Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

June 18th, 2015

AEP Offices 8th Floor, Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the revised ESWG Charter
2. Approved the Regional Review Scope as presented by staff
3. Approved the BEPC request for inclusion of the 3 generation facilities which include GI-1406 (Pioneer Recips), GI-1410 Lindahl Wind), and GI-1414 (Heart River Wind) in the 2017 ITP10 models
4. Approved the Load and Generation Review for the 2017 ITP10
5. Approved the Renewable survey as amended by SPS for the 2017 ITP10

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

June 18th, 2015

AEP Offices 8th Floor, Dallas, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

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

There were 20 in-person participants, 37 web conference participants, and 1 phone participant representing 11 of 12 ESWG members. (Attachment 1 – June 18, 2015 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC Great Plains) asked for any proxy statements. One proxy was identified; Paul Dietz (Westar) named Kip Fox (AEP-Transource) as his proxy. (Attachment 2 – Proxy Statements)

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 – June 18, 2015 Agenda)

> **Kip Fox (AEP-Transource) made a motion; seconded by Bennie Weeks (SPS) 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. A number of the items will be discussed in today's meeting. Update to item 142, the PROMOD User group meeting is tentatively scheduled for August 4th-5th in Little Rock, AR. Item 150, criteria for non-firm generation was marked complete. (Attachment 4 – Past Action Items)

Agenda Item 3 – Transmission Planning Improvement Task Force (TPITF) Update

Alan Myers (ITC Great Plains) gave an update on the status of the TPITF. The major item from the last TPITF meeting was that many members want to eliminate the ITP20 study. There has also been discussion about combining the ITP Near-Term and ITP10 assessments. A less favored approach is to combine the ITPNT and TPL assessments. Staff is investigating the feasibility of these options.

Agenda Item 4 – Study Schedules

Agenda Item 4a – 2017 ITP10

Juliano Freitas (SPP Staff) gave an update on the status of the 2017 ITP10 Study. Staff is requesting approval of the load and generation review today. The milestones that staff is beginning to work on are the Resource Plan, Powerflow Model Development, Economic Model Development, and Benchmarking. The Scope was scheduled to go to MOPC in July; due to the remaining decisions to be made, the ESWG will need to finish the Scope in September in order to take to MOPC for approval in October. (Attachment 5 – 2017 ITP10 Schedule)

Agenda Item 4b – SPP-MISO CSP

Brett Hooton (SPP Staff) gave an update on the status of the SPP-MISO CSP Study. The Regional Review Study will begin in July. Staff has been incorporating the feedback received from Stakeholders into the Regional Review model. (Attachment 6 - SPP-MISO CSP Schedule)

Agenda Item 5 – ESWG Charter Review

Kelsey Allen (SPP Staff) gave an overview of the Charter and the changes that were made. The major changes were to the Scope of Activities and adding additional members. Details were added outlining the specific studies that the ESWG is involved in and what input they provide. Representation was changed to add four additional voting members, and one non-voting Regulatory Liaison member.

Kip Fox (AEP-Transource) made a motion; seconded by Don Le (NextEra Energy Transmission) to approve the revised ESWG Charter. The motion passed unanimously.

Agenda Item 6 – 2015 Regional Review Scope

Brett Hooton (SPP Staff) presented on the Regional Review Scope. The regional review analysis evaluates the approved interregional projects in a regional model; it does not consider new alternatives. Existing planned projects will be reviewed for redundancy and evaluated following the regional review methodology. For the 2015 Regional Review, projects must have a 40 year B/C ratio of 1.0, and be more cost effective than a regional solution to be considered beneficial. There were questions among the group on cost allocation. Brett explained that the Interregional cost allocation has already been determined based on the benefit split between SPP and MISO. The regional cost allocation will follow the current regional funding process. The ESWG requested that Staff provide the benefits on a zonal level. (Attachment 7 – 2015 Regional Review Scope)

Kip Fox (AEP-Transource) made a motion; seconded by Bennie Weeks (SPS) and Tim Owens (NPPD) to approve the 2015 Regional Review Scope as presented by staff. The motion passed unanimously.

Agenda Item 7 – 2017 ITP10 Resource Additions

Kelsey Allen (SPP Staff) presented on the resource additions for the 2017 ITP10. The presentation included the criteria for resources to be included in the study. The majority of additions met the criteria for inclusion and are included in the generation review that staff will present later in the meeting. Basin Electric Power Cooperative has one resource that did not meet the criteria. (Attachment 8 – 2017 ITP10 Resource Additions) Jeremy Severson (BEPC) presented a resource addition request to the group. Basin is requesting inclusion and ownership designation of three generating resources: Pioneer, Heart River Wind, and Lindahl Wind. (Attachment 9 – BEPC Waiver Request)

Kip Fox (AEP-Transource) made a motion; seconded by Kurt Stradley (LES) to approve inclusion of the 3 generation facilities which include GI-1406 (Pioneer Recips), GI-1410 Lindahl Wind), and GI-1414 (Heart River Wind) in the 2017 ITP10 models. The motion passed unanimously.

Kelsey Allen (SPP Staff) presented a list of non-designated resources to be included in the model. These resources meet the criteria for inclusion: Interconnection agreement, minimal network costs, and a high likelihood of going into service. There was a large amount of discussion on these units. The group was concerned that some of these units would not end up going into service. Many members felt that this list should not go into the model, but should be used for siting considerations instead. Staff will continue review of the resources and criteria with stakeholders to discuss these units. The ESWG also directed Staff to gather a list of resources for the Integrated System. (Attachment 10 – 2017 ITP10 NDR Additions)

Agenda Item 8 – 2017 ITP10 Load and Generation Review

Kelsey Allen (SPP Staff) opened the discussion by asking for any feedback or questions on the posted Load and Generation review workbooks. The group wanted it noted that all units other than nuclear should not be labeled as must run units. There was discussion on updating units that have received no member feedback with the ABB Nodal Simulation Ready Data. (Attachment 11 – 2017 ITP10 Load and Generation Data Submittals)

Kip Fox (AEP-Transource) made a motion; seconded by Don Le (NextEra Energy Transmission) to approve the Load and Generation Review for the 2017 ITP10 as posted. The motion passed with one abstention, Alan Myers (ITC Great Plains).

Agenda Item 9 – 2017 ITP10 Renewable Survey

Liz Gephardt (SPP Staff) presented the 2017 ITP10 Renewable Survey to the group. She opened the floor for discussion. Bennie Weeks (SPS) requested that their siting requirements be updated to New Mexico. This was the only change to the spreadsheet. (Attachment 12 – 2017 ITP10 Renewable Energy Survey)

Kip Fox (AEP-Transource) made a motion; seconded by Kurt Stradley (LES) to approve the Renewable Survey for the 2017 ITP10 as modified by SPS. The motion passed with one no vote, Leon Howell (OGE). Leon was concerned that by showing OGE's renewable requirement while Oklahoma has already met its state goal, resources could be added through the ITP process that should not be.

Agenda Item 10 – RCAR II Modeling Discussion

Josh Ross (SPP Staff) reminded the group of the previous discussion regarding the RCAR II modeling issues. The ESWG had directed staff to solve Issue #1, Trapped Generation Pockets, using a Hybrid Approach. Staff was also directed to bring back more information on another solution method, an Incremental Approach. This approach and results are detailed in the presentation. Josh also presented the results of Solutions to Issue #2, Load Pockets. For both of these issues, the suggested solutions do not address the problems. The group discussed other options, and wants to explore other alternatives. Staff was directed to continue working on these issue with a long term solution in mind. (Attachment 13 – RCAR Modeling Discussion)

ACTION ITEM: ESWG to re-evaluate the modeling issues related to load pockets and wind in the RCAR II, with a long term solution in mind.

Agenda Item 11 – 2017 ITP10 Scope

Agenda Item 11a – Data Inputs and Methodology

Kelsey Allen (SPP Staff) reviewed the assumptions that have already been approved for the 2017 ITP10. Discussion then moved on to the prototypes for the study: the ESWG approved the use of Lazard LCOE Analysis for prototype parameters at the June 3rd meeting. There was a lot of confusion on how the Lazard data was correlated and should be utilized for modeling. Staff was directed to gather more information and bring back a recommendation at a future meeting. (Attachment 14 – Data Inputs and Methodology)

Agenda Item 11b – Portfolio Consolidation Methodology

Kelsey Allen (SPP Staff) reviewed the consolidation methodologies used the in past ITP studies, from the 2010 ITP20 up to the 2015 ITP10. He then opened the floor for discussion and ideas on how to consolidate projects in the 2017 ITP10. Many options were discussed. Some liked the idea of a 'no-regrets' set of projects, and only choosing projects that show benefit in all three futures for consolidation. Another set of projects could be developed as a 'value' set which have value within the context of the ITP10 study but may be less certain than those selected as 'no regrets'. Consolidation methodology used by MISO was discussed; assign a weighting to each future, and each project is tested in all futures and a weighted sum of APC is calculated to compare against cost. The group agreed to continue the discussion at the July 9th meeting. (Attachment 15 – Consolidation Methodology)

Closing Items

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

List of action items from the meeting:

1. ESWG to re-evaluate the modeling issues related to load pockets and wind in the RCAR II, with a long term solution in mind.

The meeting was adjourned at 1:59 PM.

Respectfully Submitted,

Kelsey Allen
ESWG Secretary

Southwest Power Pool

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

June 18, 2015

AEP Office/Dallas, TX

• ATTENDANCE LIST •

Name	Company
Don Le	Nextera Energy Trans.
Kip Fox	AEP - Transource
Shawnee Claiborn-Pinto	PUC Texas
Alan Myers	ITC
Brett Hooton	SPP
Tim Soles	Oxy
Bennie Weeks	Xcel/SPS
Jason Schmidt	Xcel
Michael Massey	AECC
Natasha Henderson	CASEC
JULIANO FREITAS	SPP
Steve [illegible]	Wind Coalition
Walt Cecil	MoPSC

Name	Attendance	Company
Don Le	In Person	Nextera Energy Trans
Kip Fox	In Person	AEP-Transource
Shawnee Claiborn-Pinto	In Person	PUC Texas
Alan Myers	In Person	ITC Great Plains
Brett Hooton	In Person	SPP
Tim Soles	In Person	Oxy
Bennie Weeks	In Person	Xcel\SPS
Juliano Freitas	In Person	SPP
Kelsey Allen	In Person	SPP
Amber Greb	In Person	SPP
Jason Schmidt	In Person	Xcel
Michael Massery	In Person	AECC
Natasha Henderson	In Person	GSEC
Steve Gaw	In Person	Wind Coalition
Walt Cecil	In Person	MOPSC
Bethany King	In Person	Empire
Sam Loudenslager	In Person	SPP
Wayman Smith	In Person	AEP
Jim Jacoby	In Person	AEP
Bary Warren	On Phone	Empire
Andrew - Basin	Webex	
Anita	Webex	
Bill Leung (NPRB)	Webex	
Brian Buffington (Xcel)	Webex	
Deral Danis	Webex	
ed pfeiffer (quanta)	Webex	
Eric Burkey	Webex	
Gayle Freier	Webex	
Gimod Olapurayil	Webex	
Jason Doerr	Webex	
Jason Shook (GDS/ETEC)	Webex	
Jeff Knottek	Webex	
Jeremy Seveson (BEPC)	Webex	
Jerry Bradshaw (SPRM)	Webex	
Jim Krajecki (CES)	Webex	
Jody Holland	Webex	
John Boshears	Webex	
Jon Iverson	Webex	
Jon Shipman (OPPD)	Webex	
Jordan Schmick	Webex	
Josh Ross	Webex	
Kirk Hall	Webex	
Kurt Stradley (LES)	Webex	
Lauren Quillian	Webex	
Leon Howell	Webex	
Liz Gephardt (SPP)	Webex	

matthew stoltz BEPC	Webex
Meena Thomas	Webex
Michael Watt (OMPA)	Webex
Nikki Roberts	Webex
Pat Hayes	Webex
Pat McCool	Webex
Randy Collier (CUS)	Webex
Robert Safuto (Customized Energy Solutions)	Webex
Rosemary Mittal	Webex
Sandeep Baidwan	Webex
Tim Owens (NPPD)	Webex

Audrey White

From: Juliano Freitas
Sent: Thursday, June 18, 2015 8:11 AM
To: Myers, Alan; Kelsey Allen
Subject: FW: proxy to Kip Fox

Juliano Schramm Freitas
Manager, Economic Planning
(501) 688-1625

From: Paul Dietz [mailto:Paul.Dietz@westarenergy.com]
Sent: Thursday, June 18, 2015 7:52 AM
To: Juliano Freitas
Subject: proxy to Kip Fox

Juliano – I need to give my proxy to Kip Fox for today. Thanks.

