Southwest Power Pool

Economic Studies Working Group

October 11-12, 2018

41st Floor AEP Office – Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

Consent Agenda:

1. Approved the August 15-16th meeting minutes
2. Approved the 2019 ITP Economic Model

2020 ITP Assessment:

3. Approved assigning must-run designations to co-generation and nuclear units only; exceptions may be requested during the 2020 ITP Generation review and approved by the ESWG. Must-run designations for hydro units will be based on ABB simulation ready data
4. *"Accreditation of existing renewable units will be determined by member data based on SPP Planning Criteria 7.1.5.3 (7) submitted through the Generation Review." (ITP Manual)* For existing units in which stakeholders do not submit data, the ESWG approved that the accreditation would default first, to previously submitted ITP data, and secondly to the average of the submitted data for the existing resources in the 2020 ITP. Accreditation is capped at the accreditation values chosen for new resources.
5. Approved the accreditation percentages for new wind at 20% and new solar at 70%.
6. Approved allowing a separate load forecast for resource planning purposes. (To be submitted with the Load Review)

Other Items:

7. Approved a motion to close Action Item 186 with the posted ITP Data Submission Guidelines
8. Approved the 2019 ESWG meeting schedule

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

October 11-12, 2018

41st Floor AEP Office – 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 10:00 a.m., welcomed those in attendance, and asked for introductions.

There were 20 in-person participants and 54 web conference participants, representing 16 of 17 ESWG members. (Attachment 1 – October 11-12, 2018 Attendance List)

Agenda Item 1b – Receipt of Proxies

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

- Jody Holland (SCMCN) named Rachel Ibuado (SCMCN) as his proxy
- Randy Collier (CUS) named John Boshears (CUS) as his proxy

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – October 11-12, 2018 ESWG Agenda).

Kurt Stradley (LES) made a motion; seconded by Anita Sharma (AEP) to adopt the agenda. The motion was approved unanimously.

Agenda Item 1d – Antitrust Reminder

Amber Greb (SPP) provided an antitrust reminder to the group.

Agenda Item 2 – Review of Past Action Items

Amber Greb (SPP) reviewed the list of past action items and asked for any comments or questions. Staff will be bringing an update to action item 151: software tools to the ESWG in November. Stakeholders approved marking two action items complete and closing them, action item 187: to address objections raised to VOM and action item 195: to provide APC education sessions. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

a. Meeting Minutes – August 15-16th, 2018 (Attachment 5 - 20180815 ESWG Minutes)
b. 2019 Economic Model

The Consent Agenda was approved unanimously.

Agenda Item 4 – APC Education Session

James Bailey (SPP) brought a continuation of the APC education session, focusing on illustrating how the addition of wind resources impact APC calculation results. James walked the group through examples where the wind has been assigned ownership to a zone versus when it was not assigned ownership. Stakeholders wanted to see a real world example of how the VOM and curtailment prices impact the APC. James ran the analysis and showed stakeholders results using the 2017 ITP Promod Models. He compared an $8 VOM and $8 curtailment prices to a $0 VOM and $-35 Curtailment price. In a model

without additional wind, these changes did not make a large impact. Stakeholders felt that the discussion was moving past an APC education and into other issues such as determining who pays for and who benefits from transmission. The topic was tabled and will be picked back up in discussing action item 194 on curtailment prices. (Attachment 6 – APC Education Session)

Agenda Item 5 – 2019 ITP Items

Agenda Item 5a – Schedule

Juliano Freitas (SPP) reviewed a presentation on 2019 ITP schedule. Juliano reviewed on-going and up-coming milestones. (Attachment 7a – 2019 ITP Schedule)

Agenda Item 5b – BA Economic Model Build Update

Clayton Mayfield (SPP) gave a brief update on the economic model build, reminding stakeholders of the model review period and approval dates. Clayton then gave an update on the Lubbock BA economic Model, reviewing the scope of the Lubbock exit analysis and the impacts to the resource and siting plans as well as the upcoming review and approval dates. (Attachment 7b – BA Economic Model Build)

Agenda Item 5c – Constraint Assessment

Clayton Mayfield (SPP) updated the ESWG on the status of the 2019 constraint assessment. A number of stakeholders have submitted feedback such as rating updates, invalidation, and constraint suggestions. Stakeholders were reminded of the review and approval dates. (Attachment 7c – Constraint Assessment)

Agenda Item 5d – DC-AC Conversion

Kelsey Allen (SPP) reviewed the 2019 ITP DC/AC conversion methodology. He gave a high level overview of the process, detailing the changes from previous studies that were discussed during the ITP Manual development. Kelsey informed stakeholders of the schedule for this milestone. (Attachment 7d – DC-AC Conversion)

Agenda Item 5e – Policy Needs Assessment

Nikki Roberts (SPP) presented a review of the policy needs assessment methodology, reminding stakeholders of the approved ITP manual language and detailing the steps of the process. (Attachment 7e. – Public Policy Needs Assessment)

Agenda Item 5f – Economic Needs Assessment

Nikki Roberts (SPP) went over the methodology for the 2019 ITP Economic Needs Assessment, explaining what an economic need is and how they are identified. Nikki informed stakeholders that constraints are ranked by congestion score, which is equal to the shadow price multiplied by the number of hours the constraint is binding. (Attachment 7f. – Economic Needs Assessment)

Agenda Item 6 – 2020 ITP Items

Agenda Item 6a – Schedule

Juliano Freitas (SPP) reviewed a presentation on 2020 ITP Schedule. Juliano reviewed on-going and up-coming milestones. (Attachment 8 – 2020 ITP Schedule)

Agenda Item 6b – Scope Development

Agenda Item 6bi – Conventional Generator Prototypes

Antonio Barber (SPP) presented on the 2020 ITP conventional generator prototypes. The two main data sources of information used were the EIA Annual Energy Outlook (AEO) report from July 2017 and the Lazard levelized cost of energy analysis from December 2016. He reviewed a chart comparing the costs of different unit types between the data sources. Antonio then showed busbar curves for combustion turbines and combines cycle units. Stakeholders requested additional information for recently built units and a calculation estimating the 2020 ITP shortfall after renewable additions, staff will bring this information to the November meeting. (Attachment 9a – Conventional Generator Prototypes)

Agenda Item 6bii – 2020 ITP Scope – Must Run Units

Nikki Roberts (SPP) provided an update on the must run criteria for the 2020 ITP Scope. She reminded stakeholders of the ITP Manual language and of the criteria used in the 2019 ITP Assessment. (Attachment 9b – Must Run Criteria)

> **Kurt Stradley (LES) made a motion; seconded by Natasha Henderson (GSEC) to assign must-run designations to co-generation and nuclear units only; exceptions may be requested during the 2020 ITP Generation review and approved by the ESWG. Must-run designation for hydro units will be based on ABB simulation ready data. The motion was approved unanimously.**

Agenda Item 6biii – Load Forecast for Resource Planning

Antonio Barber (SPP) brought options to the ESWG to address action item 193: discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process. In past ITP studies, SPP has accommodated a separate load forecast to be used only for resource planning. Stakeholders requested staff to look into the model development and provide education on what is included in the load forecasts per the Model development Procedure Manual. Antonio reviewed the Manual language and gave an illustration. Stakeholders discussed three options for the ITP assessment; using the base reliability load forecast for resource planning, allowing for a separate resource planning load forecast, or explicitly modeling controllable demand side management. Stakeholders agreed that the third option would be time consuming and would have very little impact on the study results. (Attachment 9c – Load Forecast for Resource Planning)

> **Tim Owens (NPPD) made a motion; seconded by Anita Sharma (AEP) to accept separate load forecasts for resource planning in the 2020 ITP Assessment. (To be submitted with the load review). The motion was approved unanimously.**

Agenda Item 6biv – Renewable Accreditation

Joshua Norton (SPP) began discussions for the 2020 ITP renewable accreditation. He reviewed the ITP Manual and SPP Criteria language on the subject with the group. He reviewed information provided in the September ESWG meeting by the SPP MMU as well as the approved accreditation methodology being used for the 2019 ITP Assessment. Accreditation of existing renewable units is determined by member data and based on SPP Planning Criteria 7.1.5.3 (7), which is submitted through the Generation Review. For generating units in which members do not submit data, if an accreditation percentage has been provided in a previous study, staff will default to that amount for the 2020 assessment. For all other units, stakeholders discussed options for determining the accreditation amount such as setting default percentages by unit type.

> **Tim Owens (NPPD) made a motion; seconded by Bennie Weeks (Xcel) that for existing units in which stakeholders do not submit data, the accreditation would default first, to previously submitted ITP data, and secondly to the average of the submitted data for the existing resources in the 2020 ITP. Accreditation is capped at the accreditation values chosen for new resources. The motion was approved unanimously.**

Discussion moved to the accreditation of new resources in the 2020 ITP, stakeholders discussed two options, moving forward with the assumptions from the 2019 ITP Assessment (20% for wind and 70% for solar) or changing to the recommendation of the SPP Market Monitoring Unit's (23% for wind and 60% for solar). Most stakeholders felt that the Supply Adequacy Working Group (SAWG) is the expert opinion on the subject and that the ESWG should remain consistent with their decisions, they did not want to raise the wind accreditation above 20%.(Attachment 9d – Renewable Accreditation)

> **Leon Howell (OGE) made a motion; seconded by Tim Owens (NPPD) to set the accreditation percentages for new wind at 20% and new solar at 70%. The motion was approved unanimously.**

Agenda Item 6c – Load and Generation

Theva Coleman (SPP) provided an update on the 2020 ITP Generation and Load reviews. She talked about the schedule and stakeholder review periods, changes to the workbooks, and submission deadlines. Theva

also reviewed the process for submitting a waiver or resource addition request (RAR). These will be presented to the ESWG in November. Theva offered a couple of educational sessions for stakeholders to call in and get a tutorial on how to use the load and generation workbooks. These will be set up in the next couple of weeks. (Attachment 10 – Generation and Load Review Update)

Agenda Item 6d – Generation Retirements Consistency

Chris Jamieson (SPP) reviewed the 2019 ITP Base Reliability and SPP BA Gen Review lessons learned regarding consistency in planned generation retirements between the two models. SPP staff compared the stakeholder reviewed ITP BA gen review workbook and the base reliability model planned generation retirements and found inconsistencies between the two data sets. To address this issue, we will adjust staff and stakeholder internal coordination, as needed, during the 2020 ITP powerflow and gen review milestones, and incorporate a consistency check to report inconsistencies in powerflow and gen review passes for stakeholders to internally establish a common planned retirement date between the two data sets. (Attachment 11 – ITP Planned Generation Retirement Consistency)

Agenda Item 7 – ITP Data Submission Process

Nikki Roberts (SPP) presented a resolution for ESWG action item 186: to formalize the economic model data guidelines and submission process. A data submission guidelines document has been posted and reviewed by the ESWG, Nikki provided a summary of changes made to the document based on stakeholder and staff feedback. Flow charts were added to the document as well as additional details and clarifying language for some of the more technical sections such as capacity adjustments and heat rate profiles. (Attachment 12 – ITP Data Submission Guidelines)

> **Tim Owens (NPPD) made a motion; seconded by Kurt Stradley (LES) to mark action item 186 complete with the posting of the data submission guidelines document. The motion was approved unanimously.**

Agenda Item 8 – 2019 Meeting Locations

Amber Greb (SPP) reviewed a list of proposed dates and locations for the 2019 ESWG meetings. Stakeholders have reviewed and provided feedback to the proposed dates at previous meetings, and have asked for adjustments to be made to dates in the second semester. (Attachment 13 – 2019 Meeting Locations)

> **John Olsen (Evergy) made a motion; seconded by Natasha Henderson (GSEC) to approve the meeting locations and dates for January – June 2019. The motion was approved unanimously.**

Closing Items

There were no action items from the meeting.

The meeting was adjourned at 11:00 AM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Name	Email	Date
Alan Myers	ITC	In Person
Amber Greb	SPP	In Person
Anita Sharma	AEP	In Person
Bennie Weeks	Xcel/SPS	In Person
Bill Leung	NPRB	In Person
Brian Johnson	AEP	In Person
Calvin Daniels (WFEC)	WFEC	In Person
Cliff Franklin	SUNC	In Person
Jason Davis	SPP	In Person
John Olsen	Evergy	In Person
Jon Iverson	OPPD	In Person
Juliano Freitas	SPP	In Person
Keith Collins	SPPMMU	In Person
Kurt Stradley	LES	In Person
Laura Cummings	Energy Exemplar	In Person
Michael Wegner (ITC)	ITC	In Person
Rachel Ibuado	Gridliance	In Person
Ryan Yokley	SUNC	In Person
Steve Gaw	Wind Coalition	In Person
Tim Owens	NPPD	In Person
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Al Tamimi	atamimi@sunflower.net	Webex
Andy Berg	andrew.berg@mrenergy.com	Webex
Antonio Barber (SPP)	abarber32002@gmail.com	Webex
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Joe Fultz	jfultz@grda.com	Webex

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Jon Iverson	jiverson@oppd.com	Webex
Joshua Norton	jnorton@spp.org	Webex
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Nikki Roberts	nroberts@spp.org	Webex
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Theva Coleman	tcoleman@spp.org	Webex
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Zac Hager	hagerzc@oge.com	Webex
Zach Quintero	z.quintero@occemail.com	Webex

Proxies:

Alan/Amber,

I'll be unavailable on 10/11 and 12, so I'm providing my proxy to Rachel Ibuado (formerly Hulett). Thank you.

Jody Holland

Vice President, Planning & Engineering

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Office: 972-476-0111

jholland@gridliance.com

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Thanks Randy. We'll note for the minutes.

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From: Randy Collier <Randy.Collier@cityutilities.net>
Sent: Wednesday, October 10, 2018 5:40:04 PM
To: Amber Greb; Myers, Alan K.
Cc: John Boshears
Subject: [EXT] Proxy for ESWG Meeting

Amber/Alan,

John Boshears has my proxy for the Thursday portion of the ESWG meeting on 10/11/18. John also has my proxy for the middle section of the Friday, October 12 ESWG meeting.

Thanks,

Randy Collier
Contract Manager-Electric Supply
O: 417.831.8323

ECONOMIC STUDIES WORKING GROUP MEETING

October 11-12th, 2018

41st Floor AEP Office – Dallas, TX

• A G E N D A •

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)
    d. Antitrust Reminder ..... Amber Greb (1 minute)
2. Review of Past Action Items[1] ..... Amber Greb (15 minutes)
3. Consent Agenda
    a. Meeting Minutes – August 15-16th, 2018
    b. 2019 Economic Model
4. APC Education Session ..... James Bailey (60 minutes)
5. 2019 ITP Items ..... SPP Staff (90 minutes)
    a. Schedule[1] ..... Juliano Freitas (10 minutes)
    b. BA Economic Model Build Update[1] ..... Clayton Mayfield (10 minutes)
    c. Constraint Assessment[1] ..... Clayton Mayfield (10 minutes)
    d. DC-AC Conversion ..... Kelsey Allen (20 minutes)
    e. Policy Needs Assessment ..... Nikki Roberts (20 minutes)
    f. Economic Needs Assessment ..... Nikki Roberts (20 minutes)
6. 2020 ITP Items ..... SPP Staff (200 minutes)
    a. Schedule[1] ..... Juliano Freitas (5 Minutes)
    b. Scope Development[1] ..... SPP Staff
        i. Conventional Generator Prototypes[1] (Approval Item) ..... Antonio Barber (45 minutes)
        ii. Must Run Units[1] (Approval Item) ..... Nikki Roberts (30 minutes)
        iii. Load Forecast for Resource Planning[1] (Approval Item) .... Antonio Barber (30 minutes)
        iv. Renewable Accreditation[1] (Approval Item) ..... Josh Norton (30 minutes)

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[1] Background Material Included

c. Generation and Load[1] ..... Theva Coleman (30 minutes)
    i. Reminder for RARs and Waivers
d. Generation Retirements Consistency[1] ..... Chris Jamieson (30 minutes)

7. ITP Data Submission Process[1] (Approval Item) ..... Nikki Roberts (30 minutes)
8. 2019 Meeting Locations[1] (Approval Item) ..... Amber Greb (15 minutes)
9. Closing Items ..... All (10 minutes)
    a. Summary of Action Items (Amber Greb)
    b. November ESWG Agenda Items
    c. Future Meetings
        i. October 23rd, 2018: Conference Call – Joint TWG
        ii. November 14-15th, 2018: SPP Offices, Little Rock, AR
        iii. December 3-4th, 2018: 41st floor AEP Office, Dallas Texas
        iv. January 10th, 2019: 41st floor AEP Office, Dallas Texas

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

October 11-12, 2018

	Action Item	Date Originated	Status	Comments
151	SPP staff to look into optional software tools for use in ITP studies.	May 20th, 2015	In Progress SPP Staff	Staff is compiling information from multiple tools used for economic analysis and resource planning. Staff to bring an update in November
183	SPP staff to perform transmission outage analysis in the first part of 2017 to determine the appropriate APC benefit percentage to utilize for the mitigation of transmission outages benefit metric.	September 15th, 2016	In Progress SPP Staff	ESWG Approved the methodology and staff to begin analysis
185	ESWG to continue working on and finalize the Resource Siting Manual	June 29th, 2017	In Progress ESWG	SPP Staff drafting language for stakeholder review; seeking approval October 23rd
186	Formalize the economic model data guidelines and submission process	July 20th, 2017	In Progress SPP staff	First draft posted on August 8, 2018. Staff is implementing feedback and reviewing the document for consistency with first pass of the 2020 ITP Load and Generation Review; seeking approval October 23rd.
187	Address the objections raised to the approved renewable VOM modeling detailed in the ITP manual	July 20th, 2017	In Progress SPP staff/ESWG	Completed 10/11/2018
190	SPP staff to perform a full transmission outage analysis before the next RCAR	October 12th, 2017	SPP Staff	
193	Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process	January 22nd, 2018	SPP Staff	
194	Continue researching/discussing curtailment pricing for future studies	April 25th, 2018	SPP Staff	

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195	Provide an APC education Session, including VOM and PPAs and how they impact	April 25th, 2018	SPP Staff In Progress	Completed 10/11/2018

Southwest Power Pool

Economic Studies Working Group

August 15-16, 2018

Doubletree-Grand Ballrm A, 27 North 27th – Billings, MT

• SUMMARY OF ACTIONS TAKEN •

1. Approved the scope updates subject to removing resource planning generation equivalent to the removal of Lubbock load
2. The ESWG approved Option 2 to remove the wind sited at Riverside 345 kV from the study
3. Approved the results (using Option 2) of the resource plan and siting adjustments and GOFs as posted

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

August 15-16, 2018

Doubletree-Grand Ballrm A, 27 North 27th – Billings, MT

• MINUTES •

Day 1

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 1:00 p.m., welcomed those in attendance, and asked for introductions.

