, City Utilities of Springfield
Richard Dahl, Missouri River Energy Services
Joe Fultz, Grand River Dam Authority
John Fulton, Southwestern Public Service Company
Kalun Kelley, Western Farmers Electric Cooperative
John Knofczynski, East River Electric Power Cooperative
Randy Lindstrom, Nebraska Public Power District
Jim McAvoy, Oklahoma Municipal Power Authority
Matt McGee, American Electric Power
Nate Morris, Empire District Electric
Michael Mueller, Arkansas Electric Cooperative Corporation
Alan Myers, ITC Great Plains
Gayle Nansel, Western Area Power Administration
Chris Pink, Tri-State G&T
Jason Shook, GDS Associates representing ETEC
Dave Spargo, Omaha Public Power District
Matthew Stoltz, Basin Electric Power Cooperative
Kurt Stradley, Lincoln Electric System
Noman Williams, South Central MCN
Harold Wyble, Kansas City Power & Light

ESWG
Alan Myers (Chair), ITC Great Plains
Randy Collier, City Utilities of Springfield
Jody Holland, South Central MC
Leon Howell, Oklahoma Gas & Electric
Jon Iverson, Omaha Public Power District
Jim Jacoby, American Electric Power
Evan Racine-Johnson, Golden Spread Electric Cooperative
Bethany King, Empire District Electric
Pat McCool, Kansas City Power & Light
Gayle Nansel, Western Area Power Authority
Tim Owens, Nebraska Public Power District
Matthew Stoltz, Basin Electric Power Cooperative
Kurt Stradley, Lincoln Electric System
Michael Watt, Oklahoma Municipal Power Authority

Bennie Weeks, Southwestern Public Service Company

Kirk and Kelsey informed the Chairs of a quorum for their respective groups.

Receipt of Proxies
The following proxies were announced (Attachment 1c – Proxies):

TWG
- Dave Spargo (OPPD) proxy for Dan Lenihan (OPPD)
- Kurt Stradley (LES) proxy for Scott Benson (LES)
- Jerry Bradshaw (CUS) proxy for John Boshears (CUS)

ESWG
- Jim Jacoby (AEP) proxy for Anita Sharma (AEP)
- Matthew Stoltz (BEPC) proxy for Jeremy Severson (BEPC)
- Evan Racine-Johnson (GSEC) proxy for Natasha Henderson

Agenda Item 2 – Consent Agenda

Travis and Alan asked if any TWG or ESWG members preferred discussion on the Consent Agenda (Attachment 2a, 2b – ITP Manual Posting Summary, ITP Manual Draft). No members requested additional discussion.

Motion: John Knofczynski made a motion to approve the consent agenda. Daniel Benedict seconded the motion. The motion was approved unanimously.

Motion: Alan Myers asked the ESWG to cast their vote on the consent agenda. The motion passed unanimously.

Agenda Item 3 – ITP Scope Standardization

Constraint Assessment
Chris Jamieson, SPP staff, presented staff's updated proposal (Attachment 3a – Constraint Assessment) for the constraint assessment for the new ITP process. Neither group had concerns with staff's proposal.

Motion (TWG): Harold Wyble made a motion to accept the methodology for the constraint assessment in the new ITP process. Alan Myers seconded the motion. The motion passed with no opposition.

Motion (ESWG): Kurt Stradley made a motion to accept the methodology for the constraint assessment in the new ITP process. Tim Owens seconded the motion which passed with no opposition.

Agenda Item 4 – Resource Siting Whitepaper Discussion

Chris moved onto Siting (Attachment 3b, 3c – Resource Siting Whitepaper Discussion Presentation, Draft Siting Whitepaper). He presented to the stakeholders the concepts in the draft whitepaper and provided the staff whitepaper for members to provide feedback. He informed the members that Section 4 of the whitepaper would be moved into the ITP Manual.

Respectfully Submitted,

Kirk Hall
TWG Secretary

Kelsey Allen
ESWG Secretary

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

June 15th, 2017

8th Floor AEP Offices – Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the ITP Resource Siting Process White Paper.
2. Approved the study scope of the 2017 Regional Review of the 2016 SPP-MISO CSP Proposed Project, as amended.

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

June 15th, 2017

8th Floor AEP Offices – Dallas, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:00a.m., welcomed those in attendance, and asked for introductions.

There were 17 in-person participants and 56 web conference participants, representing 16 of 16 ESWG members. (Attachment 1 – June 15th, 2017 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; two proxies were identified. Al Tamimi (Sunflower) named Wayne Penrod (Sunflower) as his proxy and Jody Holland (SCMCN) named Eric Burkey (SCMCN) as his proxy. (Attachment 2 – Proxy Statements)

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – June 15th, 2017 ESWG Agenda).

> **Kurt Stradley (LES) made a motion; seconded by Leon Howell (OGE) to adopt the agenda. The motion was approved unanimously.**

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP staff) reviewed the list of past action items and asked for any comments or questions. Steve Gaw (Wind Coalition) requested that work continue on filling in the gaps of the siting white paper and asked how that should be accomplished procedurally. SPP staff's opinion is that the white paper should become a stand-alone document and any adjustments to the process should be made in the ITP manual or potentially a resource siting manual that would cover the broader concepts of the white paper. The group discussed the closing out of other items related to the ITP manual and agreed that items 163 and 168 should be marked complete. (Attachment 4 – Past Action Items)

Agenda Item 3 – ITP Scope Standardization – Resource Siting

Chris Jamieson (SPP staff) gave an overview of the review and feedback timeline for~~of~~ the resource siting white paper discussed next steps for siting. SPP staff are requesting that the ESWG approve the white paper, include section 4 of the white paper as the resource siting methodology section of the ITP manual, and continue to work on filling in the gaps that the white paper does not address in the form of a Resource Siting Manual to be referenced by the ITP manual. Alan Myers (ITC) recommended that the TWG also have formal review rights of the SPP resource siting process. (Attachment 5 – Resource Siting White Paper Recommendation) (Attachment 6 – ITP Resource Siting Process White Paper)

> **Leon Howell (OGE) made a motion; seconded by Natasha Henderson (GSEC) to approve the ITP Resource Siting Process White Paper. The motion was approved unanimously.**

With approval of the white paper, ESWG action item 057 is considered complete.

Agenda Item 4 – Regional Review Study Scope

Adam Bell (SPP Staff) reviewed the scope for the 2017 Regional Review Study. Gayle Nansel (WAPA) expressed concerns about potential impacts to reliability and TPL compliance issues the approved project may cause as well as whether those cost would be solely born by SPP. Adam stated that SPP is working to identify any potential impacts following the ITPNT final reliability assessment process for no-harm analysis but that the scope of the approved project and cost allocation percentages for SPP and MISO are fixed and cannot change as function of the Regional Review study. Jeremy Severson (BEPC) and Gayle Nansel requested that the scope include language stating that model updates will be made to the model set approved for use in the May meeting that include model corrections submitted through the CSP study and any updates determined to impact the local area of the project. (Attachment 7 – Regional Review of 2016 SPP-MISO CSP Proposed Project - Scope_revised)

Gayle Nansel (WAPA) made a motion; seconded by Jeremy Severson (BEPC) to approve the study scope of the 2017 Regional Review of the 2016 SPP-MISO CSP Proposed Project, as amended. The motion was approved unanimously.

Agenda Item 5 – High Priority Study Scope Update

Kelsey Allen (SPP Staff) reviewed SPP staff's proposed approach to the SPP Board of Directors (Board) request for development of a High Priority Study scope that would appropriately address the needs in the Texas panhandle that were left unresolved following the 2017 ITP10. He presented the proposed study objective, modeling considerations, analysis and a preliminary schedule. SPP's proposed objective is to analyze areas of the footprint where historical market congestion is expected to persist or increase over time. Some of the members expressed concern with widening the geographical scope and the potential time and cost impacts that may have. Natasha Henderson (GSEC) suggested focusing on upgrades that would be required to alleviate areas of the system currently designated as frequently constrained (FCA). Leon Howell (OGE) suggested SPP staff evaluate the cost differences of only evaluating the Texas panhandle versus additional areas of the system. SPP staff will continue work on the scope with the plan to bring a proposal to the upcoming SPC, MOPC, and Board meetings. (Attachment 8 – High Priority Study)

Agenda Item 6 – ITP Study Schedule

Juliano Freitas (SPP Staff) reviewed the proposed standard schedule for the new ITP process, which details the timeline for milestones starting with the development of initial powerflow models through the end of the study in the October two years following. (Attachment 9 – ITP Schedule)

Agenda Item 7 – ITP Project Study Cost Estimation

Juliano Freitas (SPP Staff) continued discussion on the ITP schedule with details regarding the study cost estimates required for any top candidate projects. These estimates will either be sent to the incumbent transmission owner or a third party consultant to receive a more refined cost than the SPP staff conceptual estimate. A number of stakeholders expressed concern with the pair of short two week windows that would be allowed in the process for development of those estimates. SPP staff stated that internal investigation is still ongoing to try to find more room in the schedule or other options to provide stakeholders more time for this effort.

Agenda Item 8 – 2019 ITP Scope Kickoff

Amber Greb (SPP Staff) began the conversation on scoping of the 2019 ITP study, laying out what topics need to be discussed, what items weren't standardized in the ITP manual and will eventually need to be, and a high level timeline for completing the scope. Amber then opened the floor for discussion on potential futures or future drivers to consider in the study. The discussion covered items such as renewable levels, resource retirements, distributed energy resources, batteries, electric cars and gas supply, among others. Everyone was encouraged to continue brainstorming for a more focused discussion in July.

Agenda Item 9 – PROMOD HD Overview

Bret Toplyn (ABB) provided an overview of the features and functionality of the new version of PROMOD currently under development, PROMOD HD. The software is still in testing phase and expected to be released later in the year. (Attachment 10 - ABB PROMOD Demonstration)

Closing Items

Chair Alan Myers (ITC) requested other items meriting discussion.

List of action items from the meeting:

1. ESWG.

The meeting was adjourned at 3:00 PM.

Respectfully Submitted,

Kelsey Allen

ESWG Secretary

Southwest Power Pool

JOINT TRANSMISSION & ECONOMIC STUDIES WORKING GROUP MEETING

June 29, 2017

SPP Corporate Campus – Little Rock, AR

• Summary of Action Items •

1. Approved the Resource Siting Manual (TWG & ESWG)
2. Approved the ITP Manual (TWG & ESWG)
3. Approved joint ownership of the ITP Manual in the Revision Request process (TWG)

Southwest Power Pool

JOINT TRANSMISSION & ECONOMIC STUDIES WORKING GROUP MEETING

June 29, 2017

SPP Corporate Campus – Little Rock, AR

• M I N U T E S •

Agenda Item 1 – Administrative Items

TWG Chair Travis Hyde and ESWG Chair Alan Myers called the meeting to order at 8:35 am. The following members were in attendance (Attachment 1a – Attendance):

TWG
Travis Hyde (Chair), Oklahoma Gas & Electric
Scott Benson, Lincoln Electric System
John Boshears, City Utilities of Springfield
Eric Burkey, South Central MCN
John Fulton, Southwestern Public Service Company
James Ging, Kansas Power Pool
Kalun Kelley, Western Farmers Electric Cooperative
John Knofczynski, East River Electric Power Cooperative
Dan Lenihan, Omaha Public Power District
Randy Lindstrom, Nebraska Public Power District
Jim McAvoy, Oklahoma Municipal Power Authority
Matt McGee, American Electric Power
Nate Morris, Empire District Electric
Michael Mueller, Arkansas Electric Cooperative Corporation
Alan Myers, ITC Great Plains
Gayle Nansel, Western Area Power Administration
Dona Parks, Grand River Dam Authority
John Payne, Kansas Electric Power Cooperative
Jeremy Severson, Basin Electric Power Cooperative
Jason Shook, GDS Associates representing ETEC
Brian Wilson, Kansas City Power & Light

ESWG
Alan Myers (Chair), ITC Great Plains
Eric Burkey, South Central MCN
Randy Collier, City Utilities of Springfield
Don Frerking, Kansas City Power & Light
Natasha Henderson, Golden Spread Electric Cooperative
Leon Howell, Oklahoma Gas & Electric
Jon Iverson, Omaha Public Power District
Gayle Nansel, Western Area Power Authority
Tim Owens, Nebraska Public Power District
Anita Sharma, American Electric Power
Jeremy Severson, Basin Electric Power Cooperative
Kurt Stradley, Lincoln Electric System
Michael Watt, Oklahoma Municipal Power Authority

Kirk Hall and Kelsey Allen, both SPP staff, informed the Chairs of a quorum for their respective groups.

Receipt of Proxies
The following proxies were announced (Attachment 1b – Proxies):

TWG

- Eric Burkey (SCMCN) proxy for Noman Williams (SCMCN)
- Dona Parks (GRDA) proxy for Joe Fultz (GRDA)
- Brian Wilson (KCP&L) proxy for Harold Wyble (KCP&L)
- Jeremy Severson (BEPC) proxy for Matthew Stoltz (BEPC)

ESWG

- Eric Burkey (SCMCN) proxy for Jody Holland (SCMCN)
- Don Frerking (KCP&L) proxy for Pat McCool (KCP&L)

Agenda Item 2 – Consent Agenda

Travis and Alan asked if any TWG or ESWG members preferred discussion on the Consent Agenda (Attachment 2a – Resource Siting Manual). Members did request that the Resource Siting Manual be pulled from the consent agenda and discussed prior to approval. Stakeholders had some concerns with an incomplete version of the Resource Siting Manual being referenced in the ITP Manual as well as felt more information from the Resource Siting Manual should be included in the ITP Manual. After some discussion staff and the stakeholders agreed that the ITP Manual could be adjusted to address one concern.

Motion (ESWG): Natasha Henderson made a motion to approve the Resource Siting Manual as draft with the creation of an action item to complete the manual. Leon Howell seconded the motion. The motion was approved unanimously.

Motion (TWG): Alan Myers made a motion to approve the Resource Siting Manual as draft with the creation of an action item to complete the manual. Jason Shook seconded the motion. The motion was approved unanimously.

Action Item: Staff and working groups will work together to complete the Resource Siting Manual.

Agenda Item 3 – ITP Manual

Model Naming Convention
Prior to reviewing the manual Kirk asked the stakeholders if they had any concerns with renaming the models (Attachment 3a – Standard ITP Model Names) discussed in the ITP Manual to better describe what each model type contains. Due to the limited amount of time the members had to consider the potential new names for the different planning models, they did not want to approve a change to the naming convention of the models. They preferred to see the change come in the form of a revision request as well as including a description of each model type.

Manual Approval
Amber Greb, SPP staff, reviewed the ITP Manual change summary (Attachment 3b, 3c – Revisions Summary, ITP Manual Redlines) since original materials posting and took questions from the group. Some members expressed general concern that the manual being requested for approval had many last minute redline changes without ample time to review. Staff requested the TWG and ESWG's opinion on a few topics such as listing the process/milestone ownership section and the history sections included in the manual. Both groups felt the information should be included.

Steve Gaw, Wind Coalition, expressed objections to the renewable pricing methodology outlined in the manual, specifically that the reflection of a contract price in the operating costs of renewables is discriminatory when compared to assumptions included for resources of other types. Rodica Donaldson, EDF Renewable Energy, echoed Steve's objections and added that those contract prices include cost unrelated to the operating and maintenance costs of the renewable generators and should not be included in the economic model. Kelsey acknowledged those concerns and stated that the methodology outlined in the manual was previously approved by the ESWG, but these issues would continue to be discussed. Natasha Henderson expressed concern regarding the requirement of entities to provide documentation of contract price agreements in order to reflect those prices for renewable units in the model, specifically the potential for entities to choose whether or not to provide the information depending on what benefits them the most.

Motion (ESWG): Kurt Stradley made a motion to approve the ITP Manual as modified during the meeting with the allowance for non-substantive edits and moving the History of the ITP and TPITF section to an appendix. Jon Iverson seconded the motion. The motion passed unanimously.

Motion (TWG): Alan Myers made a motion to approve the ITP Manual as modified during the meeting with the allowance for non-substantive edits and moving the History of the ITP and TPITF sections to an appendix. Scott Benson seconded the motion. The motion passed unanimously.

Manual Ownership

Kirk discussed with the group the inclusion of the ITP Manual in the RR process. He informed both groups how the process works when a new document is added to the process and the current primary working group for the manual had been identified as the TWG due to the fact the TWG is already a primary working group. The ESWG would be identified as a 'PS' working group in the RR Routing Criteria on those sections that should be owned by the ESWG. Using this ownership model, the ESWG would maintain ownership over the sections that were economic in nature, and the main impact would be on the staff secretaries who were working the revision requests through the process. Kirk told the members he wanted to give the opportunity to the ESWG and TWG to voice their concerns over the ESWG not being considered as a Co-Primary Working Group for the ITP Manual along with the TWG. Multiple ESWG members expressed their concerns with the ESWG not being a Primary owner. The TWG agreed with the ESWG concerns.

Motion (TWG): John Boshears made a motion to split the ownership of the ITP Manual in the Revision Request Process with the ESWG. Alan Myers seconded the motion. The motion passed without opposition.

Agenda Item 4 – High Priority Study Overview

Kelsey updated the group on the progress of the High Priority Study scope development. He reviewed a presentation (Attachment 4 – High Priority Study) he gave to the Strategic Planning Committee and recapped the discussion that followed. He also discussed an alternative proposal suggested by AEP that could be an alternative method to address the current congestion issues. Travis Hyde expressed concerns with the cost and timeline of performing the study as proposed, stating that the original request from the Board was to only analyze the issues in the panhandle of Texas. Both groups asked for updates after the upcoming MOPC and Board meetings.

Respectfully Submitted,

Kirk Hall
TWG Secretary

Kelsey Allen
ESWG Secretary

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

July 20th, 2017

8th Floor AEP Offices – Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the inclusion of the evaluation of the op-guide to operate the Sioux Falls to Lawrence 115kV line as open as an alternative to the CSP project.

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

July 20th, 2017

8th Floor AEP Offices – Dallas, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:00a.m., welcomed those in attendance, and asked for introductions.

There were 19 in-person participants and 45 web conference participants, representing 15 of 15 ESWG members. (Attachment 1 – July 20th, 2017 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; two proxies were identified. (Attachment 2 – Proxy Statements)

- Eric Burkey (SCMCN) proxy for Jody Holland (SCMCN)
- Ryan Yokley (SUNC) proxy for Al Tamimi (SUNC)

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC Great Plains) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – July 20th, 2017 ESWG Agenda).

Kurt Stradley (LES) made a motion; seconded by Tim Owens (NPPD) to adopt the agenda. The motion was approved unanimously.

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP Staff) reviewed the list of past action items and asked for any comments or questions. Action item 160 was removed and replaced with action item 186. SPP staff and stakeholders will begin discussing how to formalize and document the model data submission guidelines and submission process. An action item was added (Action item 187) to address the objectives raised to the approved renewable VOM modeling detailed in the ITP manual. (Attachment 4 – Past Action Items)

ACTION ITEM: Formalize the economic model data guidelines and submission process.

ACTION ITEM: Address the objections raised to the approved renewable VOM modeling detailed in the ITP manual.

Agenda Item 3 – 2019 ITP Load and Generation Review

Juliano Freitas (SPP Staff) gave an overview of the upcoming Load and Generation review milestone for the 2019 ITP assessment. Stakeholders reviewed the data sources to be used (2016 fall NERC Nodal Simulation Ready data), the vendor data parameters to be utilized, and the data items that will be surveyed. Juliano reviewed the schedule for the load and generation review and anticipated approval dates. Jason Schmidt (NextEra) suggested using the spring 2017 data since it will be newer. Juliano shared concerns with the group that the spring data would not be ready in time, but said SPP staff would consider the updated source if it was. (Attachment 5 – 2019 ITP Gen and Load Review)

Agenda Item 4 – 2019 ITP Schedule

Juliano Freitas (SPP Staff) gave an overview of the 2019 ITP draft schedule. He presented a flow chart showing milestone dates and dependencies. It was noted that operational issues and needs assessment were not included in the chart. SPP Staff is intending to bring a final schedule to the ESWG in October, including the final dates for each milestone, as well the time and dates for members to review and approve items. (Attachment 6 – 2019 ITP Schedule)

Agenda Item 5 – 2019 ITP Scope

Amber Greb (SPP Staff) reviewed the 2019 ITP Scope milestone with the group. She presented the topics for discussion, requests for approvals in upcoming meetings and the timeline for completing each item. The ESWG will take recommended futures to the SPC meeting on October 19th and the final scope document will be up for approval on December 14th. Failure to meet these dates could have a three month impact to the ITP schedule, as the final 2019 ITP scope is scheduled to go to MOPC for approval in January 2018. (Attachment 7 – 2017 ITP Scope)

Agenda Item 6 – 2019 ITP Futures

Amber Greb (SPP Staff) began discussions on potential ITP futures. Amber reviewed the futures used in the 2015 and 2017 ITP10 studies as well as the proposed MISO MTEP18 futures. A survey will be sent out asking for input of possible future drivers and specifically those stemming from public policy issues or needs. SPP staff will compile the results of the survey to continue discussion at the August meeting. (Attachment 8 – 2019 ITP Futures)

Agenda Item 7 – SPP-MISO CSP Regional Review

Adam Bell (SPP Staff) informed stakeholders of an additional solution (op-guide to operate Sioux Falls-Lawrence 115kV line as open) to resolve the 2016 SPP-MISO Coordinated System Planning (CSP) study need that XCEL requested SPP to evaluate. SPP staff recommended a modification of the approved Regional Review (RR) study scope to include evaluation of this op-guide. Clayton Mayfield (SPP Staff) presented preliminary results based on the original RR scope and sensitivities discussed at prior meetings. The benefit of the project in Future 1 compared to Future 3 caused the group to question the modeling assumptions, specifically the MISO MTEP16 sub-regional wind totals in Future 1. Steve Gaw (Wind Coalition) suggested modifying MISO's wind totals in Future 1 for further benefit evaluation. Alan Myers (ITC) reminded ESWG of conflicts experienced in the 2014 MISO SPP CSP study RR when MISO moved SPP's renewable resources during project evaluations and suggested SPP should not tamper with MISO's renewable resource siting MW totals. The group agreed. As a result of this conversation, ESWG asked SPP staff to provide current MISO installed wind capacity to help the group gauge benefit numbers seen across all scenarios for the next ESWG. (Attachment 9 – SPP-MISO CSP Regional Review)

> **Anita Sharma (AEP) made a motion; seconded by Jon Iverson (OPPD) to include the evaluation of the op-guide to operate the Sioux Falls to Lawrence 115kV line as open as an alternative to the CSP project. The Motion was approved.**

Agenda Item 8 – High Priority Study Scope Update

Kelsey Allen (SPP Staff) provided an update on the development of the High Priority Study scope requested by the SPP Board. Kelsey presented SPP's approach to the study and scenarios at both the MOPC and SPC last week and gathered feedback. The MOPC members had much discussion on the topic but could not come to consensus on formal direction, with two votes failing to pass the required majority of support. SPP staff will consider the discussion at the MOPC and SPC meetings and make a recommendation to the Board, since neither group provided formal direction.