Paul Dietz, FRM
Westar Energy
Manager, Quantitative Analytics
Paul.Dietz@WestarEnergy.com
O (785) 575-8079 C (785) 213-9238

ECONOMIC STUDIES WORKING GROUP

June 18th

8th Floor AEP Offices, Dallas, TX

• A G E N D A •

9:30am – 3:30pm

1. Administrative items
    a. Call to Order, Introductions ..... Alan Myers (5 minutes)
    b. Receipt of Proxies ..... Kelsey Allen (1 minute)
    c. Review of Agenda[1] ..... Alan Myers (1 minute)
2. Review of Past Action Items[1] ..... Kelsey Allen (5 minutes)
3. Transmission Planning Improvement Task Force (TPITF) Update ..... Alan Myers (10 minutes)
4. Study Schedules[1] ..... Juliano Freitas (15 minutes)
    a. 2017 ITP10
    b. SPP-MISO CSP
5. 2015 Regional Review Scope[1] (Approval Item) ..... Brett Hooton (30 minutes)
6. 2017 ITP10 Resource Additions[1] ..... All (15 minutes)
    a. Resource Addition Requests
    b. Non-Designated Resources
7. 2017 ITP10 Load and Generation Review[1] (Approval Item) ..... Kelsey Allen (15 minutes)
8. RCAR II Modeling Discussion[1] ..... Josh Ross (30 minutes)
9. 2017 ITP10 Scope ..... SPP Staff (150 minutes)
    a. Data Inputs and Methodology[1]
    b. Portfolio Consolidation Methodology[1]
    c. Futures Assumptions
10. 2017 ITP10 Renewable Survey[1] (Approval Item) ..... Liz Gephardt (15 minutes)
11. ESWG Charter Review[1] (Approval Item) ..... Kelsey Allen (30 minutes)
12. Closing Items ..... All (5 minutes)
    a. Summary of Action Items (Kelsey Allen)

[1] Background Material Included

b. Future Meetings

i. July 9th, 2015: 8th Floor AEP Offices, Dallas, TX

ii. August 19th – 20th, 2015: Magnolia Hotel, Denver, CO

iii. September 23rd, 2015: 8th Floor AEP Offices, Dallas, TX

[1] Background Material Included

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

June 18th, 2015

ID	Action Item	Date Originated	Status	Comments
057	SPP staff will write a straw-man procedure or portion of the ITP manual that deals with conventional and wind generation planning and siting within the ITP process. The process should be in place by the Spring of 2015.	August 23, 2012	In Progress Staff	A draft straw man will be provided to the group at the end of April for review.
076	ESWG will analyze the aggregate studies impact on the 2015 ITP10 study for transmission service request.	May 16, 2013	Complete ESWG Members	Document in the Scope how we intend to incorporate projects issued NTC after approved ITP powerflow models.
127	SPP Staff will develop a process to address interaction between SPP departments (Generation Interconnection, Aggregate Studies, Economic Planning, Steady State and Modeling) to detect basic errors in our models.	August 7, 2014	In Progress Staff	
128	SPP Staff will explain to ESWG Members the process to submit data to model on demand.	August 7, 2014	In Progress Staff	
142	Staff will work with Ventyx to determine a schedule and details for a PROMOD User's Group meeting to be hosted by SPP.	January 29th, 2015	In Progress Staff	Tentatibvely August 4-5 in Little Rock.
147	ESWG to re-evaluate the modeling issues related to load pockets and wind in the RCAR II.	March 31st, 2015	In Progress ESWG	
148	Staff to develop a formal member review procedure for review of data and results related to economic studies.	March 31st, 2015	In Progress Staff	
149	ESWG to discuss how staff will request generation and load data in future studies.	May 1st, 2015	In Progress ESWG	Staff to give update at July meeting.
150	ESWG to develop criteria for including non-firm generation in the ITP 10 and 20 models, within 60 days.	May 1st, 2015	~~In Progress~~Complete ESWG	

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151	Staff to look into optional software tools for use in ITP studies	May 20th, 2015	In Progress Staff	
152	Continue review resource siting methodology with utilities and develop a recommendation for the 2017 ITP10	May 20th, 2015	In Progress Staff	
153	ESWG to re-evaluate the modeling issues related to load pockets and wind in the RCAR II, with a long term solution in mind.	June 18th, 2015	In Progress ESWG	

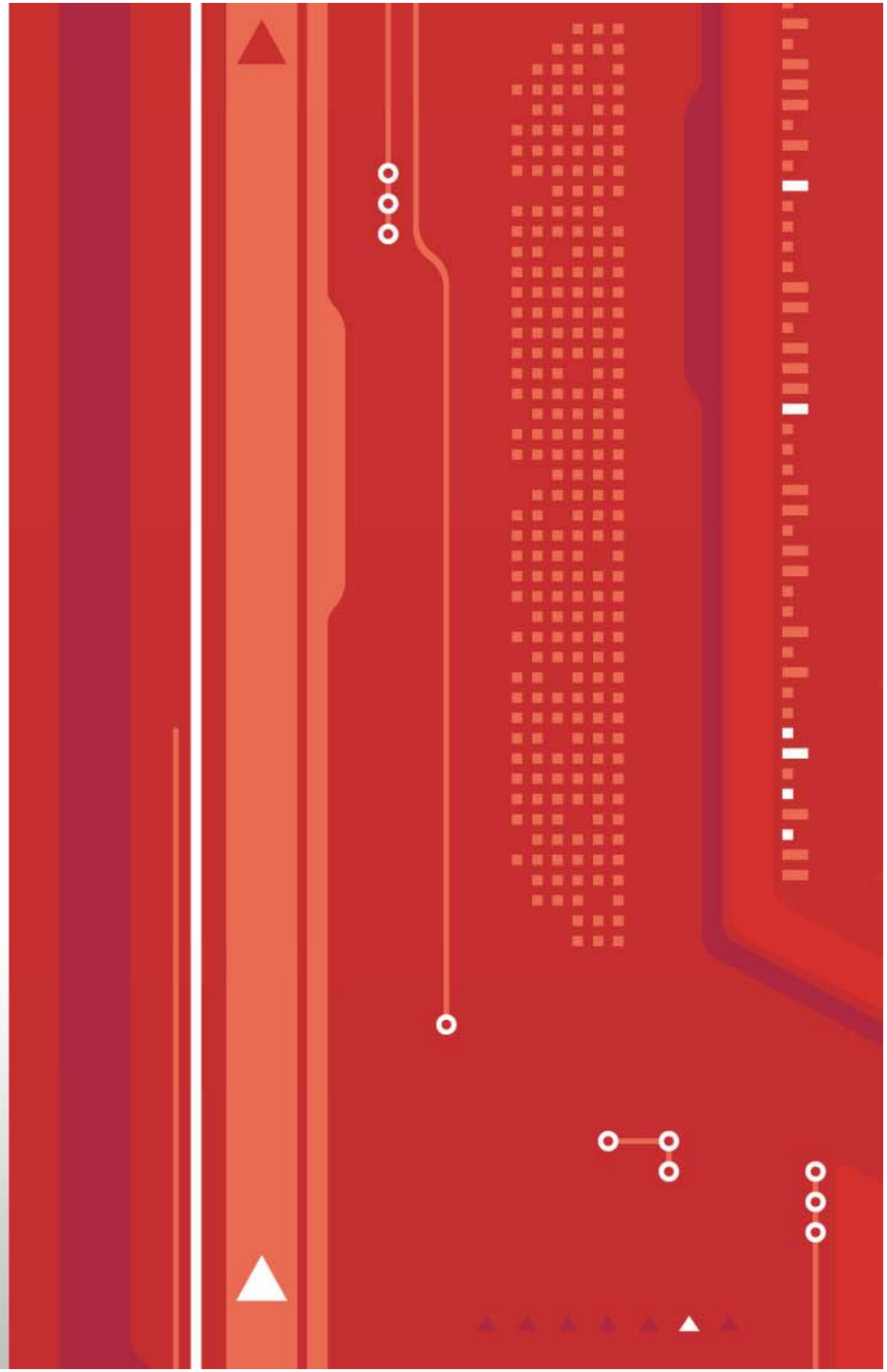
2017 ITP10 Schedule

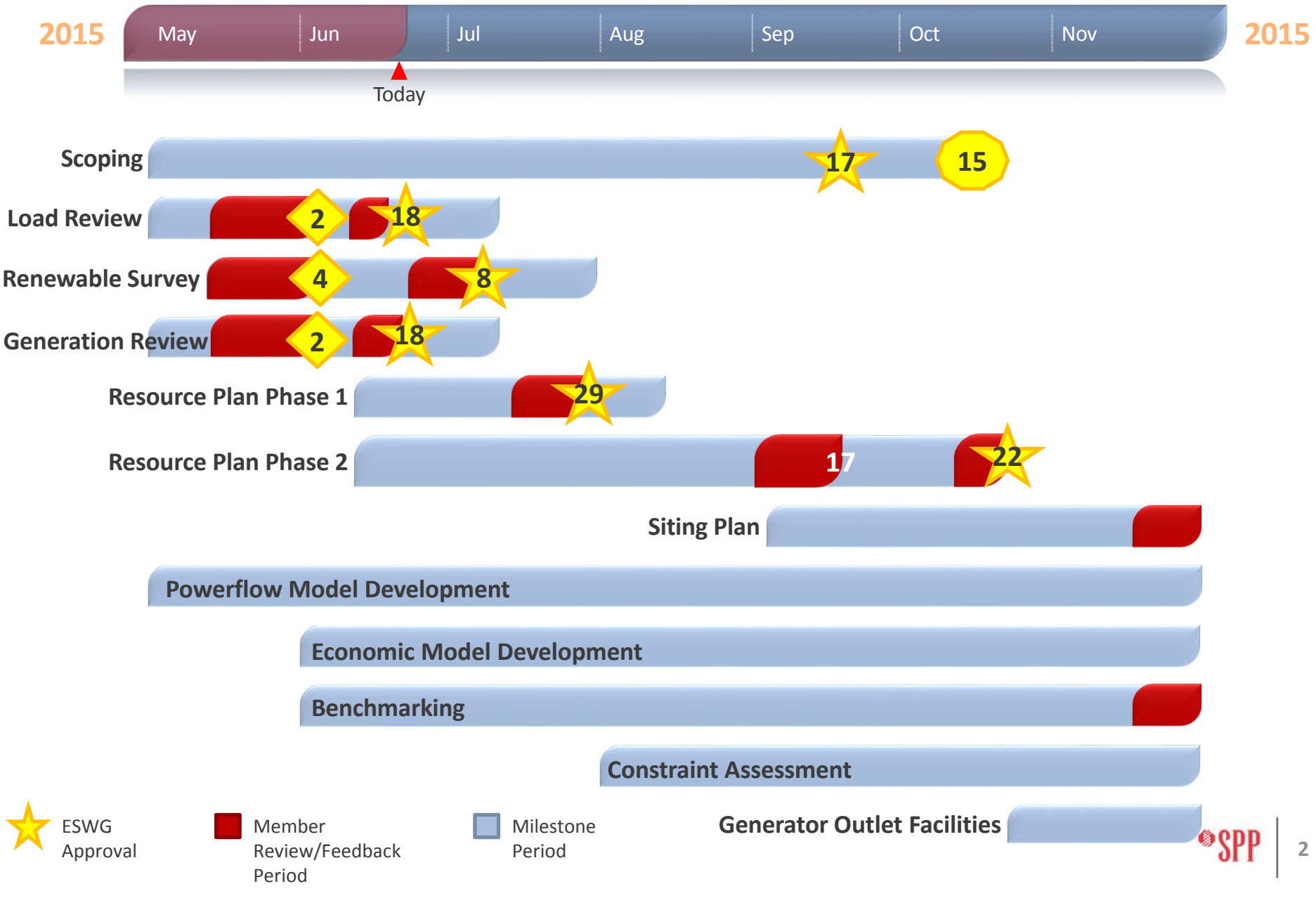
June 18th, 2015

ESWG

Juliano Freitas

SPP Southwest Power Pool




2015
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2015
Today
Scoping
17
15
Load Review
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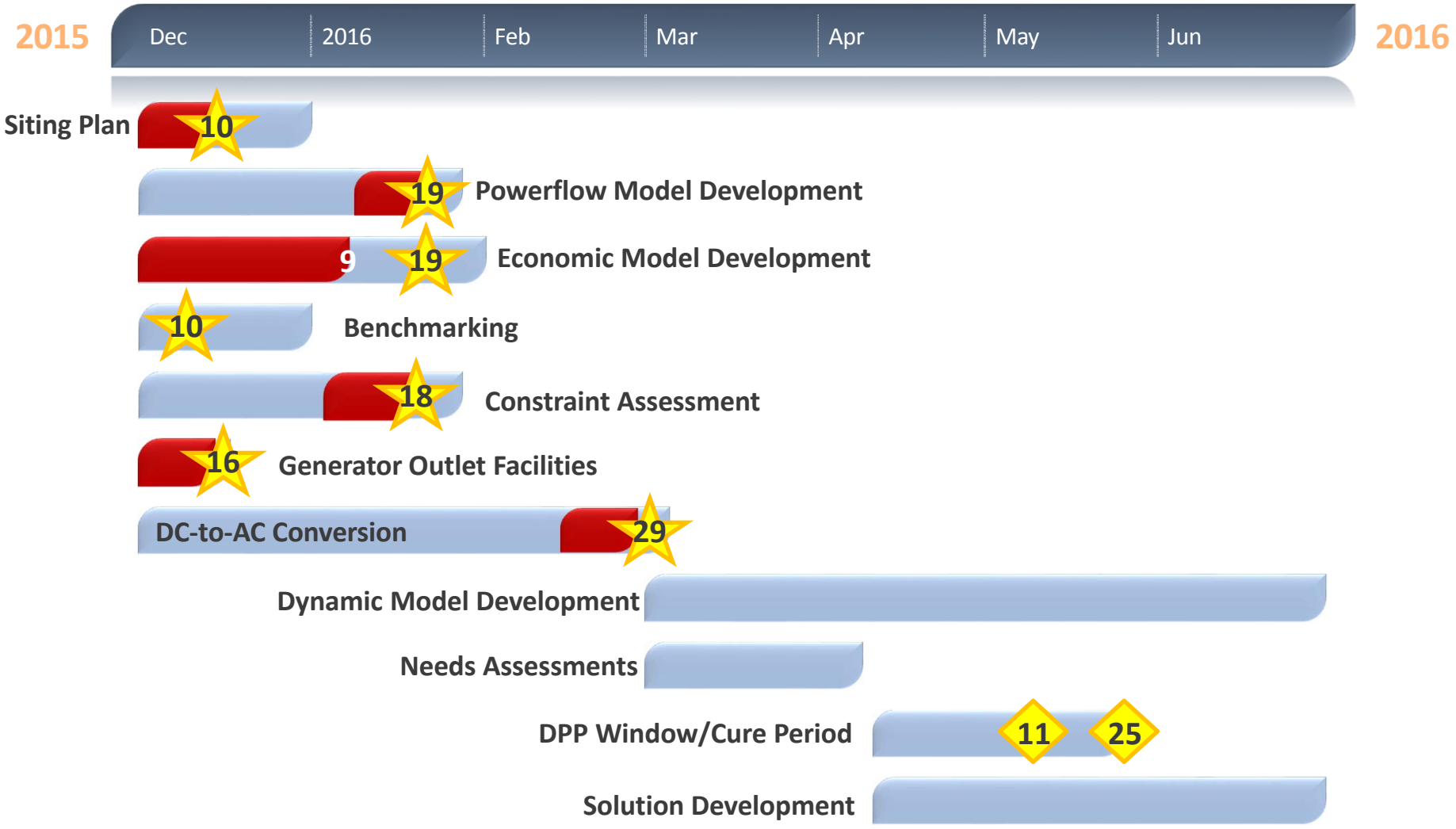
Renewable Survey
4
8
Generation Review
2
18
Resource Plan Phase 1
29
Resource Plan Phase 2
17
22
Siting Plan
Powerflow Model Development
Economic Model Development
Benchmarking
Constraint Assessment
Generator Outlet Facilities
ESWG Approval
Member Review/Feedback Period
Milestone Period