There were 29 in-person participants and 58 web conference participants, representing 16 of 17 ESWG members. (Attachment 1 – August 15-16, 2018 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; one proxy was identified. (Attachment 2 – Proxy Statements)

- Leon Howell (OGE) named Zac Hager (OGE) as his proxy

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 15-16, 2018 ESWG Agenda).

> **Jeremy Severson (BEPC) made a motion; seconded by Kurt Stradley (LES) to adopt the agenda. The motion was approved unanimously.**

Agenda Item 1d – Antitrust Reminder

Amber Greb (SPP) provided an antitrust reminder to the group.

Agenda Item 2 – Review of Past Action Items

Amber Greb (SPP) reviewed the list of past action items and asked for any comments or questions. Action Item 186: Formalize the economic model data guidelines and submission process, will be discussed at this meeting. (Attachment 4 – Past Action Items)

Agenda Item 3 – SPP Market Monitoring Unit (MMU)

Keith Collins (SPPMMU) introduced himself to the ESWG and provided information on who the MMU is and how they can help in economic studies. They plan to provide feedback in the ITP process during milestones such as scope development and future drivers' discussions. (Attachment 5 – SPP MMU)

Agenda Item 4 – 2019 ITP Items

Agenda Item 4a – Schedule

Juliano Freitas (SPP) reviewed a presentation on 2019 ITP schedule. Juliano reviewed on-going and up-coming milestones. (Attachment 6a – 2019 ITP Schedule)

Agenda Item 4b – Scope

Amber Greb (SPP) reviewed changed to the 2019 ITP Scope document. Updates to the persistent economic operational solution evaluation section and the addition of the Lubbock Power & Light system exit analysis section were approved in a previous meeting. Stakeholders reviewed the language and

approved the updated scope. Staff clarified that the resource planning generation associated with the Lubbock load would be removed from the model for the additional analysis. The updated Scope will go in front of the MOPC at an upcoming meeting. (Attachment 6b – 2019 ITP Scope)

Natasha Henderson (GSEC) made a motion; seconded by John Olsen (Evergy) to approve the scope updates subject to removing resource planning generation equivalent to the removal of Lubbock load. The motion was approved unanimously.

Agenda Item 4c – Economic Model Build

Clayton Mayfield (SPP) gave a brief update on the economic model build. He informed the group that staff is checking the model for quality assurance and that it would be posted for approval with the constraint assessment.

Agenda Item 4d – Persistent Operational Issues Review

Will Tootle (SPP) gave an informative presentation on persistent operational issues that staff has identified during the assessment period of June 1, 2016 through June 1, 2018. Will reviewed the congested flowgates and any solutions that have been identified. The ITP manual states criteria for identifying economic needs considering manual commitments of uneconomic generation for local area voltage support. Will informed the group that no single manual commitment met the 25% or $1 million threshold, but several units combined did. ESWG stakeholders felt that combining the units follows the intent of the manual language. The TWG thought that a revision request to change the manual might be necessary. Staff is not taking action at this time and requested stakeholders provide feedback on the issues presented in the upcoming weeks. (Attachment 7 – Persistent Operational Issues Review)

Agenda Item 4e – Constraint Assessment

Clayton Mayfield (SPP) updated the ESWG on the status of the 2019 constraint assessment. Staff is waiting for direction from stakeholders on a recommendation to move forward with projected wind amounts on the futures due do the cancellation of the Wind Catcher project.

Day 2

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

Agenda Item 4f – Projected Wind and Siting Adjustment

Liz Gephardt (SPP) led a discussion with the ESWG to review the wind and siting adjustment options to address the recent announcement to cancel Wind Catcher. The approved 2019 ITP scope amounts for projected renewable capacity based in part on integrated resource plan projections, which included the Wind Catcher announcement. Liz reviewed three options with the group:

Option 1: Move forward with no changes to the study
Option 2: Remove the wind sited at Riverside 345 kV from the study
Option 3: Replace the Riverside 345 kV site with other wind sites

The group discussed the impact each option could have on the schedule. Option 1 would have no immediate impact, but additional analysis and stakeholder vetting would likely be necessary during project screening and portfolio development. Option 2 required the least amount of analysis time, but requires a scope change that would need to be approved by MOPC. Option 3 requires more hours than option 2 to redo the siting work. The ESWG took one of Alan Myers famous straw poles, and removed option 1 from the choices. The group was undecided, many stakeholders wanting to remove the projected wind from the scope, and others who felt like we should choose option 3 to avoid taking the scope back to MOPC. Juliano Freitas (SPP), informed members that motion results, will be evaluated by SPP Staff and taken to the MOPC secretary to decide the next steps, regarding MOPC action.

Zac Hager (OGE) made a motion; seconded by Bennie Weeks (Xcel/SPS) to approve Option 2 to remove the wind sited at Riverside 345 kV from the study. The motion was approved with 8 votes in favor, 6 votes against, and 2 abstentions. Those votes against the motion were: Alan Myers (ITC), John Olsen (Evergy), Brad Schwarz (Hunt), Tim Owens (NPPD), Kurt Stradley (LES),

and Jody Holland (GHP). The individuals abstaining from voting for the motion were: Bethany King (EMDE) and Natasha Henderson (GSEC).

Voting Rationale

Randy Collier (CUS)

City Utilities supports the ESWG motion to remove wind capacity sited at Riverside in the 2019 ITP model. The Wind Catcher project was ~2 GW of wind and its cancellation should be factored into the 2019 ITP model. Reduction of the projected wind totals used and reduction of the wind accreditation amounts related to Wind Catcher allow for a more accurate model of the current situation (cancellation of Wind Catcher). Since the Wind Catcher cancellation is publicly acknowledged and there is sufficient time to incorporate this change into the 2019 ITP model, City Utilities is supportive of changing the 2019 ITP model per Option 2.

Kurt Stradley (LES)

It seems after the lengthy discussion that Option 3 would be the best choice, due to the fact it would leave the assumptions previously approved intact on the amounts of wind to be included in the two Futures for the 2019 ITP. Option 3 would remove proxy wind (Wind Catcher) sited at Riverside and redistribute that wind to the other SPP sites as shown in the presentation materials, using the siting criteria previously approved. Option 3 would be more straight forward avoiding revisions to the 2019 ITP scope and having MOPC expedite the process to approve the scope change.

Tim Owens (NPPD)

After considering the discussion during the ESWG meeting, I voted no on the motion to proceed with Option 2 to address the recently announced cancelation of the Wind Catcher project, because I believe that Option 3, also presented during the meeting, was a better choice from both a technical and risk perspective. Unlike Option 2, Option 3 would have left the previously approved assumptions regarding projected wind development for the two Futures in the 2019 ITP intact. These assumptions were developed and approved without specific consideration of the Wind Catcher project. Option 3 would have removed proxy wind capacity currently sited at Riverside and redistributed it to other locations in the SPP footprint using the approved sitting criteria, as described in the presentation materials. If the wind sited at Riverside is considered to be a proxy for Wind Catcher, then this approach seems to more appropriately express the original intent of the two Futures, than does Option 2. Option 3 would also have avoided the need to change the 2019 ITP scope and would therefore have eliminated the schedule risk associated with requesting expedited action by the MOPC to approve the scope change, which will be required for Option 2.

Brad Schwarz (Hunt Transmission Services)

I voted no on Option 2 due to the ad hoc MOPC vote that would be required and I thought Option 1 allowing the stakeholder project vetting process would work better than rushing through a vote on Option 2.

Alan Myers (ITCGP)

ITC voted no regarding the option to replace the 2000 MW of wind interconnected at Riverside in the 2019 ITP study with CT's in other locations for the following reasons:

1. The change may set an unfortunate precedent for future ITP studies when unexpected changes occur during a study period. It was the intention of the TPITF to minimize these type of changes in order to be able to have the benefit of producing results every year.

2. Elimination of 2000 MW of wind is not consistent with the approved future definitions and we would prefer that the original values, which represented a compromise among stakeholders, be maintained.
3. Other options were discussed which appeared to ITC to better address the issue.

John Olsen (KCPL and Westar, Evergy Companies)

> Evergy voted no on the motion to replace the wind generation with conventional generation because the motion reduces the total wind generation in the previously approved Futures. Evergy prefers that we maintain the approved levels of wind generation in the two Futures. The ESWG could have approved alternate wind sites per the siting guidelines and could have done so without additional cost or impact to the ITP schedule.

Staff informed the ESWG that the analysis for option 2 was already complete, and that the results had been posted in the background material, and shown during the meeting. They asked for clarification if the motion was to proceed with option 2, or to approve the results of option 2 as well. The group felt another motion should be made to clarify. Gayle Nansel (WAPA) noted that had she reviewed the results of option 2, she would probably have changed her vote. (Attachment 8 – 2019 ITP Siting Adjustment)

> **Zac Hager (OGE) made a motion; seconded by Randy Collier (CUS) to approve the results (using Option 2) of the resource plan and siting adjustments and GOFs as posted. The motion carried with 2 abstentions, Alan Myers (ITC) and John Olsen (Evergy).**

Agenda Item 5 – Central Point of Contact (CPOC) List

Juliano Freitas (SPP) updated the ESWG on the progress of the Central point of contact (CPOC) list. He reviewed the ITP Manual language that states that SPP stakeholders have flexibility when identifying the CPOC for their respective companies, which include: Identifying a specific person who will coordinate the various requests that come out of the planning process, assigning individuals who will be responsible for specific parts of the planning process, providing SPP with an email address to be used for requests that will target specific groups with their organization instead of naming an individual. Staff asked for feedback on the contact list. (Attachment 9 – Central Point of Contact (CPOC) List)

Agenda Item 6 – Action Item 186: Data Submission Guidelines

Nikki Roberts (SPP) reviewed a presentation outlining the draft of the data submission guidelines document. This will complete action item 186 which originated from a stakeholder request for a document detailing the data requests associated with the economic model. Stakeholders asked for additional details to be added to the charts in the guidelines. Staff will make the updates and bring the final document back for approval. (Attachment 10 – Action Item 186: Data Submission Guidelines)

Agenda Item 7 – ABB Simulation Ready data

Keith Smith (ABB) presented to the ESWG, he went over the data sources used to develop the simulation ready data and the ABB model behavior. Stakeholders voiced concerns with a few data points in the model. Staff will follow up with ABB to provide updates or resolutions. (Attachment 11 – ABB SRD Data Item Overview)

Agenda Item 8 – Member Voting Education

Kirk Hall (SPP) spoke to the ESWG about member voting. The members of the ESWG are the subject matter experts for economic studies and staff seeks and values their input. He gave examples of appropriate times to abstain from a vote, but reminded the group that a motion can pass with 1 yes vote and 15 abstentions.

Agenda Item 9 – 2020 ITP Items

Agenda Item 9a – 2020 ITP Schedule

Juliano Freitas (SPP) reviewed a presentation on 2020 ITP schedule. Juliano reviewed on-going and up-coming milestones. (Attachment 12 – 2020 ITP Schedule)

Agenda Item 9b – 2020 ITP Scope Development

Kirk Hall (SPP) presented on the 2020 ITP futures. Staff sent out a survey to Stakeholders requesting input and direction on the number of futures for this study and what the drivers of those futures would be, Kirk reviewed the responses with the group. The majority of stakeholders who responded to the survey would like to see futures similar to the 2019 ITP assessment. Kirk talked about some of the assumptions that we could adjust for the upcoming study, retirements, energy prices, and renewable amounts are items we should explore. Results of a straw poll showed that most stakeholders are in favor of exploring a third future, staff will work on estimating the cost. (Attachment 13 – 2020 ITP Futures)

Agenda Item 9bii – 2020 ITP Scope – Conventional Generator Prototypes

Antonio Barber (SPP) began a discussion of conventional generator prototypes for the 2020 ITP scope. We reviewed the data sources that have been used historically and showed the updated parameters for each data source. Stakeholders agreed that we should include combined cycle, combustion turbine, and reciprocating engines as the available prototypes for resource planning. Staff will continue researching and bring back a recommendation to the September meeting. (Attachment 14 – Conventional Generation Prototypes)

Agenda Item 9biii – 2020 ITP Scope – Resource Planning Load Forecast

Antonio Barber (SPP) spoke to the ESWG about action item 193: Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process. He reviewed the ITP Manual language and provided background on the assumptions being used in the current 2019 ITP study. Staff recommended allowing stakeholder to use a separate load forecast for resource planning, stakeholders wanted clarity on what is submitted in the powerflow models, to make an informed decision. Staff will bring back more information in September. (Attachment 15 – Load Forecast for Resource Planning)

> **Jon Iverson (OPPD) made a motion; seconded by Anita Sharma (AEP) to approve using the base reliability load forecast with the option to submit separate load forecast for Resource Planning, in accordance with Resource Adequacy guidelines. The motion failed.**

Agenda Item 9c – 2020 ITP Load and Generation

Theva Coleman (SPP) gave a brief update on the current status of the 2020 load and generation review. She informed them of the tasks that staff is currently working on and reviewed the upcoming schedule. (Attachment 16 – Load & Generation Review)

Agenda Item 9d – Generation Retirements Consistency

Did not cover agenda item

Agenda Item 10 – 2019 Meeting Locations

Amber Greb (SPP) showed stakeholders the proposed meeting locations and dates for the 2019 calendar year. She will post for stakeholder review and request feedback.

Closing Items

There were no action items from the meeting.