Agenda Item 9 – 2018 ESWG Meeting Schedule

Amber Greb (SPP Staff) showed the ESWG potential dates for future meetings. The ESWG discussed possible locations for meetings such as Michigan (ITC) and Denver (Xcel Energy). No dates have officially been set. (Attachment 10 – 2018 ESWG Meeting Schedule)

Closing Items

Chair Alan Myers (ITC) requested other items meriting discussion.

List of action items from the meeting:

1. Formalize the economic model data guidelines and submission process.
2. Address the objections raised to the approved renewable VOM modeling detailed in the ITP manual.

The meeting was adjourned at 3:00 PM.

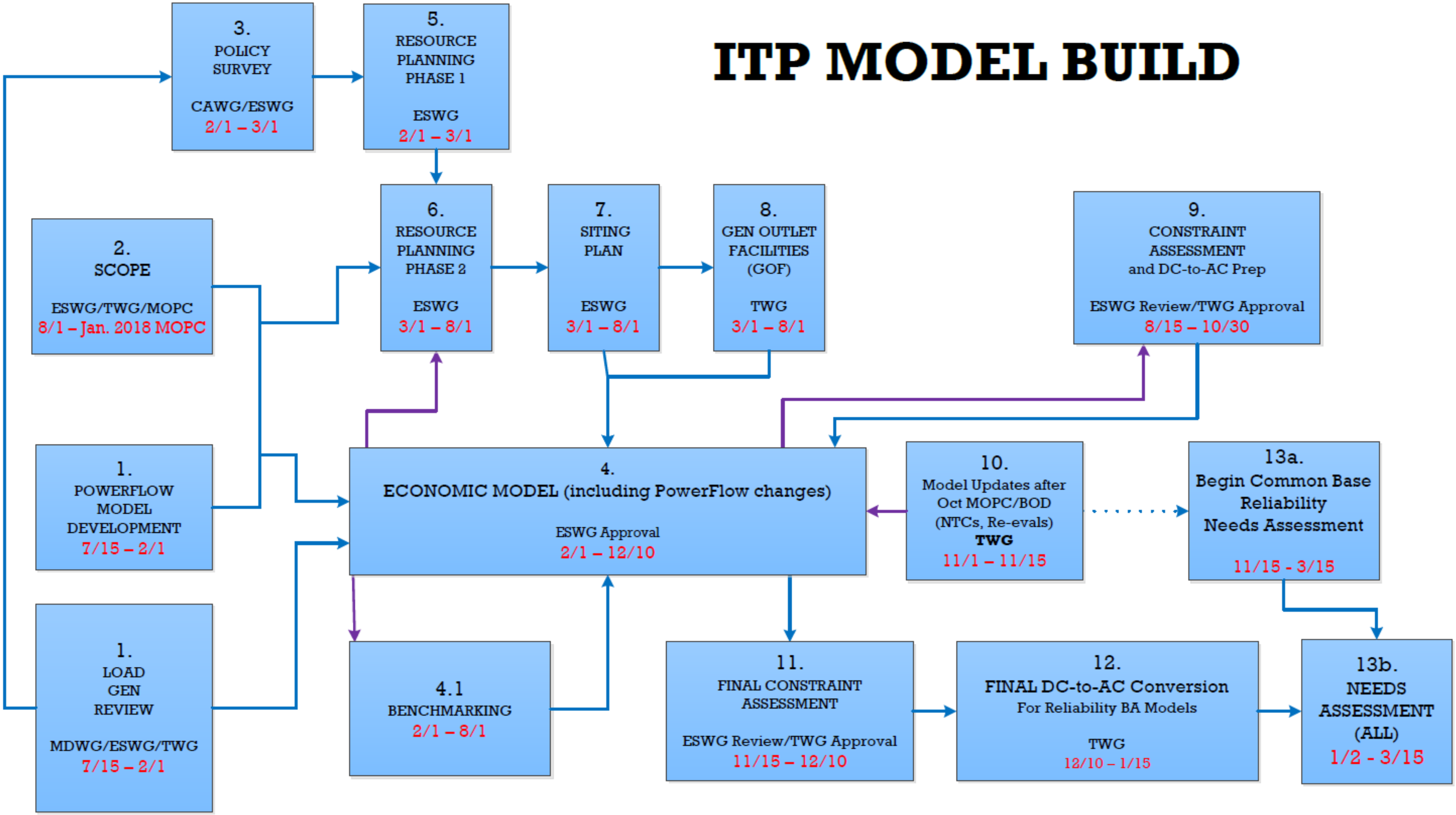
Respectfully Submitted,

Kelsey Allen

ESWG Secretary

ITP Study Draft Schedule

ITP MODEL BUILD



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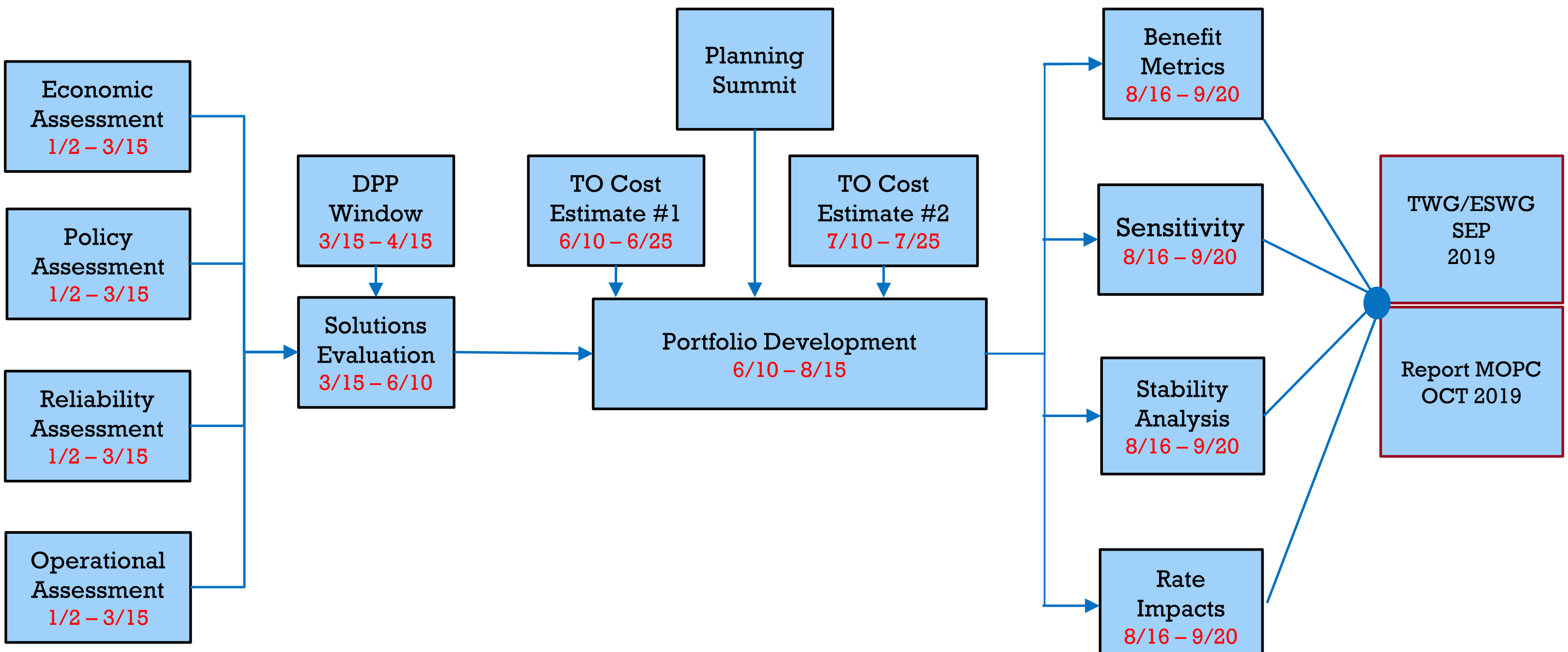
ITP ASSESSMENTS AND ANALYSIS

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2019 ITP Load and Generation Review

Nikki Roberts

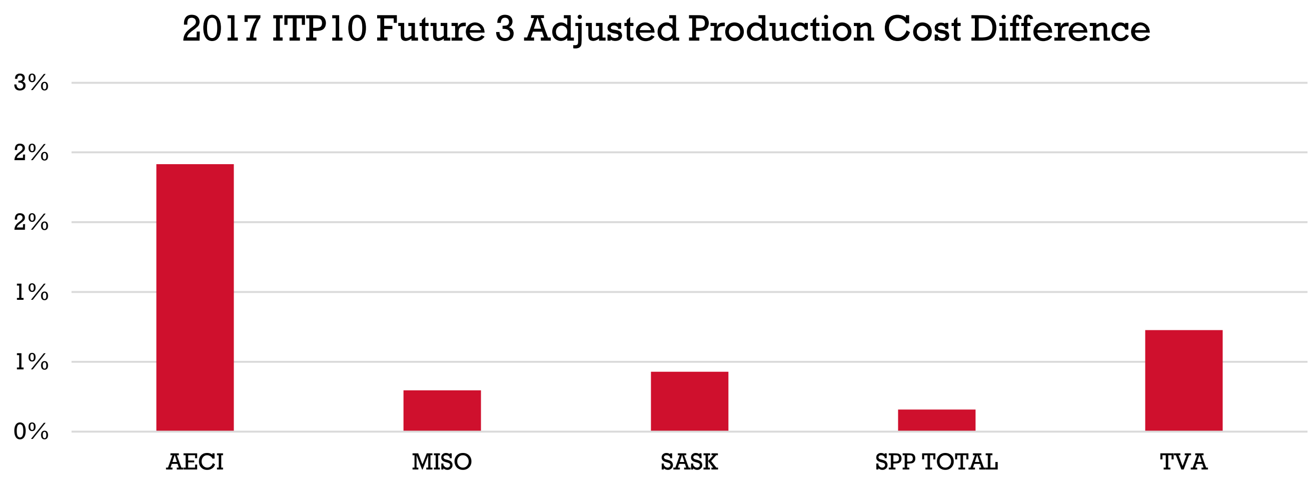
August 16-17, 2017

Load Review Update

- Minor demand group changes
- Load comparisons in progress
- Non-scalable/non-conforming designations will be included as part of the load review

Vendor Hourly Profiles Testing

- SPP Staff tested the hourly profiles from the ABB reference case in the 2017 ITP10 F3 model.
  - Mapped ABB hourly profiles to demand groups based on parent area.
  - Of the future 3 flowgates with congestion scores equal to or above 50,000, 5 SPP flowgates increased more than 20% and 1 SPP flowgate decreased more than 20% with the new hourly profiles.
  - APC generally decreased for SPP areas and increased for external areas



Gen Review Update

- Generation capability limits should represent gross output if the station service load is modeled in the powerflow models.
  - ABB reference case has net max caps.
  - SPP Staff will update max caps based on powerflow models.
  - Station service/Aux Loads should be identified as non-scalable/non-conforming.
  - Aux Loads account for approximately 4% of all SPP load.
- Renewable Generation Profiles
  - NREL 2012 Wind Profiles
  - Evaluating NREL Solar Profiles
    - SPP Staff is currently planning to use NREL 2006 Solar Profiles
    - MISO has stated they use 2012 NREL Profiles
    - SPP Staff is waiting on data from NREL

Gen Review Update

- Seasonal Operation Data to be added to Generation Review Workbook:
  - Summer Maximum Capacities for years 2, 5 and 10 captured in main tab in generation workbook
  - Separate tab to be added for stakeholders to provide monthly multipliers for max cap profiles
  - Give stakeholders the option to model seasonal operation
    - Alternative approach to modeling "special cases"
- 2017 ITP10 generator names will be mapped to ABB Reference case generator names in generation review workbook as a reference.

Vendor Data Findings

- Vendor data does not accurately represent generator ownership.
- Preliminary comparison of vendor generator data to previous ITP10 shows no substantive differences.
- Investigating aggregate units.

Stakeholder Gen Review Expectations

- Do not anticipate a lot of changes submitted by stakeholders for ABB data review items.
  - Any changes submitted should include rationale in order to maintain consistency across the footprint.
  - Exceptions:
    - Commission and Retirement Dates
    - Min and Max Capacities due to modeling of gross capacity and station service/aux loads
- Reminder: RAR and Waiver request will be sent out on September 15th

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Appendix

2019 ITP Generation and Load Review

July 20th, 2017

2019 ITP Gen Review Overview

Timeline:

- July 2017 – January 2018
- Stakeholder review starts in September
- Working Group Final Approval in January

Working Group Involvement:

- ESWG
- TWG
- MDWG

2019 ITP Gen Review Overview

- 2016 Fall NERC Nodal Simulation Ready Model from ABB used as data source
- Machines from summer peak year 2, 5, & 10 of 2018 Series Powerflow models to be used
- Items to be surveyed:
  - Unit Ownership Percentages
  - Wind and Solar Accreditation
  - Wind Generation Pricing Information
- ABB data parameters to be reviewed:
  - Summer/Winter Max Capacity (MW)
  - Unit Commission & Retirement Date
  - Fixed and Variable O&M Costs ($/MWh)
  - Annual Maintenance Hours
  - Heat Rates & Profiles
  - Must Run Designation
  - Forced Outage Rate
  - Unit Name & Short Name
  - Unit & Bus Number
  - Unit Category
  - Fuel Forecast
  - Hydro Energy Limits
  - Effluents
  - Emission Rates
  - Physical State Location

2019 ITP Gen Review Timeline

Task	Start Date	Duration (Days)	End Date
Post Generation Review for Stakeholder Review	9/1/2017		
Stakeholder Feedback Period	9/1/2017	32	10/2/2017
Send out RAR and Waiver Request to Stakeholders	9/15/2017		
Stakeholder RAR and Waiver Request Submittal Period	9/15/2017	26	10/11/2017
Working Group Meetings on RAR and Waiver Requests	10/1/2017		11/30/2017
Post Existing Generation Review for WG meetings	12/6/2017		12/7/2017
Working Group Meetings on Existing Generation	12/13/2017		12/14/2017
Generation Data Locked Down	12/22/2017		
Working Group Materials/Presentation Posting	1/4/2018*		
Working Group Milestone Approval	1/11/2018*		

*Subject to change based on future working group meeting dates

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Other Non-Standard Items

- Renewable Generation Profile Recommendation
  - NREL 2012 Wind Profiles
  - NREL 2006 Solar Profiles

2019 ITP Load Review Overview

Timeline:

- July 2017 – January 2018
- Stakeholder review starts in September
- Working Group Final Approval in January

Working Group Involvement:

- ESWG
- TWG
- MDWG

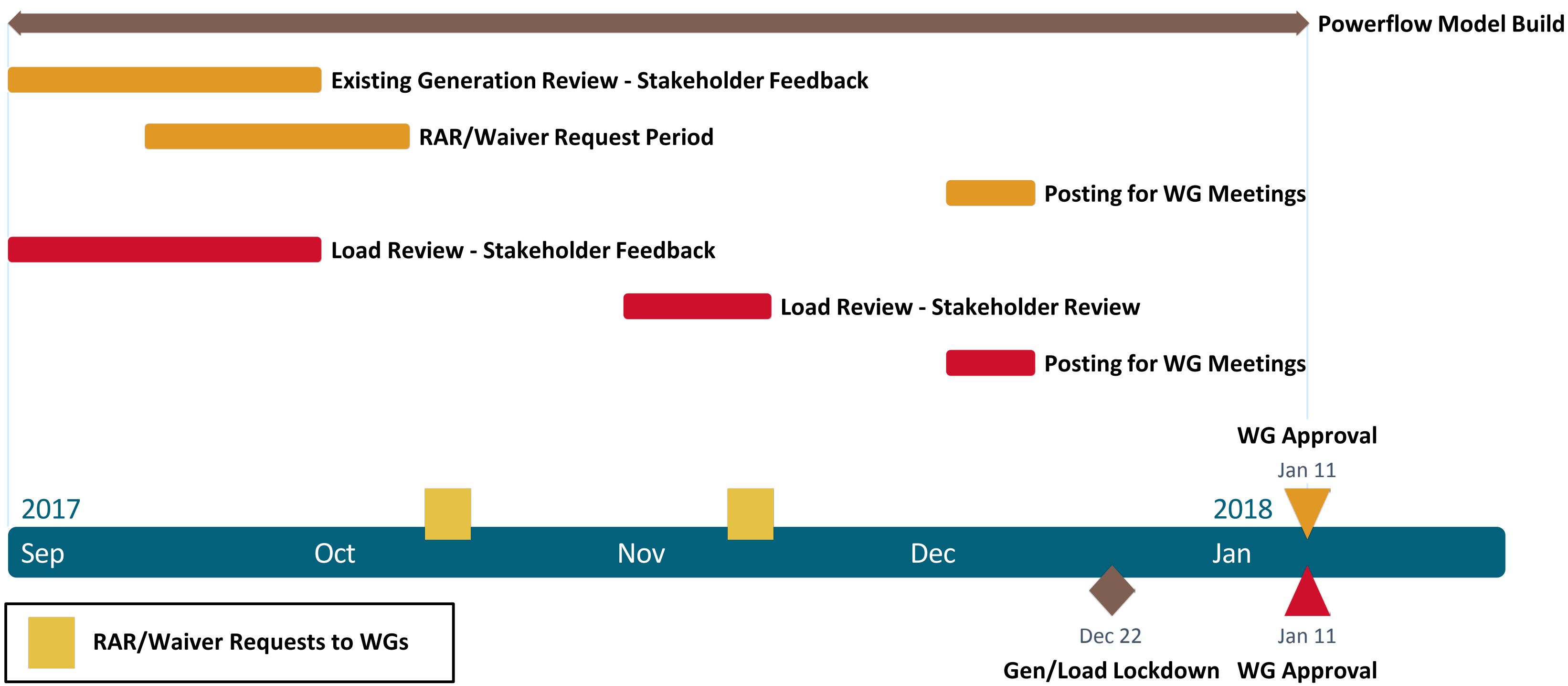
2019 ITP Load Review Overview

- 2016 Fall NERC Nodal Simulation Ready Model from ABB used for load shapes
- Peak Load from summer peak year 2, 5, & 10 of 2018 Series Powerflow models to be used
- Items to be surveyed:
  - Load factors by Demand Group
  - Loss factors by Demand Group
- Items to be reviewed:
  - Demand Group Mappings (Economic Load Ownership Legend)
  - Non-Scalable and Scalable Loads (2018 MDWG)
  - Hourly Load Profiles (ABB Reference Case)
  - Monthly Peak & Energy Percentages (ABB Reference Case)

2019 ITP Load Review Timeline

Task	Start Date	Duration (Days)	End Date
Post Load Review for Stakeholder Review	9/1/2017		
Stakeholder Feedback Period	9/1/2017	32	10/2/2017
Post Load Review Results for Stakeholder Review	11/3/2017		
Stakeholder Review Period	11/3/2017	15	11/17/2017
Post Load Review for WG meetings	12/6/2017		12/7/2017
Working Group Meetings on Load Review	12/13/2017		12/14/2017
Load Data Locked Down	12/22/2017		
Working Group Materials/Presentation Posting	1/4/2018*		
Working Group Milestone Approval	1/11/2018*		

*Subject to change based on future working group meeting dates



Powerflow Model Build
Existing Generation Review - Stakeholder Feedback
RAR/Waiver Request Period
Posting for WG Meetings
Load Review - Stakeholder Feedback
Load Review - Stakeholder Review
Posting for WG Meetings
WG Approval
Jan 11
2017
2018
Sep
Oct
Nov
Dec
Jan
RAR/Waiver Requests to WGs
Dec 22
Gen/Load Lockdown
Jan 11
WG Approval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Interconnection Seams Study Update

August 2017

Jay Caspary
Director – Research, Development & Tariff Services
jcaspary@spp.org

Agenda

- DOE Interconnection Seams Study overview
- Timeline
- Transmission Modeling
- Preliminary Results
- Next Steps