2015
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Siting Plan
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Powerflow Model Development
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Economic Model Development
10
Benchmarking
18
Constraint Assessment
16
Generator Outlet Facilities
DC-to-AC Conversion
29
Dynamic Model Development
Needs Assessments
DPP Window/Cure Period
11
25
Solution Development
ESWG Approval
Member Review/Feedback Period
Milestone Period

ESWG Approval

Member Review/Feedback Period

Milestone Period

ITP10 Milestone Schedule - Summary

Task Name	Start	Finish	Review Period	Feedback Cutoff	ESWG Approval
Scoping	October '14	October '15	Multiple Reviews		9/17/15
Load Review	February	July	Thru 6/2/2015	6/2/2015	6/18/15
Renewable Survey	May	July	Thru 6/4/15	6/4/2015	7/8/15
Generation Review	February	July	Thru 6/2/2015	6/2/2015	6/18/15
Resource Plan Phase 1	June	August	7/14/15 - 7/28/15		7/29/15
Resource Plan Phase 2	June	October	9/3/15 - 9/17/15		10/22/15
Siting Plan	September	December	11/12/15 - 12/10/15		12/10/15
Powerflow Model Development	May '15	January '16	1/4/16 - 1/19/16		January '16
Economic Model Development	June '15	January '16	12/21/15 – 1/9/16		January '16
Benchmarking	June	December	11/12/15 - 12/2/15		12/10/15
Constraint Assessment (TWG)	August '15	January '16	1/4/15 - 1/18/15		January '16
Generator Outlet Facilities	October	December	12/1/15 - 12/15/15		12/16/15
DC-to-AC Conversion	October	March '16	2/17/15 - 2/26/15		February '16
Needs Assessments	March '16	April '16			
DPP Window/Cure Period	April '16	May '16	4/11/16 - 5/11/16 5/12/16 - 5/25/16	5/11/2016	
Solution Development	April '16	July '16	7/7/16 - 7/14/16		
Project Grouping	August '16	September '16	9/9/16 - 9/16/16		Sept '16
Portfolio Consolidation	September '16	October '16	9/29/16 - 10/5/16		October '16
Project Staging	October '16	November'16	11/9/16 - 11/16/16		November '16
Sensitivity Analysis	October '16	December '16	11/18/16 - 12/2/16		December '16
Benefit Calculation	October '16	December '16	11/18/16 - 12/2/16		December '16
Draft Report	July '16	December '16	Multiple Reviews		December '16

Note: Most review period dates are subject to change based on future WG meeting schedules and do not include normal meeting material review times (generally 1 week).

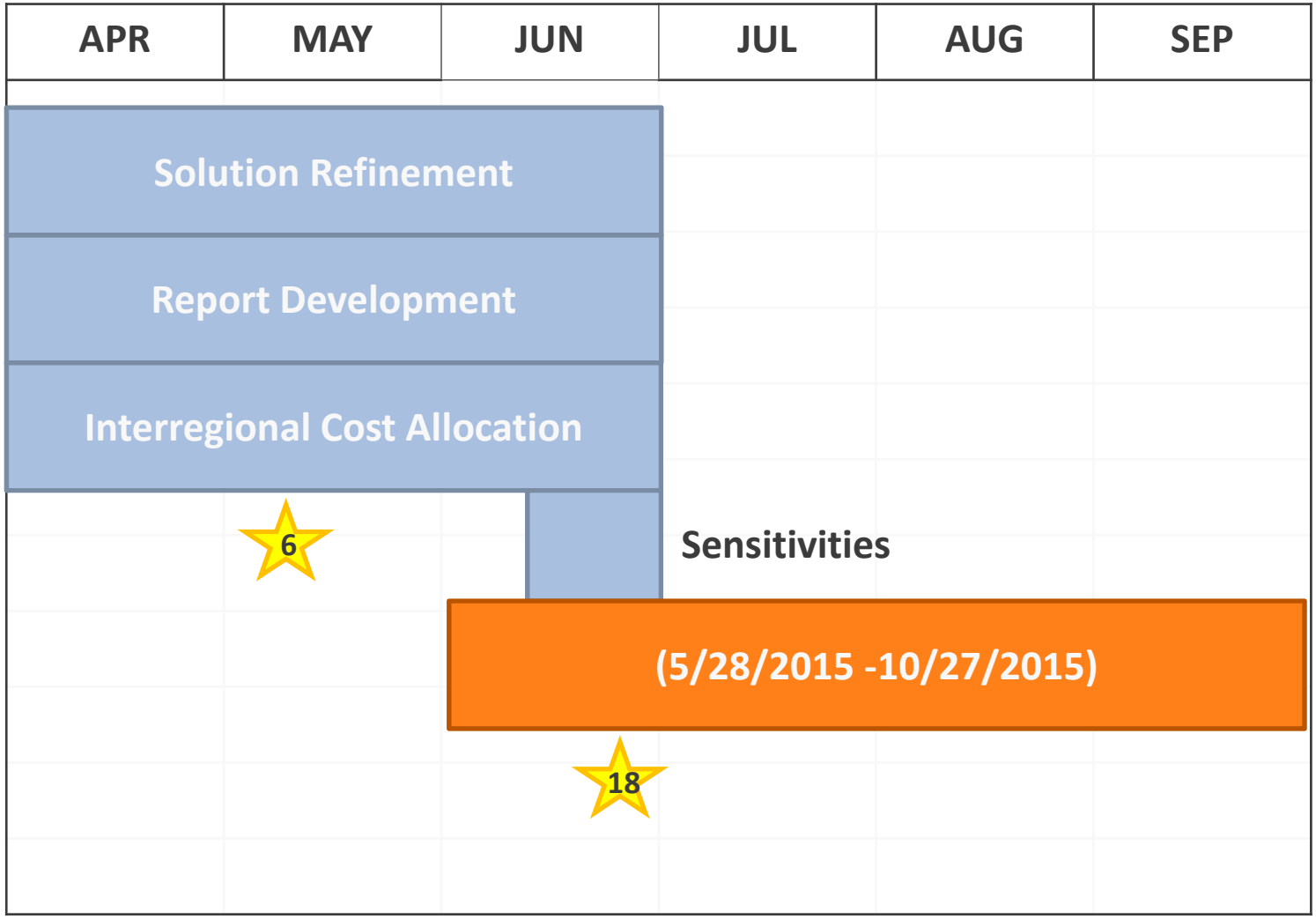
SPP-MISO CSP Study

Brett Hooton

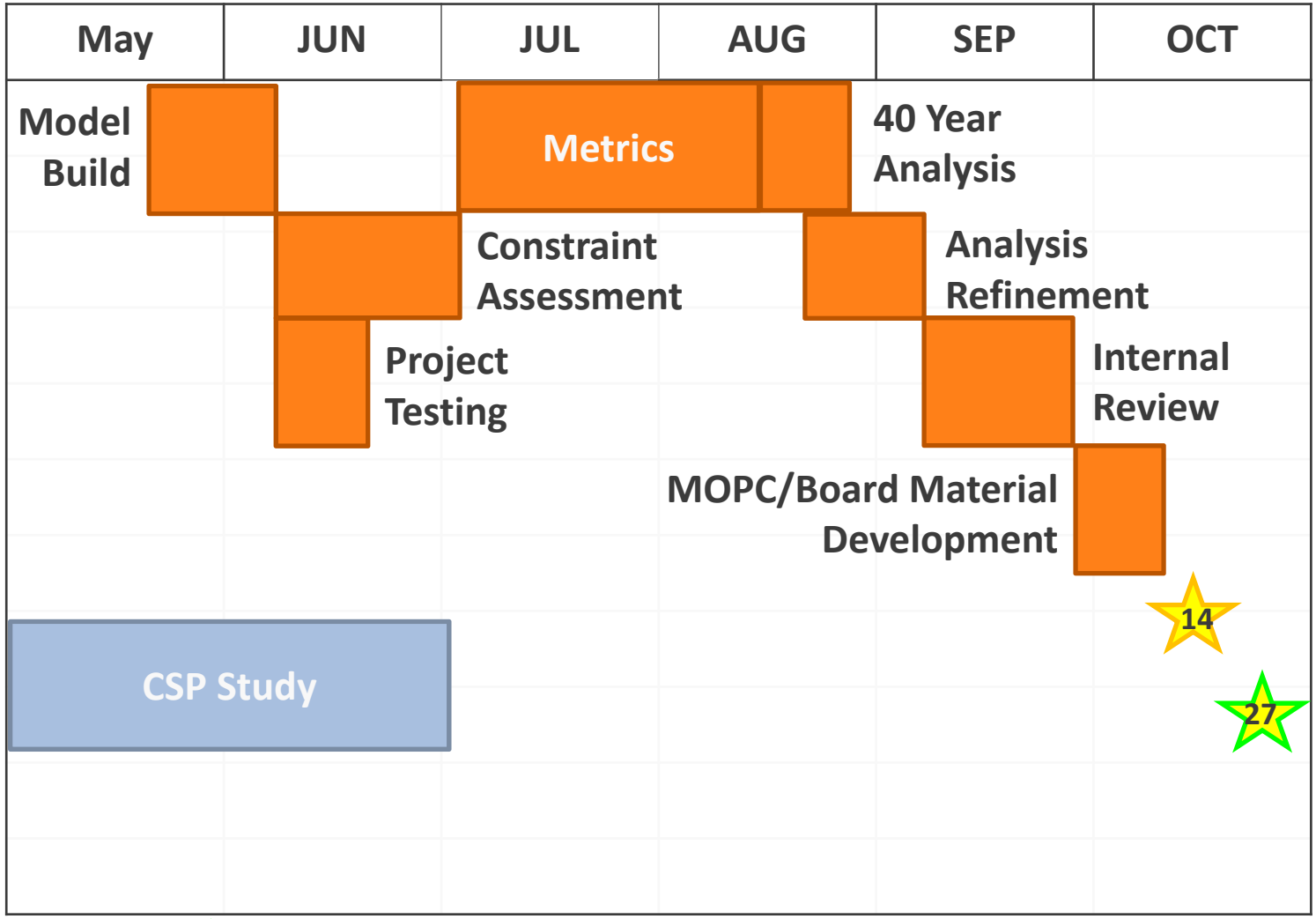
bhooton@spp.org

SPP Southwest Power Pool

MISO SPP CSP Milestone Schedule (Apr-Sep 2015)



Regional Review Milestone Schedule (May-Oct 2015)

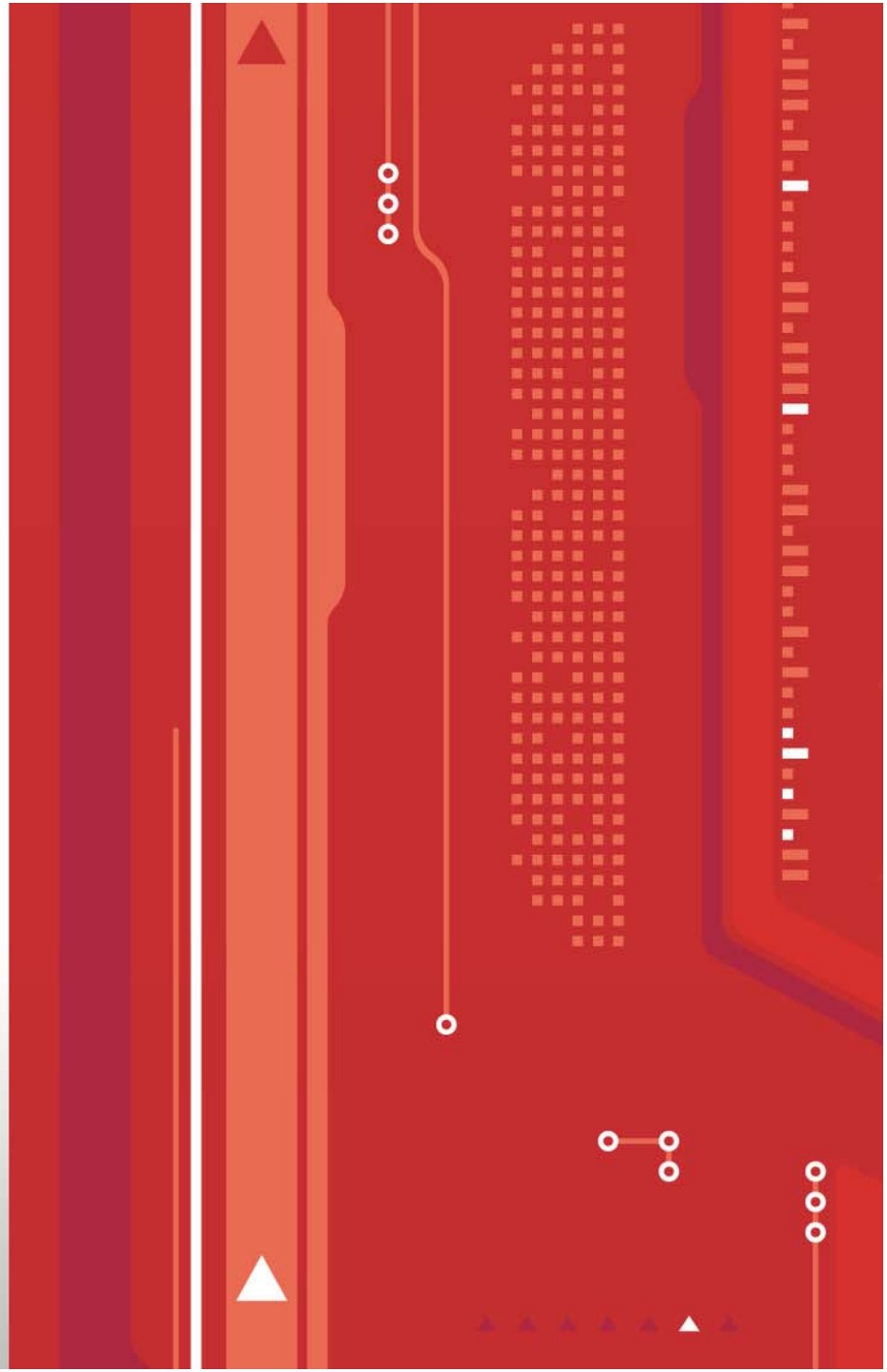


Regional Review Scope

Brett Hooton

bhooton@spp.org

SPP Southwest Power Pool



Objective

- Evaluate the recommended Interregional Projects
- Identify SPP benefits
- Determine if the project is more cost effective than any applicable regional solution
- Compare SPP benefits to SPP and determine if B/C ratio is greater than 1.0

Stakeholder Process

- ESWG
  - Approval of scope
  - Authority similar to the ITP
- TWG
  - Review constraint assessment, no-harm reliability analysis, reliability metric results
- MOPC, RSC, BOD