The meeting was adjourned at 11:00 AM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Annual Regional APC (No Added Wind)

$8 VOM
$8 Curtailment

	Production Cost	Purchases	Sales	APC
Base	$9,118M	$2,030M	$1,383M	$9,766M
Change	$9,068M	$2,053M	$1,387M	$9,734M
Difference	($50M)	$23M	$4M	($31M)

$0 VOM
$-35 Curtailment

	Production Cost	Purchases	Sales	APC
Base	$8,516M	$2,028M	$1,373M	$9,171M
Change	$8,465M	$2,053M	$1,378M	$9,139M
Difference	($51M)	$24M	$5M	($32M)


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APC Calculation Fundamentals: Wind Examples

James Bailey

October 11-12, 2018

Objective

- Provide additional examples illustrating how addition of wind resources to a real world PROMOD model affect APC calculation results
  - Zonal (no additional wind resources)
  - Unassigned wind capacity added
  - Assigned wind capacity added

Methodology (No Additional Wind)

- Develop Base Case
  - Start with 2017 ITP10 model for 2025 Reference Case
  - Set renewable VOM to $0 and curtailment price to $-35
  - Run simulation
  - Calculate APC for each zone
- Develop Change Case
  - Start with Base Case
  - Add 2017 ITP10 portfolio
  - Run simulation
  - Calculate APC for each zone
- Calculate APC benefit of the portfolio (Base -> Change)

Methodology (Unassigned Wind)

- Develop Base Case
  - Start with 2017 ITP10 model for 2025 Reference Case
  - Set renewable VOM to $0 and curtailment price to $-35
  - Add 5 GW wind capacity on a pro-rata basis to all wind units already modeled
    - **Do not assign** additional wind capacity to any zone
  - Run simulation
  - Calculate APC for each zone
- Develop Change Case
  - Start with Base Case
  - Add 2017 ITP10 portfolio
  - Run simulation
  - Calculate APC for each zone
- Calculate APC benefit of the portfolio (Base -> Change)

Methodology (Assigned Wind)

- Develop Base Case
  - Start with 2017 ITP10 model for 2025 Reference Case
  - Set renewable VOM to $0 and curtailment price to $-35
  - Add 5 GW wind capacity on a pro-rata basis to all wind units already modeled
    - **Assign** additional wind capacity to all zones on a pro-rata basis
  - Run simulation
  - Calculate APC for each zone
- Develop Change Case
  - Start with Base Case
  - Add 2017 ITP10 portfolio
  - Run simulation
  - Calculate APC for each zone
- Calculate APC benefit of the portfolio (Base -> Change)

Annual Regional APC

No Added

	Production Cost	Purchases	Sales	APC
Base	$8,516M	$2,028M	$1,373M	$9,171M
Change	$8,465M	$2,053M	$1,378M	$9,139M
Difference	($51M)	$24M	$5M	($32M)

Unassigned

	Production Cost	Purchases	Sales	APC
Base	$8,103M	$2,218M	$1,045M	$9,277M
Change	$8,015M	$2,248M	$1,053M	$9,210M
Difference	($88M)	$30M	$9M	($67M)

Assigned

	Production Cost	Purchases	Sales	APC
Base	$8,119M	$1,812M	$1,303M	$8,628M
Change	$8,029M	$1,840M	$1,314M	$8,555M
Difference	($90M)	$28M	$12M	($73M)

* Excludes informational zones

Energy

Purchases

	No Additional Wind	Unassigned Wind	Assigned Wind
Base	35,497,444	42,850,713	33,594,407
Change	35,961,167	43,567,527	34,213,244
Difference	463,723	716,815	618,837

Sales

	No Additional Wind	Unassigned Wind	Assigned Wind
Base	31,991,222	25,763,923	33,414,551
Change	31,966,823	25,949,004	33,562,769
Difference	(24,399)	185,081	148,218

* Values in MWh

Average LMPs

Load (Hours Purchasing)

	No Additional Wind	Unassigned Wind	Assigned Wind
Base	$57.57	$52.92	$54.50
Change	$57.32	$52.76	$54.08
Difference	($0.25)	($0.16)	($0.42)

Generation (Hours Selling)

	No Additional Wind	Unassigned Wind	Assigned Wind
Base	$45.27	$42.12	$40.67
Change	$45.49	$42.35	$41.11
Difference	$0.22	$0.23	$0.44

Key Observations

- Regional APC benefits of transmission slightly increase as a result of assigning wind vs. not assigning wind due to:
  - Decreased production costs
  - Decreased purchase costs
  - Increased sales revenues

Appendix

Annual Purchases and Sales Energy (No Additional Wind)

Zone	Region	Purchases (Base)	Purchases (Change)	Purchases (Difference)	Sales (Base)	Sales (Change)	Sales (Difference)
KACY	Info.	623,334	625,618	2,284	68,873	68,662	(212)
OTHSPP	Info.	-	-	-	12,979,665	13,115,578	135,913
SWPAALL	Info.	212,983	217,354	4,371	3,034,584	3,031,161	(3,424)
AEPWALL	Main	6,534,992	6,488,100	(46,893)	1,240,482	1,259,150	18,668
EMDEALL	Main	106,001	137,548	31,548	1,728,704	1,490,868	(237,836)
GMOALL	Main	1,230,094	1,210,510	(19,584)	433,633	446,328	12,695
GRDA	Main	343,979	335,747	(8,232)	2,455,381	2,491,699	36,317
IS	Main	3,313,068	3,294,905	(18,162)	1,190,602	1,207,915	17,313
KCPLALL	Main	151,111	138,288	(12,824)	6,957,611	7,099,523	141,912
LES	Main	226,184	223,354	(2,831)	812,092	825,909	13,817
MIDWALL	Main	852,313	858,635	6,322	9,998	10,471	473
MKECALL	Main	3,111,898	3,108,995	(2,903)	-	-	-
NPPDALL	Main	142,862	141,479	(1,382)	7,411,070	7,495,964	84,894
OKGEALL	Main	10,342,284	10,257,623	(84,662)	29,723	32,117	2,394
OPPDALL	Main	443,297	434,832	(8,465)	4,173,019	4,187,272	14,253
SPCIUT	Main	278,141	299,225	21,084	684,309	654,769	(29,540)
SUNCALL	Main	764,291	745,942	(18,350)	323,625	338,801	15,176
SWPSALL	Main	4,112,206	4,705,803	593,597	429,917	312,808	(117,109)
WESTALL	Main	1,269,607	1,327,494	57,886	3,702,528	3,705,344	2,816
WFECALL	Main	2,275,116	2,252,688	(22,428)	408,528	407,886	(642)
SPPMAIN	Main	35,497,444	35,961,167	463,723	31,991,222	31,966,823	(24,399)

*Values in MWh

Annual Purchases and Sales Energy (Unassigned Wind)

Zone	Region	Purchases (Base)	Purchases (Change)	Purchases (Difference)	Sales (Base)	Sales (Change)	Sales (Difference)
KACY	Info.	677,534	690,331	12,797	45,807	43,901	(1,906)
OTHSPP	Info.	-	-	-	32,091,636	32,429,769	338,133
SWPAALL	Info.	198,306	204,074	5,767	3,054,597	3,045,446	(9,152)
AEPWALL	Main	7,258,093	7,279,960	21,867	940,572	891,293	(49,279)
EMDEALL	Main	104,231	145,021	40,790	1,703,871	1,378,777	(325,094)
GMOALL	Main	1,408,772	1,385,465	(23,307)	300,763	300,351	(412)
GRDA	Main	330,139	313,360	(16,779)	2,328,615	2,400,903	72,288
IS	Main	4,209,238	4,111,513	(97,724)	881,886	920,579	38,693
KCPLALL	Main	177,738	147,113	(30,625)	5,877,623	6,073,044	195,421
LES	Main	267,626	253,648	(13,978)	500,040	543,406	43,367
MIDWALL	Main	890,317	1,005,510	115,193	10,436	9,512	(924)
MKECALL	Main	3,159,838	3,137,925	(21,913)	-	-	-
NPPDALL	Main	272,556	229,880	(42,676)	5,561,234	5,889,546	328,312
OKGEALL	Main	11,867,706	11,683,378	(184,329)	5,511	6,337	826
OPPDALL	Main	534,708	525,068	(9,639)	3,849,400	3,908,158	58,758
SPCIUT	Main	297,916	331,341	33,425	666,224	618,149	(48,075)
SUNCALL	Main	1,128,266	1,089,137	(39,128)	241,444	255,663	14,219
SWPSALL	Main	6,669,286	7,505,254	835,968	67,688	49,062	(18,627)
WESTALL	Main	1,824,277	1,972,370	148,092	2,498,358	2,380,371	(117,987)
WFECALL	Main	2,450,007	2,451,585	1,577	330,258	323,853	(6,405)
SPPMAIN	Main	42,850,713	43,567,527	716,815	25,763,923	25,949,004	185,081

*Values in MWh

Annual Purchases and Sales Energy (Assigned Wind)

Zone	Region	Purchases (Base)	Purchases (Change)	Purchases (Difference)	Sales (Base)	Sales (Change)	Sales (Difference)
KACY	Info.	595,467	605,629	10,162	79,886	77,384	(2,502)
OTHSPP	Info.	-	-	-	13,895,174	14,113,840	218,667
SWPAALL	Info.	171,047	175,484	4,437	3,176,762	3,166,067	(10,695)
AEPWALL	Main	5,591,181	5,615,562	24,381	2,117,903	2,074,303	(43,600)
EMDEALL	Main	84,374	114,133	29,759	1,995,016	1,679,540	(315,476)
GMOALL	Main	1,138,668	1,111,618	(27,050)	566,913	573,182	6,269
GRDA	Main	257,288	238,605	(18,683)	2,592,435	2,664,280	71,844
IS	Main	3,025,654	2,943,040	(82,613)	1,736,395	1,800,774	64,379
KCPLALL	Main	130,852	112,566	(18,286)	6,876,609	7,123,662	247,053
LES	Main	194,026	187,878	(6,148)	801,088	852,950	51,861
MIDWALL	Main	801,330	917,751	116,421	13,827	11,385	(2,442)
MKECALL	Main	3,003,574	2,979,256	(24,318)	-	-	-
NPPDALL	Main	187,005	158,749	(28,256)	6,417,879	6,761,720	343,840
OKGEALL	Main	10,004,370	9,838,599	(165,772)	41,716	41,378	(338)
OPPDALL	Main	453,224	444,764	(8,461)	4,776,314	4,830,825	54,511
SPCIUT	Main	252,257	283,878	31,621	771,564	717,782	(53,783)
SUNCALL	Main	1,045,668	1,007,826	(37,841)	266,433	277,828	11,395
SWPSALL	Main	4,202,006	4,975,844	773,838	355,846	243,511	(112,335)
WESTALL	Main	1,242,593	1,327,607	85,014	3,629,181	3,475,514	(153,667)
WFECALL	Main	1,980,337	1,955,567	(24,770)	455,430	434,136	(21,294)
SPPMAIN	Main	33,594,407	34,213,244	618,837	33,414,551	33,562,769	148,218

*Values in MWh

Annual Average LMPs (No Additional Wind)

Zone	Region	Load (Base)	Load (Change)	Load (Difference)	Generation (Base)	Generation (Change)	Generation (Difference)
KACY	Info.	$47.73	$47.00	($0.73)	$48.91	$48.50	($0.41)
OTHSPP	Info.	-	-	-	$49.64	$50.16	$0.52
SWPAALL	Info.	$47.99	$47.00	($0.99)	$60.93	$60.91	($0.02)
AEPWALL	Main	$59.37	$59.37	$0.00	$43.18	$43.50	$0.32
EMDEALL	Main	$64.12	$60.72	($3.40)	$50.60	$49.98	($0.62)
GMOALL	Main	$51.48	$52.09	$0.61	$38.10	$38.35	$0.25
GRDA	Main	$48.15	$47.75	($0.40)	$54.15	$54.25	$0.10
IS	Main	$49.32	$49.58	$0.26	$42.92	$42.98	$0.06
KCPLALL	Main	$75.53	$70.61	($4.92)	$43.85	$44.45	$0.60
LES	Main	$52.16	$52.77	$0.61	$38.12	$38.54	$0.42
MIDWALL	Main	$45.62	$45.98	$0.36	$55.21	$55.20	($0.01)
MKECALL	Main	$46.82	$47.22	$0.40	-	-	-
NPPDALL	Main	$61.21	$62.02	$0.81	$40.58	$40.89	$0.31
OKGEALL	Main	$53.51	$53.87	$0.36	$36.31	$36.82	$0.51
OPPDALL	Main	$62.11	$63.42	$1.31	$39.03	$39.25	$0.22
SPCIUT	Main	$61.10	$58.49	($2.61)	$52.01	$51.79	($0.22)
SUNCALL	Main	$39.47	$39.69	$0.22	$51.75	$51.86	$0.11
SWPSALL	Main	$57.46	$56.12	($1.34)	$46.35	$47.71	$1.36
WESTALL	Main	$51.51	$51.49	($0.02)	$43.91	$44.06	$0.15
WFECALL	Main	$50.47	$50.81	$0.34	$62.55	$62.93	$0.38
SPPMAIN	Main	$57.57	$57.32	($0.25)	$45.27	$45.49	$0.22

Annual Average LMPs (Unassigned Wind)

Zone	Region	Load (Base)	Load (Change)	Load (Difference)	Generation (Base)	Generation (Change)	Generation (Difference)
KACY	Info.	$44.75	$43.70	($1.05)	$46.06	$46.82	$0.76
OTHSPP	Info.	-	-	-	$39.40	$40.62	$1.22
SWPAALL	Info.	$51.15	$48.61	($2.54)	$58.70	$58.75	$0.05
AEPWALL	Main	$57.64	$57.33	($0.31)	$37.65	$37.78	$0.13
EMDEALL	Main	$64.86	$59.96	($4.90)	$49.24	$47.87	($1.37)
GMOALL	Main	$47.55	$47.77	$0.22	$34.78	$35.14	$0.36
GRDA	Main	$48.19	$48.03	($0.16)	$51.53	$51.70	$0.17
IS	Main	$44.97	$45.43	$0.46	$41.81	$41.94	$0.13
KCPLALL	Main	$64.48	$64.57	$0.09	$39.34	$39.99	$0.65
LES	Main	$47.19	$48.56	$1.37	$32.10	$33.58	$1.48
MIDWALL	Main	$38.34	$38.94	$0.60	$60.35	$59.79	($0.56)
MKECALL	Main	$39.16	$39.75	$0.59	-	-	-
NPPDALL	Main	$44.74	$48.37	$3.63	$37.23	$37.52	$0.29
OKGEALL	Main	$49.17	$50.14	$0.97	$31.34	$31.79	$0.45
OPPDALL	Main	$58.10	$59.25	$1.15	$35.23	$35.62	$0.39
SPCIUT	Main	$61.31	$56.75	($4.56)	$50.29	$49.62	($0.67)
SUNCALL	Main	$31.22	$31.05	($0.17)	$53.11	$53.37	$0.26
SWPSALL	Main	$50.44	$49.11	($1.33)	$51.27	$55.07	$3.80
WESTALL	Main	$44.59	$44.75	$0.16	$39.68	$40.20	$0.52
WFECALL	Main	$45.07	$45.81	$0.74	$60.52	$62.57	$2.05
SPPMAIN	Main	$52.92	$52.76	($0.16)	$42.12	$42.35	$0.23

Annual Average LMPs (Assigned Wind)

Zone	Region	Load (Base)	Load (Change)	Load (Difference)	Generation (Base)	Generation (Change)	Generation (Difference)
KACY	Info.	$45.02	$43.97	($1.05)	$42.94	$43.48	$0.54
OTHSPP	Info.	-	-	-	$41.93	$43.31	$1.38
SWPAALL	Info.	$51.22	$48.89	($2.33)	$57.76	$57.87	$0.11
AEPWALL	Main	$60.13	$59.96	($0.17)	$37.38	$37.40	$0.02
EMDEALL	Main	$64.45	$61.04	($3.41)	$48.96	$47.51	($1.45)
GMOALL	Main	$49.59	$50.24	$0.65	$33.74	$34.00	$0.26
GRDA	Main	$48.47	$48.61	$0.14	$50.68	$50.89	$0.21
IS	Main	$46.24	$46.78	$0.54	$39.61	$39.78	$0.17
KCPLALL	Main	$72.19	$71.14	($1.05)	$38.98	$39.80	$0.82
LES	Main	$50.93	$52.20	$1.27	$31.80	$33.68	$1.88
MIDWALL	Main	$38.31	$38.83	$0.52	$55.93	$57.46	$1.53
MKECALL	Main	$39.18	$39.79	$0.61	-	-	-
NPPDALL	Main	$48.35	$51.92	$3.57	$37.18	$37.50	$0.32
OKGEALL	Main	$49.62	$50.59	$0.97	$24.51	$24.96	$0.45
OPPDALL	Main	$59.71	$60.92	$1.21	$35.38	$35.74	$0.36
SPCIUT	Main	$62.78	$58.02	($4.76)	$49.33	$48.61	($0.72)
SUNCALL	Main	$31.14	$31.04	($0.10)	$52.21	$52.48	$0.27
SWPSALL	Main	$52.29	$49.75	($2.54)	$37.98	$42.63	$4.65
WESTALL	Main	$48.45	$48.33	($0.12)	$37.91	$38.46	$0.55
WFECALL	Main	$46.37	$46.84	$0.47	$51.81	$53.45	$1.64
SPPMAIN	Main	$54.50	$54.08	($0.42)	$40.67	$41.11	$0.44


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2019 ITP Schedule

Juliano Freitas

November 14, 2018

Economic Model Building (Complete)