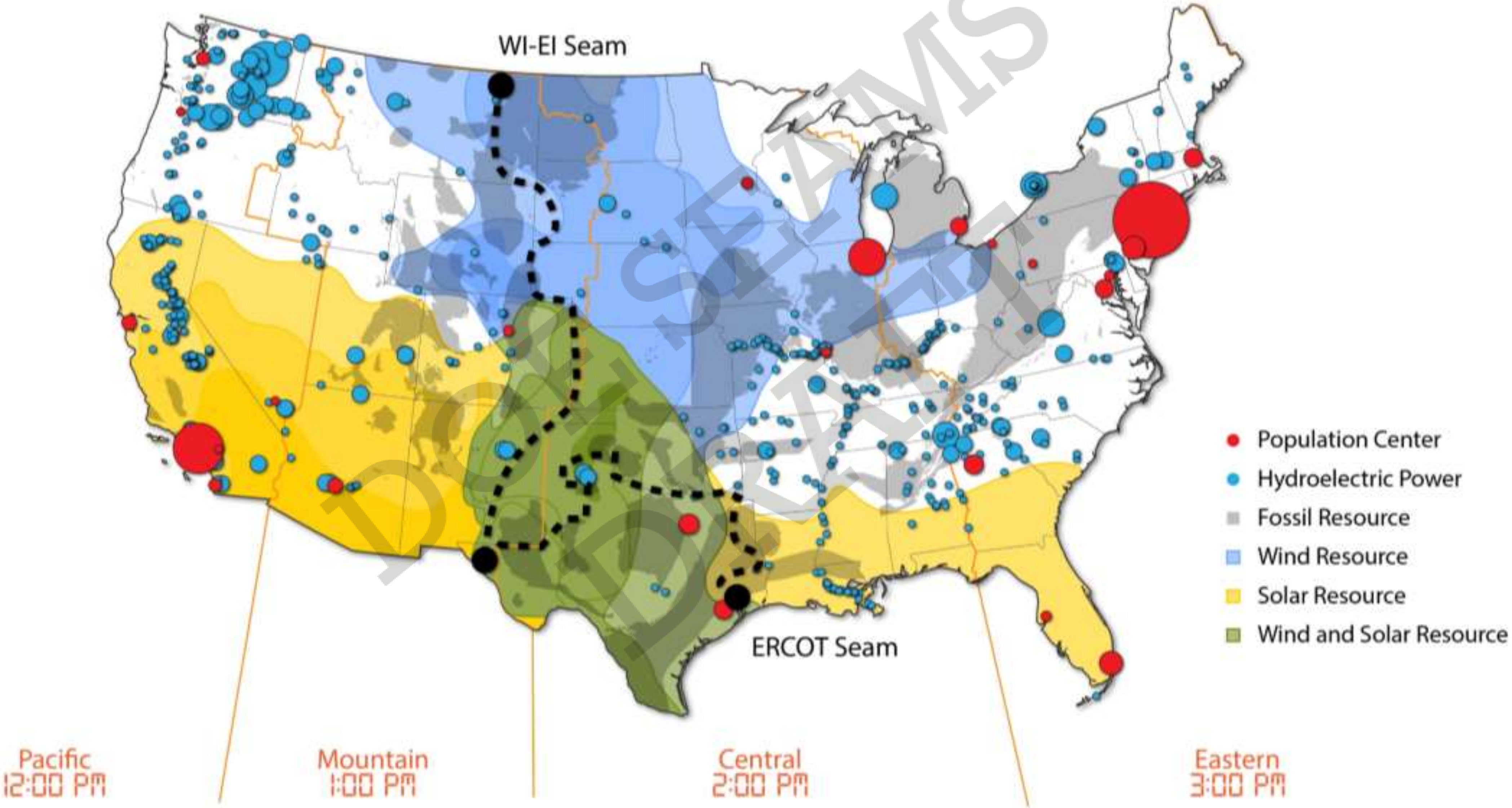
Disclaimer

- This deck includes materials which were presented at the TRC meeting 5/17 and are subject to change as this project is concluded. While the models and inputs have been vetted on several occasions with stakeholders, caution needs to be exercised in drawing conclusions and sharing results…

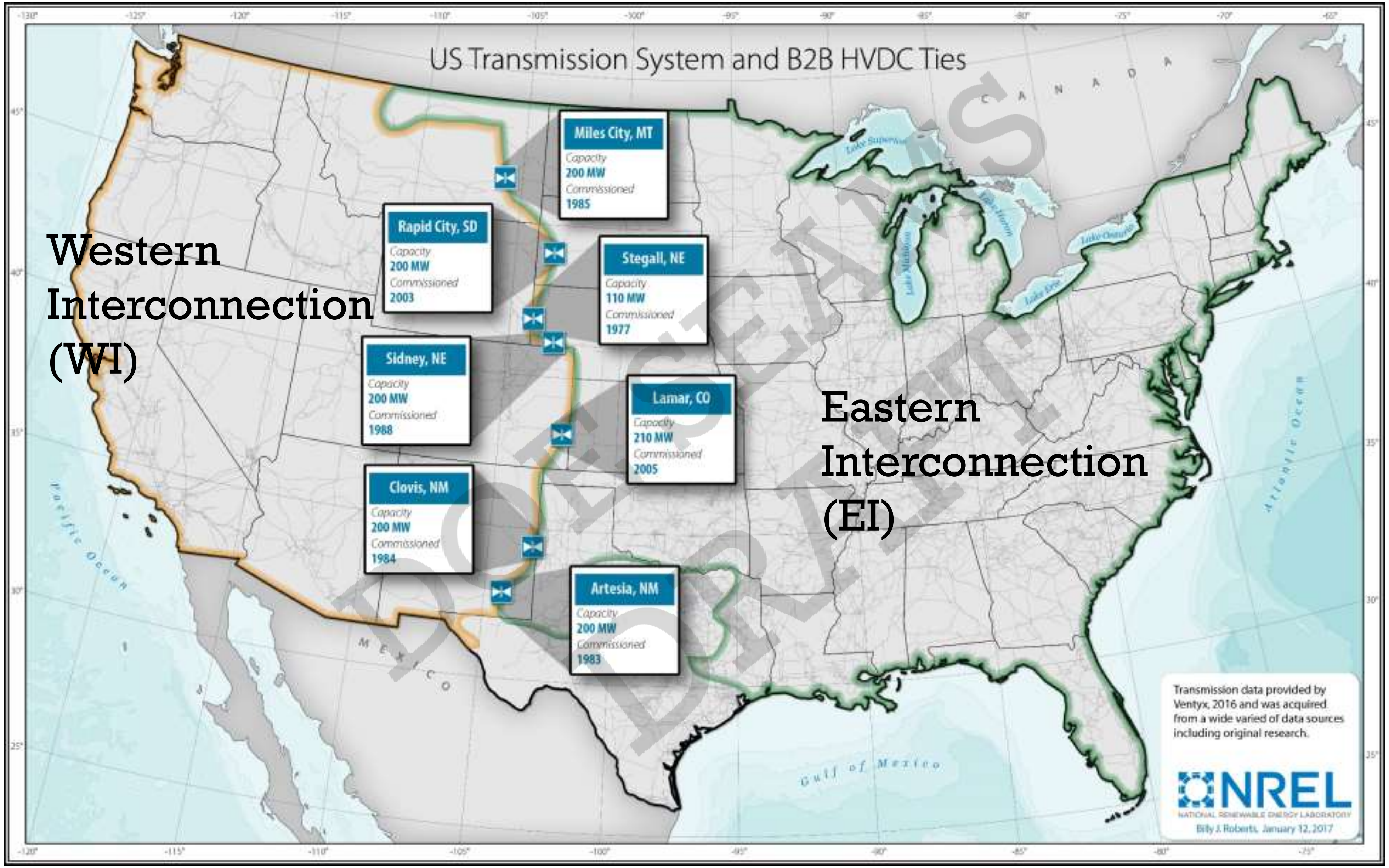
DOE-funded, NREL-led Interconnection Seams Study

- $1.2M, 18 month EI-WECC Seams and HVDC Overlay Study approved as part of DOE's Grid Modernization Laboratory Collaborative (GMLC)
  - Strong industry support
  - Opportunity to not just replace in-kind the aging B2B HVDC Ties between EI and WECC
  - Three DC Scenarios
    - Status Quo
    - Modernized/Optimized Seam with Rightsized/Relocated B2B and/or Links
    - Macrogrid Overlay
- Promising preliminary results
- Additional analyses being discussed

Diversity in Resources and Load Centers



WI & EI Back-to-Back HVDC Ties

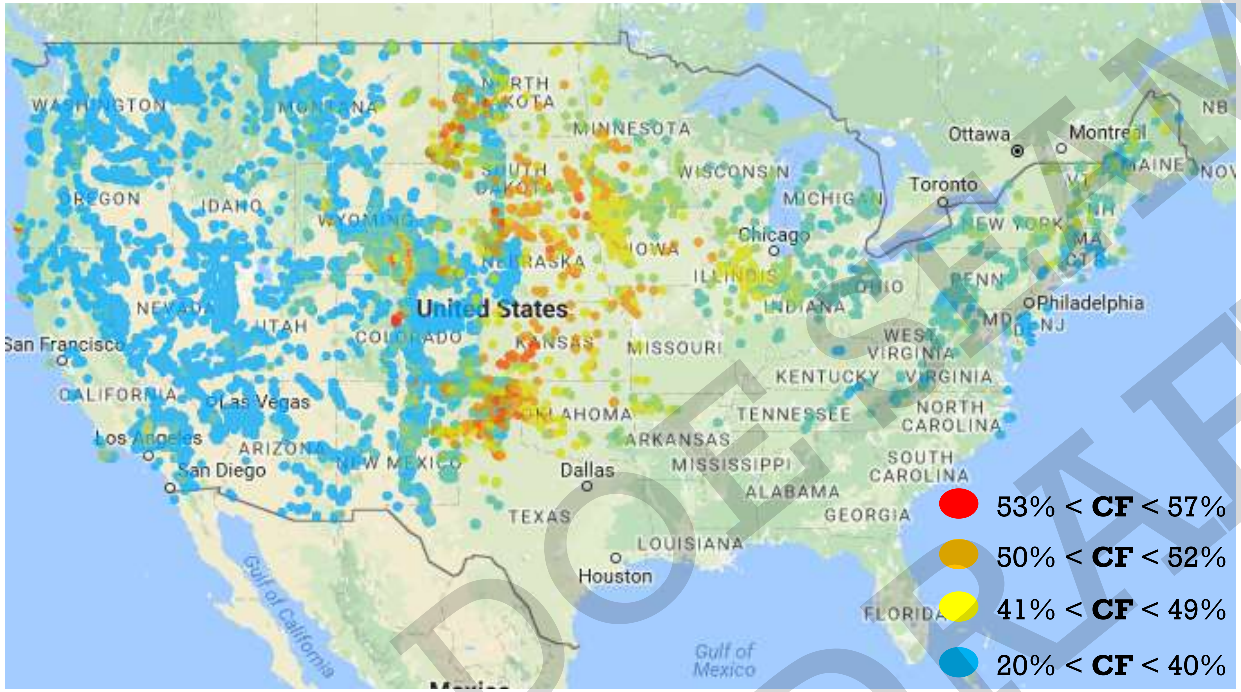


- http://www.nrel.gov/analysis/seams.html
- Seams TRC 4 v7 Final.pptx

Conceptual Scenarios

Wind and Solar Data: Capacity Factors

Eastern/Western Wind Dataset [1]

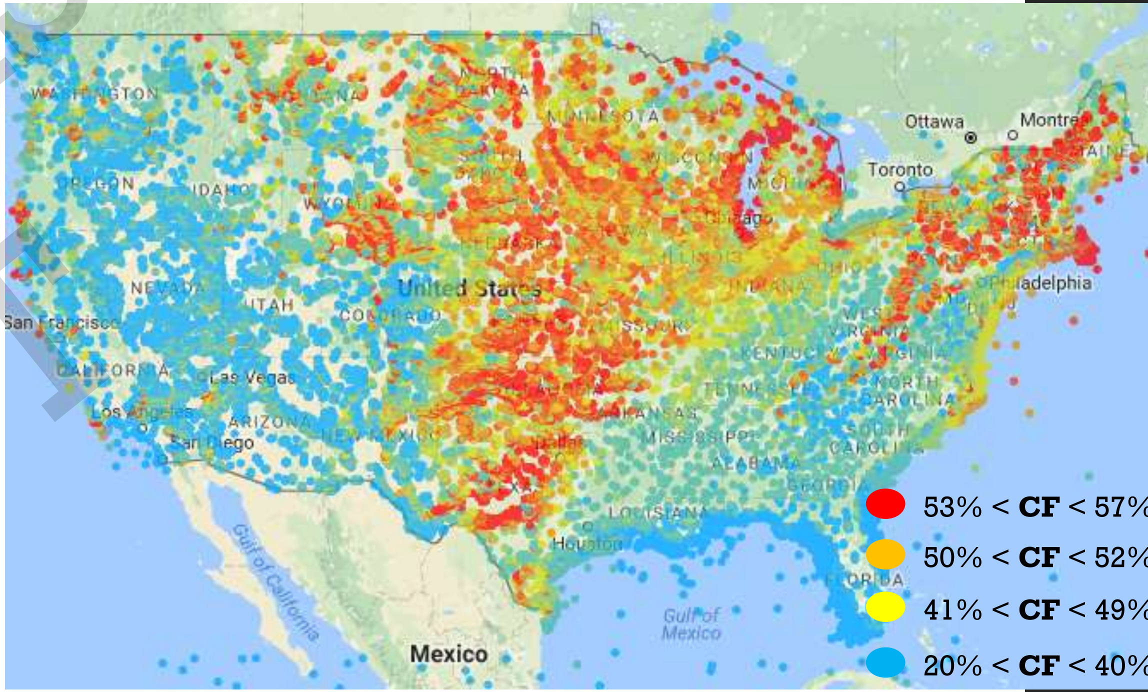


- 2004-2006
- 80m towers

* Previous CEP work using this dataset

1. Eastern Interconnection Study
2. Western Interconnection Study
3. EIPC Phase 1 & 2
4. EISPC-NARUC

Wind Toolkit Dataset [1]



2007-2013

100m towers, 3 tower types, 3 bins

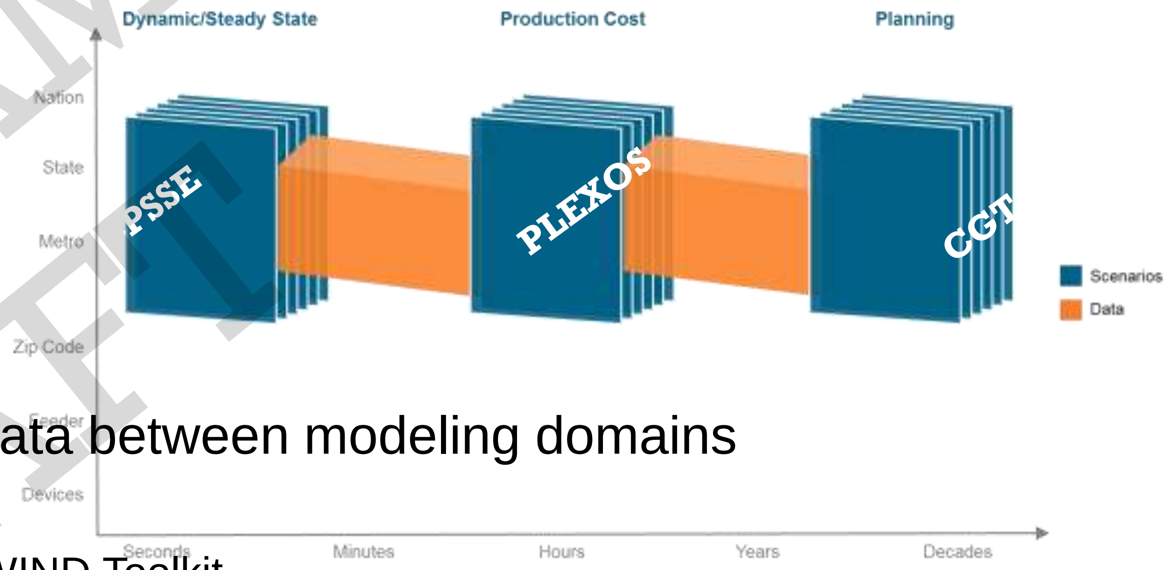
Modified:

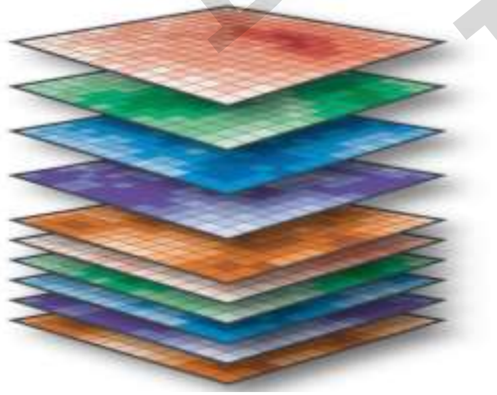
- De-rated capacity factors by 10% to approximate net (from gross)
- For Appalachian Ridgeline area, reduced potential resource and increased cost multiplier.

[1] http://www.nrel.gov/gis/data_wind.html

Comprehensive Economic and Reliability Analysis with Integrated Data

- Models are chosen to ask a specific set of questions
  - CGT-Plan
    - Capital and operating costs 2024-2038
    - Generation and transmission system for 2038
  - PLEXOS
    - Operating costs 2038
    - Hourly unit commitment and 5 minute economic dispatch
  - PSSE
    - Steady state AC power flow
    - N-1 contingency





- Consistent data between modeling domains
  - Wind
    - 2012 WIND Toolkit
  - Solar
    - 2012 NSRDB
  - Transmission and Generation
    - WECC TEPPC 2026-Western Interconnection
    - MMWG 2024-Eastern Interconnection
  - Load
    - 2012 FERC

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Timeline

- June 15-30, 2017
  - Finalize capacity expansion
- July 15-31, 2107
  - Finalize PCM 2038
- August 1-14, 2017
  - Finalize AC power flow 2038
- September 15-30, 2017
  - Final webinar

Base Design Information

All designs – General Info

- Use of 169 bus model (68 EI buses, 101 WI buses)
- 4 regions: West, Northwest, Midwest, East
- Wind uses 100-m tower CFs ~ 0.45-0.50
- RPS not enforced
- Demand growth per NEEM & WI (E3) per state
- DG growth per AEO 2016, 3% per yr
- 19 operating blocks per year
- Gen capacity investment limited to ~40GW/year

All designs – Cost Info

- All oprtnl, invstmnt costs assessed at NPV w/ real DR=5.7%.
- Annual CO_2 cost rate of increase: $3/mton per yr
- Fuel cost forecasts according to AEO 2017 (med-gas)
- Gen investment base costs according to NREL ATB 2016
- Technology maturation rates from NREL ATB 2016
- Transmission base costs according to EIPC/B&V
- Gen & trans regional cost multipliers from EIPC/WECC
- Run for 15 yrs w/ 7 investment periods (every other yr)

Base Design 2a Information

- All B2B ties may grow without constraint.

Base Design 2b Information

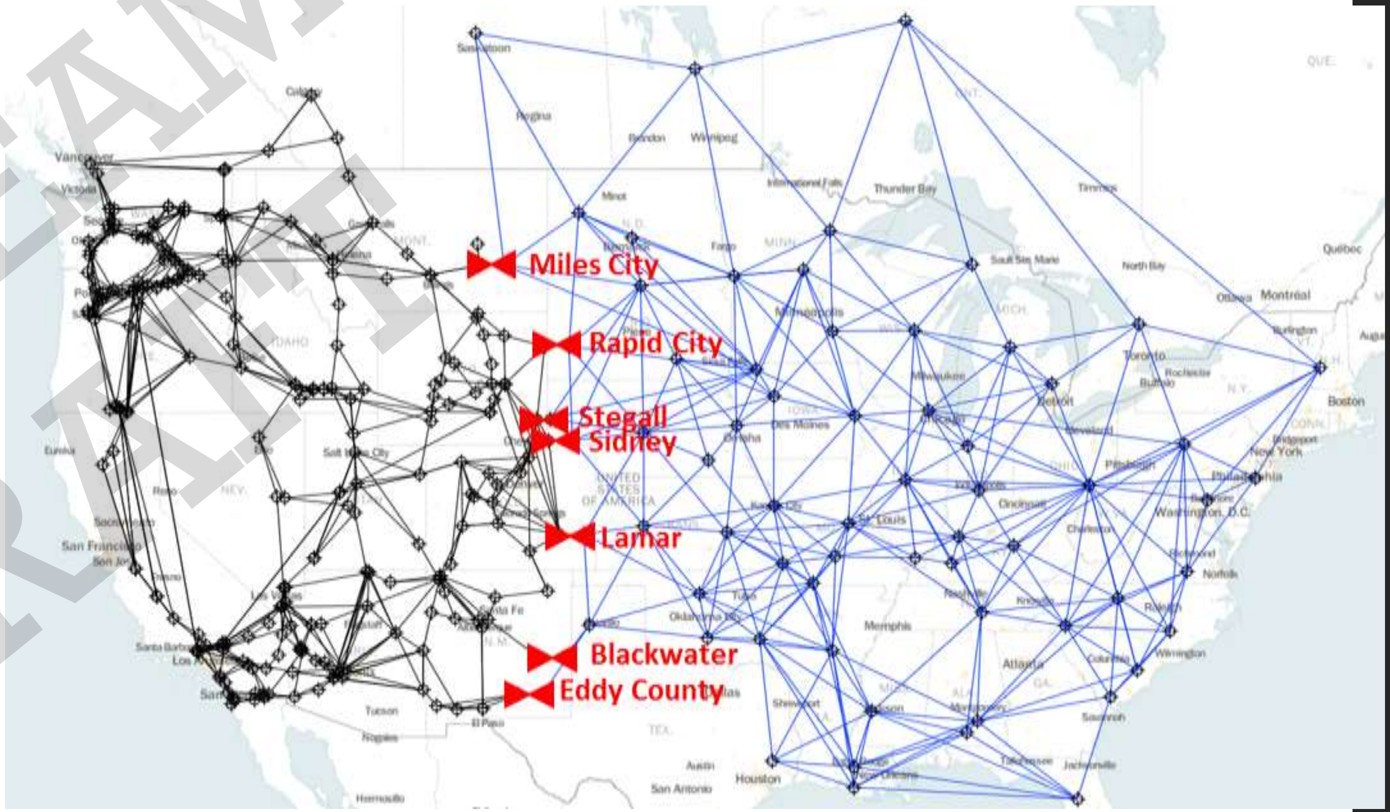
- 3 line design with B2B investments allowed.
- ID of 3 lines from highest investments in 10 line design
- Self-contingent w/o flow limit (3 lines, 7B2B parallel paths)
- Lines may have unequal capacity.