Stakeholder Review

- Abbreviated review
  - Not a full study
  - Already approved methodology utilizing stakeholder approved data from the ITP
  - 6 month process
- Economic model review
- Constraint assessment review

Study Process

- Assumption refinement
- Model refinement
- Constraint assessment
- Project evaluation
  - 40-year assessment
  - Cost effective analysis with regional projects
- Reliability no-harm evaluation

Data Inputs

- CBA including IS
- Assumptions primarily based on 2015 ITP10
  - Load
  - Resource plan
  - Topology with the approved ITP10 and ITPNT projects
  - Fuel prices
- Hurdle rates taken from the SPP-MISO CSP study

Analysis

- Constraint evaluation
- Solution evaluation
  - APC
  - Avoided or delayed reliability projects
  - Mitigation of transmission outage costs
  - Increased wheeling through and out revenue
- Study level cost estimates
  - Only considering SPP's portion of the cost which is determined in the SPP-MISO CSP Study
- 40-year analysis

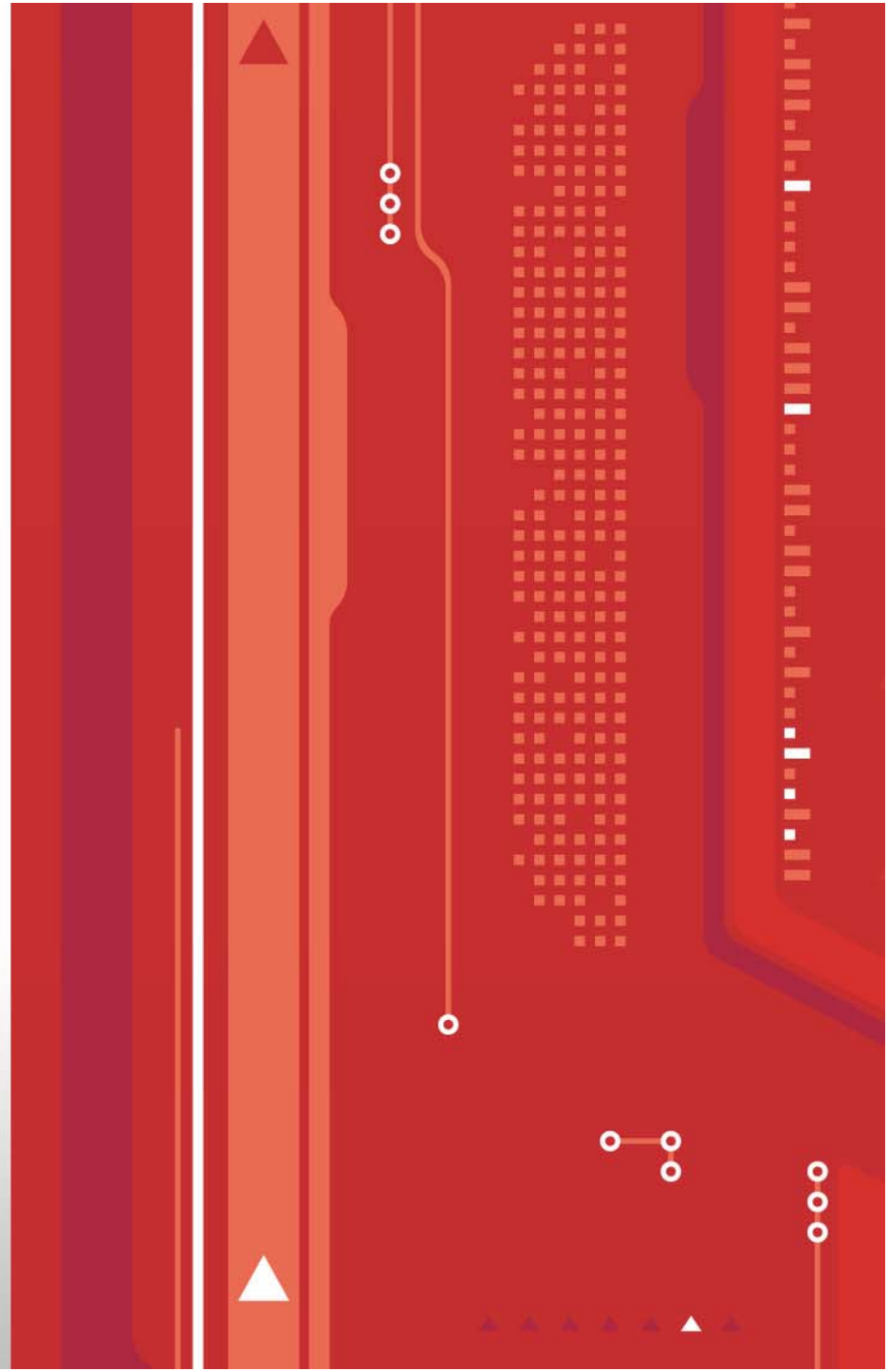
Timeline

2015 Regional Review	Group(s) to review/endorse	Start Date	Completion Date
Model Refinement	ESWG	June 2015	June 2015
Constraint Review	TWG	June 2015	June 2015
APC Calculation	ESWG	July 2015	July 2015
Other Metrics	ESWG	July 2015	August 2015
40-Year Financial Assessment	ESWG	August 2015	August 2015
No-Harm Reliability Evaluation	TWG	July 2015	August 2015
Analysis Refinement	ESWG	August 2015	September 2015
Project Recommendations	ESWG	September 2015	September 2015
Project Endorsement	MOPC	October 2015	October 2015
Project Approval	BOD	October 2015	October 2015

2017 ITP10
Resource Additions

June 18th, 2015

ESWG



RESOURCE INCLUSION METHODOLOGY

ITP10/20 Resource Inclusion Background

6/3 ESWG Approval:

Generation interconnection resources and facilities are included in the ITP models if they have an executed Interconnection Agreement (IA) that is not on suspension and minimal network upgrade costs. Generation capacity will automatically be designated to any utility once there is an executed transmission service agreement.

Proposed resources and facilities that have a high probability of going into service (i.e. If a planned generating resource does not have a TSR filed service agreement but does have a high probability of going into service) will be designated to a utility if it meets all of the following requirements:

ITP10/20 Resource Inclusion Background

- A Resource Addition Request (RAR) has been sent to SPP requesting the generation capacity be included into the ITP;
- The generating resource has a FERC-filed IA not on suspension or FERC-filed interim IA; and
- The generating resource will have firm contract for delivery in one or more forms:
  - The generating resource has entered the Aggregate Study or equivalent; Transmission Owner transmission service study publicly posted on OASIS and has a completed facility study that is waiting for final results without unmitigated third party impacts; or
  - The utility to be designated will own and operate the resource or has procured a Purchase Power Agreement (PPA) from the generation owner

ITP10/20 Resource Inclusion Background

- If a generating resource does not meet all the above requirements, a RAR for generation capacity to be included in a long-term ITP assessment can be made to ESWG on a case by case basis. ESWG will take into account the following, but not limited to, additional points:
  - A Definitive Interconnection System Impact Study Agreement (DISIS) for the generating resource has been executed, an interim IA has been requested when the DISIS was posted and a final IA was FERC filed when applicable
  - An RFP for the generating resource has been awarded, if applicable.

- All other resource expansion needs will be determined through the SPP resource planning process

NON-FIRM RESOURCE INCLUSIONS

Results

- Non-Designated Resources (NDR)

Total Wind Additions (MW)	3187.77
Total Non-Wind Additions (MW)	74.4
Total Additions (MW)	3262.17

- Resource Addition Requests (RAR)

Staff Recommendation

SPP recommends the ESWG approve the addition of the Non-Designated Resources and Resource Addition Requests into 2017 ITP10 as posted.

BASIN ELECTRIC POWER COOPERATIVE

A Touchstone Energy® Cooperative

ITP10 Waiver Request for BEPC generation

Jeremy Severson - BEPC

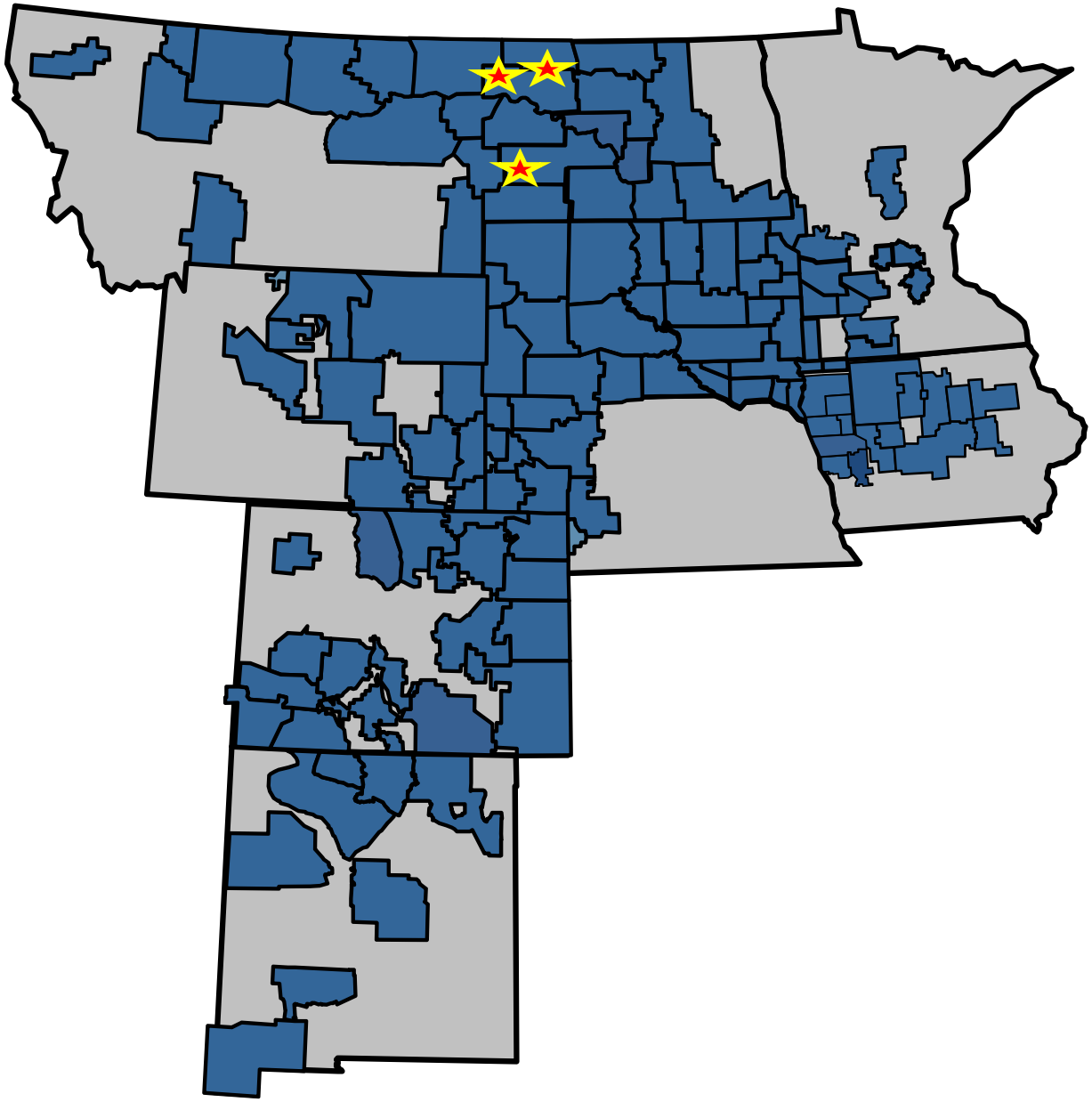
June 18th 2015

Purpose

- Waiver request to ESWG for SPP to include generation in ITP10 models
  - Generation
    - Pioneer “Phase 3”
    - Heart River Wind
    - Lindahl Wind

BASIN ELECTRIC POWER COOPERATIVE

Locations



Pioneer

- 12 Reciprocating Engines located at the Pioneer Generation Station
- WAPA Oasis:
  - GI-1406
  - TSR #79793892
- GI and TSR to set to have MAPP acceptance July 20th 2015
- Construction underway
  - Set for in service July 2016

BASIN ELECTRIC POWER COOPERATIVE

Lindahl Wind

- 150 MW wind request
  - Lindahl ND
- WAPA Oasis:
  - GI-1410
  - TSR #80344105
- Signed PPA with BEPC
- GI and TSR to set to have MAPP acceptance by October 2015
- Scheduled in service Fall 2016

BASIN ELECTRIC POWER COOPERATIVE

Heart River

- 150 MW wind request
  - Belfield ND
- WAPA Oasis:
  - GI-1414
  - TSR #80339077
- Signed PPA with BEPC
- GI and TSR to set to have MAPP acceptance by October 2015
- Scheduled in service Fall 2016

BASIN ELECTRIC POWER COOPERATIVE

Recommendation

- Motion:
  - Basin Electric requests the ESWG approve a waiver for inclusion of the 3 generation facilities which include GI-1406 (Pioneer Recips), GI-1410 Lindahl Wind), and GI-1414 (Heart River Wind) in the 2016 ITP10 models.