- Start: 7/3/2017
- End: 10/11/2018 (Member's Final Approval)
- Member Review Time:
  - Post 1: 2/12/2018 – 2/23/2018 (10 days)
  - Post 2: 5/8/2018 – 5/22/2018 (10 days)
  - Post 3: 6/6/2018 (informational only)
  - Post 4: 6/29/2018 – 7/16/2018 (10 days)
  - Post 5: 7/19/2018 – 7/26/2018 (5 days)
  - Final Post for Approval: 9/28/2018 – 10/09/2018 (7 days)
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)
- Working Group Approval: ESWG

Constraint Assessment (Complete)

- Start: 8/2/2018
- End: 10/11/2018 (Member's Final Approval)
- Member Review Time:
  - 9/17/2018 – 9/21/2018 (5 days)
  - 9/26/2018 – 10/05/2018 (7 days)
  - Final Post for Approval: 9/28/2018 – 10/09/2018 (7 days)
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)
- Working Group Approval: TWG

Economic Model Conversion to Powerflow (BA Models)

- Start: 8/2/2018
- End: 10/31/2018 (Member's Final Approval)
- Member Review Time:
  - Reactive Settings Review: 10/17/2018 – 10/24/2018 (5 days)
  - TWG Review: 10/29/2018 – 10/30/2018 (3 days)
- Staff Leader: Kelsey Allen (kallen@spp.org)
- Working Group Approval: TWG

Base Reliability Needs Assessment

- Start: 8/2/2018
- End: 11/5/2018
- Staff Leader: Jason Speer (jspeer@spp.org)

BA Reliability Needs Assessment

- Start: 10/31/2018
- End: 1/7/2019
- Staff Leader: Jason Speer (jspeer@spp.org)

Economic Needs Assessment

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Nikki Roberts (nroberts@spp.org)

Policy Needs Assessment

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Nikki Roberts (nroberts@spp.org)

Operational Needs Assessment

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Will Tootle (wtootle@spp.org)

Short Circuit Needs Assessment

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Jason Terhune (jterhune@spp.org)

DPP Window

- Start: 1/8/2019
- End: 2/6/2019
- Member Review Time:
  - Transmission-planning response window (30 calendar days)
- Staff Leader: Ellen Bailey (ebailey@spp.org)

Staff Solutions Development

- Start: 1/8/2019
- End: 3/20/2019
- Staff Leaders:
  - Reliability: Derek Johnson (djohnson@spp.org)
  - Economic: Liz Gephardt (lgephardt@spp.org)
  - Policy: Nikki Roberts (nroberts@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

DPP/Solutions Evaluations

- Start: 1/8/2019
- End: 3/20/2019
- Staff Leaders:
  - Reliability: Derek Johnson (djohnson@spp.org)
  - Economic: Liz Gephardt (lgephardt@spp.org)
  - Policy: Nikki Roberts (nroberts@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

Initial Reliability Portfolio Development

- Start: 2/7/2019
- End: 3/20/2019
- Staff Leader: Kelsey Allen (kallen@spp.org)

Project Grouping – Phase 1
(Conceptual Cost Estimate)

- Start: 1/18/2019
- End: 4/23/2019
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Study Cost Estimates – Round 1

- Start: 4/24/2019
- End: 5/16/2019
- Member Response Time:
  - 4/24/2019 – 5/16/2019 (16 days)
- Staff Leader: John O'Dell (jodell@spp.org)

Project Grouping – Phase 2
(Study Cost Estimate – Re-rank)

- Start: 5/15/2019
- End: 5/16/2019
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Planning Summit

- Start: 5/17/2019
- End: 6/6/2019
- Member Review Time:
  - Summit Materials (7 days prior to meeting)
- Staff Leader: Ellen Bailey (ebailey@spp.org)

Project Grouping – Phase 3
(Conceptual + Study Cost Estimates using Summit Feedback)

- Start: 6/5/2019
- End: 6/19/2019
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Study Cost Estimates – Round 2

- Start: 6/20/2019
- End: 6/26/2019
- Member Response Time:
  - 6/20/2019 – 6/26/2018 (5 days)
- Staff Leader: John O'Dell (jodell@spp.org)

Final Reliability Portfolios Development

- Start: 6/26/2019
- End: 8/5/2019
- Staff Leader: Kelsey Allen (kallen@spp.org)

Project Grouping – Phase 4
(Study Cost Estimate II – Final Re-rank)

- Start: 6/27/2019
- End: 7/8/2019
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Project Grouping – Final Determination

- Start: 6/28/2019
- End: 7/8/2019
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Optimization

- Start: 7/9/2019
- End: 7/17/2019
- Staff Leader: James Bailey (jbailey@spp.org)

Portfolio Consolidation

- Start: 7/18/2019
- End: 8/2/2019
- Staff Leader: Liz Gephardt (lgephardt@spp.org)

Staging

- Start: 8/5/2019
- End: 8/15/2019
- Staff Leader: Kirk Hall (khall@spp.org)

Benefit Metrics Calculation

- Start: 8/2/2019
- End: 8/26/2019
- Staff Leader: Antonio Barber (abarber@spp.org)

Stability Analysis

- Start: 8/5/2019
- End: 8/26/2019
- Staff Leader: Derek Johnson (djohnson@spp.org)

Sensitivity Analysis

- Start: 8/5/2019
- End: 8/26/2019
- Member Review Time:
  - 8/19/2019 – 8/23/2019 (5 days)
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)

Final Reliability Assessment

- Start: 8/5/2019
- End: 8/27/2019
- Staff Leader: Dee Edmondson (dedmondson@spp.org)

Rate Impacts/ATRR

- Start: 8/15/2019
- End: 8/28/2019
- Staff Leader: Antonio Barber (abarber@spp.org)

Final Report

- Start: 8/1/2019
- End: 9/18/2019
- Staff Leader: Ellen Bailey (ebailey@spp.org)

TWG/ESWG Final Approvals

- Start: 9/26/2019
- End: 10/3/2019
- Member Review Time:
  - 9/26/2019 – 10/3/2019 (5 days)
- Staff Leaders:
  - TWG – Kirk Hall (khall@spp.org)
  - ESWG – Amber Greb (agreb@spp.org)

MOPC and SPP Board

- Start: 9/6/2019
- End: 10/29/2019
- Member Review Time:
  - MOPC: 10/7/2019 – 10/15/2019 (7 days)
  - SPP Board: 10/22/2019 – 10/29/2019 (5 days)


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BA Economic Model Build

Clayton Mayfield

October 11-12, 2018

Objective

- 2019 ITP BA Economic model update
- Lubbock Exit Analysis BA Economic models update

BA Economic Model Update

BA Economic Model – Final Pass

- 2019 ITP BA Economic model Review Period:
  - ESWG Review Period: 9/17/2018 – 9/21/2018
  - ESWG Approval Review: 09/28/2018 – 10/09/2018
- Stakeholder feedback:
  - One RMS response which resulted in no change

Lubbock BA Economic Model Update

Lubbock Exit Analysis
Scope

- Build Lubbock Exit Analysis BA Economic models (5 models)
  - Lubbock BA powerflow import
  - Remove LPL from PROMOD translated regions
  - Adjust LPL demand group demand and energy
  - Deactivate existing Lubbock generation
  - Update SPS Zonal Load Weighted Hub definitions
  - Inactivate Resource Expansion Plan units added for LPL in SPS area at lowest ranked sites

Lubbock Exit Analysis

Future 1 Results

- Resource Plan Adjustments

	2024	2029
SPS Original Shortfall (MW)	654.9	1459.2
Lubbock Shortfall Exiting (MW)	428.9	464.2
SPS New Shortfall (MW)	226.0	995.0
SPS Original CT Assignment	2.9	6.7
CTs Removed	1.0	2.0
SPS New CT Assignment	1.9	4.7

- Siting Plan Adjustments
  - Change (1) Plant X 230kV CT to 2029 commission date
  - Deactivate (1) Nichols 115kV and (1) Nichols 230kV CTs
  - Change Ownership of (1) Hobbs 230kV to 80% SPS, 20% MIDW

Lubbock Exit Analysis

Future 2 Results

- Resource Plan Adjustments

	2024	2029
SPS Original Shortfall (MW)	389.2	1131.4
Lubbock Shortfall Exiting (MW)	467.0	498.5
SPS New Shortfall (MW)	0.0	667.2
SPS Original CT Assignment	2.0	5.3
CTs Removed	2.0	2.0
SPS New CT Assignment	0.0	3.3

- Siting Plan Adjustments
  - Change (1) Plant X 115kV CT to 2029 commission date
  - Change (1) Plant X 230kV CT to 2029 commission date
  - Deactivate (1) Hobbs 115kV and (1) Hobbs 230kV CTs

Lubbock Exit Analysis
Timeline

- ESWG economic model review period
  - 10/15/2018 – 10/19/2018
- ESWG economic model approval review
  - 10/24/2018 – 10/31/2018
- SPP requests approval of economic model by ESWG
  - Via email
  - 10/31/2018
- ESWG economic model approval voting closes
  - 11/2/2018


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Constraint Assessment

Clayton Mayfield

October 11-12, 2018

Objective

- Provide Constraint Assessment Update

Constraint Assessment Update

- 2019 ITP Constraint Assessment Review Period:
  - TWG Review Period: 9/17/2018 – 9/21/2018
  - TWG Approval Review: 9/28/2018 – 10/09/2018
- Stakeholder feedback:
  - 10 companies responded
  - Responses included rating updates, invalidation, and constraint suggestions
- 69kV constraint request:
  - One additional constraint was submitted


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2019 ITP DC/AC Conversion

Kelsey Allen

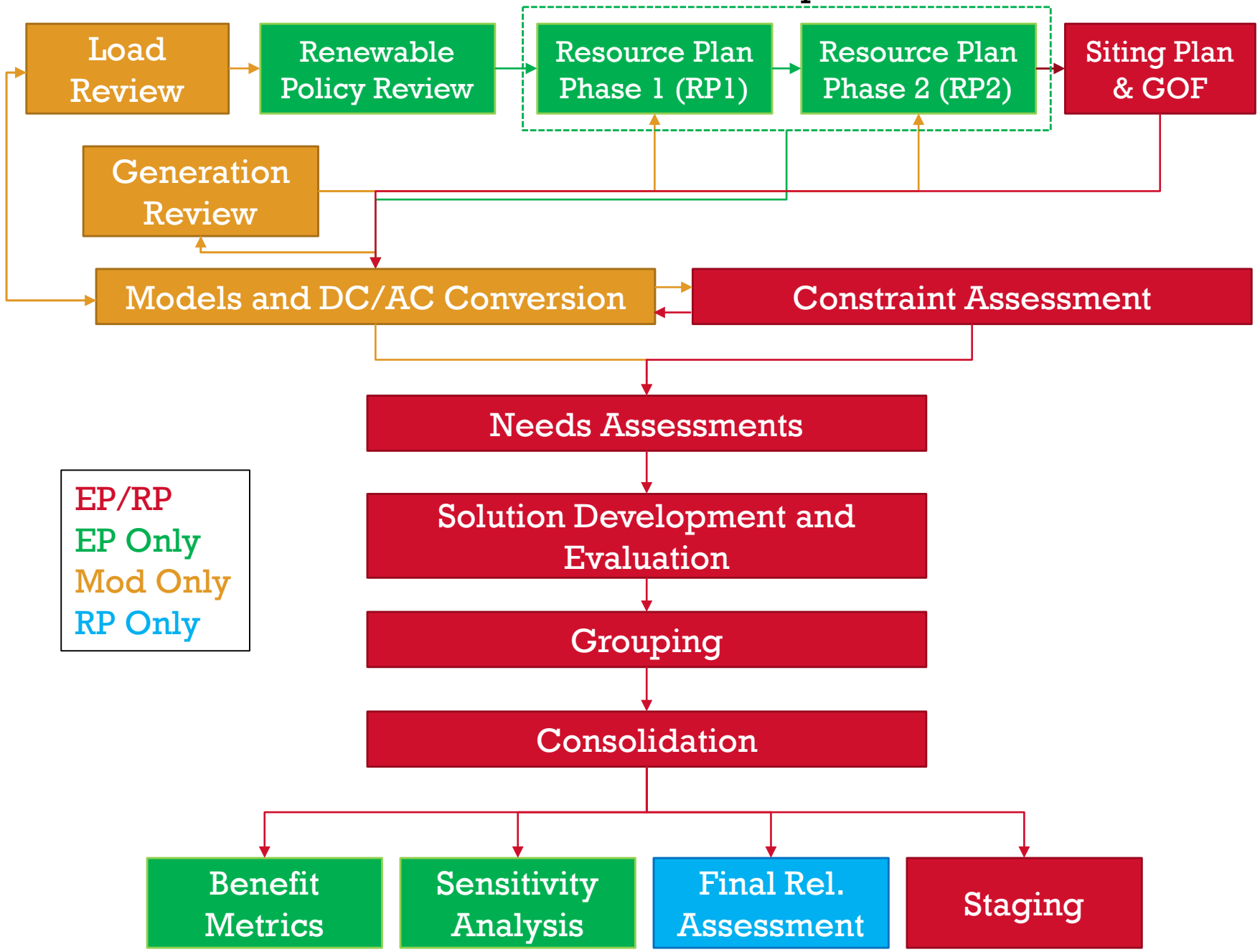
October 11, 2018

Overview

- Review high level process
- Process changes
- Process update and next steps

Process Overview

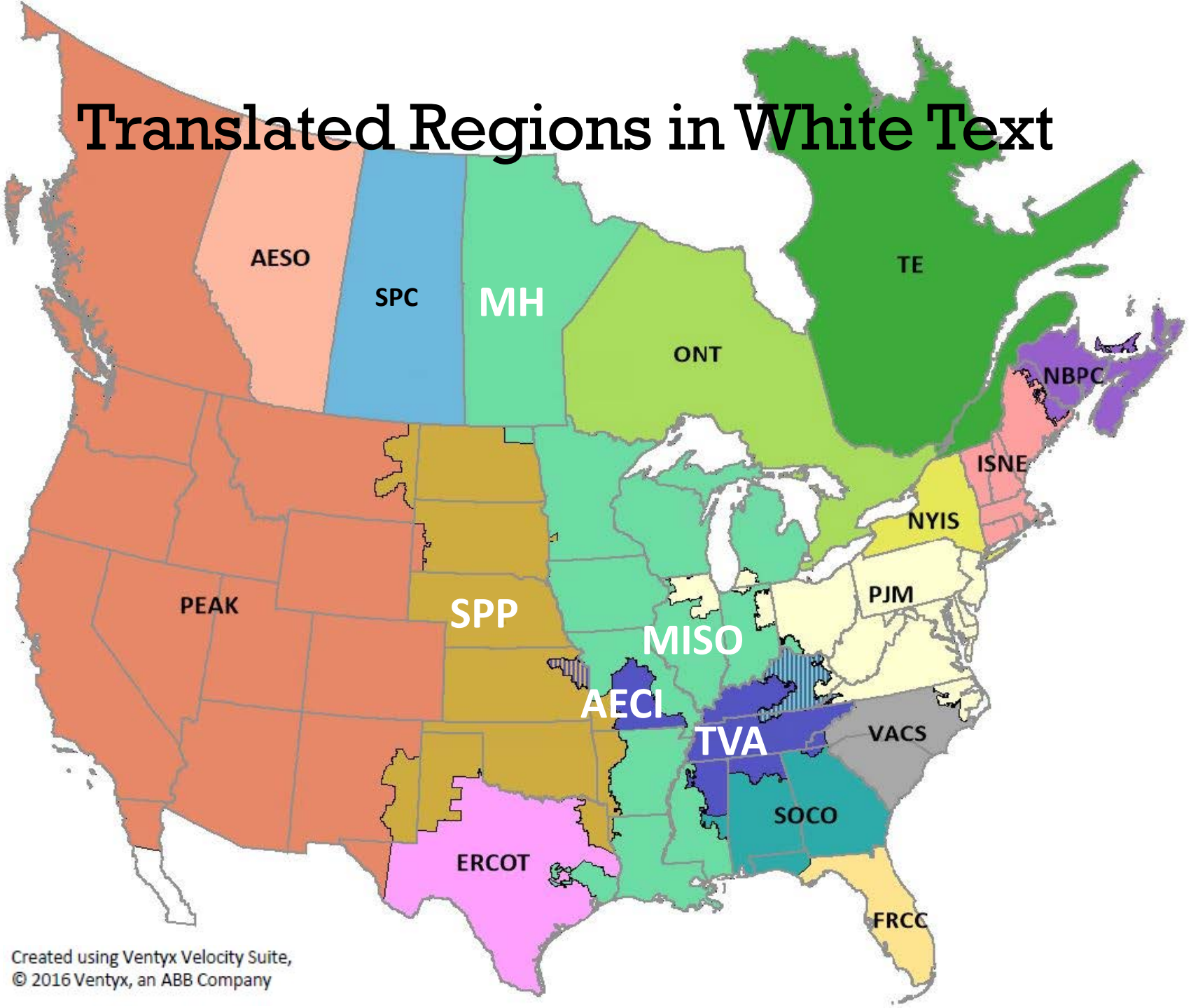
Resource Expansion Plan



DC to AC Model Conversion Process

- Select certain hours out of the year that uniquely stress the SPP transmission system:
  - SPP coincident peak
  - Off Peak (highest wind penetration – April/May, 12am-6am)
- Utilize operating points from the economic (DC) simulation to develop AC powerflow models
  - Coincident load for SPP and other simulated (translated) regions
  - Market dispatch (SCUC/SCED) for translated regions
  - DC line flows
  - PST angles
- Send to stakeholders for reactive device settings review

Translated Regions in White Text



Main Process Changes

Previously discussed during ITP manual development

Non-Translated Region Powerflow Modeling

- PROMOD simulation does not allow power transfers between translated and non-translated regions
- 2017 ITP10
  - Utilize external transactions based upon MMWG seasonal transaction values and proxy load shape to simulate transfers between translated and non-translated regions.
  - Scale external generation to balance.
- 2019 ITP
  - Remove external transaction modeling due to their small size relative to the simulated system.
  - Incorporate output of all load and generation from the production cost model simulation

Transmission Losses Modeling

- 2017 ITP10
  - Utilize no loss load simulation for AC load profiles
  - Utilize grossed up load (by demand group) simulation for AC generation profiles
- 2019 ITP
  - No change to AC load approach
  - Utilize annual peak loads without grossed up load assumption and utilize PROMOD full loss simulation for AC generation profiles

Next Steps

- Complete draft models and QA efforts
- Post models for TWG reactive device settings review (10/12 – 10/18)
- Incorporate reactive setting feedback (10/19 – 10/23)
- Request final approval (10/24 – 10/31)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Policy Needs Assessment

Nikki Roberts

October 11, 2018

Objective

- Review Policy Needs Assessment methodology
- Review schedule

ITP Manual

4.3 Public Policy Needs Assessment

Needs driven by public policy arise if the economic simulations identify conditions on the system that keep a utility from meeting its regulatory or statutory mandates and goals as defined by the renewable policy review and/or future specific public policy assumptions identified in the study scope.