Base Design 3 Information

- Used MISO topology & terminal locations.
- All segments have equal capacity

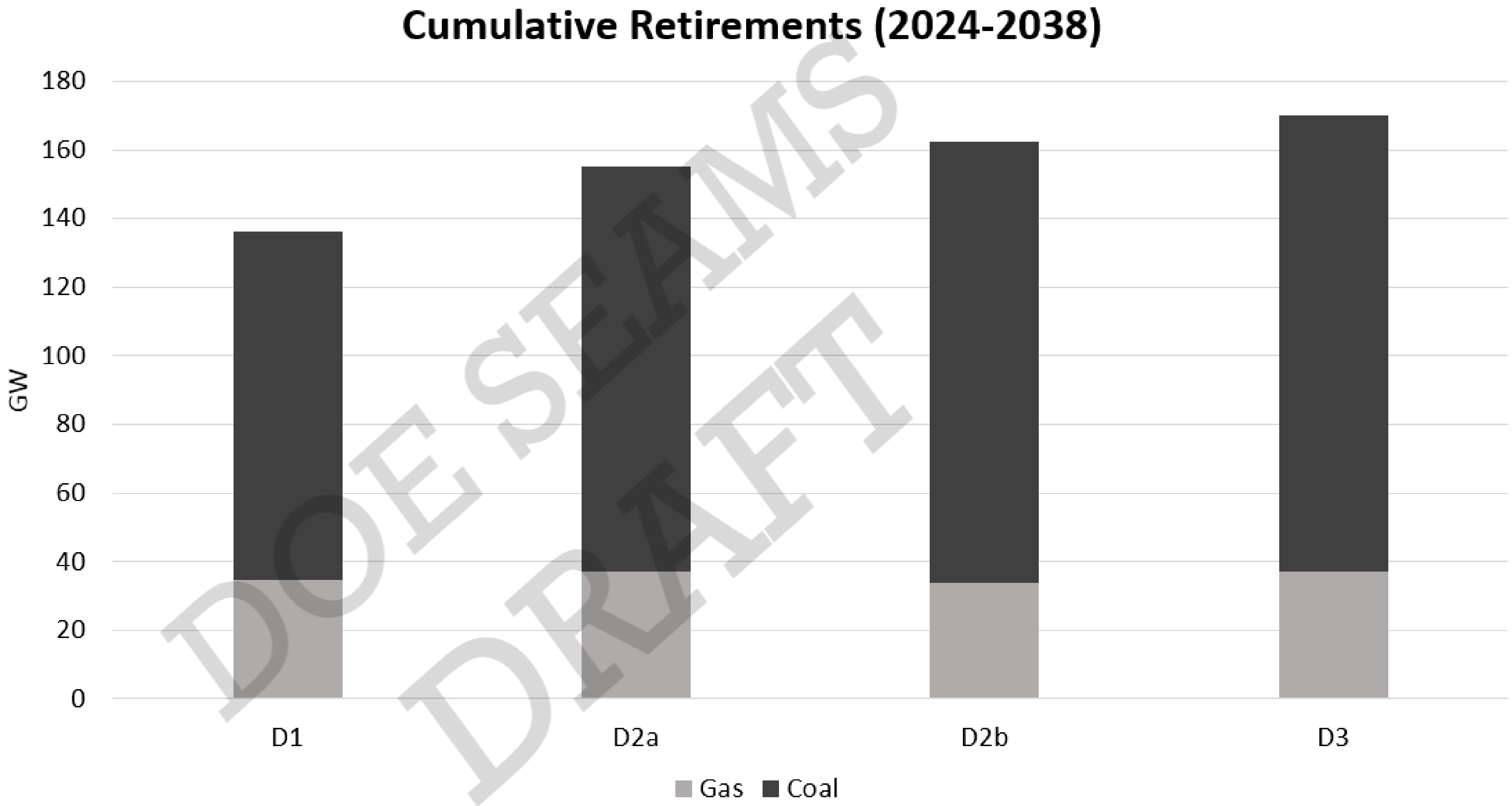
Transmission Modeling

- TEPPC Interface Limits
- EI Interface Limits from Capacity Expansion model
- Thermal limits down to some voltage level (i.e. 345kV, 500kV?)
- Wheeling and Hurdle Rates
  - TEPPC in WI
    - Unique for each interface
  - ERGIS used $10/MWh
    - Move to unique by interface?
    - Intra-market region hurdles?



Base Design Results

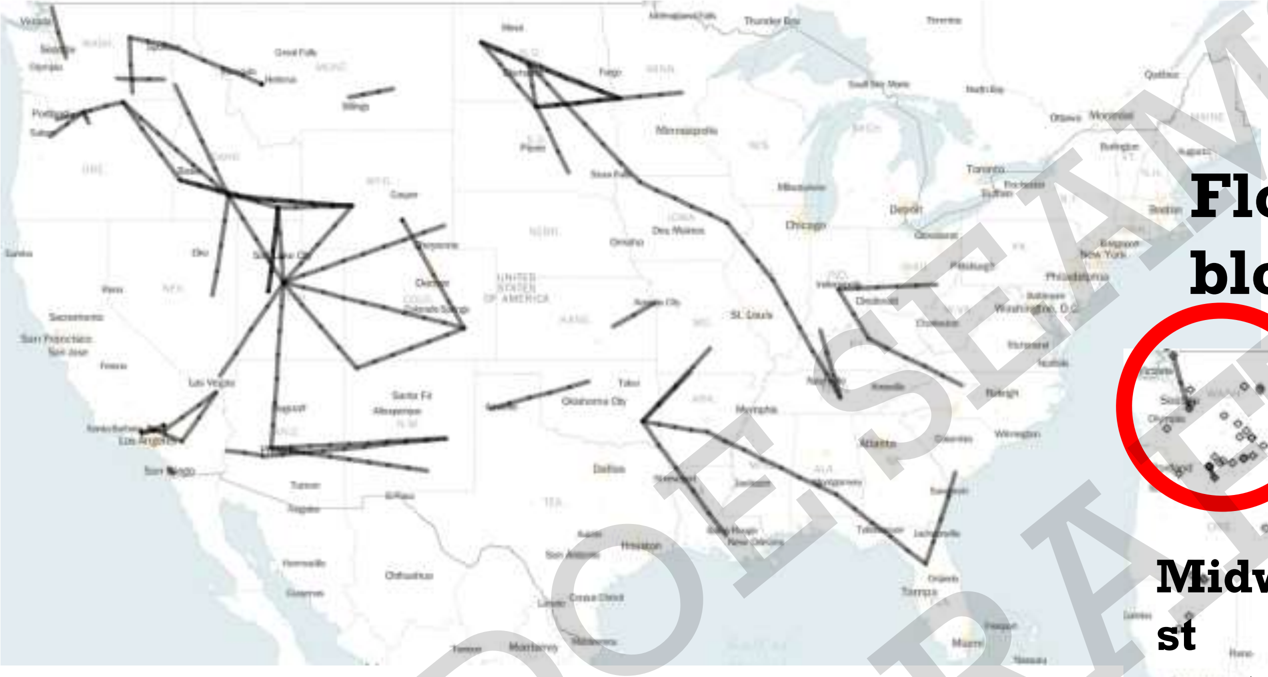
Retirement criteria:
If a unit is not dispatched at all in a given year, then it is retired in next year.



Retirements are modest – model keeps fossil units for capacity (not energy)!

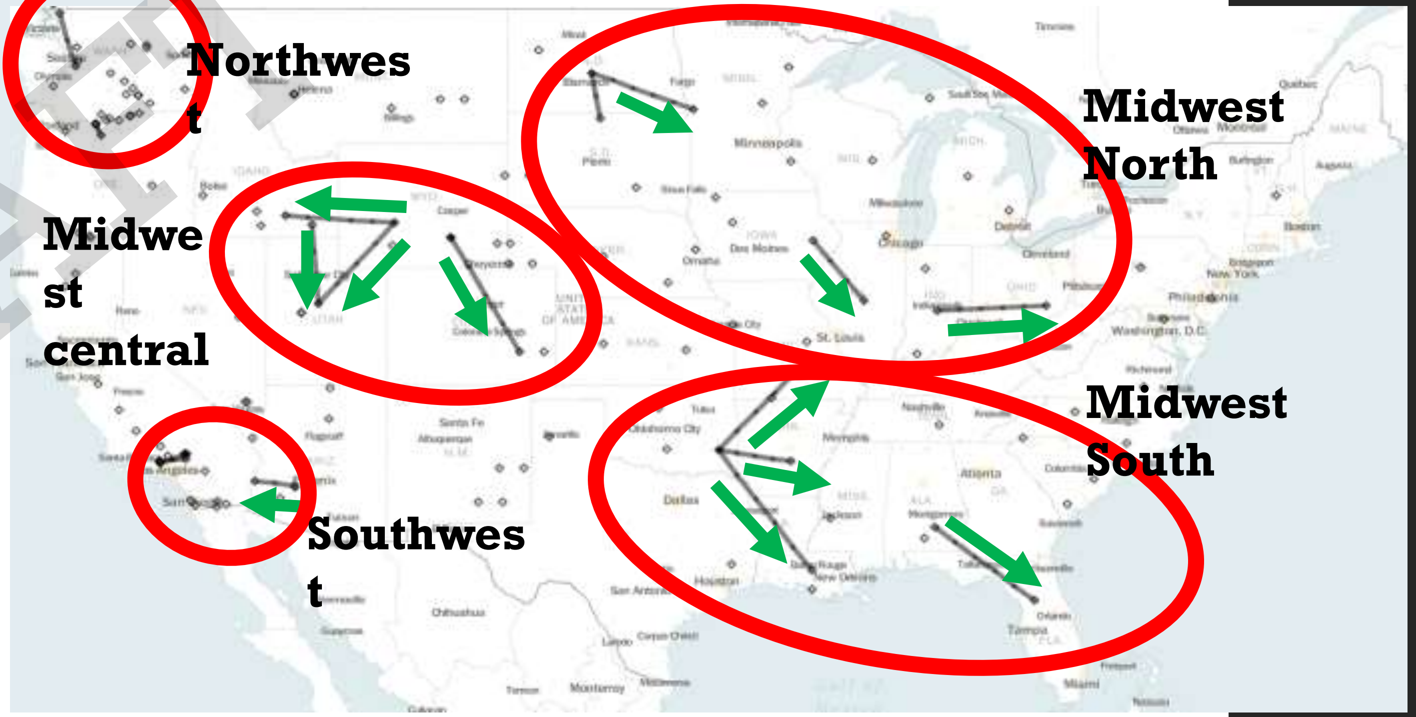
Robust AC Upgrades

These AC transmission investments were made in every base design.



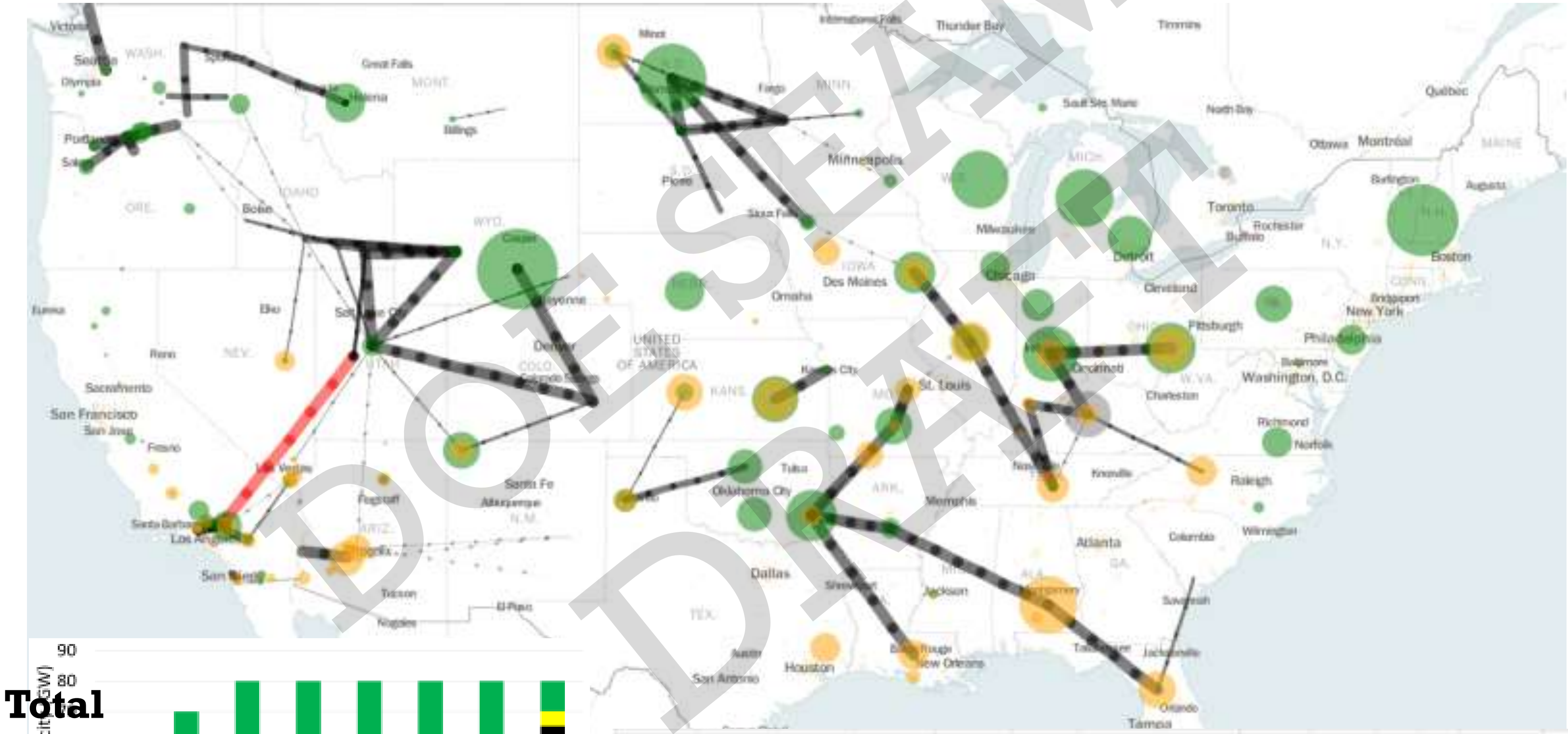
AC Upgrades>0 GW

Flow directions are average across all blocks in last year.



AC Upgrades>1GW

Base Design 1: No B2B upgrades



Cross-Seam Transmission Capacity

ID	B2B	GW
1	BW	0
2	EDDY	0
3	LAMAR	0
4	MC	0
5	RC	0
6	SID	0
7	STEG	0
Total		0

Solar

Wind

Gas

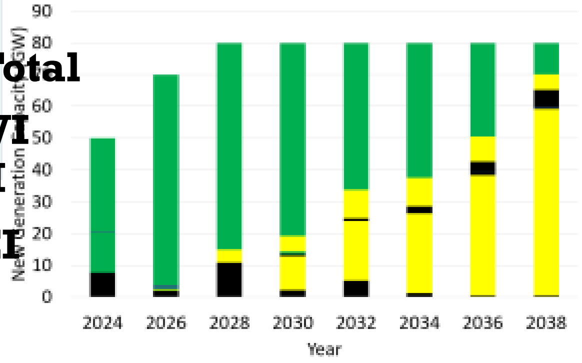
Wind Total

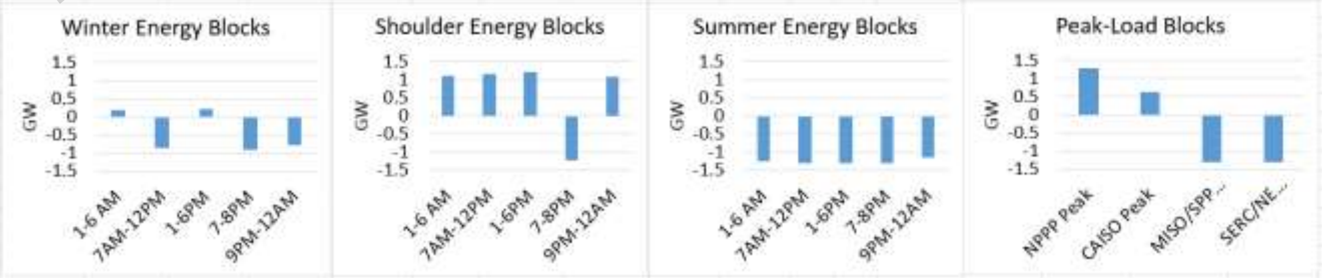
Solar WI

Gas WI

Solar EI

Gas EI





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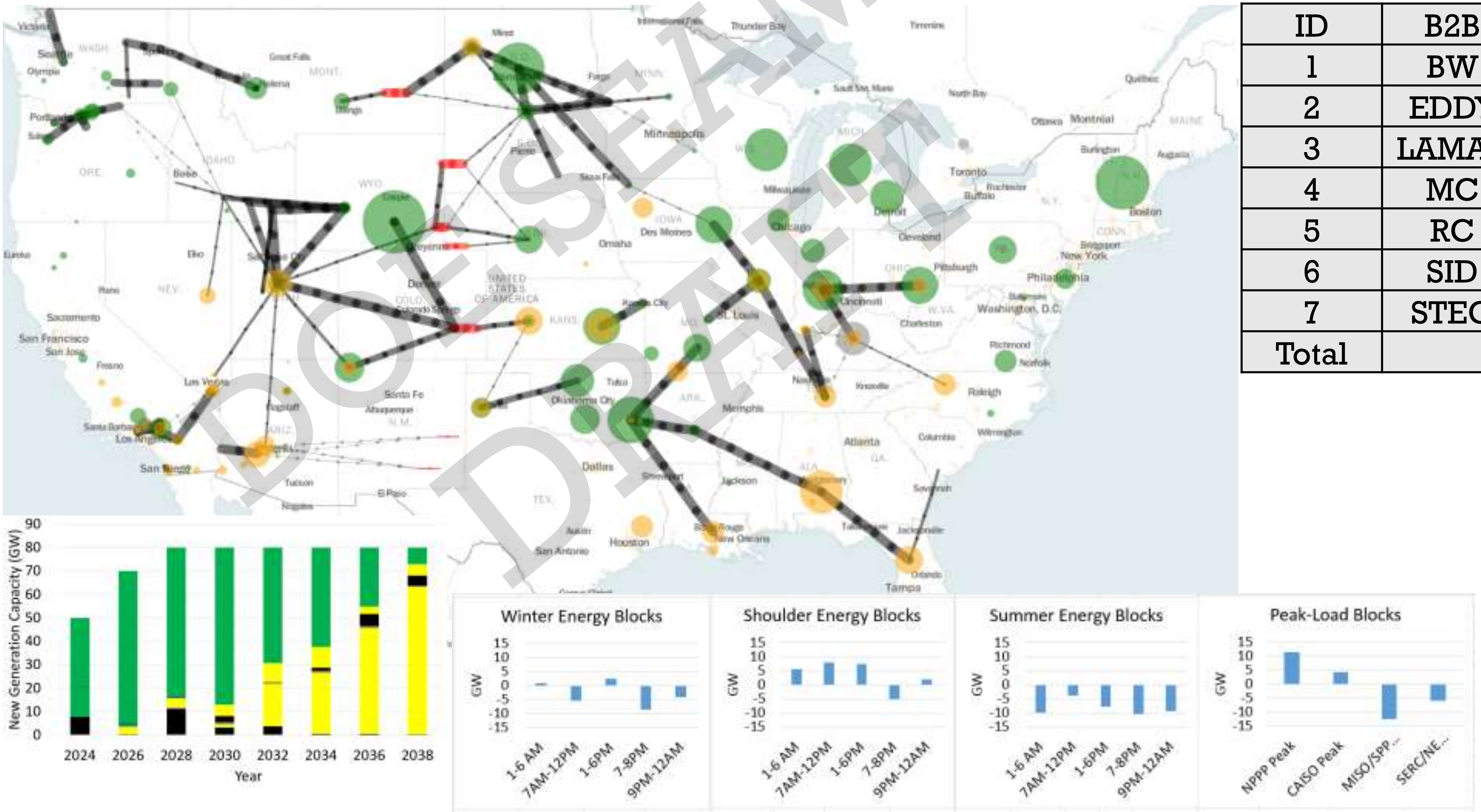
Base Design 2a: B2B upgrades