BASIN ELECTRIC POWER COOPERATIVE

Questions

- Contact: Jeremy Severson
- jseverson@bepc.com
- 701-557-5707

Thanks

GI Number	Nearest Town or County	State	CA	In-Service Date	CO Date	Capacity
GEN-2007-062	Harper County	OK	OKGE	12/31/2011		765
GEN-2008-017	Scott County	KS	SUNC	3/1/2012		300
GEN-2008-092	Ellis County	KS	MIDW	12/1/2011		201
GEN-2008-123N	Webster County	NE	NPPD		12/1/2015	89.7
GEN-2008-124	Ford County	KS	SUNC	1/1/2016		200.1
GEN-2009-008	Ness County	KS	MIDW	9/1/2011		199.5
GEN-2010-003	Coffey County	KS	WERE	12/31/2011		100.8
GEN-2010-041	Du Bois	NE	OPPD	12/31/2011	12/1/2015	10.5
GEN-2010-046	Albernathy	TX	SWPS	5/1/2013	6/1/2016	56
GEN-2011-025	Lorenzo	TX	SWPS	6/30/2012	12/22/2015	80
GEN-2011-049	Beckham County	OK	OKGE	12/31/2013	12/15/2015	250.7
GEN-2012-020	Abernathy	TX	SWPS	9/30/2015	6/30/2016	478
GEN-2012-028	Kiowa	OK	WFEC	12/1/2014	10/1/2015	74.8
GEN-2012-024	Ford	KS	SUNC	12/31/2015		180
GEN-2013-002	Lancaster	NE	LES	12/31/2013		50.6
GEN-2013-019	Lancaster	NE	LES	6/30/2014		73.6
GEN-2013-022	Quay	NM	SWPS	5/1/2015	5/1/2015	25
GEN-2013-029	Grant	OK	OKGE	12/15/2015		300
GEN-2014-002	Dewey County	OK	OKGE	12/31/2014		10.5
GEN-2014-003	Blaine	OK	OKGE	12/31/2014		15.8
GEN-2014-004	Jefferson	NE	NPPD	12/31/2014		4
GEN-2014-005	Caddo	OK	OKGE	12/31/2014		5.7
~~GEN-2014-013~~	~~Antelope / Boone~~	~~NE~~	~~NPPD~~	~~12/31/2014~~		~~73.5~~

Generation Type	Gen POI	In ITPNT PF?	In ITP10 Gen Review?	ITP10 2025 Addition
Wind	515375	No	No	765
Wind	531465	200.1	No	99.9
Wind	530584	No	No	**100.8**
Wind	560134	No	No	89.7
Wind	539803	No	No	200.1
Wind	530582	No	No	199.5
Wind	532799	No	**Addition to Waverly Wind**	100.8
Wind	646399	No	No	10.5
Gas	525830	No	No	56
Wind	562004	No	No	80
Wind	515458	No	No	250
Wind	525830	No	No	477.1
Wind	520925	No	No	74.8
Wind	539800	No	No	180
Wind	560746	No	No	50.6
Wind	560746	No	No	73.6
Solar	524502	No	No	18.4
Wind	515543	No	No	300
Wind	515407	No	**Addition to Mammoth Plains**	10.5
Wind	515407	No	**Addition to Seiling Wind**	15.04
Wind	640426	No	Addition to Steele Flats	3.96
Wind	514801	No	Addition to Minco III	5.67
~~**Wind**~~	~~**640540**~~	~~**No**~~	~~**No**~~	~~**73.5**~~

Total Additions	**3161.97**
Total Wind Additions	**3087.57**
Total Non-Wind Additions	**74.4**

Gen Name	Machine Bus1	Bus1 Capacity	Machine Bus2	Bus2 Capacity	Machine Bus3
G07-62	560221	191.25	560222	191.25	560223
WDCTWF-1	531610	300			
G08-92	560234	201			
G08-123N	560137	89.7			
G08-124	560432	200.1			
G09-08	560140	199.5			
G10-03	560248	100.8			
G10-41	560326	10.5			
G10-46	560331	56			
G11_025	562007	80			
G11_049_3	562074	250			
G12-020	562270	245.3	562269	231.8	
G12-028	562277	74.8			
G12-024	562298	180			
G13_002_3	560749	50.6			
G13-019	562405	73.6			
ASGI13_02_3	560759	18.4			
G13-029	562429	300			
G0721_G1402	560648	10.5			
G0744_G1403	560175	15.04			
S. FLATS GEN	640555	3.96			
MNCWND31	515550	5.67			
~~G14_013_3~~	~~562500~~	~~73.5~~			

Bus3 Capacity	Machine Bus4	Bus4 Capacity	Substation or Line
191.25	560224	191.25	Woodward EHV 345kV
			Setab 345kV
			Post Rock 230kV
			Tap Pauline - Hildreth (Rosemont) 115kV
			Ironwood 345kV
			South Hays 230kV
			Waverly 345kV
			S1399 161kV
			TUCO Interchange 230kV
			Tap Floyd County - Crosby County 115kV
			Border 345kV
			TUCO 230kV
			Gotebo 69kV
			Sheldon - Folsom & Pleasant Hill 115kV CKT 2
			Sheldon - Folsom & Pleasant Hill 115kV Ckt 2
			Norton 115kV
			Renfrow 345kV
			Tatonga 345kV (GEN-2007-021 POI)
			Tatonga 345kV (GEN-2007-044 POI)
			Steele City 115kV (GEN-2011-018 POI)
			Minco 345kV (GEN-2011-010 POI)
			~~Meadow Grove (GEN-2008-086N2 Sub) 230kV~~

Status	Network Upgrade Costs
IA FULLY EXECUTED/ON SCHEDULE	$2,707,042
IA FULLY EXECUTED/ON SCHEDULE	$8,304,207
IA FULLY EXECUTED/ON SCHEDULE	$599,380
IA FULLY EXECUTED/ON SCHEDULE	$5,950,000
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$13,842,416
IA FULLY EXECUTED/ON SCHEDULE	$478,861
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$4,013,283
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$1,500,377
IA FULLY EXECUTED/ON SCHEDULE	$197,972
IA FULLY EXECUTED/ON SCHEDULE	$1,138,472
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$1,588,977
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
IA FULLY EXECUTED/ON SCHEDULE	$0
~~IA FULLY EXECUTED/ON SCHEDULE~~	~~$0~~

Comments

Buckeye in Gen Review, LES has 100.2 MW PPA

Prairie Breeze II in Gen Review

Important Notes:

• All data contained in this spreadsheet is publically available data, which was derived from stakeholder
• This data will be utilized in SPP economic models, which will be posted publicly. **PLEASE DO NOT PROVIDE**

Economic Model Demand Group Review Instructions:

PSSE-PROMOD Load Mapping

• The '*PSSE-PROMOD Load Mapping* ' tab contains the information supplied during the MDWG review of Economic Model Load Mapping information mapped to the models developed from information supplied during
• Utilize the '*Economic Load Ownership Legend* ' tab as a guide. The PSSE Load Owner tab from the SPP MDWG Data Submittal workbook was used to map current Economic Demand Groups, adding necessary combinations of bus area, load area, or load ID to match unique demand groups. These mappings may not be all inclusive,

Peak Load

bus load totals (MW) based on the latest ITP powerflow models currently being developed and the demand group mappings provided by stakeholders during the MDWG Economic Load Review. These load totals will be used to develop the coincident SPP peak load for the AC powerflow models based on PROMOD load curves and to calculate peak load with losses. The data for 2015, 2016, 2017, 2020, and 2025 have been sumed directly from the powerflow models and represent the load total of the peak season for each company (demand group)

Annual Load Factor

• Review the '*Annual Load Factor* ' tab for each Demand Group for years 2014-2035. These numbers were calculated from the data provided by stakeholders during the 2015 ITP10 study. These will be used to calculate

Annual Loss Factor

• Review the '*Annual Loss Factor* ' tab for each Demand Group for years 2014-2035. These numbers were calculated from the data provided by stakeholders during the 2015 ITP10 study. These will be used to calculate

Monthly Peak & Energy

• Review the '*Monthly Peak & Energy* ' tab for each Demand Group for a typical year. These numbers were developed from the data provided by stakeholders during the 2015 ITP10 study. The monthly peak values should represent a typical percentage of annual peak load that is reached in each month. These values are used

Load Review Assumptions/Notes:

• Make changes directly in the workbook, highlight them in yellow
• Feel free to provide any comments in the "Member Comments" column
• Demand Group: a group of loads "owned" by a common company or companies; a group of loads with a unique hourly load curve profile and annual energy requirements (non-conforming loads do not follow hourly
• Loads from the summer peak 2015, 2020 and 2025 of the 2015 Series MDWG Powerflow Pass 5 Models were mapped to Economic Model Demand Groups according to the structure used in the SPP economic models
• Bus loads from the PSSE model were narrowed down to only include load owned by companies within the SPP. If any load is mislabeled or any load is missing from the supplied data, please inform SPP Staff.

Contact Info:

Please direct questions to:
Kelsey Allen (kallen@spp.org, 501-614-3593)

Amber Greb (agreb@spp.org, 501-614-3561)

General Information

Please provide the data for each tab per the instructions below.
Please send all questions and feedback for this survey to Liz Gephardt (lgephardt@spp.org, 501-482-2236) ***by June 4, 2015*** .
Several days prior to the submittal deadline, Staff will contact those companies having not yet responded based on the information included in the Utility Contacts tab.
DISCLAIMER: The data supplied by SPP Members in response to this survey is solely intended to support the development of SPP transmission planning models and may not be applicable beyond the scope of the SPP Planning processes.

Renewable MANDATES & GOALS Tab

General

This survey is to be filled out with respect to each utility by state. If a utility is in multiple states, there should be a row of information for each state in which the utility has a Mandate or Goal.
Table 2 is already populated with the utilities by state as it was filled out in the 2015 ITP10. If necessary, please update the requirement type (Mandate/Goal) and/or the requirement's unit of measure (Capacity (MW)/Energy(MWh)).

If there is a requirement that is not already the table, insert this new utility information ***at the bottom*** of the table. Please do not insert or delete rows.
The Siting Considerations will be used to feed any additions from the Renewable Resource Plan into Strategist for the Conventional Resource Plan.
The information in this tab is completely separate from the existing renewables submitted through the 2017 ITP10 Generation Review -- they are not additive. The existing renewables submitted through the Generation Review will be used to help meet the submitted Mandates and Goals.

Mandates Data

Renewable Statutory/Regulatory Mandates are as defined below. This shall include only the expected impacts of existing mandates, NOT any new mandates that may be in place in future years.
Definition of a Renewable Statutory/Regulatory Mandate: Any currently effective state or federal statute or local law or any regulatory rule, directive or order which requires that an electric utility, subject to the jurisdiction of that state, federal, or local law or regulatory body, must use a certain level (e.g. percentage) of renewable energy to serve load. As used in this Definition, a regulatory body is: 1) Any state or federal regulatory body with authority over rate-setting, resource planning, and other policy matters for electric utilities within its jurisdiction; or 2) An elected City Council, a publicly-elected Board of Directors, a Board of Directors appointed by a publicly-elected official(s), or other governing body as defined by the appropriate governing statutes with jurisdiction over rates, resource planning and other regulatory matters.
Additional renewable energy requirements related to any expected future changes in these statutes, laws, or regulatory rules, directives, or orders are *not* to be included under Renewable Statutory/Regulatory Mandate. In calculating the level of Renewable Statutory/Regulatory Mandate MWs or MWhs for the expected futures, only the levels required under the definition above, subject to the expected changes in load, should be reflected.

In completing this section, please provide at the bottom of the page or on a separate page: 1) A recitation of all of the state or federal statutes or local laws or the regulatory rules, directives or orders (with all appropriate cites included) upon which the MWs or MWhs included under Renewable Statutory/Regulatory Mandate are based; 2) A recitation of all of the state or federal statutes or local laws or the regulatory rules, directives or orders (with all appropriate cites included) which impose any penalties for failure to meet the Renewable Statutory/Regulatory Mandate; and 3) The calculation of the MWs or MWhs included under Renewable Statutory/Regulatory Mandate, complete with an explanation of all assumptions used in that calculation.

Fill in any mandates as they are required in the statute, law, rule, etc., whether in energy or capacity. Specify whether the numbers submitted are reflective of capacity (MW) or energy (MWh) in Column M. The cells in which to enter the requirement values (in Columns P and Q) can not be filled in until the unit of measure is selected.

Table 1 gives the utilities and MWs or MWhs of annual renewable capacity or energy provided in the 2015 ITP10 survey (2019 and 2024 Mandates). This data is provided for reference.

Table 2 provides a place to put in renewable energy numbers for 2020 (Year 5) and 2025 (Year 10) based on existing renewable statutory/regulatory mandates.

If the column for 2020 is not filled out, 50% of the difference between existing and the 2025 mandate will be used.

Goals Data

Renewable Statutory/Regulatory Goals are as defined below. This shall include only the expected impacts of existing goals, NOT any new goals that may be in place in future years.

Definition of a Renewable Statutory/Regulatory Goal: Any currently effective state or federal statute or local law or any regulatory rule, directive or order which establishes an aspirational goal to promote the use of a certain level (e.g. percentage) of renewable energy to serve load for an electric utility (subject to the jurisdiction of that state, federal, or local law or regulatory body). This definition does not include renewable energy used by a utility pursuant to Renewable Statutory/Regulatory Mandates, as reported above. As used in this Definition, a regulatory body is: 1) Any state or federal regulatory body with authority over rate-setting, resource planning, and other policy matters for electric utilities within its jurisdiction; or 2) An elected City Council, a publicly-elected Board of Directors, a Board of Directors appointed by a publicly-elected official(s), or other governing body as defined by the appropriate governing statutes with jurisdiction over rates, resource planning and other regulatory matters.

Additional renewable energy goals related to any expected future changes in these statutes, laws, or regulatory rules, directives, or orders are *not* to be included under Renewable Statutory/Regulatory Goal. In calculating the level of Renewable Statutory/Regulatory Goal MWs or MWhs for the expected futures, only the levels required under the definition above, subject to the expected changes in load, should be reflected.

In completing this section, please provide at the bottom of the page or on a separate page: 1) A recitation of all of the state or federal statutes or local laws or the regulatory rules, directives or orders (with all appropriate cites included) upon which the MWs or MWhs included under Renewable Statutory/Regulatory Goal are based; and 2) The calculation of the MWs or MWhs included under Renewable Statutory/Regulatory Goal, complete with an explanation of all assumptions used in that calculation.

Fill in any goals as they are required in the statute, law, rule, etc., whether in energy or capacity. Specify whether the numbers submitted are reflective of capacity (MW) or energy (MWh) in Column M. The cells in which to enter the requirement values (in Columns P and Q) can not be filled in until the unit of measure is selected.

Table 1 gives the utilities and MWs or MWhs of annual renewable capacity or energy provided in the 2015 ITP10 survey (2019 and 2024 Goals). This data is provided for reference.

Table 2 provides a place to put in renewable energy numbers for 2020 (Year 5) and 2025 (Year 10) based on existing renewable statutory/regulatory goals.

If the column for 2020 is not filled out, 50% of the difference between existing and the 2025 goal will be used.