Policy Needs Assessment Overview

- Determine which Utility by State require a renewable mandate/goal per the renewable policy review.
- Determine which renewable units can be applied to each Utility by State based on ownership percentage and state.
- Determine how much renewable energy can be applied to the Utility by State renewable mandate/goal as determined by curtailments.
- Ensure Utility by State is meeting renewable energy requirement by renewable type as defined in the renewable policy review per future and year.

Schedule

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Nikki Roberts (nroberts@spp.org)


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Economic Needs Assessment

Nikki Roberts

October 11, 2018

Objective

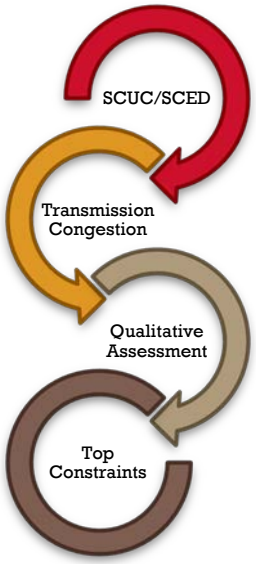
- Review Economic Needs Assessment methodology
- Review schedule

What is an Economic Need?

- Flowgates get congested when powerflows on the system require the SCUC/SCED simulation to redispatch generation in order to not violate the thermal rating of a transmission branch (line/transformer) that is defined as a constraint
- An economic need is a congested flowgate that meets certain criteria as outlined in the ITP Manual
- All economic needs are congested flowgates, not all congested flowgates are defined as economic needs

Economic Needs Assessment Overview

- Identify the top areas of known or forecasted congestion for each future and study year
- Group/relate economic needs based on criteria in ITP Manual



Economic Needs Identification

1. Binding constraints will be ranked from highest to lowest congestion score.

2. Reduce binding constraint list to congested flowgates that have greater than $50k/MW in annual flowgate congestion score. Additional constraints may be included if SPP determines the inclusion would better define an economic need overall.

3. Constraints with monitored elements not interconnected with the SPP transmission system that provide less than $1 million in annual potential benefit to SPP will be removed unless SPP determines the constraints are related to a target area or a historically congested market-to-market flowgate and warrant further analysis.

Schedule

- Start: 11/1/2018
- End: 1/7/2019
- Staff Leader: Nikki Roberts (nroberts@spp.org)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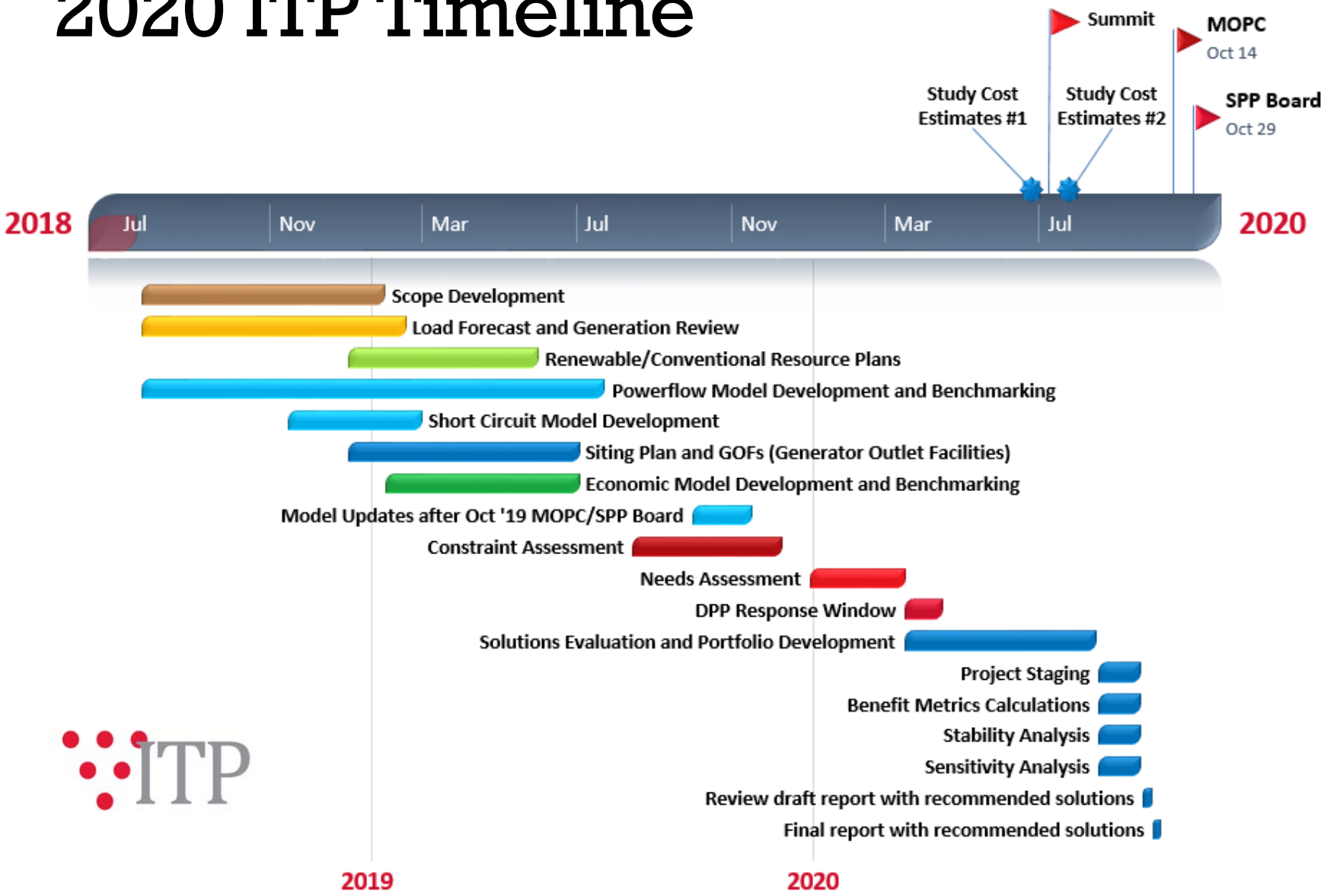
2020 ITP Schedule

Juliano Freitas

October 11, 2018

2020 ITP Timeline



Scope Development

- Start: 7/23/2018
- End: 1/16/2019 (Member's Final Approval)
  - MOPC Approval: 1/16/2019
- Member Review Time:
  - 12/15/2018 – 12/27/2018 (8 days)
- Staff Leader: Kirk Hall (khall@spp.org)
- Working Group Approvals: ESWG and TWG

Powerflow Model

- Start: 7/09/2018
- End: 2/15/2019 (Final Approval)
- Member Review Time:
  - Pass 0 – Trial 1: 7/13/2018 – 7/20/2018 (5 days)
  - Pass 0 – Trial 2: 8/03/2018 – 8/24/2018 (15 days)
  - Pass 1: 9/14/2018 – 9/21/2018 (5 days)
  - Pass 2: 10/05/2018 – 10/26/2018 (15 days)
  - Pass 3: 11/16/2018 – 12/07/2018 (15 days)
  - Pass 4: 12/21/2018 – 1/11/2019 (15 days)
  - **Final Data Submission Deadline: 1/11/2019**
  - Final Initial ITP: 2/02/2019 – 2/08/2019 (5 days)
  - **Final Initial ITP Approval: 2/15/2019**
  - **Final ITP Approval with Oct. 2019 Board approved projects in Nov. 2019**
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

Short Circuit Model

- Start: 11/14/2018
- End: 2/28/2019
- Member Review Time:
  - Pass 1: 12/14/2018 – 12/21/2018 (5 days)
  - Pass 2: 1/17/2019 – 2/01/2019 (10 days)
  - Pass 3: 2/21/2019 – 2/28/2019 (5 days) (MDWG Approval)
  - **Final ITP Approval with Oct. 2019 Board approved projects in Nov. 2019**
- Staff Leader: Theva Coleman (tcoleman@spp.org)
- Working Group Approval: TWG

Load Review

- Start: 7/23/2018
- End: 2/15/2019 (Member's Final Approval)
- Member Review Time:
  - Load Pass 1: 9/17/2018 – 9/28/2018 (10 days)
  - Load Pass 2: 10/15/2018 – 10/26/2018 (10 days)
  - Load Pass 3: 11/26/2018 – 12/07/2018 (10 days)
  - **Final Data Submission Deadline: 1/11/2019**
  - Final Posting for Approval: 2/08/2019 (7 days)
- Staff Leader: Theva Coleman (tcoleman@spp.org)
- Working Group Approval: TWG and ESWG

Generation Review

- Start: 7/23/2018
- End: 2/15/2019 (Member's Final Approval)
- Member Review Time:
  - Gen Pass 1: 9/17/2018 – 9/28/2018 (10 days)
  - RAR & Waiver Request to Stakeholders: 9/21/2018 – 10/26/2018 (25 days)
  - Gen Pass 2: 10/15/2018 – 10/26/2018 (10 days)
  - Gen Pass 3: 11/26/2018 – 12/07/2018 (10 days)
  - **Final Data Submission Deadline: 1/11/2019**
  - Final Posting for Approval: 2/08/2019 (7 days)
- Staff Leader: Theva Coleman (tcoleman@spp.org)
- Working Group Approval: TWG and ESWG

Renewable Policy Review

- Start: 1/02/2019
- End: 2/06/2019 (Member's Final Approval)
- Member Review Time:
  - 1/21/2019 – 1/24/2018 (4 days)
  - 1/25/2019 – 2/6/19 (8 days)

- Staff Leader: Joshua Norton (jnorton@spp.org)
- Working Group Approval: ESWG

Policy Renewable Resource Plan – Phase 1

- Start: 1/16/2019
- End: 3/15/2019 (Member's Final Approval)
- Member Review Time:
  - 3/08/2019 – 3/15/2019 (5 days)
- Staff Leader: Joshua Norton (jnorton@spp.org)
- Working Group Approval: ESWG

Renewable & Conventional Resource Plan – Phase 2

- Start: 2/6/2018
- End: 5/23/2018 (Member's Final Approval)
- Member Review Time:
  - 5/15/2018 – 5/23/2018 (6 days)
- Staff Leader: Antonio Barber (abarber@spp.org)
- Working Group Approval: ESWG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Conventional Generation Prototypes

EWSG

October 11th-12th, 2018

Antonio Barber

Objective

- Seek approval for Conventional Generation Prototypes for the 2020 ITP Scope.

Prototype Data Source Options

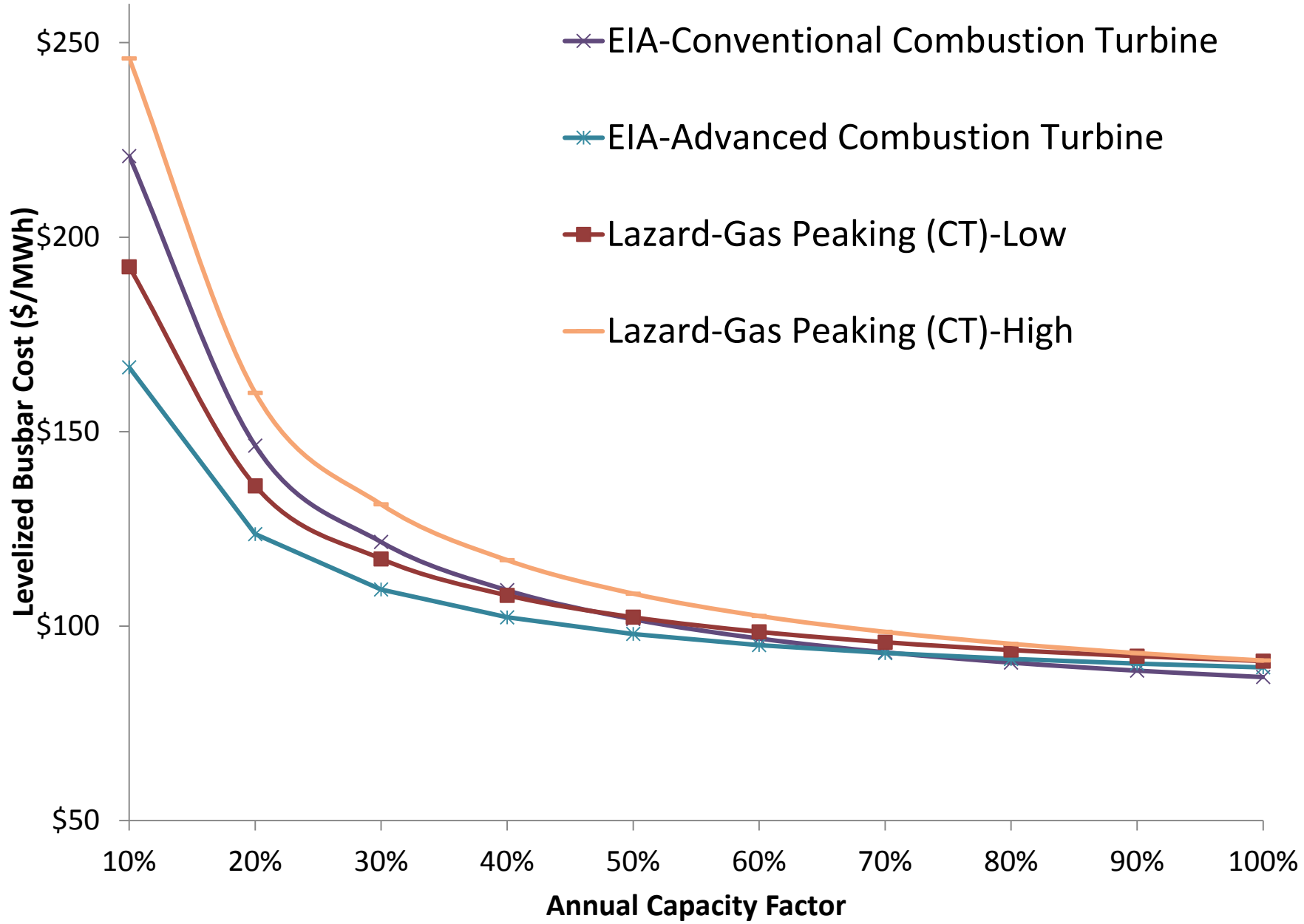
- EIA Annual Energy Outlook (AEO) Report
  - Option in 2019 ITP: July 2017 Data
  - March 2018 Data
- Lazard Levelized Cost of Energy Analysis
  - Used in 2019 ITP10: December 2016 data (Version 10.0)
  - November 2017 (Version 11.0)