Cross-Seam Transmission Capacity

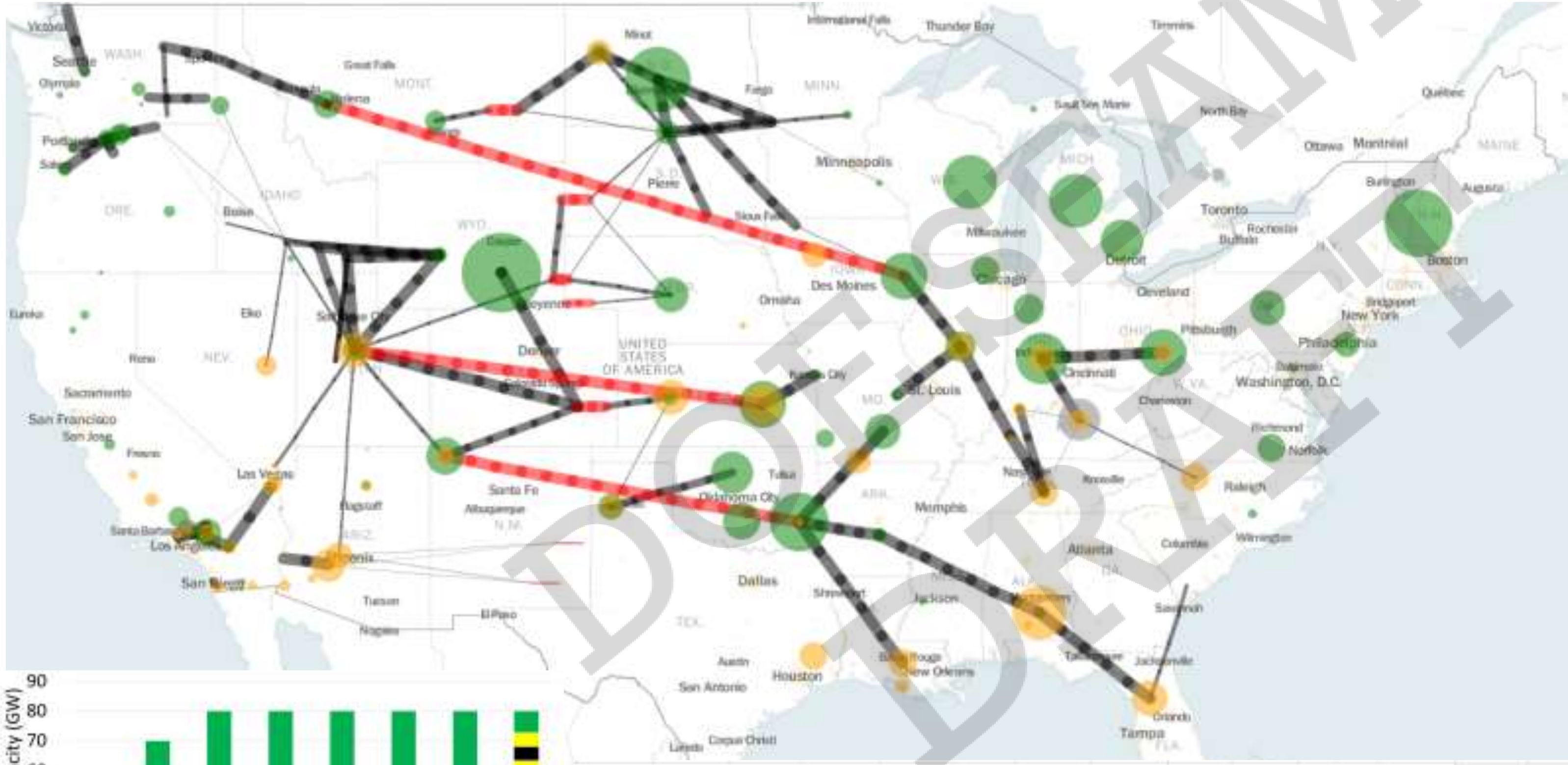
ID	B2B	GW
1	BW	0.558
2	EDDY	0.200
3	LAMAR	0.200
4	MC	3.494
5	RC	2.448
6	SID	1.831
7	STEG	1.551
Total		11.939

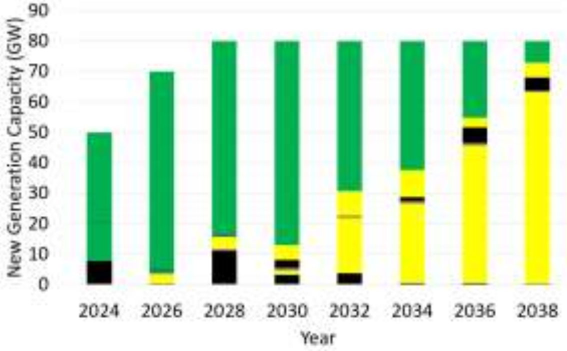
Solar

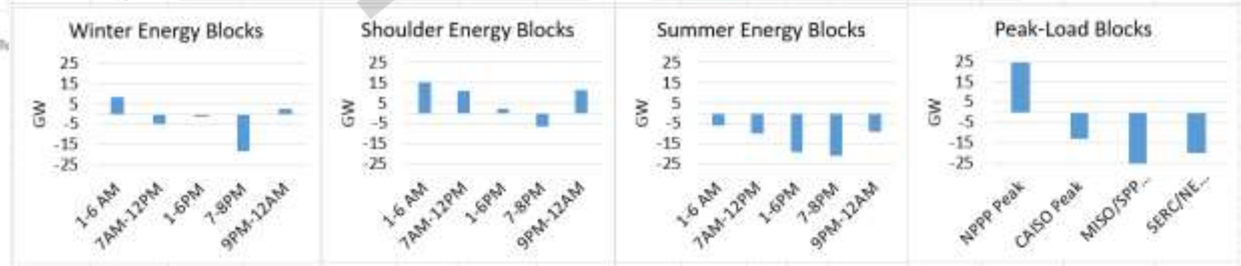
Wind

Gas

Base Design 2b: Upgraded Seam







Cross-Seam Transmission Capacity

ID	B2B	GW
1	BW	0.200
2	EDDY	0.200
3	LAMAR	2.916
4	MC	2.155
5	RC	1.547
6	SID	0.672
7	STEG	1.584
Line a		2.990
Line b		9.188
Line c		13.586
Total		35.0360

Solar

Wind

Gas

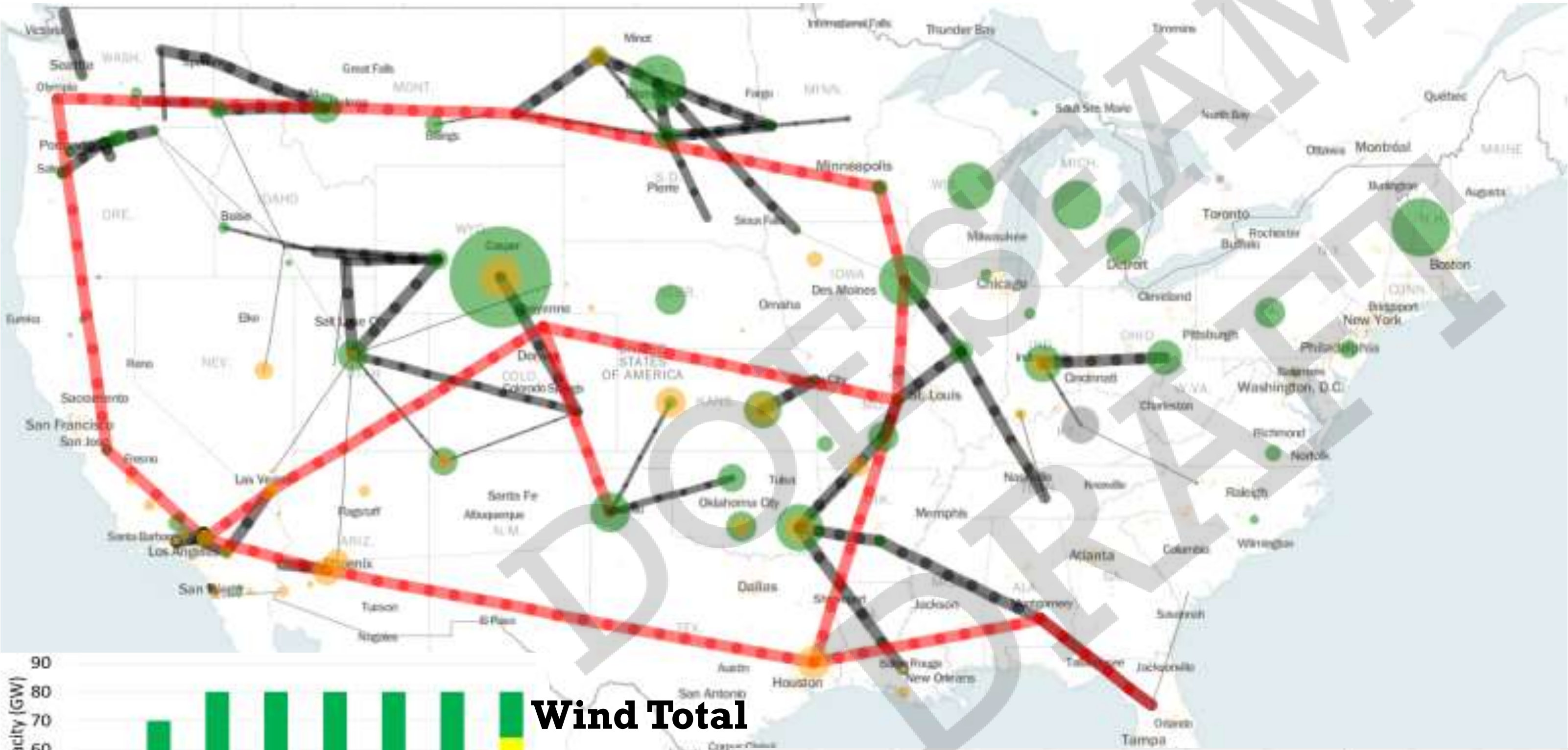
SPP

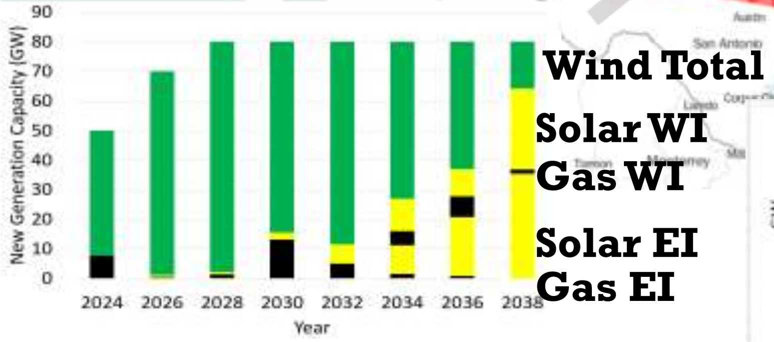
Base Design 3: Macrogrid

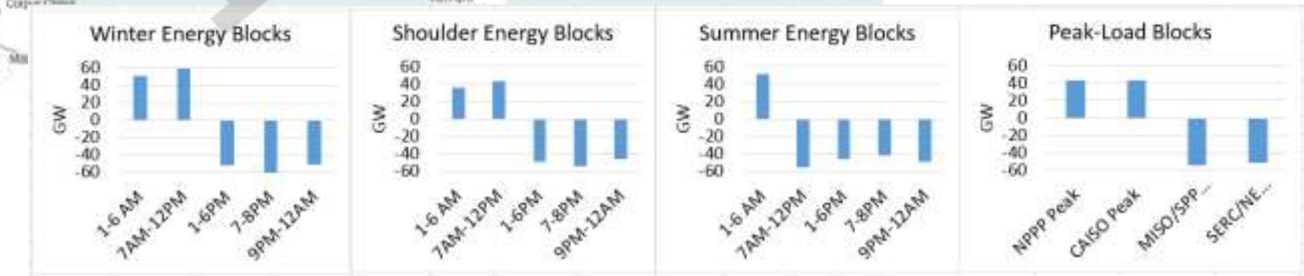
Cross-Seam Transmission Capacity

ID	GW/line	Total GW
1-15	12.867	193.858

Solar
Wind
Gas







Base Design Results (B$, NPV)

Delta from Design 1

	Design 1	Design 2a	**Delta**	Design 2b	**Delta**	Design 3	**Delta**
Objective Function ($B)	3,712.6	3,698.8	14 B$	3,687.7	25 B$	3,648.2	64 B$
Transmission Investment Cost ($B)	23.2	28.4	5.2	40.4	17.2	89	65.8
Generation Investment Cost ($B)	703.1	703.9	0.8	703	-0.1	717.4	14.3
Fixed O&M Cost ($B)	1031.8	1020.6	-11.2	1023	-9.3	1036.4	4.6
Variable O&M Cost ($B)	175.5	175	-0.5	170.6	-4.9	164.7	-10.8
Fuel Cost ($B)	1224.8	1219.8	-5	1207	-18.3	1123.3	-101.5
Carbon Cost ($B)	347.2	343.4	-3.8	337.2	-10	310.4	-36.8
Regulation Up Reserve Cost ($B)	81.6	81.1	-0.5	81.3	-0.3	81.2	-0.4
Regulation Down Reserve Cost ($B)	35.5	35.6	0.1	35.7	0.2	35.5	0
Contingency Reserve Cost ($B)	90	90.9	0.9	90.6	0.6	90.4	0.4
Total Generation Investment (GW)	600	600	0	600	0	600	0
Total Generation Retired (GW)	143.9	162.7	18.8	170.3	28.2	177.8	33.9
Total AC Transmission Investment (GW)	102.4	110.7	8.3	106.7	4.3	91.5	-9.9
Total DC Transmission Investment (GW)	0	11.18	11.18	34.8	38.4	193.6	196.3
Year 2038 CO2 Emissions (Mton)	1.08 E12	1.07 E12	-1.0 E10	1.05 E12	-3.0 E10	9.16 E11	-1.6 E11

Observations / Next Steps

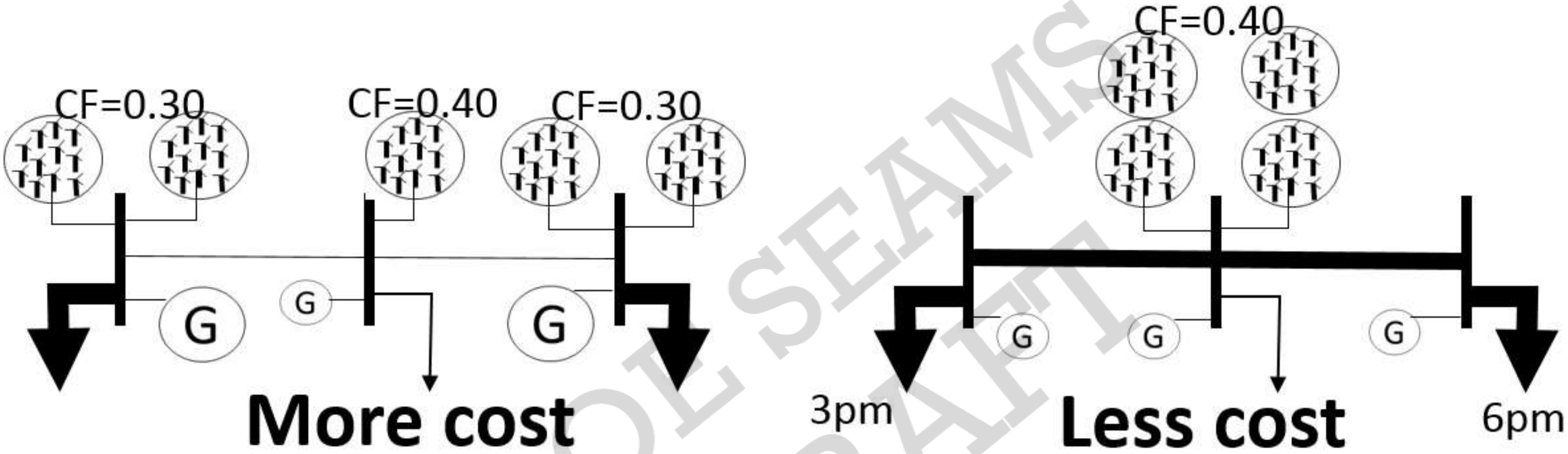
- Objective function represents net benefits of each scenario which incorporates transmission expansion costs that are the denominator of B/C ratios used by SPP and others. Preliminary results show B/Cs of 3.7, 2.5 and 2.0 for Scenarios 2a, 2b and 3, respectively.
- Significant AC expansion is needed 2024-2038 absent any changes to EI-WECC Seams facilities.
- Harmonized models and datasets are an important and valuable step in shaping future dialogue and assessments
- Distributed PV in SPP is 1.1GW+ at 96 substations in 2024
- 1.7GW of new wind farms and approved 345kV expansion in Eastern NM and Eastern CO are being added to 2024 model for WECC which includes Gateway Energy projects
- Welcome feedback and suggestions on preliminary results and next steps to help inform Regional Planning efforts

Supplemental Slides

Insights

1. There are five large AC transmission reinforcements that occur in every design and every sensitivity. These are as follows:
   a. Midwest-North flowing eastwards and a bit southwards.
   b. Midwest-South flowing eastwards and both southwards and northwards.
   c. West-Central flowing westwards and a bit southwards.
   d. Southwest flowing westwards
   e. Northwest flowing northwestwards. Attractive wind (100m) and solar cost/performance are main drivers to generation investments, so much so that gas price and CO2 cost do not have huge effect.
2. Solar becomes very competitive with wind after 2030; we are not sure that solar moves heavily across Seams, although we might not be capturing time-zone effect as well as PCM will.
3. In spite of non-negligible CO2 cost ($3/Mton/yr), the model does not retire all coal and gas, and it builds some gas. But it builds a lot of wind and solar. The model sees it to be most economic to supply ENERGY with wind and solar and retain fossil units to supply CAPACITY.
4. There are two main drivers for benefits of cross-seams transmission:
   a. Wind energy moving from middle of US to coasts.
   b. Capacity sharing.
5. Macrogrid realizes most benefit because it is most effective in taking advantage of capacity sharing.

The simple picture



1. Transm capacity less costly than gen capacity.
2. Transm+highCF wind less costly than lowCF wind alone.
3. Transmission enables regions to share planning reserves.
4. Transm enables sharing of cheap energy across time zones.

Sensitivities

1. Perform model-check sensitivities (model 2a only):
   (a) Increase # of blocks; (b) # of line candidates; (c) # of investment periods.
2. Evaluate terminal locations for Designs 2b & 3 (see Appendix 1):
   a) Design 2b: Run screening w/ candidates between all existing/proposed HVDC terminals and SPP-proposed terminals. Then rerun Design 2b.
   b) Design 3: Rerun Design 3 w/terminal locations adjusted, particularly those near to Seam (Design 3 electrical topology will not be changed).
3. Perform future condition sensitivities (all four designs), in this order:
   a) No sharing of regulation, contingency, or planning reserves
   b) Low, medium, high gas prices;
   c) \$3, \$5 CO_2 cost rate increase/year;
   d) With all state's RPS enforced;

Needs From 6/14 SSC Meeting

- Access to models, datasets, etc.
- Existing system constraints, including stability limits, near B2B ties must be addressed
- Key inputs and study assumption details with granularity as expected by stakeholders, e.g., 2024 baseline assumptions for all resources especially wind and solar by zones/areas, base carbon price, etc.
- Key outputs, e.g., benefits by zones/areas over time, AC expansion in each case (particularly the base and incremental impacts), HVDC expansion details, e.g., terminals, capabilities, need date, etc., thresholds for curtailments, resource changes by zone/areas by year and drivers, e.g., resource CFs, level of demand response/storage in solutions, etc.

ITP 10 2019 Futures

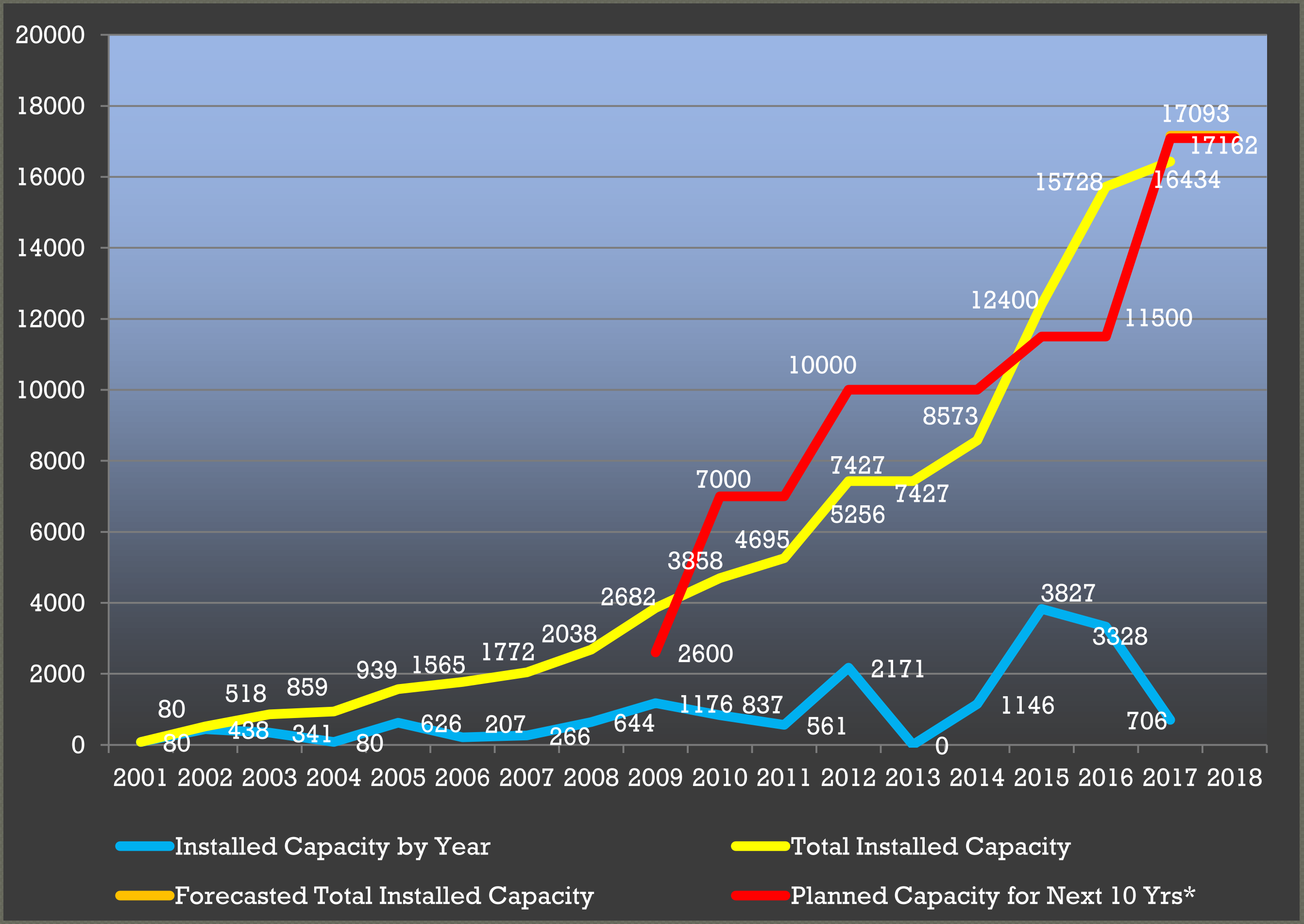
Suggested Futures
From the Wind Coalition

ITP 10 2019 Futures

- SPP has regularly underestimated the level of wind generation build in every planning cycle beginning with the Balanced Portfolio. This underestimation has cost consumers money by delaying access to lower cost generation.