RCAR Modeling Discussion

June 18th, 2015

ESWG

SPP Southwest Power Pool

Helping our members work together to keep the lights on... today and in the future

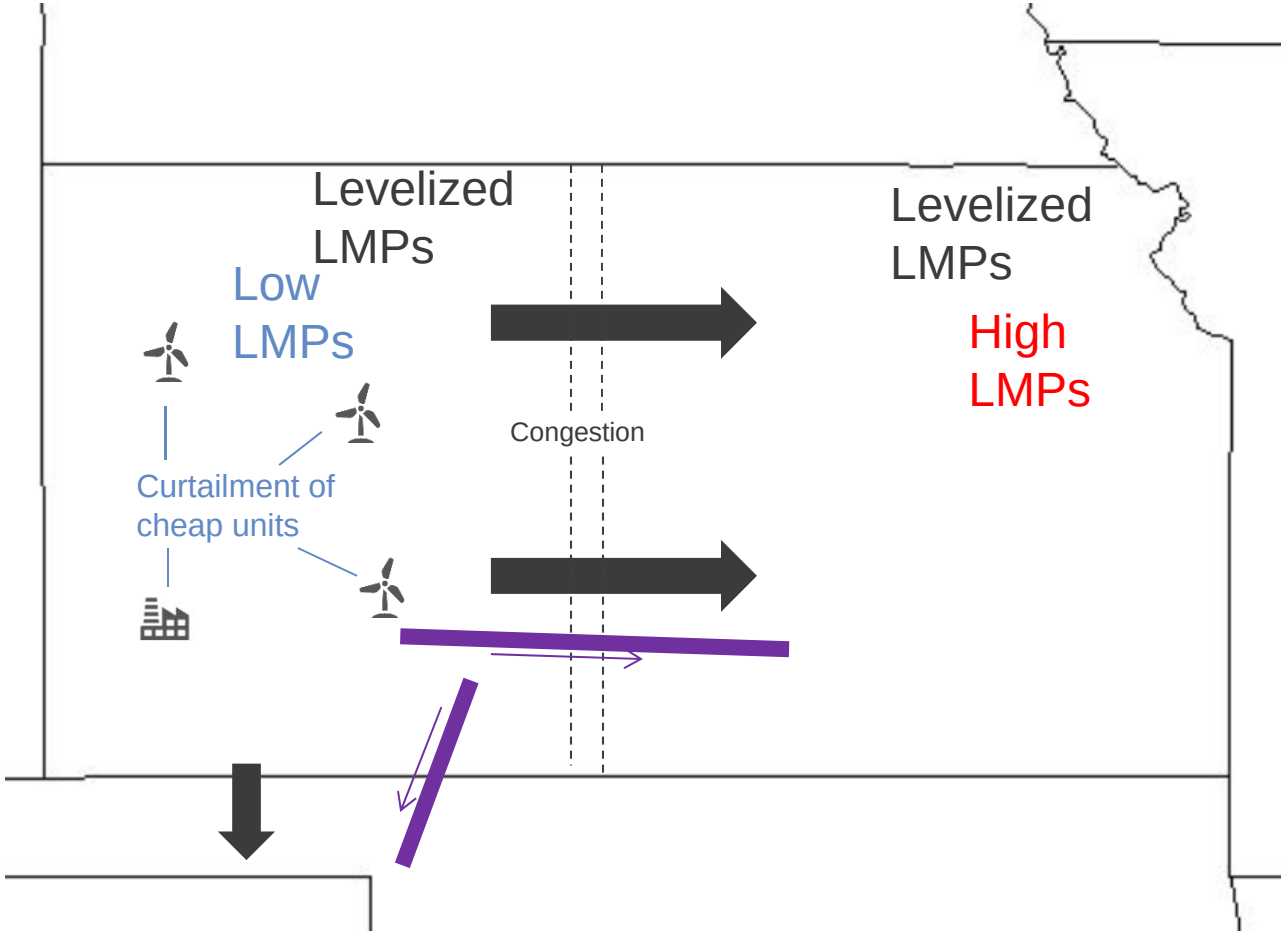
Economic Modeling Issues – Previous Discussion

- Jan – Feb 2015: Discussed two technical modeling issues with RCAR base model, and approaches were approved to address them
- It was noted this was a short-term approach for the RCAR schedule at that time and that the group would like more time to develop long-term approaches to these issues

Economic Modeling Issues

- With the change in RCAR timeline, we have more time to work on these issues
- Today
  - Review prior work and ideas
  - Present a little bit of new material
  - New ideas are welcome
- Future meetings
  - Further refinement and discussion
  - Finalize approaches

Issue #1: Trapped Generation Pockets



Load and gen are identical
between base and change cases

Base Case

Lack of transmission ->
Curtailment of cheap units ->
Large LMP differential ->
Low LMP purchase prices in west KS ->
Low APC

Change Case

Robust transmission ->
Cheap units generate more->
Levelized LMPs ->
Moderate LMP purchase prices in west KS ->
Moderate APC

Under current approach:

- APC savings is negative for west KS zones, even though the new transmission unleashes more of their cheap generation.
- Conversely, APC savings for zones to the east will be inflated due to artificially high LMPs in the base case

Issue #1: Trapped Generation Pockets

- West KS zones are showing negative APC savings, even though their more expensive generation is being displaced with cheaper generation in the change case
  - This issue is created due to the modeling approach adopted in the RCAR process
  - When the economic models are transmission-deficient, current modeling practices overstate the separation of prices between zones
    - Impact more pronounced in smaller zones
  - Model does not recognize that wind interconnection was granted subject to transmission upgrades

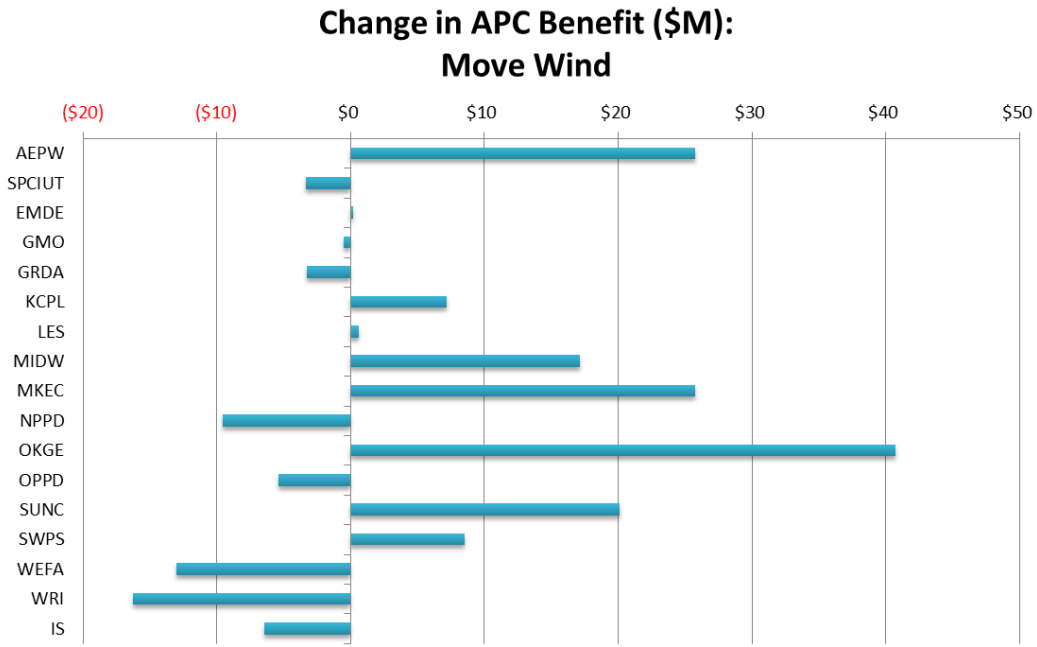
Issue #1: Solutions

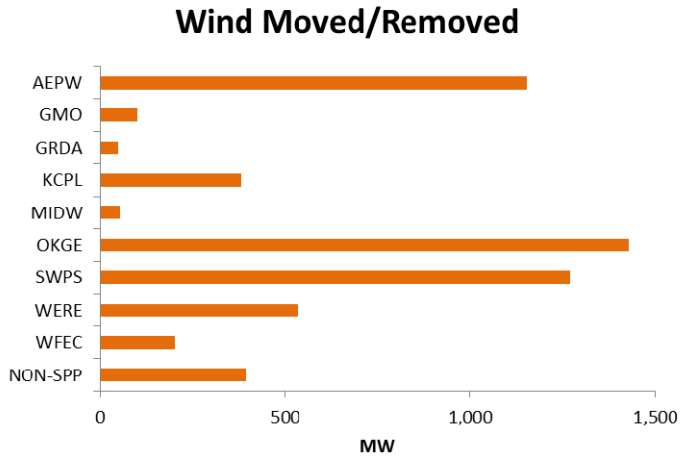
- Option 1a: Status Quo
- Option 1b: Move Wind to Zonal Load Centers
- Option 1c: Remove Wind
- **Option 1d: Hybrid Approach**
  - **Approved by ESWG**
- Option 1e: Incremental Approach
  - New results for this approach

- All results are 1-year APC savings, 2034 $

Option 1b: Move Wind to Zonal Load Centers

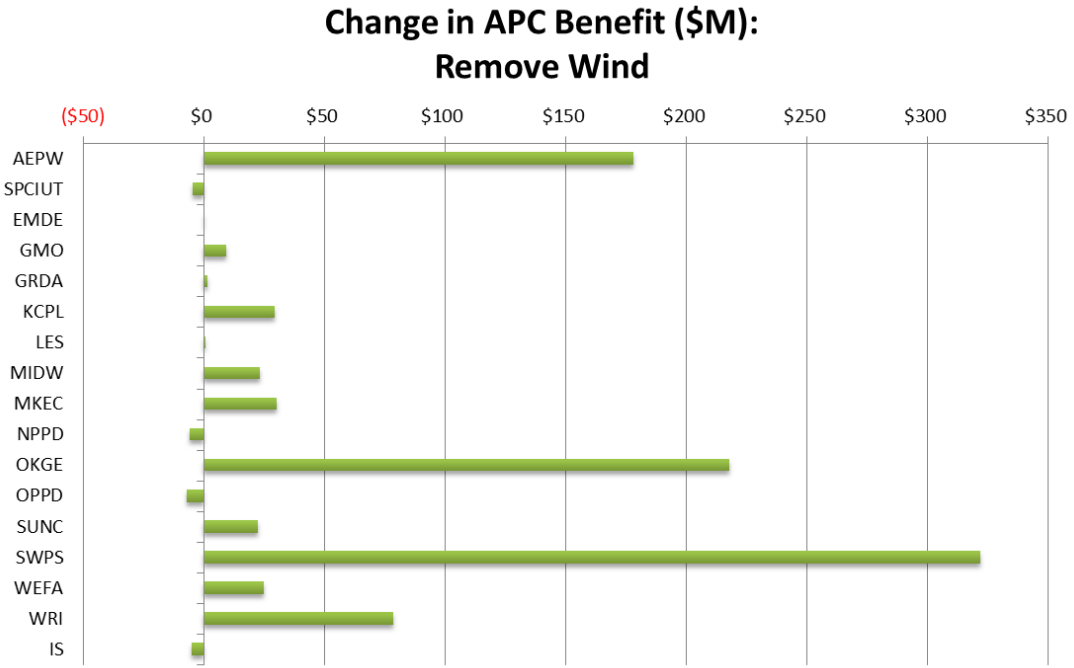
- Move wind only if it is dependent on the HWBW transmission (5.0 GW)
- Decreases capacity factors
- Zones would still need to meet their public policy mandates/goals

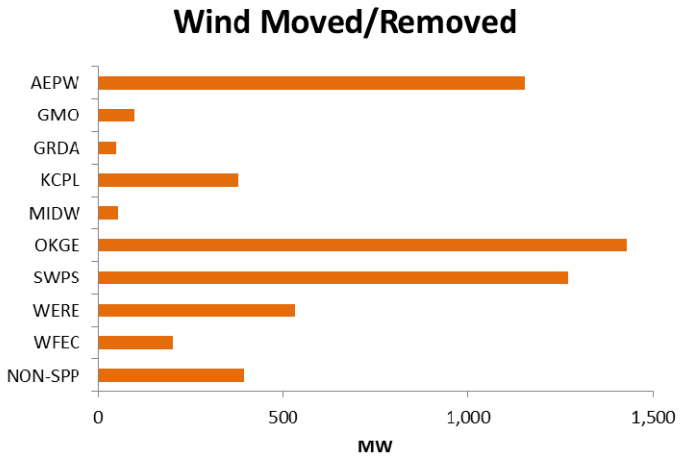




Option 1c: Remove Wind

- Remove wind only if it is dependent on the HWBW transmission (5.0 GW)
- These numbers do not account for capital cost of wind



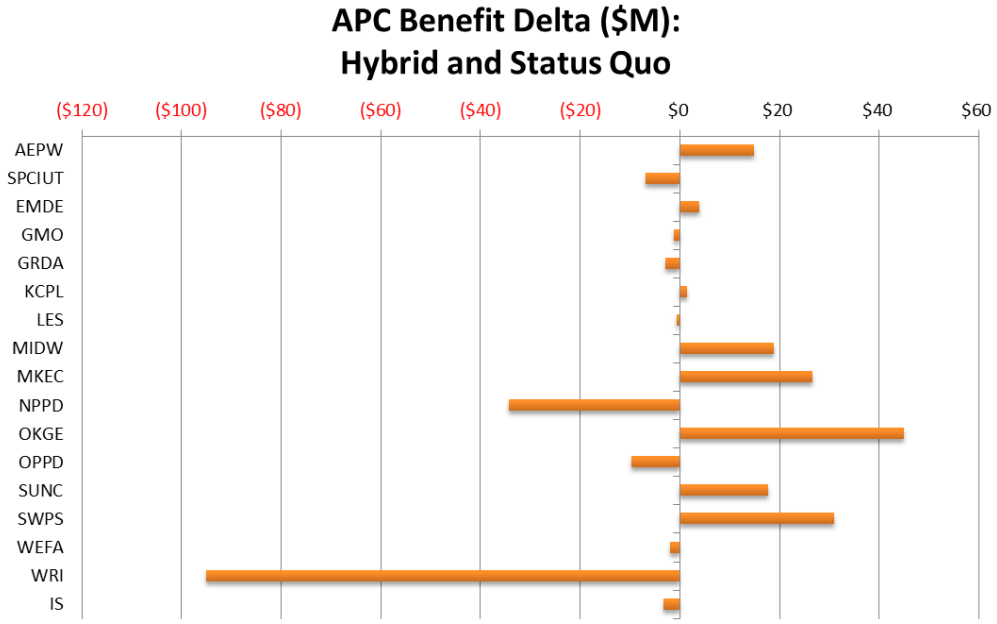


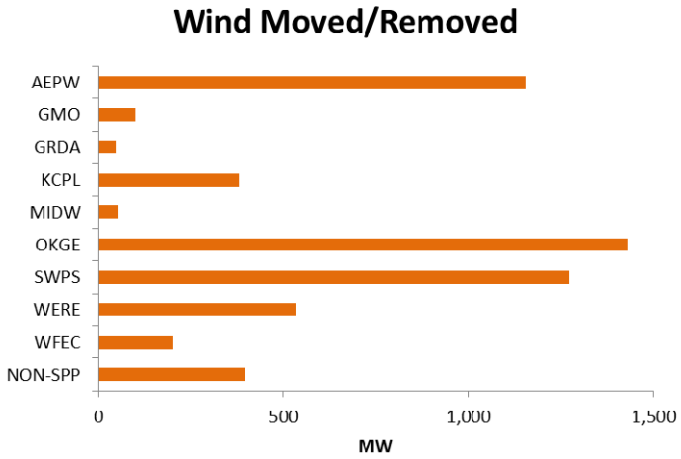
Option 1d: Hybrid Approach

- Approach 1 (A1): Status Quo, wind in both base and change cases
  - Good for analyzing regional benefit
  - Problematic for analyzing zonal benefits
- Approach 2 (A2): Remove Wind, wind is taken out of base case
  - Problematic for analyzing regional benefit
  - Good for analyzing zonal benefits, as % share of regional benefits
- Calculate X by zone as the APC benefit:

$$\frac{\text{Zonal APC Benefit}_{A2}}{\text{Regional APC Benefit}_{A2}} = \frac{X}{\text{Regional APC Benefit}_{A1}}$$