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'18	Adv.	429	1,136	2.07	10.35	6,300
	EIA AEO'18	Conv.	702	1,007	3.63	11.39	6,600
	Lazard	High	550	1,333	2.05	5.64	6,900
	Lazard	Low	550	718	3.59	6.36	6,133
Combustion Turbine (CT)	EIA AEO'18	Adv.	237	697	11.08	7.04	9,800
	EIA AEO'18	Conv.	100	1,135	3.57	17.82	9,920
	Lazard	High	50	1,025	10.25	20.50	8,000
	Lazard	Low	241	769	4.82	5.13	9,804
Coal	EIA AEO'18		650	5,216	7.35	72.47	9,750
	Lazard		600	3,075	2.05	41.00	8,750
Nuclear	EIA AEO'18		2,234	6,095	2.38	103.81	10,460
	Lazard		2,200	6,663	0.77	138.38	10,450
Wind	EIA AEO'18		100	1,698	0.00	48.66	N/A
	Lazard		100	1,230	0.00	30.75	N/A
Solar PV (Utility Scale)	Lazard		30	1,409	0.00	12.30	N/A
Solar PV - Tilt	EIA AEO'18		150	1,897	0.00	22.57	N/A
Solar PV - Tracking	EIA AEO'18		150	2,158	0.00	22.57	N/A
Gas Recip Engine	Lazard	High	0.25	1,128	15.38	20.50	10,000
	Lazard	Low	1	666	10.25	15.38	8,000
Battery	EIA AEO'18		30	2,224	7.30	36.49	N/A
Distributed Gen - Base	EIA AEO'18		2	1,592	8.44	18.98	8,969
Distributed Gen - Peak	EIA AEO'18		1	1,913	8.44	18.98	9,961

Busbar Curves – All CT Units

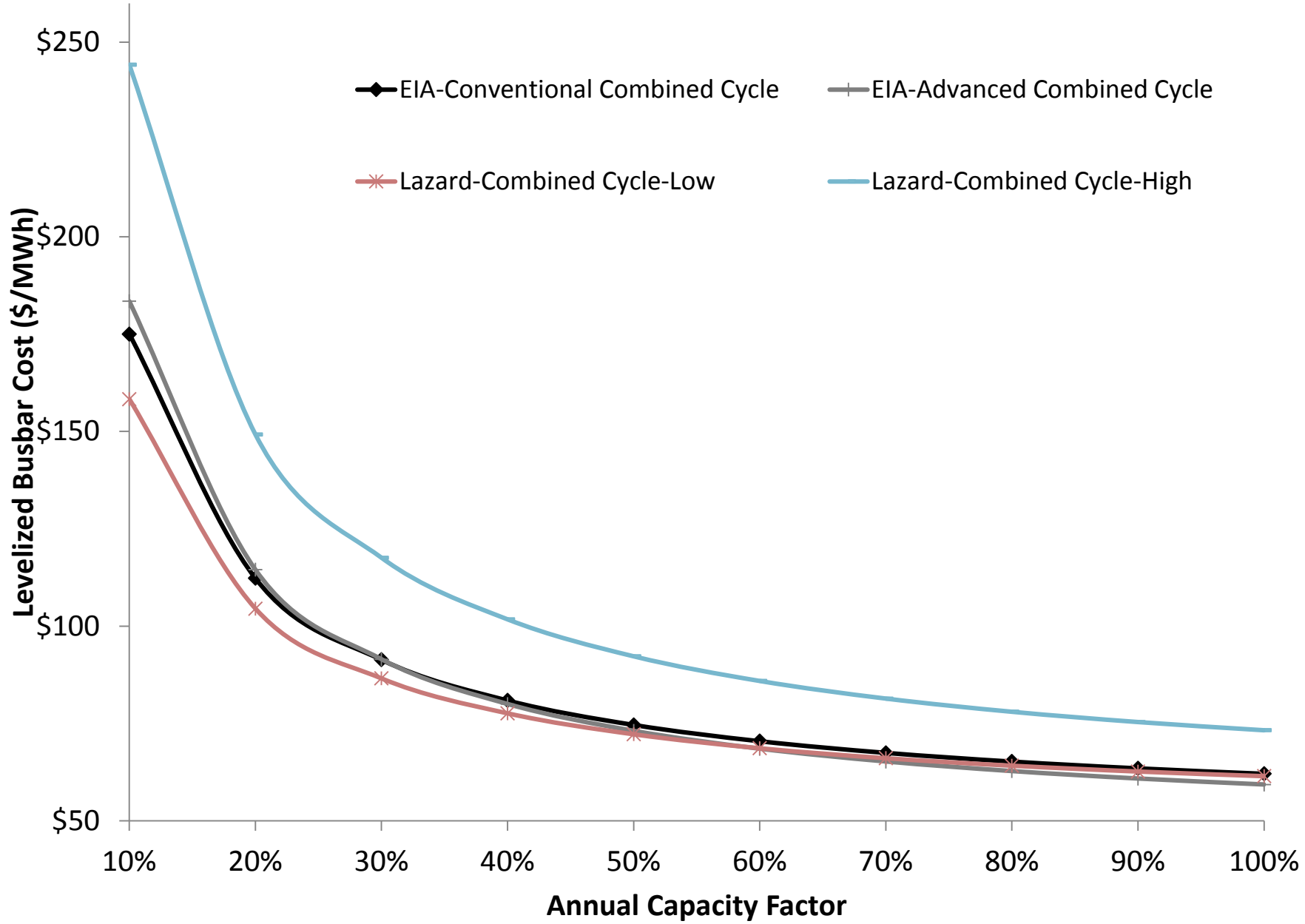
Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



Levelized Busbar Costs for Resource Options

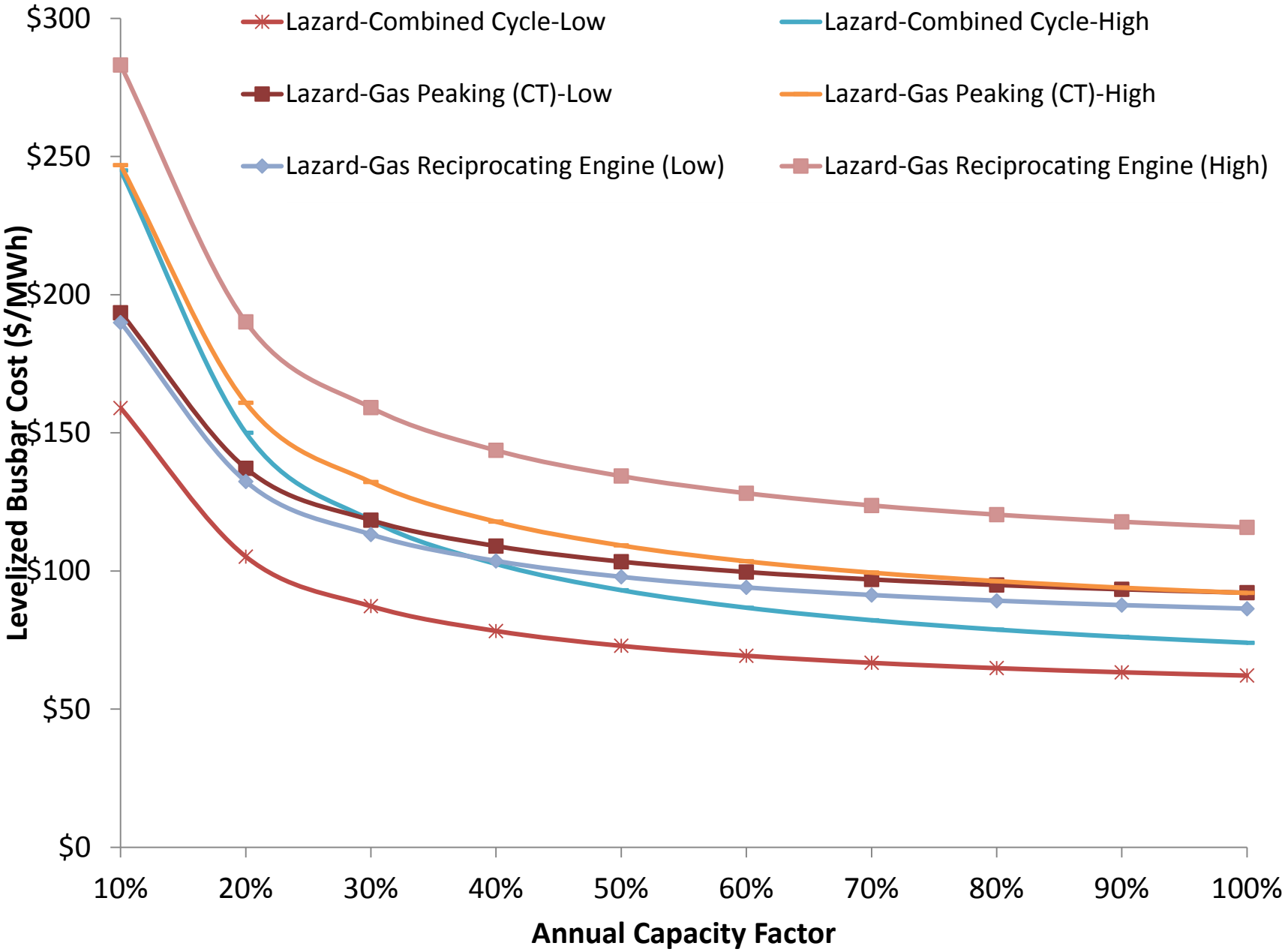
20 Years, 8.0% Discount Rate, 2018$



Busbar Curves – CC, CT, Recip.

Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



Busbar Curves – CC, CT, Recip.

Levelized Busbar Costs for Resource Options

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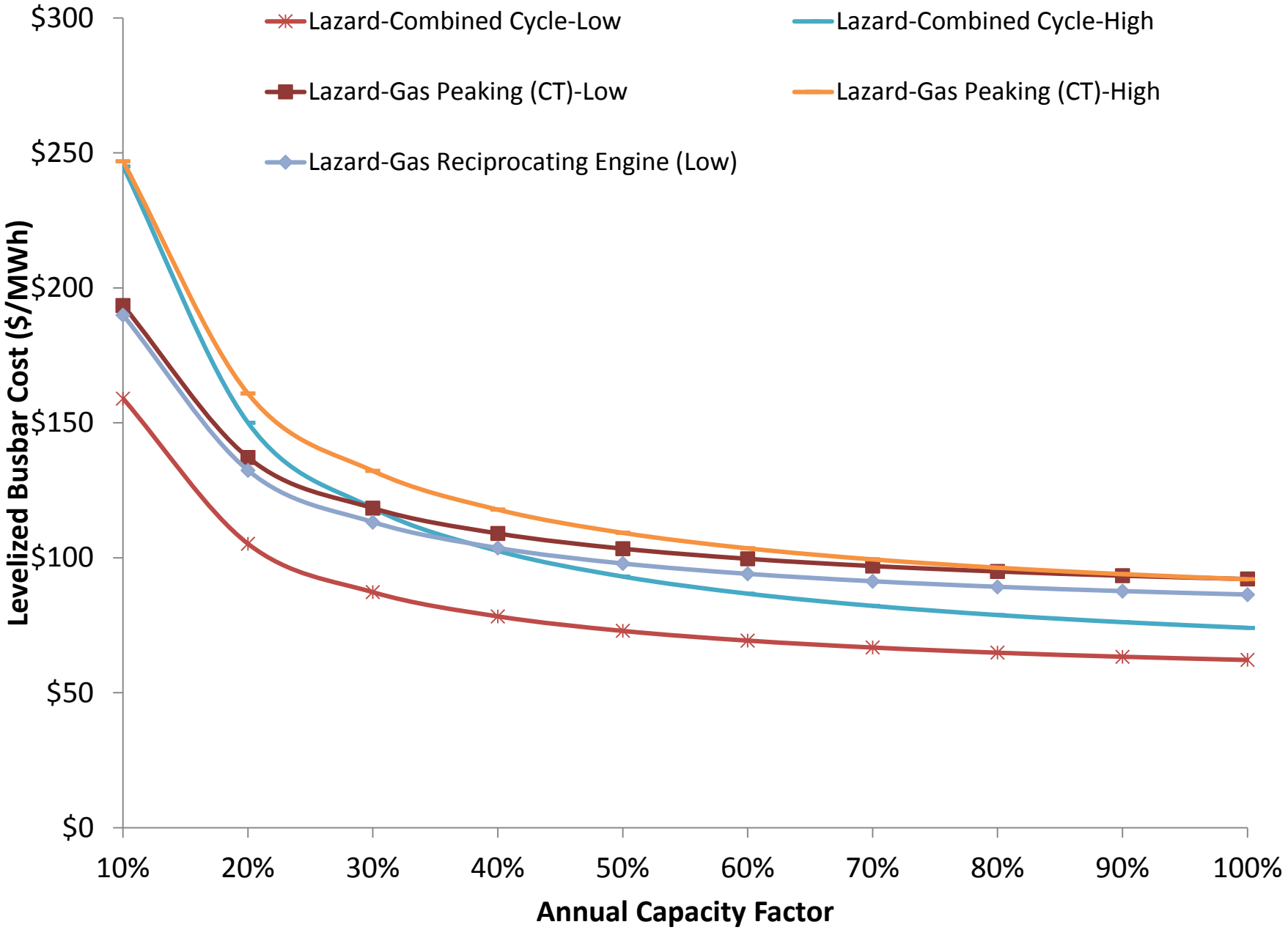
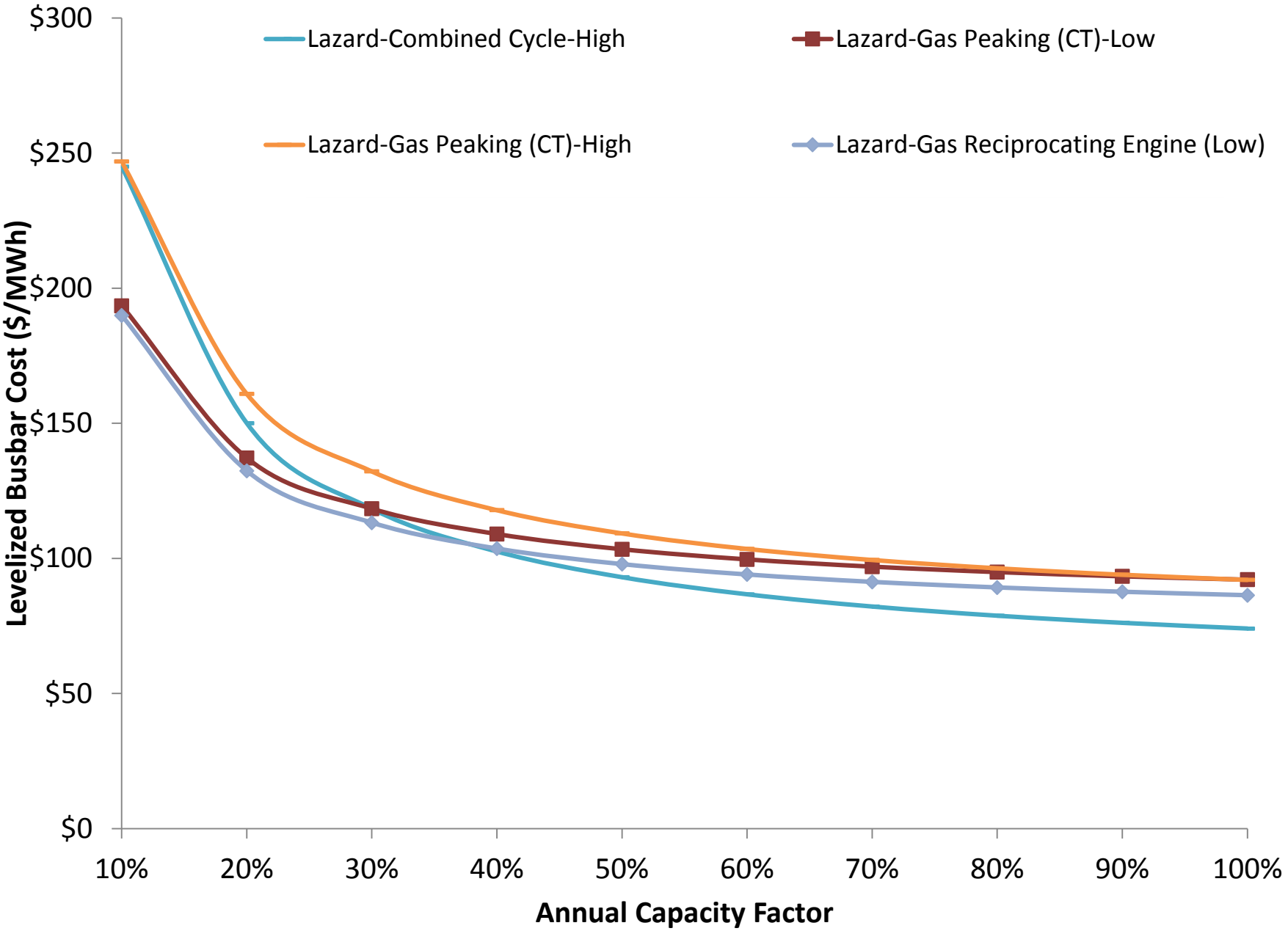


Busbar Curves – CC, CT, Recip.