ITP Plan	Projected Wind Deployment	Actual Wind Deployment
ITP 20 in 2010	Four futures for 2030 ranging from 10 GWs to 16.5 GWs	Hit 16 GW in 2017, 13 years earlier than SPP predicted
ITP 10 in 2012	National RES case only had 14 GWs by 2022	Again under estimated wind even in most aggressive future
ITP 20 in 2013	Had 4 futures for 2033 ranging from 9.2 GW to 16.3 GW	Will exceed most aggressive case 15 years early
ITP 10 in 2015	Both futures had only 12.9 GWs of wind by 2025	Built 24% more capacity than expected in less than half of the forecasted time
ITP 10 in 2017	Expected only 560MW incremental deployment between 2020 and 2025	Analysts now expect over 3GW in this time frame

Wind Planning vs Wind Development



*Business as Usual/Reference Case for Economic Studies Only. Sensitivity case wind levels not included.

ITP 10 2019 Futures

- The primary transmission driver that will impact the SPP region over the ITP study timeframe will be the continued growth of renewable generation

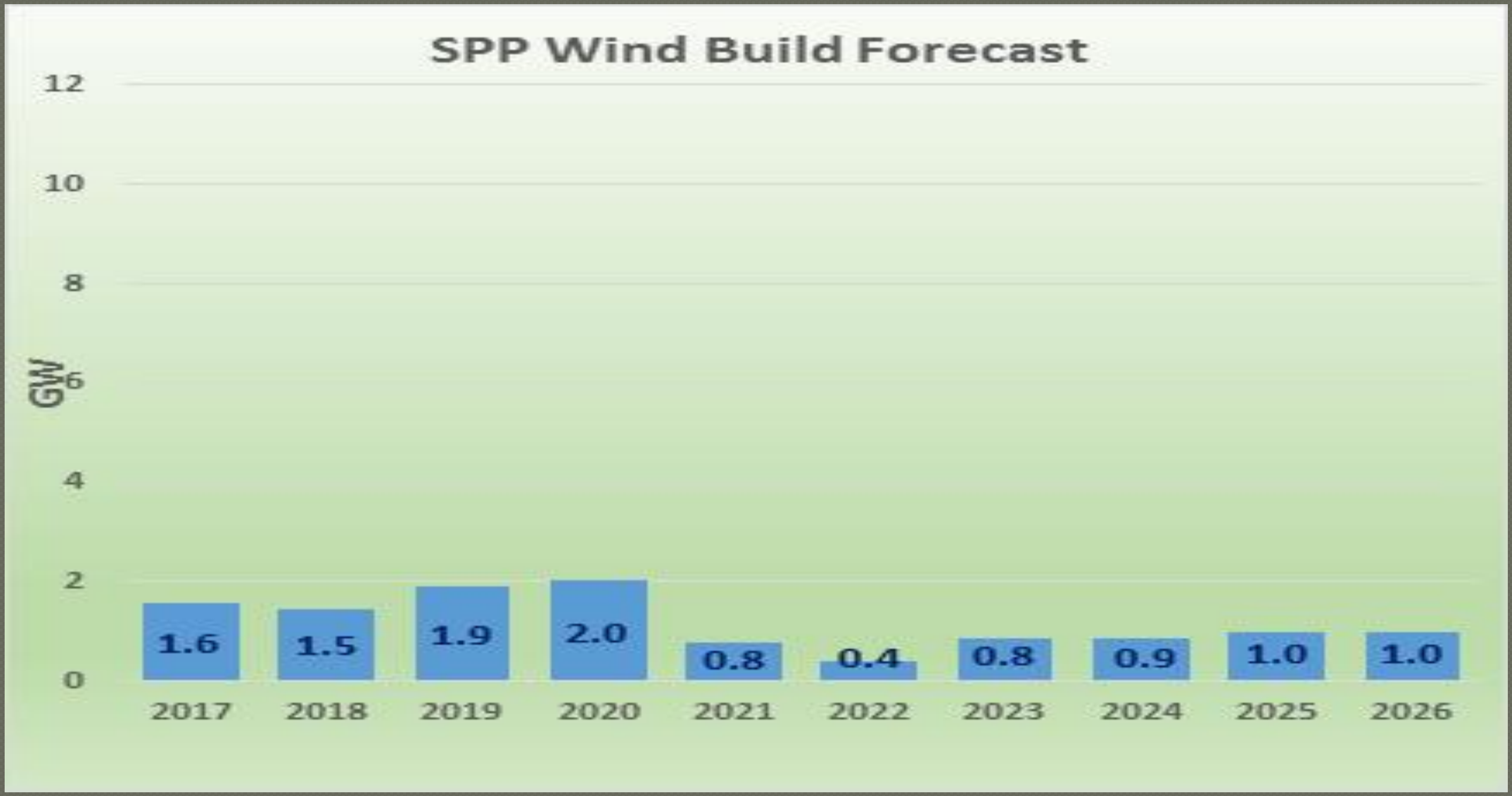
Reference Case Future I- 2021

- The primary drivers of renewable energy development in this future are existing policies as well as economics and consumer demand.
- According to AWEA's Market Database Pro corporate demand for renewables has escalated rapidly and is ongoing.

Reference Case Future I- 2021

- According to AWEA's Market Database, there are currently 5.5 GW of wind under construction or with off take agreements in the SPP footprint.
- By the end of 2021 (or the Year 2 reference case), analysts predict that there will be at least 7.8 GW of additional capacity installed.

Analyst's Predictions



SPP Wind Build Forecast by Year (source: average IHS and BNEF projections)

Base Case Future I- 2021

- Given the project development timelines for wind generators as well as the timeline for the expiration of the Production Tax Credit (PTC), there is a high level of confidence in development projections through 2021. As a result, SPP's reference case should include at least 7.8GW of additional wind to be added to the 16 GW currently in operation in the footprint, bringing the total expected wind in the SPP footprint to at least 23.8 GW by the end of 2021.

Base Case Future I- 2021

- Looking further to 2024 and the Year 5 reference case, analysts expect at least an additional 2.1 GW of wind to be deployed in the footprint. This would bring SPP's total wind deployment to around 26GW by the end of 2024.

Future 1- 2029

- Analysts expect an average of 1GW/ year of wind deployment from 2025-2029. This assumes no additional local, state, or federal policy drivers are implemented. Thus, a total of 31GW of wind should be included in the base case for 2029.
- We would suggest adding 5GW of large scale solar to the current solar levels in SPP by year 10.

Base Case Future I- 2024

- ERGIS study released by NREL earlier this year, in particular the conservative "RTx10 Scenario for 2026".
- In the RTx10 study scenario, NREL looked at a system in which there was approximately 10% total wind and solar penetration and only intra-regional transmission expansion for the forecast year 2026. As the table highlights, under this conservative scenario, SPP can economically and reliably integrate over 27.5 GW by 2026.

ERGIS Study

Table 10. RTx10 Wind Resources by Region

	Capacity (MW)	Available Energy[1] (GWh)	Potential Penetration[1] (%)
FRCC	0	0	0%
ISO-NE	4,024	14,406	11%
MISO	40,035	142,632	18%
NYISO	9,799	35,075	21%
PJM	22,059	72,757	8%
SERC	860	2,500	0%
SPP	27,521	104,154	43%
Total	**104,299**	**371,524**	**11%**

[1]This table shows available energy and potential penetration, which are inputs to the PLEXOS model rather than outputs. Actual wind generation and penetration could be lower due to curtailment of available energy.

Future II

- Future II should examine the impact of more expansive renewable development beyond that motivated by existing policies.
- Future II would thus build about 50% more wind than in Future I.

Future II

- NREL's ERGIS study examined a regional scenario in which the Eastern Interconnect reached 30% renewables. This scenario sited wind economically within the Eastern Interconnect without building large amounts of inter-regional transmission.
- This scenario resulted in a cumulative total of 43 GW of wind in SPP by 2026, or **27 GW of incremental build** from currently installed levels (page 32 at http://www.nrel.gov/docs/fy16osti/64472.pdf).

Future II

- This proposed regional scenario for Future II is more moderate than ERGIS's Interconnect-wide scenario that built large amounts of inter-regional transmission to more optimally reach 30% renewables. That scenario reached a cumulative total of 61 GW of wind in SPP by 2026.
- Based on NREL's more conservative study, we support a future model in SPP with wind levels set in a range of 35GWs in 2024 to 43GW in 2029.
- Based upon the same study we would suggest a total of 12GW of solar by year 10.

THANK YOU!

Steve Gaw

Drivers	Description/Notes	Reference Case
Reference Case	50/50 Load, Carbon at regulations, age based retirements, etc	
Electric vehicle market penetration	Increased usage of electric vehicles	
Lower electric rates	Duck Curve Effect	
Continued renewable development		
Increased utility scale renewables	And possible energy storage development to serve EV load. (e.g., solar during the day, with higher loads due to EV charging at night)	
Net Metering Structures	Reduced load. Does it incentivize rooftop?	
Stresses to the Reference Case:		
Accelerated Fleet		
Load Growth	Demand and/or Energy growth	50/50
Flat load growth		
High Gas Prices		
High Renewables	Scope and Location being a large transmission driver. Some percentage of the additional wind will be flowing out of SPP, possibly in a similar ratio to what we see today. As such, we think it is reasonable to make this a base assumption.	Maybe
	Repowering Old Windfarms	
	Higher capacity factors for new wind farms	
Economical Retirements	More aggressive retirement of old coal, gas units in urban centers and location of new flexible generation on outskirts of urban areas	Maybe
Batteries		
Transmission retirements	Retireing underused lines?	
Federal infrastructure bill?		
Must Runs Units		Self Commits?
Paris Accords Carbon Reductions		
Transmission De-rate variable	Most of the western side of SPP is at maximum capacity, there is 0 injection capability at many points. Pockets of stranded generation and high LMPs, significant curtailments are occurring and not being addressed. Recommendation: use a Transmission De-rate variable. This would be applied to the interchange allowed when performing the capacity expansion between regions and in the production cost modeling.	Yes
Declining Capital costs for Wind		

Significant capital costs to solar and battery storage	Significant increases in solar and battery recognized with a penetration factor variable to ensure they are included in the models
Higher reserve margins	Because of the higher forced outage rates of natural gas units as already being seen in the market
Hydraulic fracking regulations	Increased gas prices
Mountain West	How to reflect in modeling. DC ties flows/planning
Confirm that load forecasts are including behind the meter	

Futures

Low Demand	Robust Economy	Emerging Technologies	Renewable Future	Clean Energy Future
		Yes		
		Yes		
Maybe				
Low	High Demand	Base +		High
No	Yes			
	Yes	Yes	43GW in Y10	
	Yes	Yes	Yes	Yes
	No		No	
			X	
				Yes, higher than refernce
				Yes

Yes

Yes

Yes

	Drivers			
Key Assumptions	Reference Case	Low Demand	Robust Economy	Emerging Technologies
Demand Growth Rates	50/50	Low 10/90	High 90/10	Electric Vehicles
Energy Growth Rates	XX%	+XX%	-XX%	XX%
Natural Gas Prices	Vendor Data	-XX%	+XX%	Vendor Data
Coal Prices	Vendor Data			Vendor Data
Emissions Prices	Vendor Data			Vendor Data
Retirements	Age-Based	Age-Based +	Age-Based ++	Age-Based
Renewable Growth	Moderate	Low	High	Moderate +
Wind				
Solar				
Environmental Regulation				
Demand Response				
Distributed Generation				
Energy Efficiency				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Renewable Resource Expansion Plan

Chris Jamieson

August 16, 2017

ITP Manual Language

Section 2.2.2.1.1 Renewable Resource Expansion Plan

“SPP shall develop a resource plan to meet renewable expectations for the region. This will include capacity as required through the renewable policy review, as well as capacity identified through criteria developed by SPP and stakeholders. Consideration will be given to the futures being studied and factors such as government regulations, historical trends, natural gas prices, installation trends, integrated resource plan projections, and SPP stakeholder feedback.

Renewable additions will be computed using criteria that can be applied uniformly across pricing zones. For example, each pricing zone should have renewable capacity of at least a certain percentage of their annual peak-load responsibility. Renewable resources other than wind and solar (such as biomass) shall only be added to the model as defined in the Generation Resource Inclusion and Generation Resources sections.”

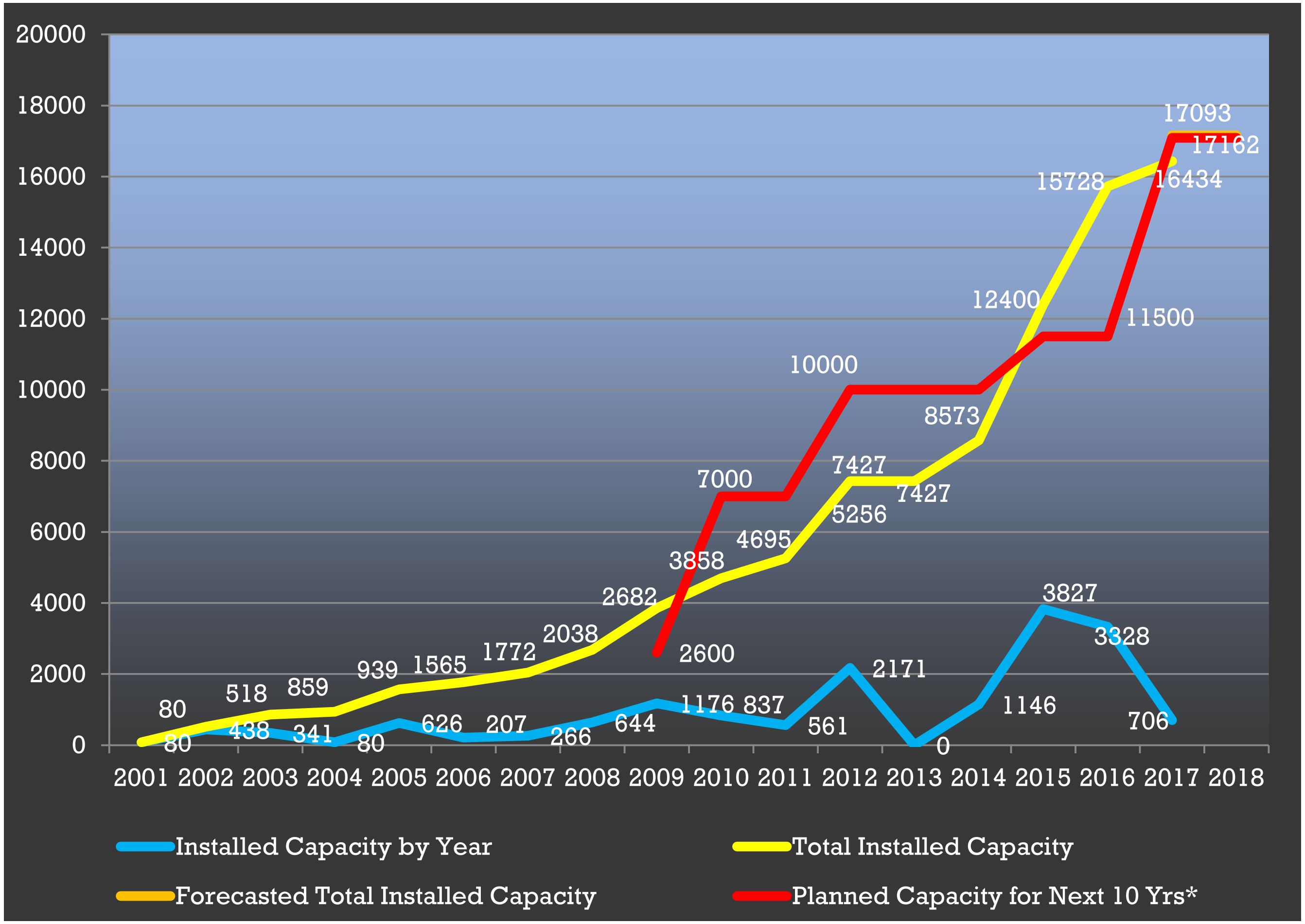
“Resource expansion software is not currently adequate for identifying new renewable resources. As resource expansion software improves, SPP may incorporate renewable resources additions in the software as an additional factor for consideration.”

SPP

Criteria Development

- Futures
- Government regulations
- Historical trends
- Natural gas prices
- Installation trends
- Integrated resource plan projections
- And, SPP stakeholder feedback

Wind Planning vs Wind Development



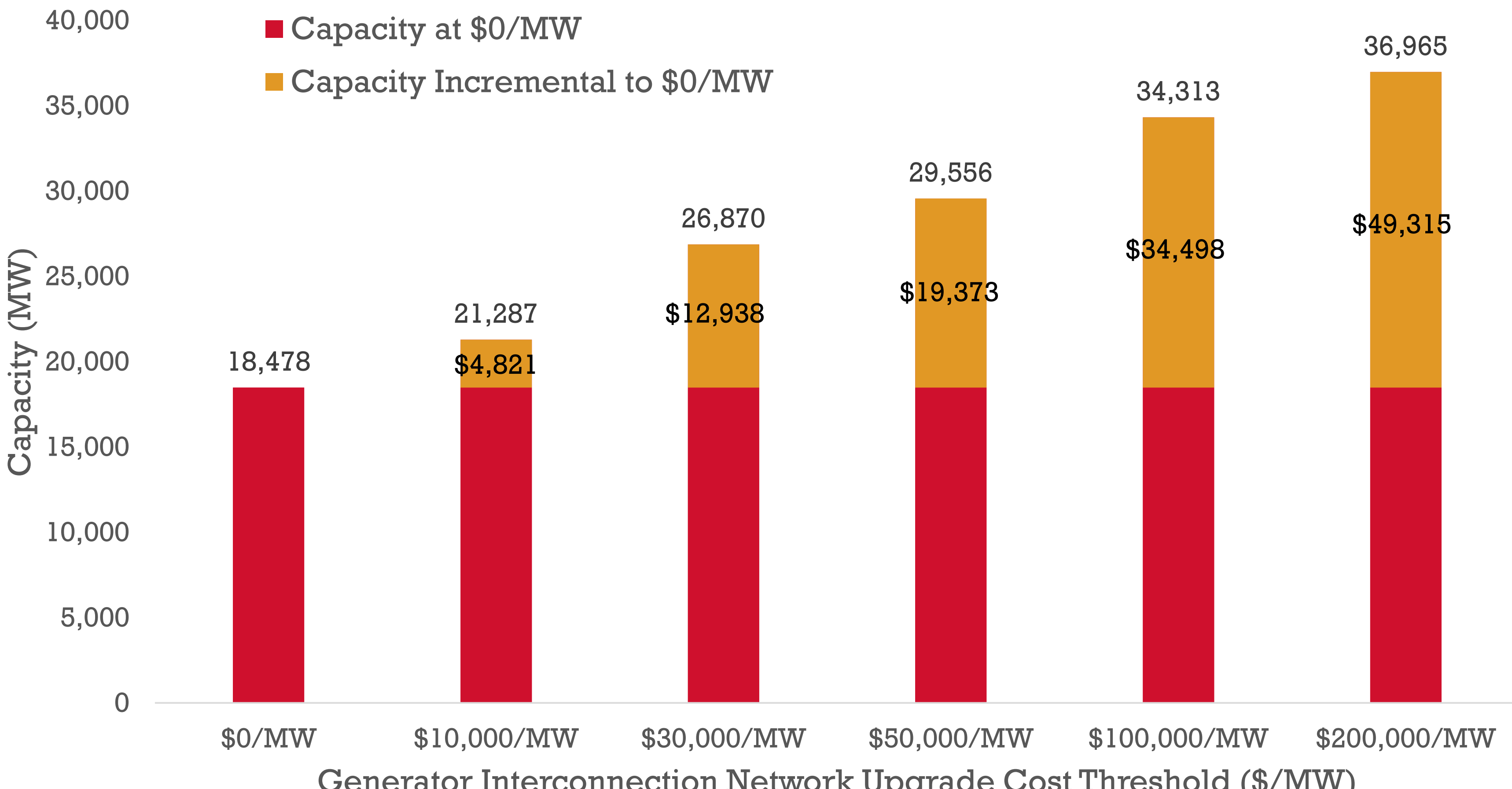
*Business as Usual/Reference Case for Economic Studies Only. Sensitivity case wind levels not included.