Option 1d: Hybrid Approach

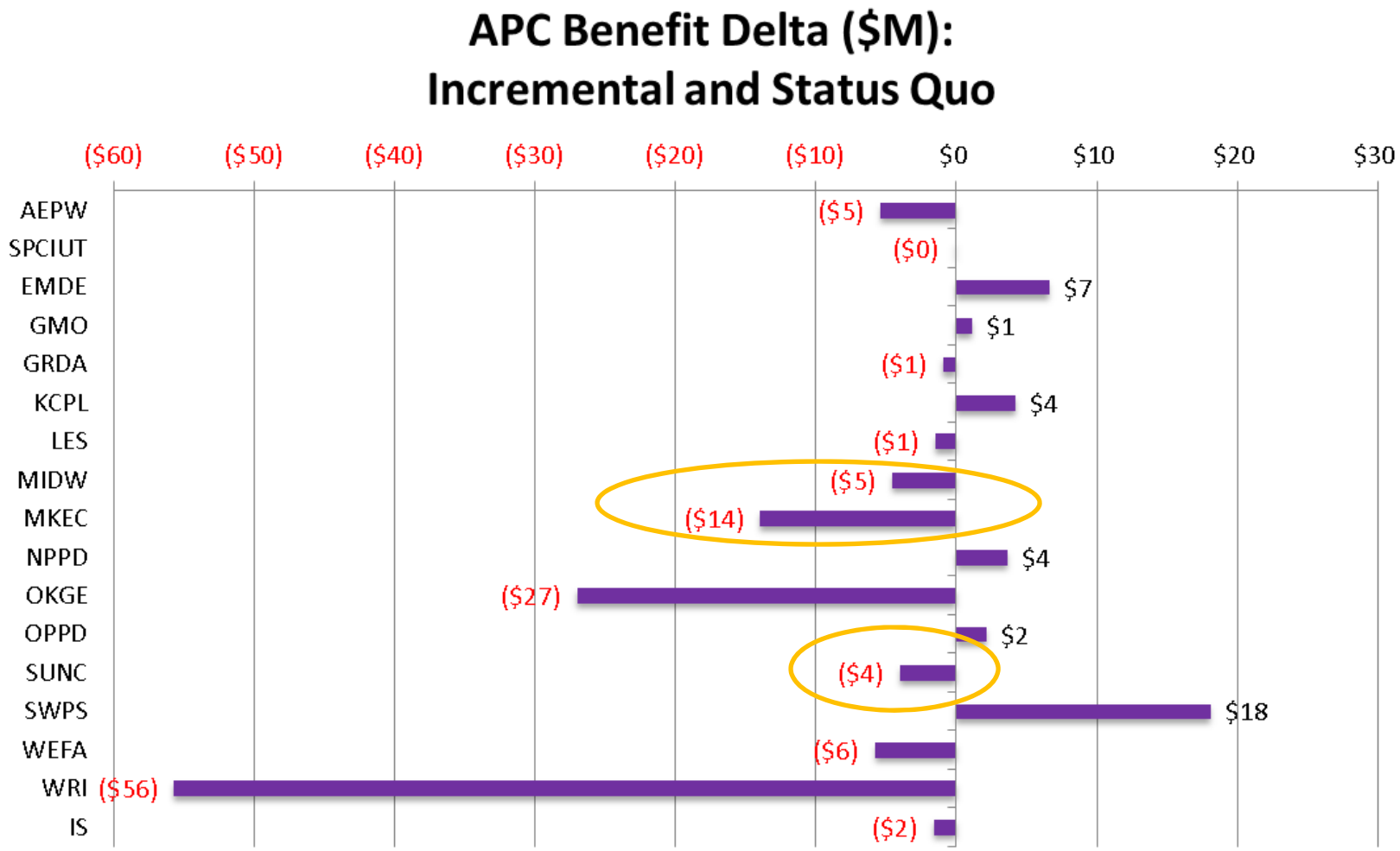




Option 1e: Incremental Approach

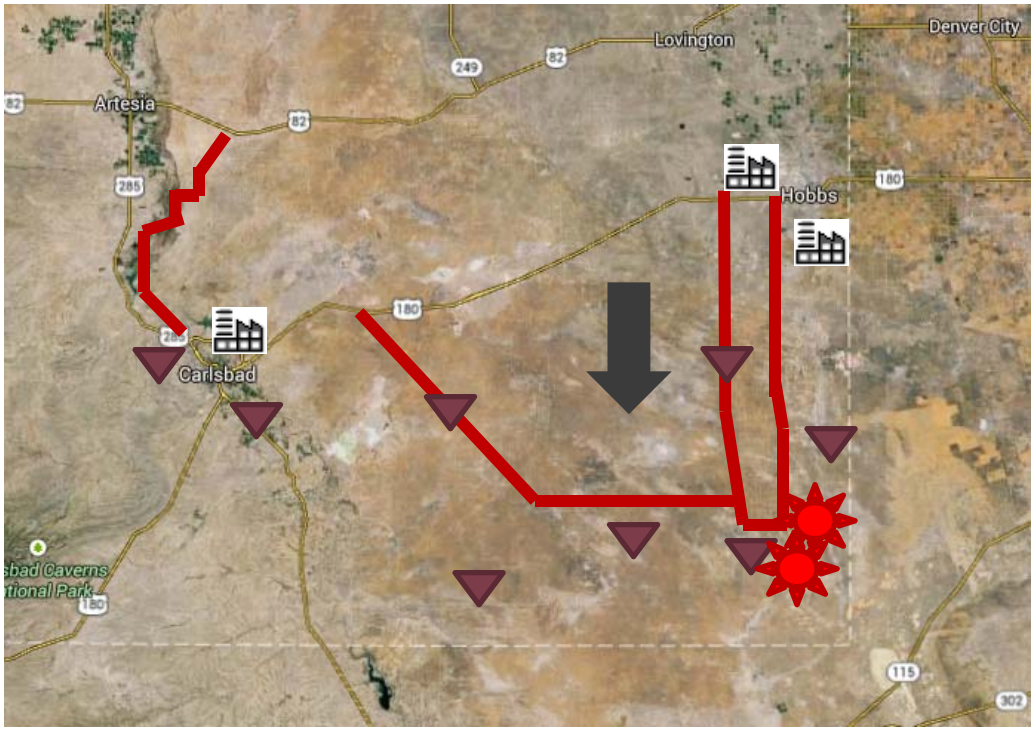
- Identify the specific projects creating the bulk of the problem with wind (wind projects)
  - Base B1: Include the wind projects, no other HWBW
  - Change C1: Include all HWBW
  - Change C2: Include all HWBW except for the wind projects
- APC Benefit 1 = B1 – C1
- APC Benefit 2 = C2 – C1
- Total APC Benefit = APC Benefit 1 + APC Benefit 2
- **Results show that APC Benefit 2 and Total Benefit are negative for west KS zones, and approach does not address the problem**

Option 1e: Incremental Approach



Issue #2: Load Pockets

- Load pocket does not have enough transmission to serve load in base case
- Excessive emergency gen and breaching constraints are causing high LMPs in the base case, resulting in high APC

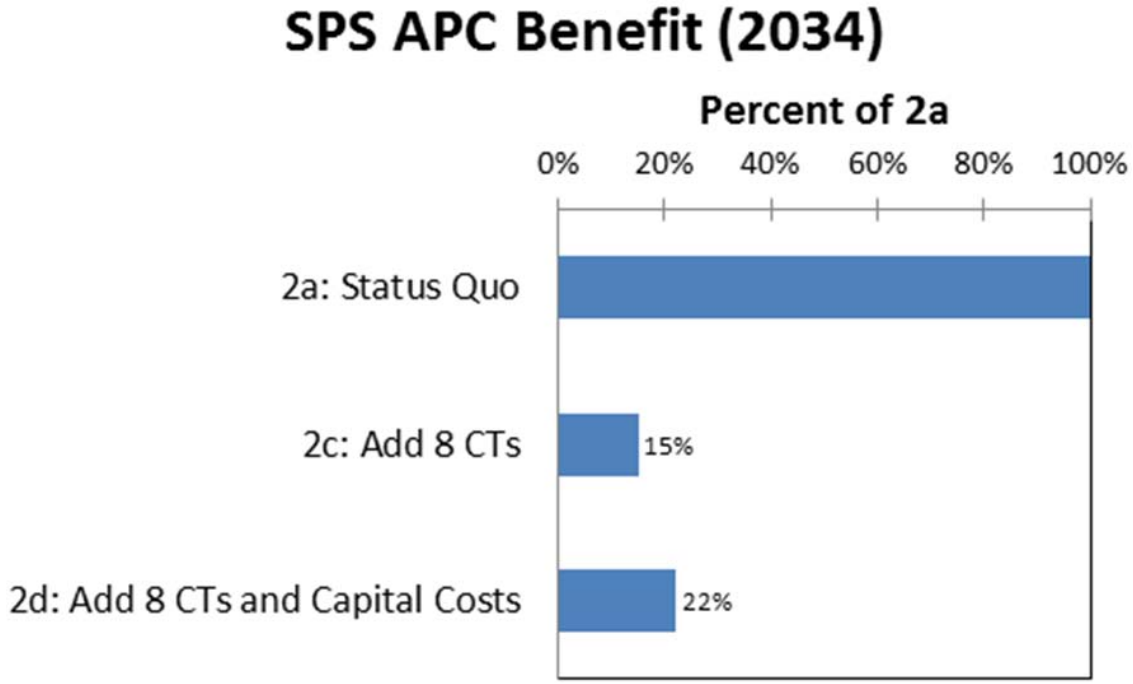


Issue #2: Solutions

- Option 2a: Status Quo
- Option 2b: Add load pocket upgrades to base case
  - No results at this time
- **Option 2c: Add CTs in base/change case, make non-dispatchable in change case**
  - **Added 8 CTs, 1,680 MW**
  - **Approved by ESWG**
- Option 2d: Add CTs in base/change case, make non-dispatchable in change case, include CT capital costs
  - Added 8 CTs, 1,680 MW

Issue #2: Solutions

- Options 2c and 2d effectively address the emergency generation and breaching constraint problems
- **ESWG approved Option 2c**



2017 ITP10 Data Inputs & Study Methodology

SPP Staff

June 18th, 2015

Data Inputs & Study Methodology

- Load & Gen Review
- Renewable Survey
- System Topology
- Fuel Prices
- Emissions Prices
- DC Ties
- Hourly Load Profiles
- Hourly Renewable Profiles
- Benchmarking
- Resource Plan
  - Capacity accreditation/margin

*Complete Discussing Today Reference

Approved Assumptions

- Status quo hourly load profiles
- Maintain a 13.6% reserve margin for resource planning (As currently outlined in SPP criteria)
- Use actual calculated values for accreditation of wind resources with 3 years of historical data and follow SPP criteria for accreditation of future wind resources
- Follow SPP criteria for accreditation of solar resources

Approved Assumptions

- Utilize the status quo methodology for modeling of fuel, wind, and emissions prices. (Ventyx Reference Case for coal, oil, uranium and emissions prices. NYMEX futures and DOE growth rates for natural gas prices. $8/MWh VOM and curtailment price for wind)
- Remove PROMOD must run flag on all base load units except nuclear for all futures

Approved Assumptions

- Approved the use of new “Other GI Firm” resources [not designated to a utility] to meet any potential renewable Mandate or Goal shortfalls
- Approved the use of prototypes from Lazard’s 2014 Levelized Cost of Energy Study (Version 8)
- Approved the use of 2012 hourly wind profiles from the NREL 2012 WIND toolkit dataset

Data Inputs & Study Methodology

- Resource plan
  - Prototypes
  - Renewable capacity factors
- Siting
- Generator Outlet Facilities
- Constraint Assessment
- Needs Assessments
- Project Selection
- Project Grouping
- Portfolio Consolidation
- Project Staging
- Benefit Metrics
- Sensitivities

*Complete Discussing Today Reference

2017 ITP10 Data Inputs

LAZARD GENERATION PROTOTYPES

Generation Prototype Data

- June 3rd ESWG
  - Group approved use of Lazard LCOE Analysis v8.0 for generation prototype parameters in the 2017 ITP10 resource plan
  - Lazard data provides ranges of data for some parameters, such as capital costs, O&M, etc.
- Today
  - Address how to select data within these ranges

Lazard Prototype Data

Generation Type	Size (MW)	Total Capital Cost ($/kW)	V O&M ($/MWh)	F O&M ($/kW-yr)	Heat Rate (Btu/kWh)
Combined Cycle (CC)	550	1,006-1,318	3.50-2.00	6.20-5.50	6,700-6,900
Combustion Turbine (CT)	216-103	800-1,000	4.70-7.50	5.00-25.00	10,300-9,000
Coal	600	3,000-8,400	2.00-5.00	40.00-80.00	8,750-12,000
Nuclear	1,100	5,385-8,199	0.25-0.75	95.00-115.00	10,450
Wind	100	1,400-1,800	0.00	35.00-40.00	N/A
Solar PV (Utility Scale)	10	1,750-1,500	0.00	20.00-13.00	N/A

Reasons Lazard provides ranges of values

- Differing technology assumptions regarding:
  - Renewable units and capacity factors
  - Carbon capture & sequestration (CCS) for Coal
- Location-specific cost variances
- Differing CT capacities result in different costs
- Other ranges (such as nuclear parameters) do not have an explanation