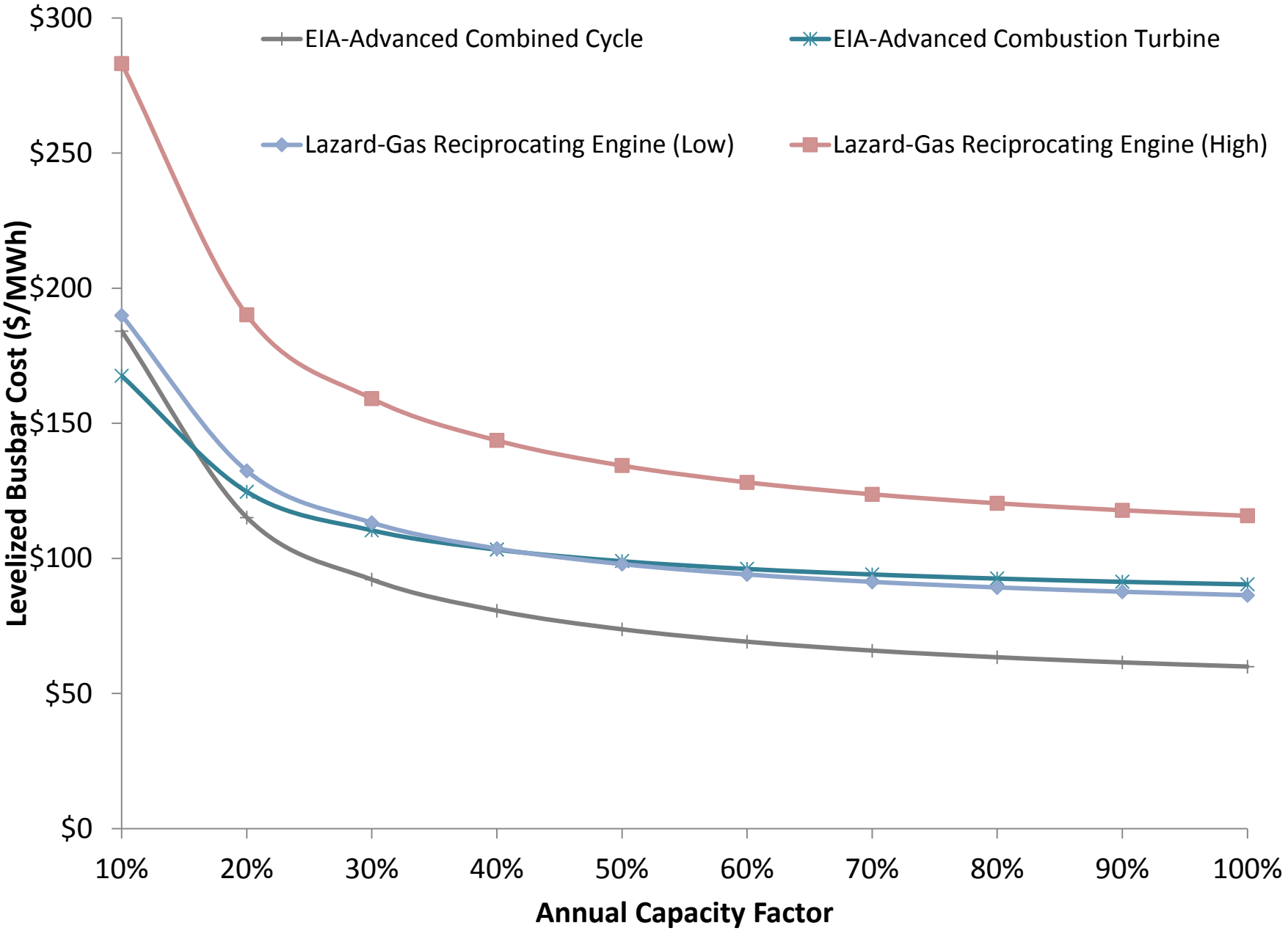
Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



Recommendation

SPP Staff recommends the ESWG approve using Lazard **High** CC, **Low** CT, **Low** reciprocating engines prototypes and eliminating nuclear and coal as options.

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)	Lazard	High	550	1,333	2.05	5.64	6,900
Combustion Turbine (CT)	Lazard	Low	241	769	4.82	5.13	9,804
Gas Recip Engine	Lazard	Low	1	666	10.25	15.38	8,000

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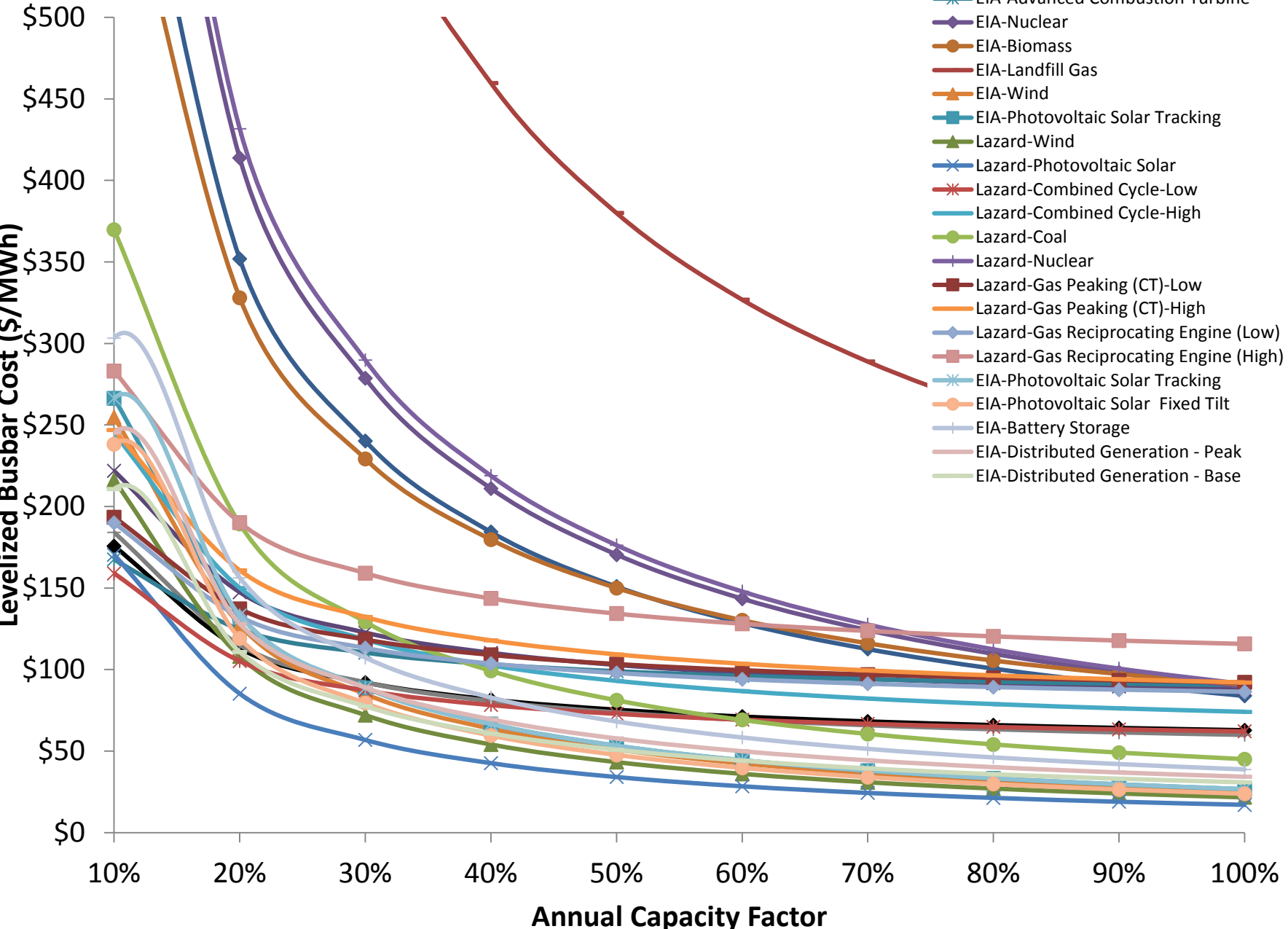
Appendix

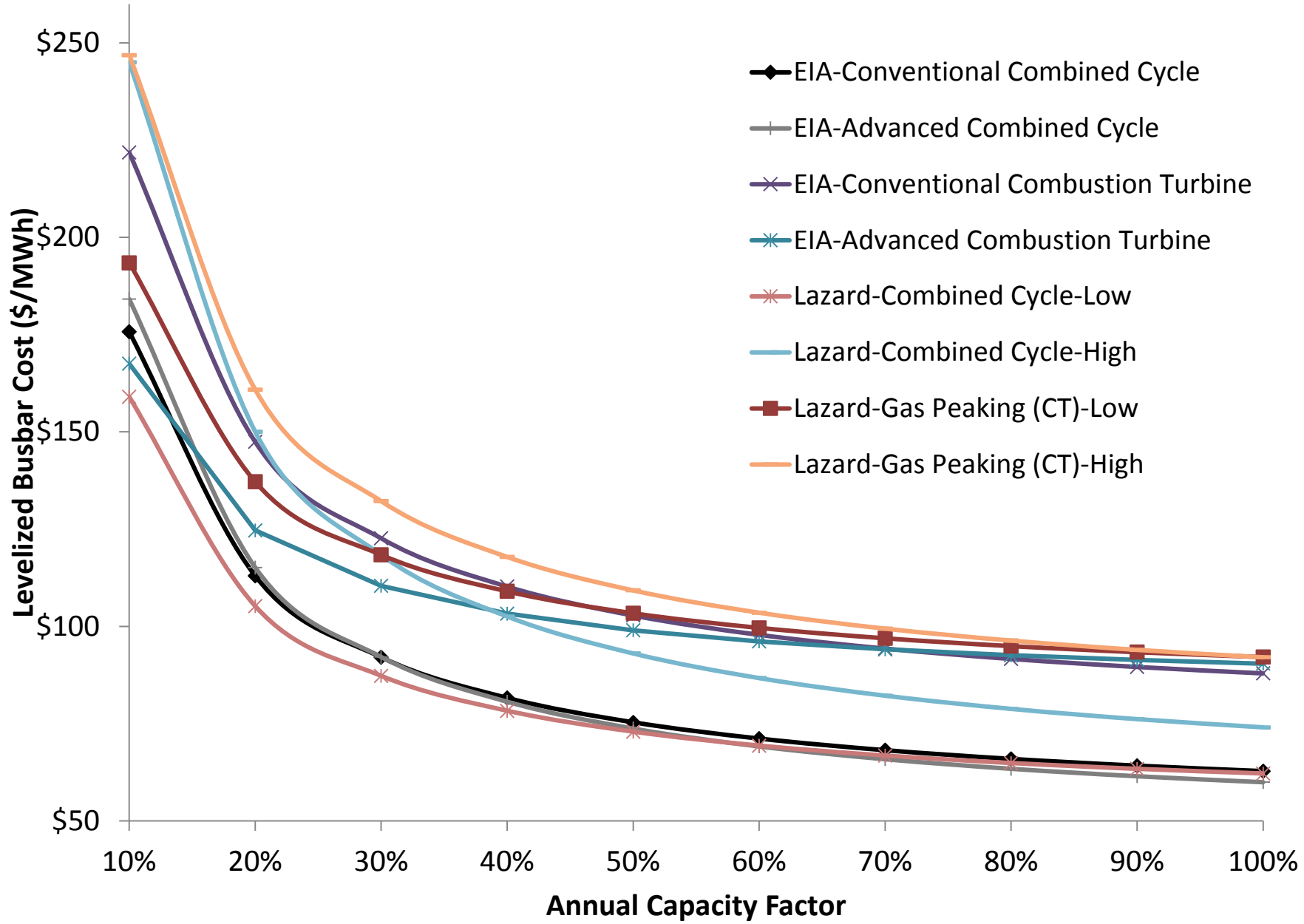
Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



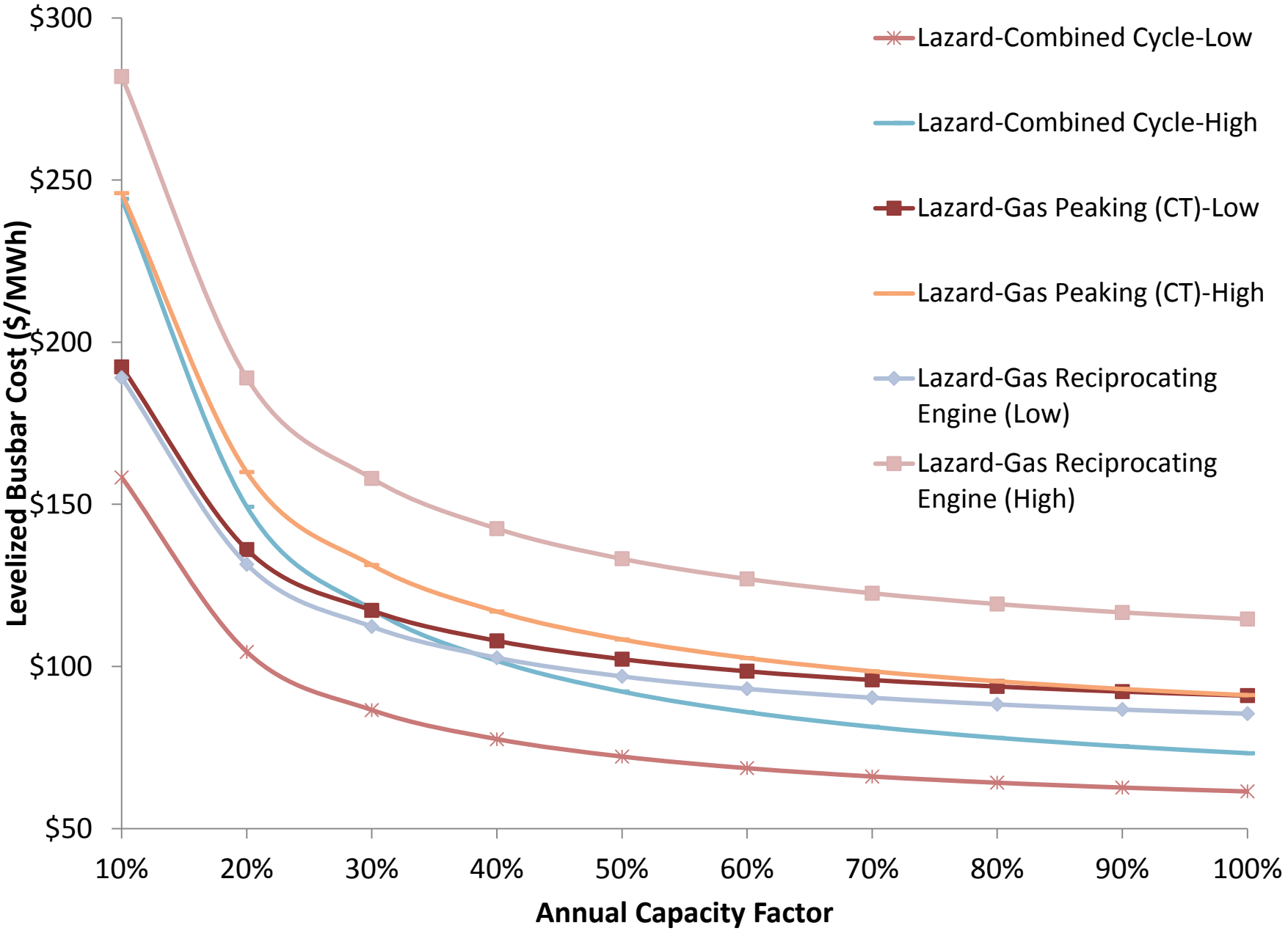
Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