SPP

SPP GI Queue

- SPP GI queue is renewable heavy
  - 43.4 GW analyzed to date*
  - Over 30 GW of requests in most recent windows
- Generator interconnection network upgrade costs
  - Last 7.6GW of wind was placed in service at average network upgrade cost of $32,500/MW
  - Interconnection costs under a $100,000/MW network upgrade cost threshold have an average cost of $34,500/MW
  - Some projects experience network upgrade costs greater than $1M/MW

Installed Renewable Capacity at Interconnection Cost* Thresholds

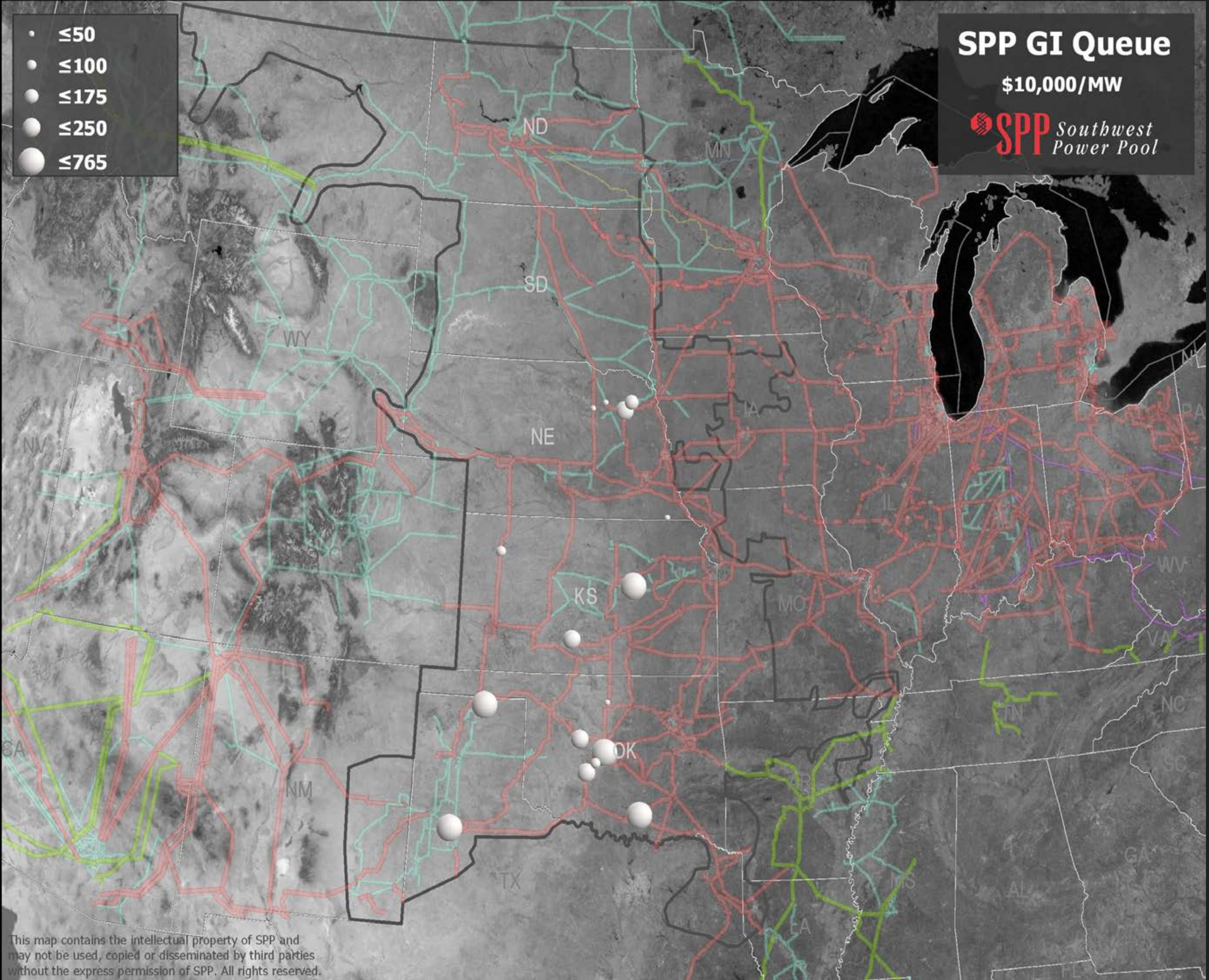


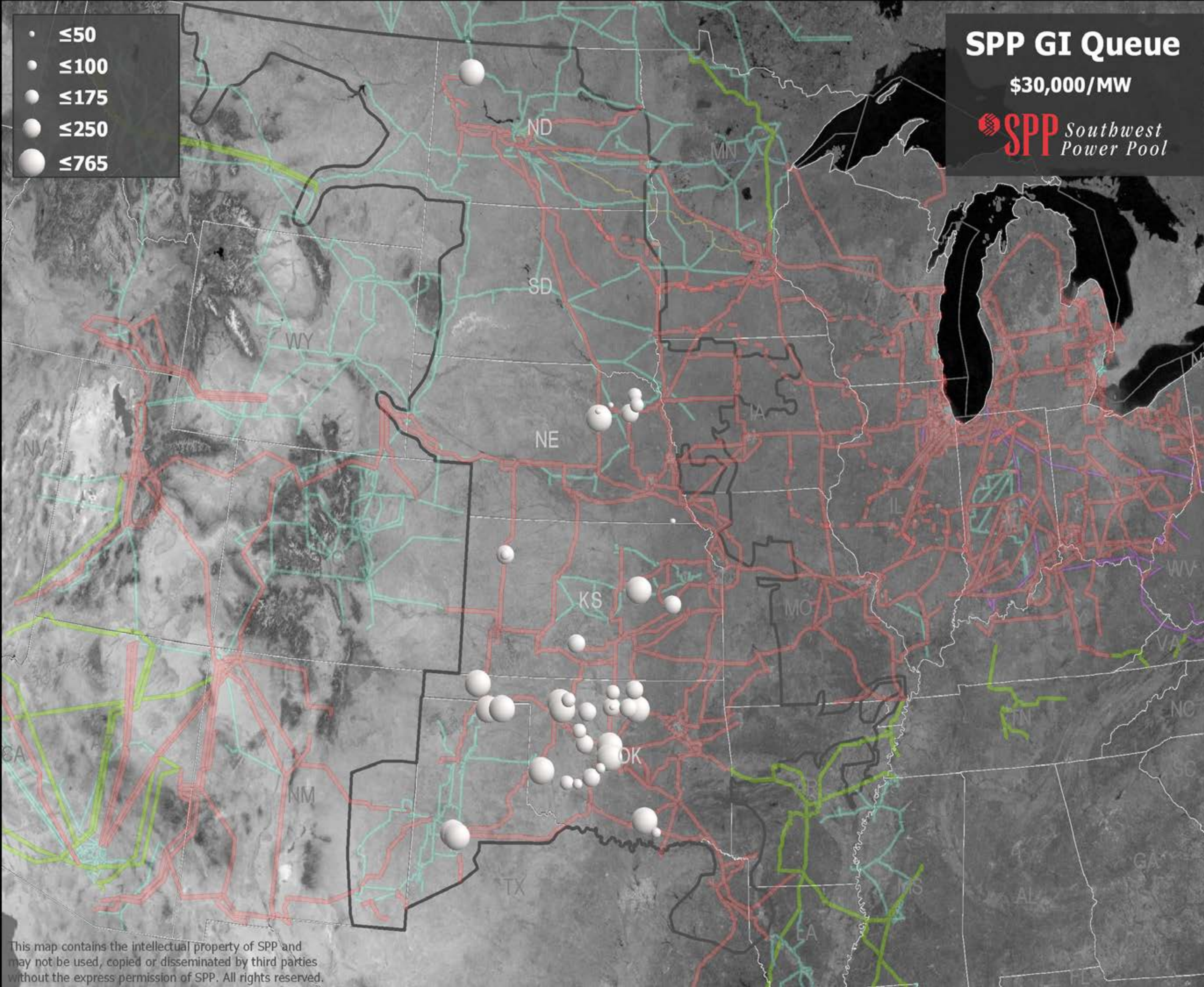
* Remaining actual and projected Network Upgrade costs per MW requested reported for capacity incremental to $0/MW threshold

SPP GI Queue

$10,000/MW

SPP Southwest Power Pool





≤50
≤100
≤175
≤250
≤765
SPP GI Queue
$30,000/MW
SPP Southwest Power Pool
ND
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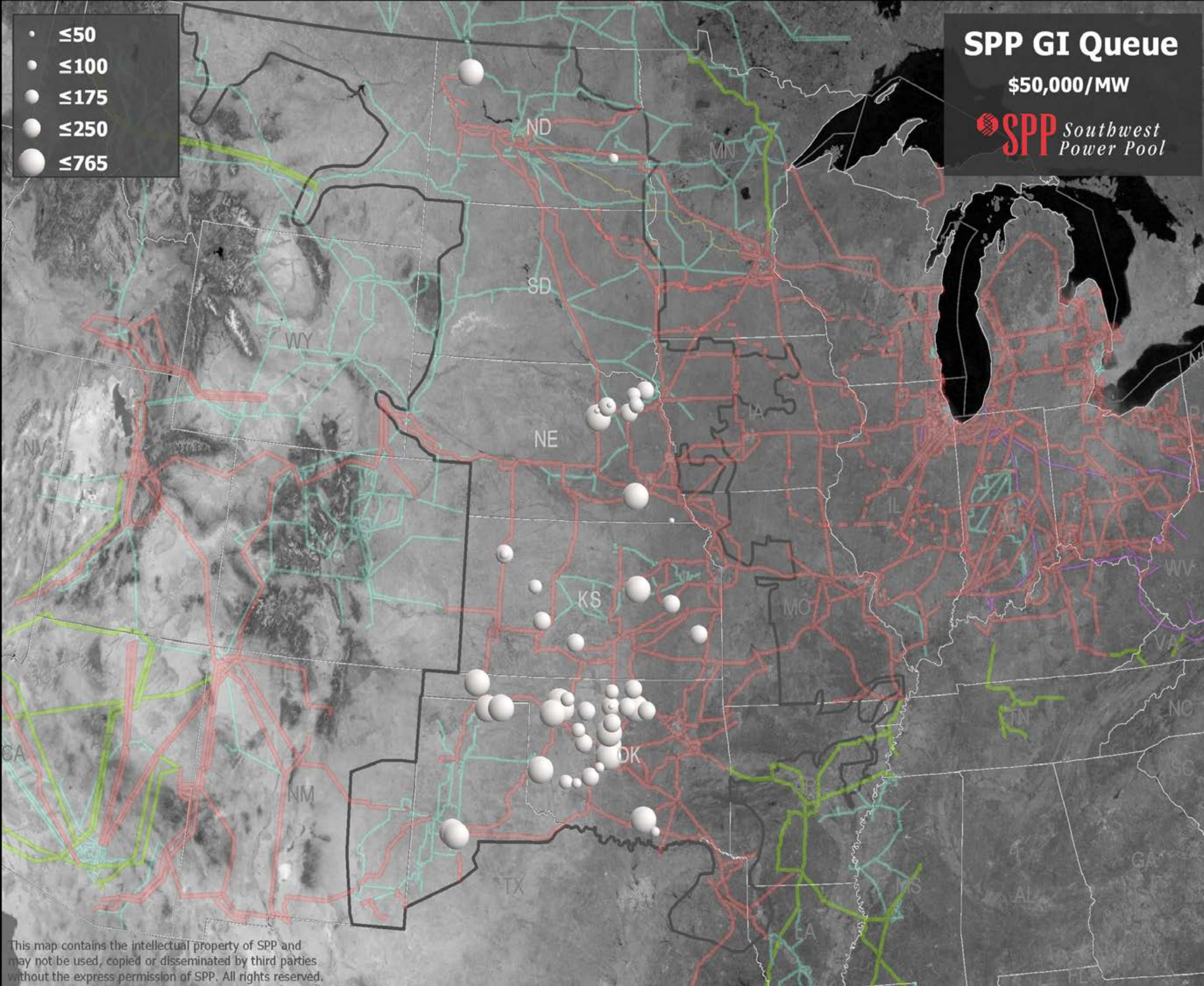

≤50
≤100
≤175
≤250
≤765
SPP GI Queue
$50,000/MW
SPP Southwest Power Pool
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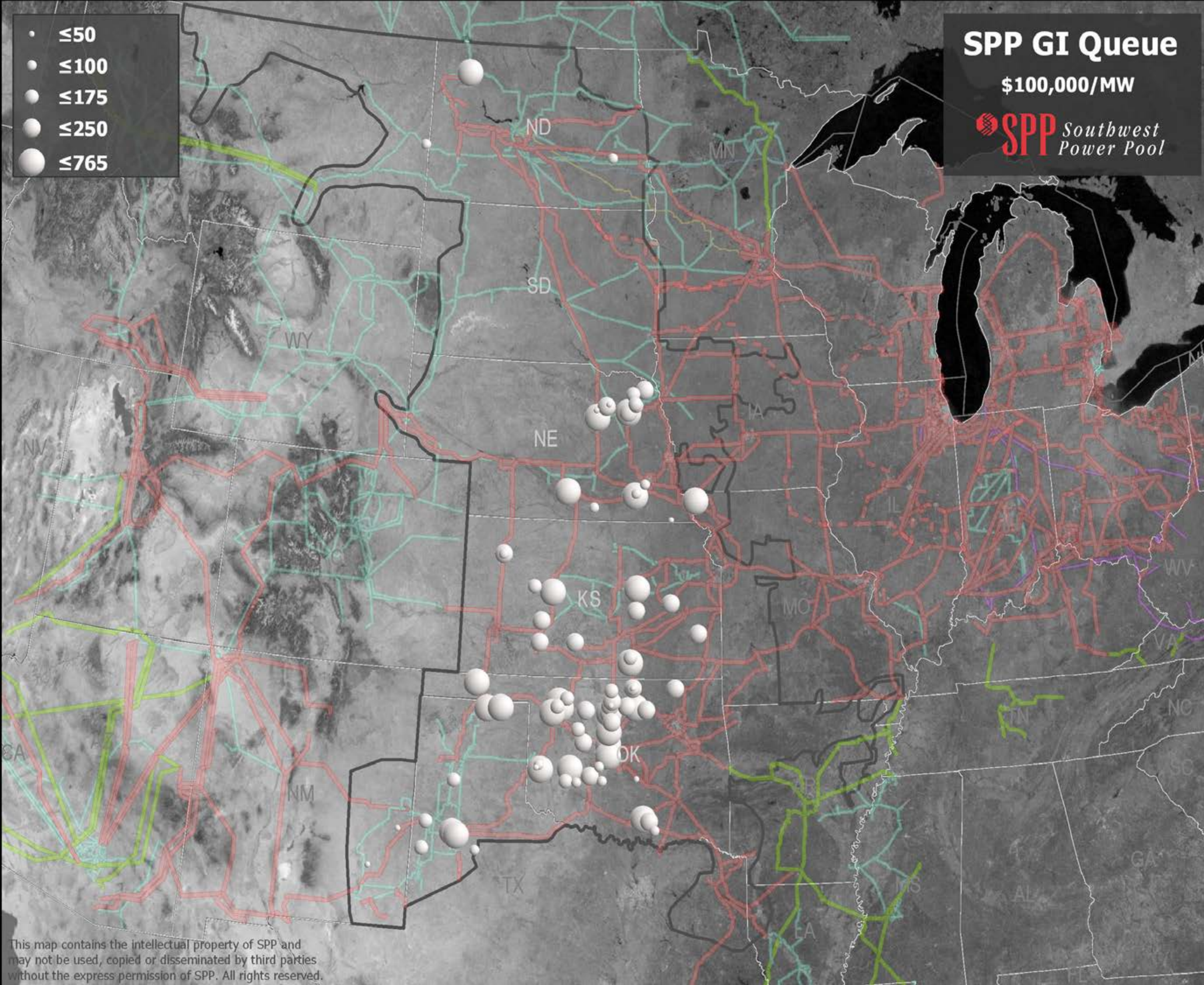
SPP

SPP GI Queue

$100,000/MW



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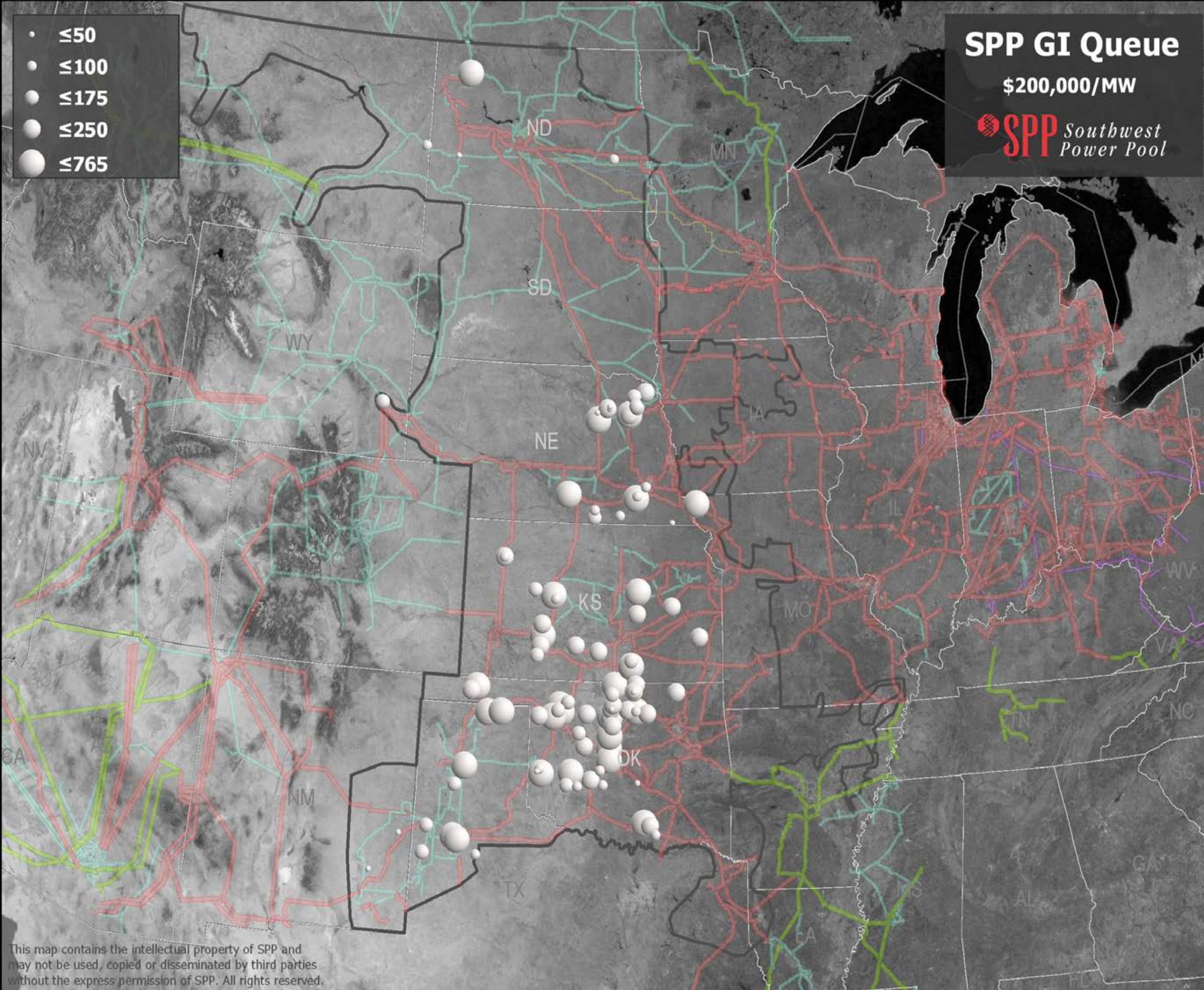

SPP GI Queue
$200,000/MW
SPP Southwest Power Pool
≤50
≤100
≤175
≤250
≤765
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SPP

Renewable Saturation Analysis

- Analyze installed renewable capacity by GI cost threshold to indicate the potential point of diminishing economic returns
- Analysis
  - Perform production cost simulations
  - Disable all interchange between SPP and Tier 1 to ensure no renewable energy exports
  - Disable transmission thermal limitations and losses to determine optimal unit commitment and dispatch considering only ancillary service needs and resource specific constraints
  - Analyze increases in renewable energy curtailments

Renewable Saturation Analysis

Interconnection Cost Ceiling	Installed Renewable Capacity* (GW)	Annual Energy Delivered (TWh)	Minimum Conventional Dispatch (MW)	Maximum Renewable Penetration	Annual Curtailment %
Base (2017ITP10 F3)	17.1	70	10,755	54.2%	0.0%
$10K/MW	21.1	86	8,430	65.2%	0.3%
$30K/MW	26.4	105	7,523	72.1%	2.8%
$50K/MW	29.1	114	6,360	76.6%	4.5%
$100K/MW	33.6	127	3,621	87.4%	8.0%

* Scenario also contains ~2.7GW of proxy solar by 2025, not included in totals

SPP

Next Steps

- Evaluate Futures and SPP stakeholder feedback
- Research integrated resource plan projections
  - Understand the value of portfolio diversification
- Research renewable projections in MISO MTEP futures
- Additional installation trending and renewable saturation analysis (optional)
- Potential feedback request of generation interconnection customers similar to the 2017 ITP10 Non-Designated Resources feedback request