Wind Prototype

	Units	Wind
Net Facility Output	MW	100
EPC Cost	$/kW	$1,100 – $1,400
Capital Cost During Construction	$/kW	included
Other Owner's Costs	$/kW	$300 – $400
Total Capital Cost[(a)]	$/kW	$1,400 – $1,800
Fixed O&M	$/kW-yr	$35.00 – $40.00
Variable O&M	$/MWh	—
Heat Rate	Btu/kWh	—
Capacity Factor	%	52% – 30%
Fuel Price	$/MMBtu	—
Construction Time	Months	12
Facility Life	Years	20
CO_2 Emissions	lb/MMBtu	—
Investment Tax Credit[(b)]	%	—
Production Tax Credit[(b)]	$/MWh	—
Levelized Cost of Energy[(b)]	$/MWh	$37 – $81

- Staff recommends use of the low-end costs of wind, for Total Capital Cost and Fixed O&M
- More indicative of wind capability in SPP, as we expect capacity factors of ~50% in the 2017 ITP10

CT Prototype

	Units	Gas Peaking
Net Facility Output	MW	216 – 103
EPC Cost	$/kW	$580 – $700
Capital Cost During Construction	$/kW	included
Other Owner's Costs	$/kW	$220 – $300
Total Capital Cost[(a)]	$/kW	$800 – $1,000
Fixed O&M	$/kW-yr	$5.00 – $25.00
Variable O&M	$/MWh	$4.70 – $7.50
Heat Rate	Btu/kWh	10,300 – 9,000
Capacity Factor	%	10%
Fuel Price	$/MMBtu	$4.50
Construction Time	Months	25
Facility Life	Years	20
CO_2 Emissions	lb/MMBtu	117
Investment Tax Credit[(b)]	%	—
Production Tax Credit[(b)]	$/MWh	—
Levelized Cost of Energy[(b)]	$/MWh	$179 – $230

- Low-end costs represent 216 MW unit, high-end costs represent 103 MW unit
- Staff recommends use of <u>both the high-end 103 MW prototype and the low-end 216 MW prototype</u>
- High-end cost units in-line with max caps of other CT units in SPP
- Low-end cost units in-line with upward direction of CT size in GI queue

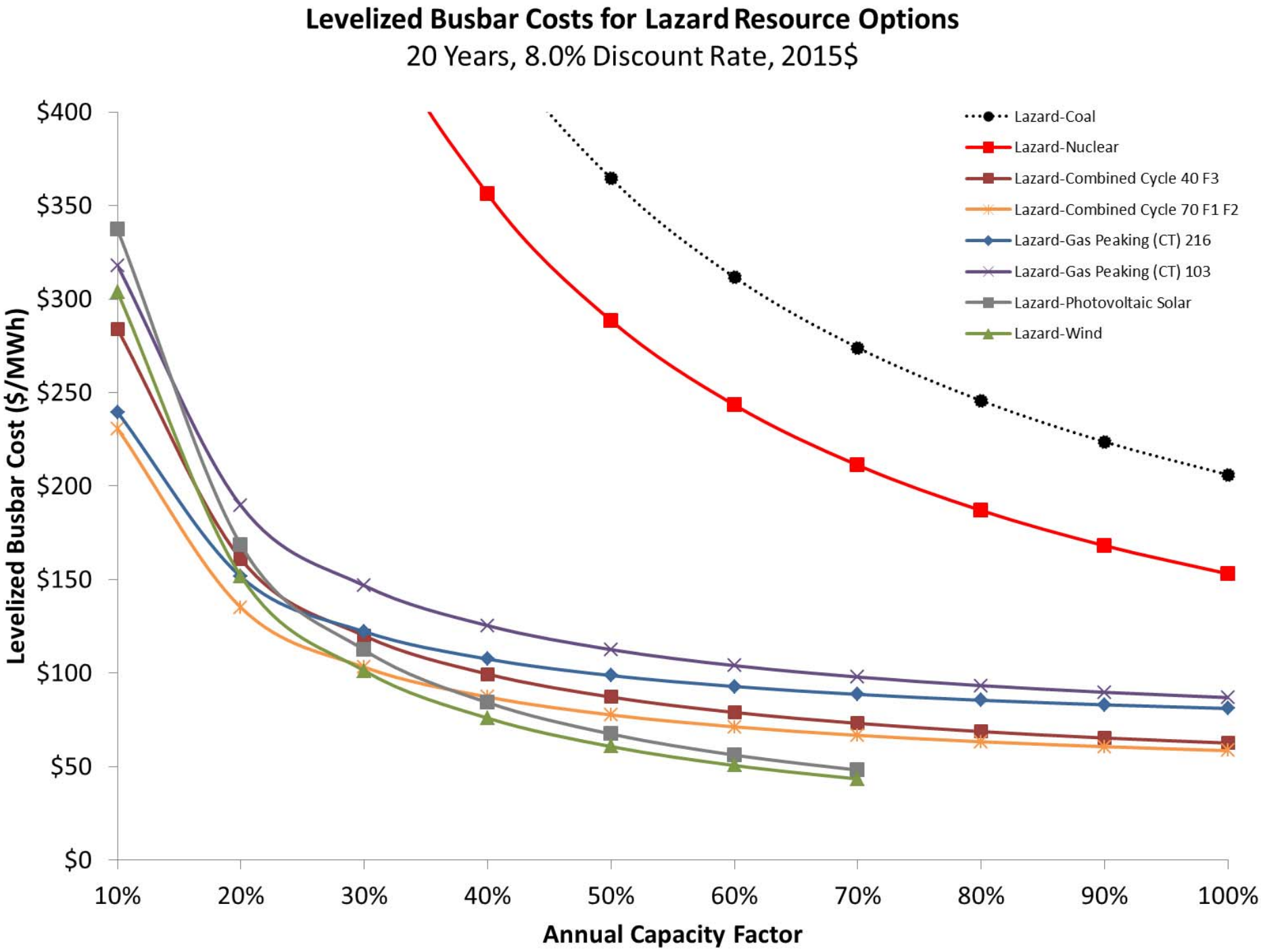
CC Prototype

	Units	Gas Combined Cycle
Net Facility Output	MW	550
EPC Cost	$/kW	$743 – $1,004
Capital Cost During Construction	$/kW	$107 – $145
Other Owner's Costs	$/kW	$156 – $170
Total Capital Cost[a]	$/kW	$1,006 – $1,318
Fixed O&M	$/kW-yr	$6.20 – $5.50
Variable O&M	$/MWh	$3.50 – $2.00
Heat Rate	Btu/kWh	6,700 – 6,900
Capacity Factor	%	70% – 40%
Fuel Price	$/MMBtu	$4.50
Construction Time	Months	36
Facility Life	Years	20
CO_2 Emissions	lb/MMBtu	117
Investment Tax Credit[b]	%	—
Production Tax Credit[b]	$/MWh	—
Levelized Cost of Energy[b]	$/MWh	$61 – $87

- Low-end cost parameters based on 70% CF
- High-end cost parameters based on 40% CF
- Staff recommends the high-end cost parameters for F1 & F2, and the low-end cost parameters for F3

Other Prototypes – Recommendations

- Coal – No Prototype
  - Due to expected carbon restrictions
- Solar – Use low-end of the cost ranges
  - Low-end costs represent single-axis tracking, 30% CF
  - High-end costs represent fixed-tilt installation, 21% CF
- Nuclear – Use mid-point of the ranges
  - No documented reasons for ranges of costs; assume the average


Levelized Busbar Costs for Lazard Resource Options
20 Years, 8.0% Discount Rate, 2015$
Levelized Busbar Cost ($/MWh)
$400
$350
$300
$250
$200
$150
$100
$50
$0
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Annual Capacity Factor
Lazard-Coal
Lazard-Nuclear
Lazard-Combined Cycle 40 F3
Lazard-Combined Cycle 70 F1 F2
Lazard-Gas Peaking (CT) 216
Lazard-Gas Peaking (CT) 103
Lazard-Photovoltaic Solar
Lazard-Wind

Recommendation

- Staff recommends ESWG approve the use of the following values for Lazard prototypes:
  - Wind: Low-end cost parameters
  - CT: High- and Low-end prototypes
  - CC
    - Futures 1 & 2: Low-end costs based on 70% CF
    - Future 3: High-end costs based on 40% CF
  - Coal: No prototype
  - Solar: Low-end cost parameters
  - Nuclear: Mid-point of parameters

Resource Plan - Wind Capacity Factors

- Issue
  - Need proxy capacity factor assumption for input of phase 1 resources (renewable survey) into phase 2 (Strategist) resource planning
- Recommendation
  - Utilize Regional, State, Zonal, or bus information provided for siting considerations in renewable survey
  - Use average of SPP capacity factors for each category (existing modeled wind, NREL data)
  - Site specific NREL data for supplied bus level data

Needs Assessments Recommendation

- Economic, Policy, Reliability conducted in parallel
- Policy Assessment
  - Shortfall in the achievement of renewable requirements
- Economic Assessment
  - The SCED will solve nodal LMPs
  - Constraints ranked based on flowgate congestion cost
  - Up to 25 constraints based upon the ranking will be identified as economic need per future

Solution Development Recommendation

- Solicit stakeholders for solutions for all identified needs
- Policy projects: mitigate renewable curtailment to meet the regulatory/statutory mandates and goals
- Economic projects: B/C > .75 for one year
- Seams projects
  - Identified based on benefits to other regions
  - 80/20 cost sharing

Economic Project B/C Threshold

- 2015 ITP10 consolidated portfolio
  - APC only B/C was 3.05
  - Total benefit metric B/C was 4.1
  - Additional benefits increased B/C by 34%
- 2015 ITP10 consolidated portfolio individual projects
  - No consistent correlation between 1-year and 40-year B/C
  - Dependent on the staging year and need date
  - Many 40-year B/C's saw a decrease over the 1-year B/C

Economic B/C threshold recommendation

- Staff recommends setting an APC based 1-year individual project B/C threshold > 0.6 to pass phase 1 screening
- Staff recommends setting an APC based 1-year individual project B/C threshold > 0.8 for inclusion in a final portfolio

Phase 1 – Individual Project Testing Recommendation

- Projects will move on to Phase 2 for further testing if they meet the following criteria
  - The project must meet the need for which it was submitted and
    - Projects to address economic needs must provide a 1-year B/C ratio greater than 0.75 by reducing the congestion.
    - Policy Projects must allow the utilities to meet the regulatory/statutory mandates and goals.

Project Grouping Methodology Recommendation

- Reliability, policy, and economic projects will be combined into project groupings for each future and evaluated for redundancies
- Project groupings will be developed considering:
  - Project's Phase 1 performance
  - 70% congestion relief per need to address locality of constraint and solution
- Groupings per Future:
  - Cost Effective
  - Highest Gross APC benefit
  - Highest Net APC benefit
  - Multi-Variable Grouping

Phase 2 – Combined Project Testing Recommendation

- **Cost-Effective Rank** - Total Project Cost / Flowgate Congestion Cost Mitigated
- **Highest Gross APC benefit** - Highest APC benefit, not considering the cost of the projects
  - Projects will be ranked based on the gross benefit when considering mitigation of each individual constraint
- **Highest Net APC benefit** - The cost of the projects will be subtracted from the APC benefit provided
  - Projects will be ranked based on the net benefit when considering mitigation of each individual constraint
- **Multi-Variable Grouping (Optional)** – Allows SPP staff to layer multiple criteria. The experience gained from analyzing projects for the first three groups will be utilized to determine projects

Project Staging Criteria

- 2010 ITP20 and 2013 ITP20
  - All projects staged for year 20
- 2012 ITP10 Economic Projects
  - B/C ratios interpolated between 5 years out & 10 years out to identify when it exceeds 1.0 in Future 1
- 2012 ITP10 Policy Project
  - Staged for 5 years out due to the 5 years out renewable goals from renewable survey

Project Staging Criteria – 2015 ITP10

- Single project classification
  - Economic – based on a linear interpolation of B/C ratios from 2020 to 2025
  - Reliability - based on linear interpolation of thermal loadings from 2020 to 2025
  - Policy – staged to meet renewable requirement
- Multiple project classification
  - Staged to meet the earliest need date established through the Single Project Classification
  - Economic projects must cross the 1.0 B/C ratio threshold

Project Staging Recommendation

- **Staff recommends utilizing the 2015 ITP10 project staging methodology**

Benefit Metrics

Metric Description
APC Savings
Value of Replacing Previously Approved Projects
Reduced Losses
Reduced Capacity Costs
Reduction of Emissions Rates and Values
Public Policy Benefits
Assumed Benefit of Mandated Reliability Projects
Mitigation of Transmission Outage Costs

Sensitivities

- In the 2015 ITP10
  - Natural Gas Price
  - Demand levels
  - Tres Amigas and Clean Line Plains & Eastern
  - Increased Input Prices
- Staff recommends performing no sensitivities on the final portfolio

2017 ITP10 Portfolio Consolidation

SPP Staff

June 18th, 2015

Consolidation Methodology

- 2010 ITP20
  - Consolidated plan most resembles the plan from high wind & carbon constraint future
- 2012 ITP10 - Criteria
  - Policy projects: Included if appears in either future
  - Economic projects: Included if B/C > 1.0 in Future 1
  - Reliability projects:
    - Included if the overload exceeded 100% in one future and exceeded 95% in the other future, OR,
    - Included if the voltage violation occurred in both futures.

Consolidation in the 2013 ITP20

- **2013 ITP20 – Weighting**

Portfolio	Weighting	Threshold	Project X	Project Y
Future 1	50%		✓	✗
Future 2	15%		✗	✓
Future 3	10%		✓	✓
Future 4	15%		✗	✓
Future 5	10%		✓	✗
Total	100%		70%	40%
Consolidated		60%	✓	✗

SPP

Consolidation in the 2015 ITP10

- Economic projects with a 1-year B/C ratio greater than 0.9 in Future 1
- Economic projects with a 1-year B/C ratio greater than 0.7 in Future 1, but that also had a 1-year B/C ratio greater than 0.9 in Future 2
- Policy projects were be included in the consolidated portfolio if they meet a policy need in Future 1.
- Reliability projects were included if they mitigated a thermal/voltage violation in Future 1
- A Future 2 reliability project was included if it mitigated a thermal violation in Future 2 and mitigated loading above a 90% threshold in Future 1. A Future 2 project that mitigates a voltage limit violation in Future 2 and voltage below 0.92 pu in Future 1 was also included.