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Southwest Power Pool

Conventional Generation Prototypes

Amber Greb

August 16-17, 2017

Prototype Data Source Options

- EIA Annual Energy Outlook (AEO) Report
  - Used in 2015 ITP10
  - July 2017 Data
- Lazard Levelized Cost of Energy Analysis – Version 10.0
  - Used in 2017 ITP10
  - December 2016 data

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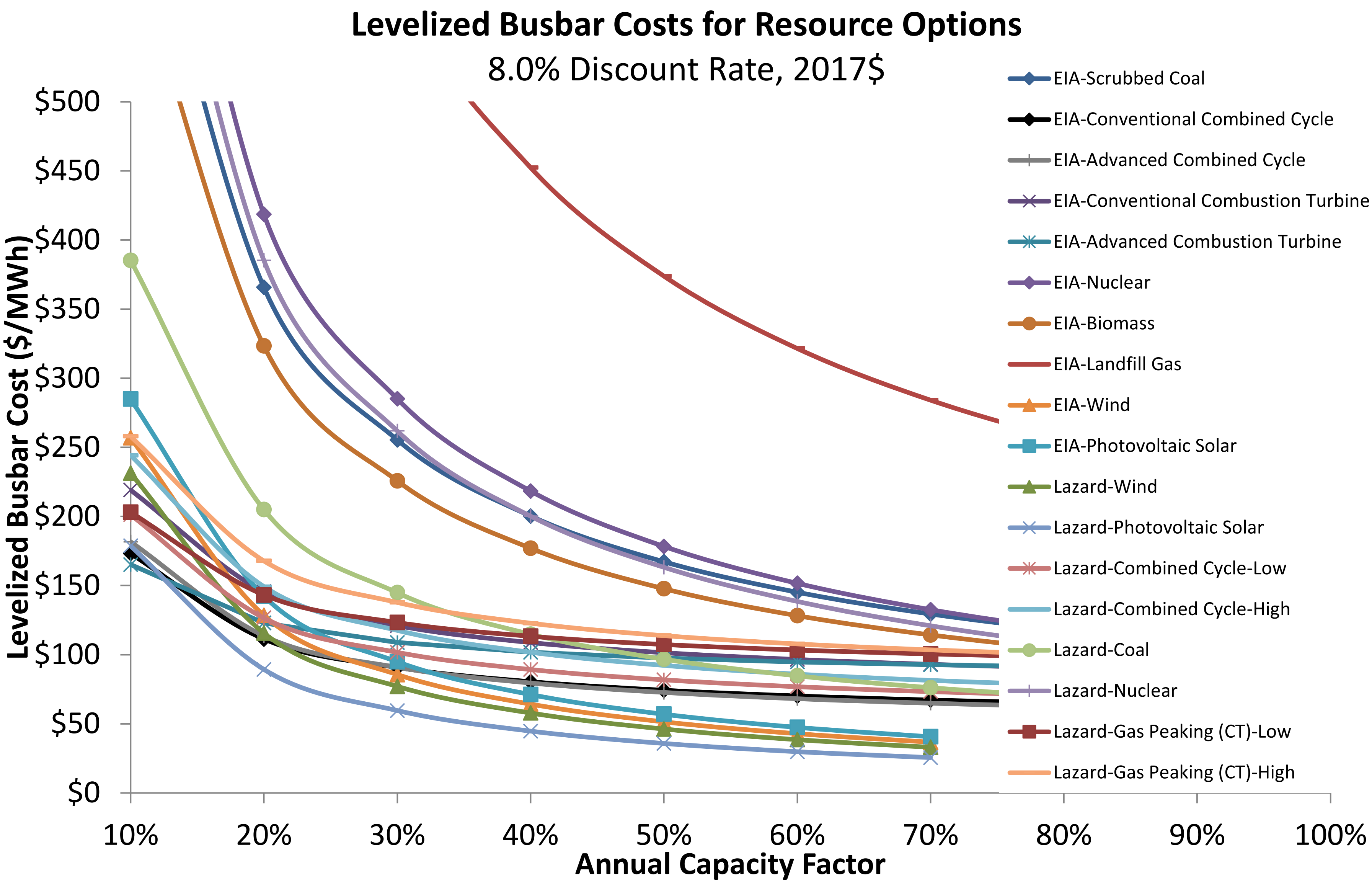
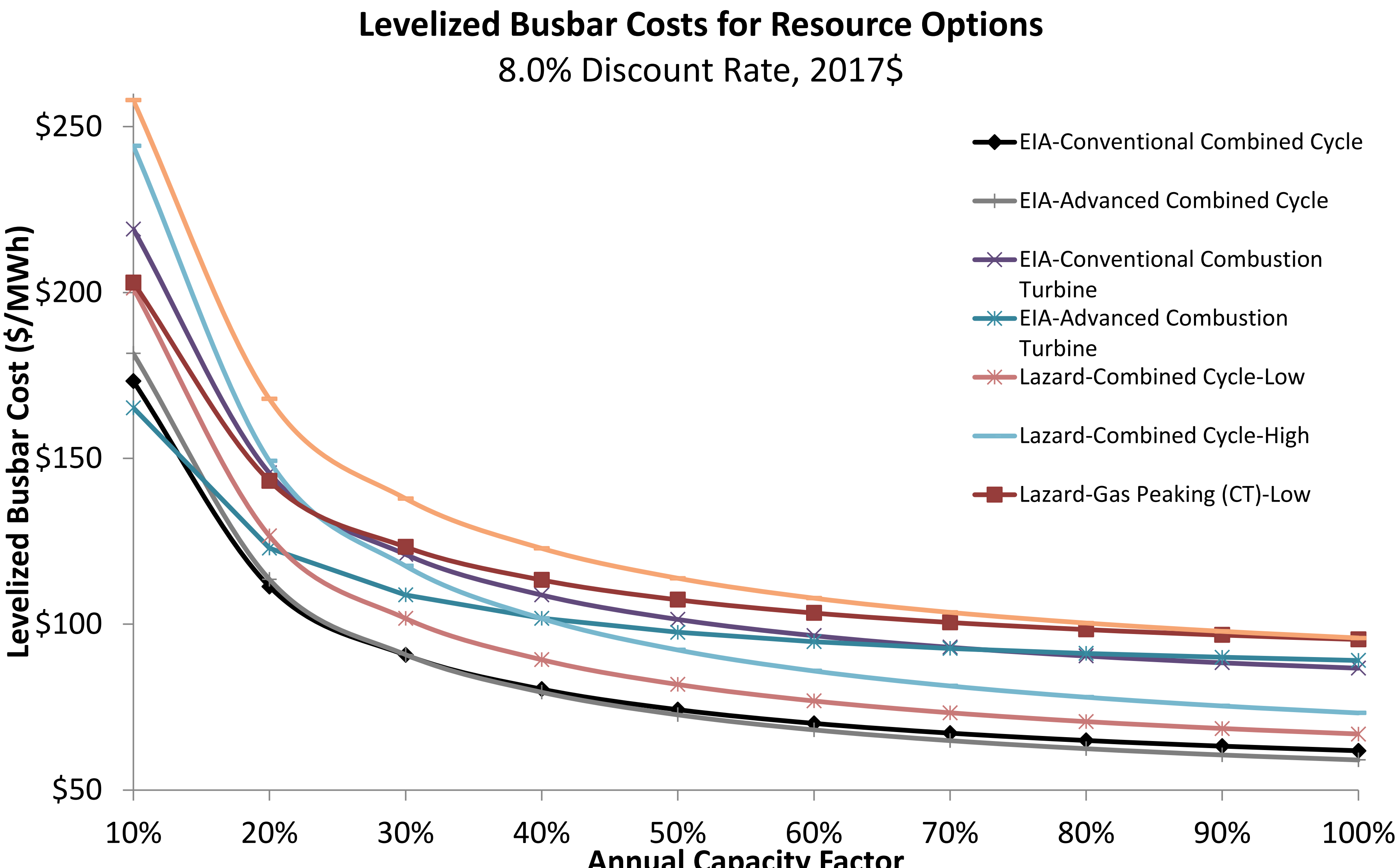
Generation Type	Data Source	Tech Type	Size (MW)	Total Capital Cost ($/kW)	V O&M ($/MWh)	F O&M ($/kW-yr)	Heat Rate (Btu/kWh)
Combined Cycle (CC)	EIA AEO'17	Adv.	429	1,121	2.04	10.19	6,300
	EIA AEO'17	Conv.	702	993	3.57	11.20	6,600
	Lazard	High	550	1,333	2.05	5.64	6,900
	Lazard	Low	550	1,025	3.59	6.36	6,300
Combustion Turbine (CT)	EIA AEO'17	Adv.	237	689	10.90	6.93	9,800
	EIA AEO'17	Conv.	100	1,119	3.57	17.82	9,920
	Lazard	High	103	1,025	7.69	25.63	9,000
	Lazard	Low	216	820	4.82	5.13	10,300
Coal	EIA AEO'17		650	5,156	7.24	71.30	9,750
	Lazard		600	3,075	2.05	41.00	8,750
Nuclear	EIA AEO'17		2,234	6,027	2.35	102.14	10,459
	Lazard		1,100	5,535	0.51	138.38	10,450
Wind	EIA AEO'17		100	1,728	0.00	47.88	N/A
	Lazard		100	1,281	0.00	35.88	N/A
Solar PV (Utility Scale)	EIA AEO'17		150	2,334	0.00	22.20	N/A
	Lazard		30	1,486	0.00	12.30	N/A

Busbar Curves – All Units



Busbar Curves – Gas Units



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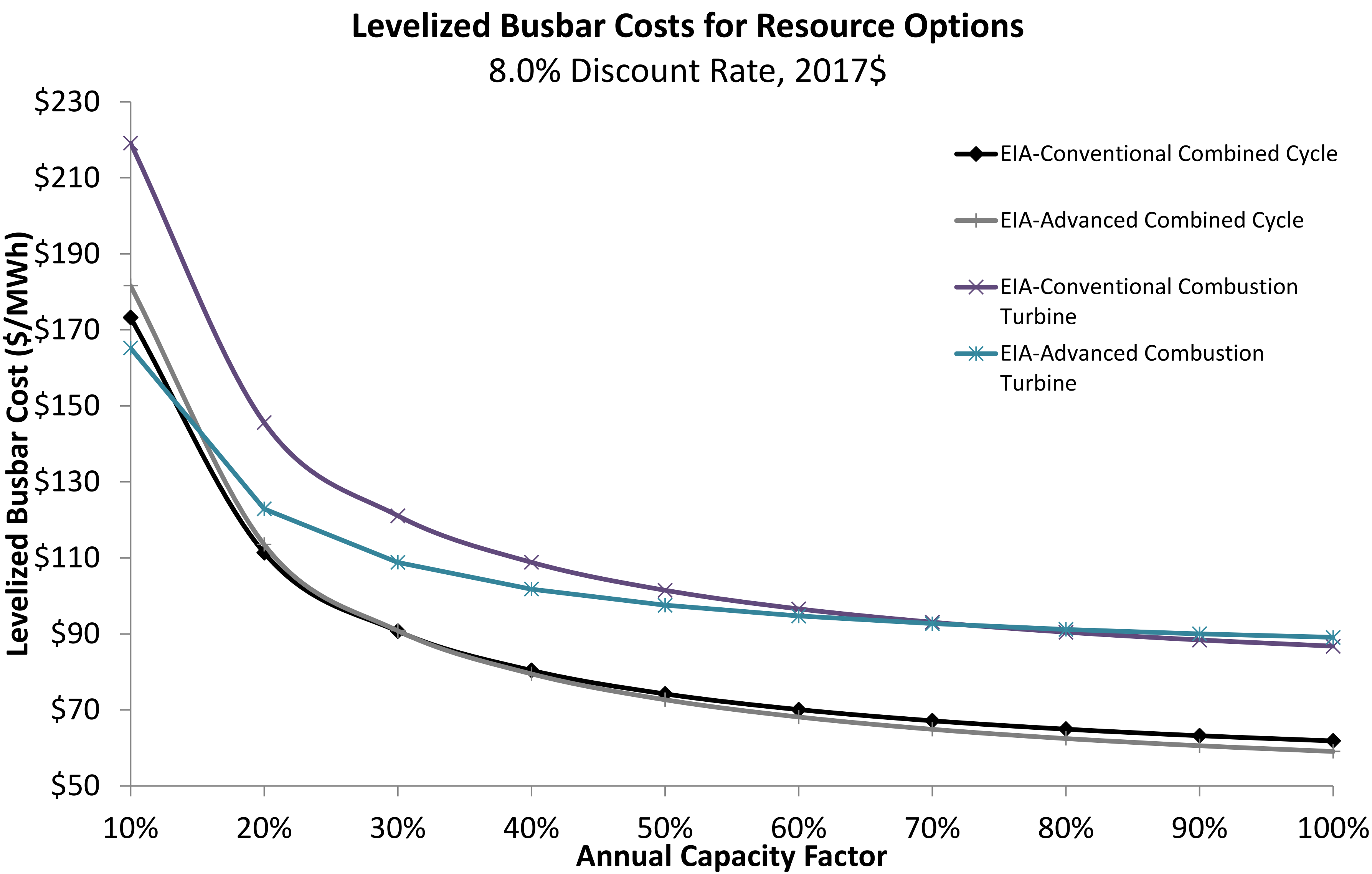
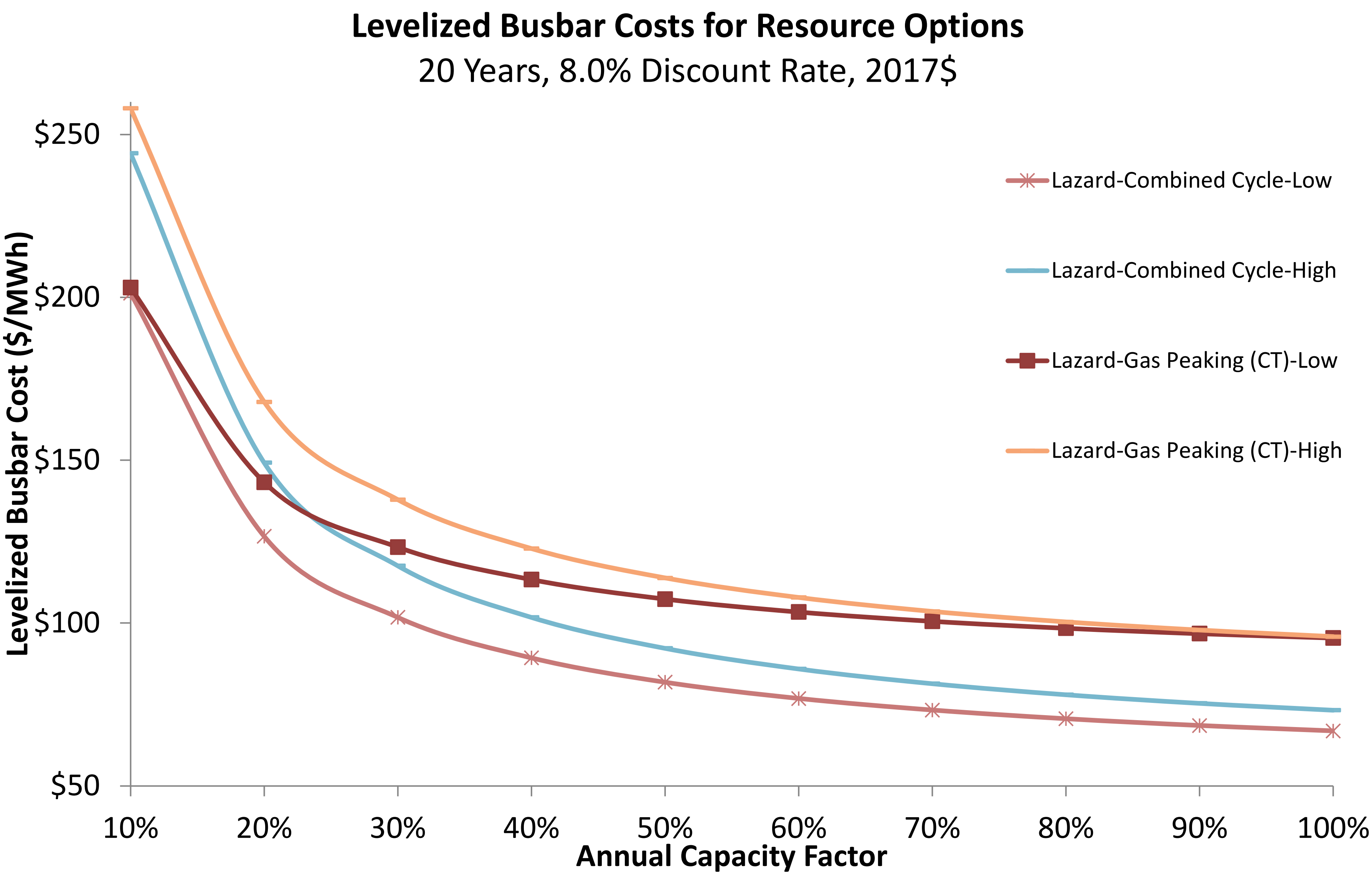
Busbar Curves – Gas Units – EIA



Busbar Curves – Gas Units – Lazard



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Prototypes Recommendation

SPP Staff recommends the ESWG approve using Lazard High Cost CC prototypes and low cost CT prototypes adding large scale reciprocating engines and eliminating nuclear and coal as options.


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2019 ITP Renewable Accreditation

SPP Staff

August 16-17, 2017

ITP Manual Language

Section 2.2.2.1.2 Conventional Resource Expansion Plan

- Each pricing zone shall be assessed for resource adequacy by accounting for load projections, existing generation, new wind and solar additions, capacity accreditation for all renewable units, fleet PPAs, and DC tie accreditations. ”

2017 ITP10

- SPP Planning Criteria 7.1.5.3
  - Solar – 10% to 0% by default
  - Wind – 5% to 0% by default
- Accreditation percentages were surveyed by the stakeholders for existing and planned renewable capacity
  - Solar – Max 50% - Min 10%
  - Wind – Max 38% - Min 0%
    - 9 GWs at 5%
    - Non-designated wind at 0%
- Future renewable resources were counted at a regional average of accreditation percentages submitted by stakeholders
  - Solar – 10% accreditation
  - Wind – 20% accreditation

2019 ITP

- Gen review milestone
  - Survey Wind and Solar Accreditation
    - Anticipate consistency with Resource Adequacy process going forward
- SPP Planning Criteria 7.1.5.3 as backup
  - Solar – 10% to 0% by default
  - Wind – 5% to 0% by default
    - Adjust accreditation of wind at 5% to regional average
    - Non-designated wind at 0%
- Count future renewable resources at a regional average of accreditation percentages submitted by stakeholders


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2019 ITP Scope-MUST Run Criteria

Nikki Roberts

August 16-17, 2017

ITP Manual Language

"Must-run statuses will be removed from all units at the start of each study. In the development of the ITP study scope, the ESWG will determine if must-run units will be allowed and the criteria needed for such designation. Individual generating units meeting must-run criteria will be submitted by SPP or stakeholders during the generation review and subject to approval by the ESWG."

Must-Run Status

- ABB Simulation Ready Data
  - Units that generally run to meet a base level of load and have physical constraints that prevent it from shutting down easily.
  - Coal and Gas (CC) above 100MW.
- MISO MTEP18 Model
  - All Nuclear Units.
  - Co-generation Units in MISO South.

SPP

Recommendation

- SPP Staff recommends assigning must-run designations to co-generation and nuclear units only.
- Potentially implement must-run designations to additional units as a sensitivity during the Project Selection milestone.
  - Coal units < 40 years with capacity factors below average would be considered must-run.
  - Coal units > 40 years with capacity factors below average would ***not*** be considered must-run.
  - Survey members for exceptions.

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Operational Project Evaluation

Will Tootle

August 16-17, 2017

Persistent Operational Solution Evaluations

- Flowgates (Economic/Reliability)
  - Evaluate approved NTCs for potential acceleration
  - Evaluate upgrades to monitor element (rebuilds, terminal equipment, etc.)
  - Select and evaluate other solutions using the Operational model
  - Verify that no persistent new issues will be created by projects needed for persistent operational issues

SPP

Persistent Operational Solution Screening

- Types of solutions
  - Staff-developed solutions
  - DPPs
  - Other submittals/feedback
- Flowgates
  - Solutions will be evaluated based on their ability to relieve congestion on needs
  - Create 10% tiers and take top 3 from each tier to evaluate economically

SPP

Persistent Operational Solution Evaluations

- High/Low Voltage issues (Reliability)
  - Evaluate approved NTCs for potential acceleration
  - Evaluate snapshot case where voltage issue occurred that required mitigation
  - Remove implementation of op guide to identify how much voltage support is needed
  - Verify that no persistent new issues will be created by projects needed for persistent operational issues

Persistent Operational Solution Evaluations

- Manual Commitments (Economic)
  - Evaluate approved NTCs for potential acceleration
  - Evaluate snapshot case where Manual Commitment was required
  - Remove generation to determine amount of voltage support needed
  - Verify that no persistent new issues will be created by projects needed for persistent operational issues

SPP

Persistent Operational Portfolio Development

- Flowgates
  - Use CLR metric methodology for reliability needs
  - Provide all needs to planning at the beginning of economic model build
  - Identify differences between ops and planning models if issues do not show up in Planning models
  - For economic analysis a selection of 40 days with various operating conditions will be selected to determine an average production cost savings based on daily actual operational models

- High/Low Voltage issues (Reliability)
  - Use CVR metric to select best project

- Manual Commitments
  - Annual Benefits = absence of Make-Whole Payment (MWP) requirement

- Use the same criteria as planning as much as possible.