Levelized Busbar Costs for Resource Options

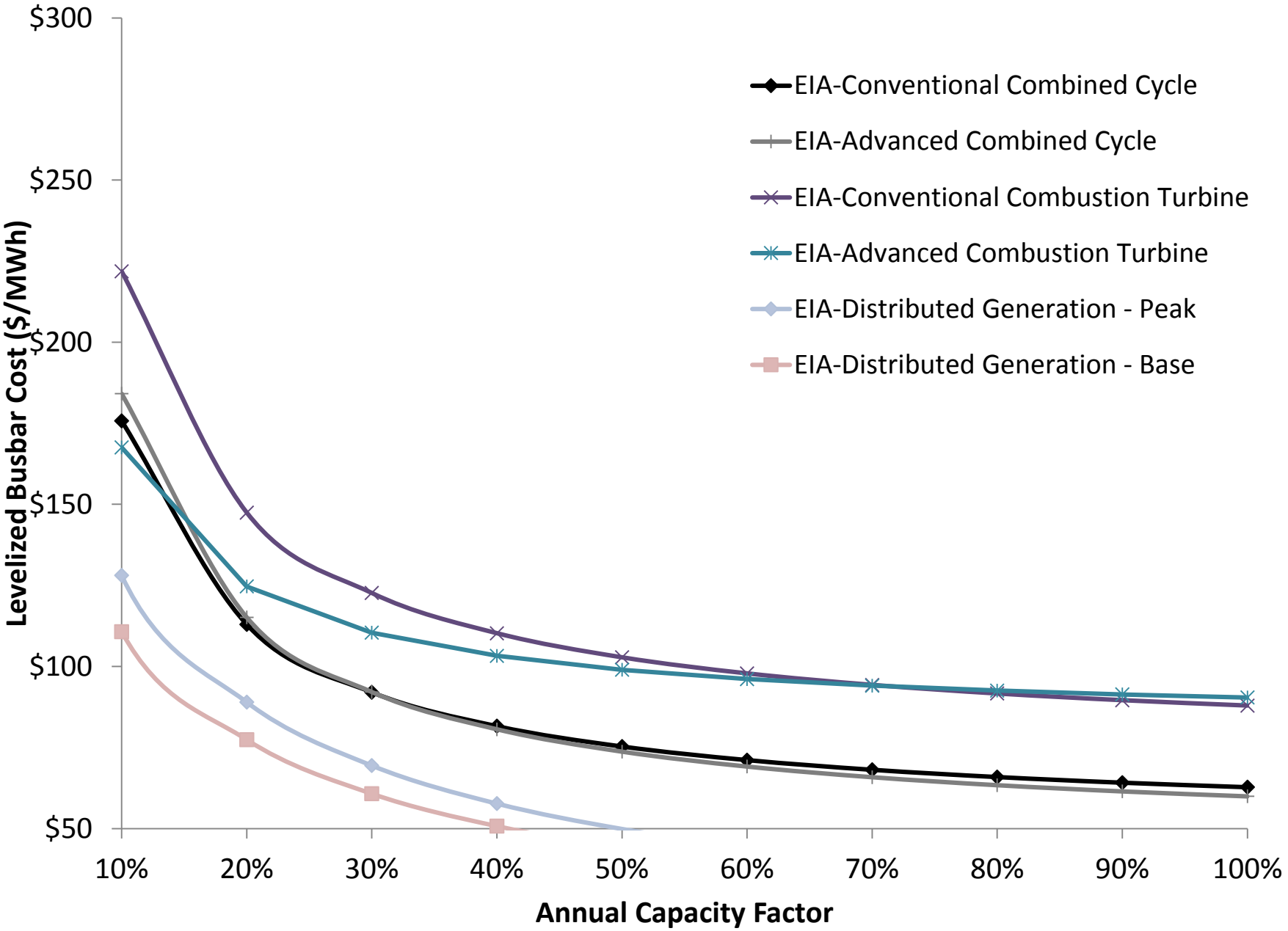
20 Years, 8.0% Discount Rate, 2018$



Busbar Curves – EIA Gas Units

Levelized Busbar Costs for Resource Options

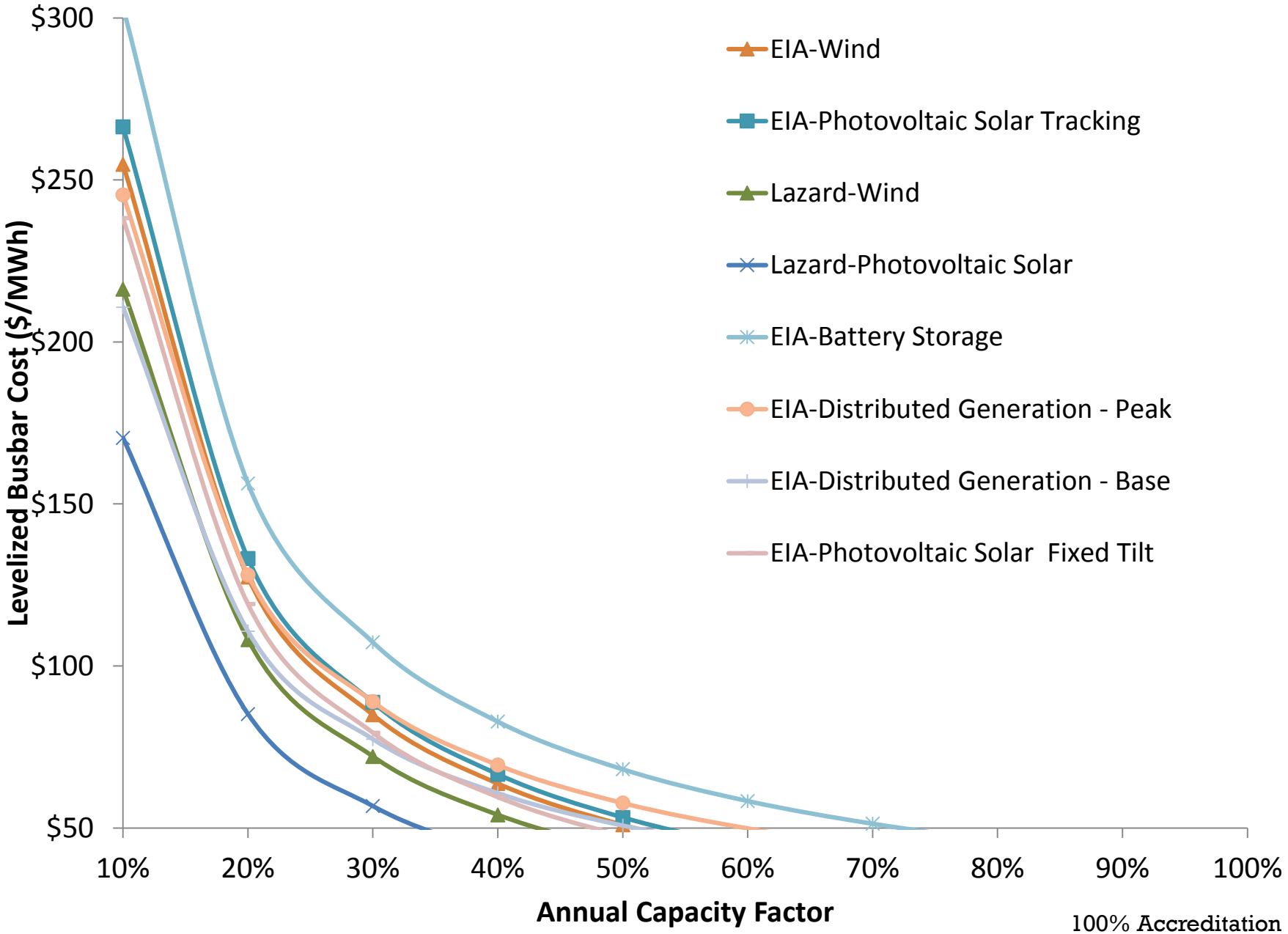
20 Years, 8.0% Discount Rate, 2018$



Busbar Curves – Alt Units

Levelized Busbar Costs for Resource Options

20 Years, 8.0% Discount Rate, 2018$



100% Accreditation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2020 ITP Scope – Must Run Criteria

Nikki Roberts

October 12, 2018

Objective

- Seek approval for Must Run Criteria for the 2020 ITP Scope

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 Background

- 2019 ITP Economic Model
  - All Co-generation and Nuclear Units
  - Hydro Must Run assignments based on ABB Simulation Ready data
- MISO MTEP19 Model
  - All Nuclear Units
  - Co-generation Units in MISO South
  - No Must Run designations in Accelerated Fleet Change Future

2019 ITP Must Run Identification

- SPP Areas
  - Identified co-generation units based on EIA 860 data
  - Included any co-generation units in ABB data not identified in EIA 860 data
  - Allowed exceptions for other types of conventional generation
- External Areas
  - Identified co-generation units based on EIA 860 data
  - Included any co-generation units in ABB data not identified in EIA 860 data

Recommendation

- SPP Staff recommends assigning must-run designations to co-generation and nuclear units only; exceptions may be requested during the 2020 ITP Generation review and approved by the ESWG.
- SPP Staff recommends assigning must-run designations to hydro based on ABB simulation ready data.


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Load Forecast for Resource Planning

ESWG

Antonio Barber

October 11th-12th, 2018

Objective

- To discuss options to address action item 193:
  - Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process

Recap

- In past ITP studies SPP accommodated a separate load forecast to be used only for resource planning.
- For the 2019 ITP, by default the base reliability peak load forecast was used for developing the resource plan.
  - **ESWG 01/22/2018**: Approved motion to send out data request for load forecast for resource planning to accommodate controllable curtailable resources.

Recap

- Members requested details on modeling forecast; how does modeling request for this information?
- Members are concerned with curtailable load being included in load forecast.
- Members suggested modeling curtailable load as generation rather than a separate load forecast

Overview

SPP Model Development Procedure Manual

- Load Forecast
- Summary of Data Submitter's load forecast data comprisal:
  - Non-coincident to the SPP region
  - 50/50 load forecast
  - Load forecast amount includes non-controllable (Automatic) Demand Side Management *(MW Reduce)*
  - *Load forecast amount excludes controllable* (Manual) *Demand Side Management (MW Not Reduced)*
  - Load forecast amount excludes Distributed Energy Resources (recommended)

- Load forecast amount includes non-controllable (Automatic) Demand Side Management *(MW Reduce)*
- *Load forecast amount excludes controllable* (Manual) *Demand Side Management (MW Not Reduced)*

50/50 load forecast

Current MDWG Manual:

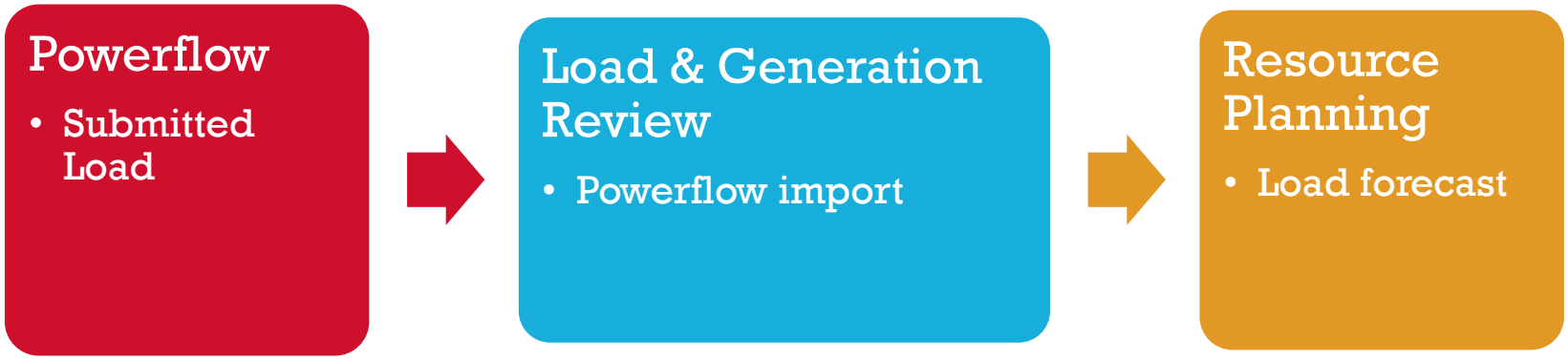
Non-controllable +
Excludes controllable

Separate Load Forecast

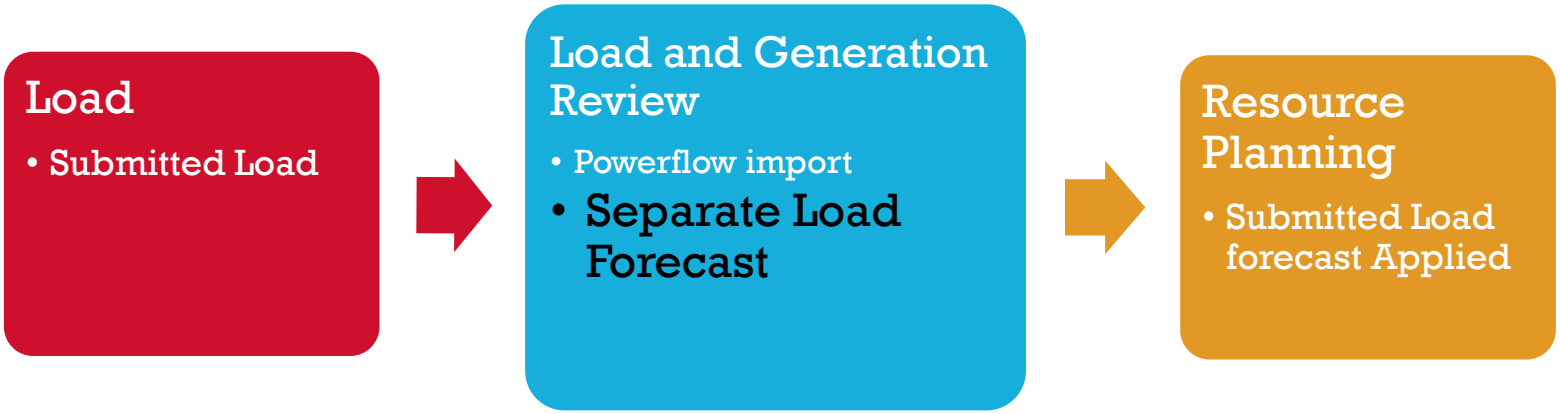
Options

- Option 1: Base Reliability peak load forecast will be used for Resource Planning (Load and Generation)
- Option 2: Submit separate Load forecast for Resource Planning
- Option 3: Explicitly modeling Controllable Demand Side Management by Demand Group

Option 1: Base Reliability peak load forecast will be used for Resource Planning



Option 2: Submit separate Load Forecast for Resource Planning



Reducing load forecasts by Controllable Demand Side Management is consistent with the resource adequacy process and reduces the magnitude of resource additions identified by the Conventional Resource Expansion Plan

Option 3: Explicitly modeling Controllable Demand Side Management by Demand Group

Process Implications Decisions

- Are all Controllable demand side management programs equal?
- APC benefit metric impacts
- ITP Manual Adjustments
- Potential Schedule Impacts

Resource Expansion software Requirements & Benchmarking

- Pricing implementation
- Annual & Monthly Capacity/Energy Limits

Economic Modeling decisions and Benchmarking

- Bus Mappings
- Curtailment Price

Recommendation

- SPP Staff recommends the ESWG approve
  - Option 2: Submit separate Load forecast for Resource Planning

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Appendix

ITP Manual language

- 2.2.2 RESOURCE PLAN
- 2.2.2.1 Resource Expansion Plan
- After forecasted load and existing and planned generation have been defined through the SPP annual data request, analysis will be conducted to determine new (conventional and renewable) resource additions required in years 5 and 10 for each future in the economic and SPP BA powerflow model. Resource additions are included to develop realistic future-year models by accounting for reserve margin requirements, historical trends, economics, etc. The resource-planning phase will identify new units and the associated parameters for these new units, but will not include any siting considerations, which will be addressed in the Resource Siting Plan section. The year 2 models will be assessed to evaluate whether the reserve margin requirements are being met at the SPP BA level.

ITP Manual language

- 2.2.1.2 Load and Energy Forecast
  - For the economic model development process, SPP will obtain load data to utilize in the ITP assessment by the following unless directed otherwise by the ESWG:
    - Peak load
    - Hourly load shape
    - Monthly peak and energy percentages
    - Load factor
    - Transmission loss factor
    - Demand mapping

ITP Manual language

- 2.1.1 GENERATION RESOURCES
- Generation resources shall be included in the base reliability model if any of the following requirements are met:

1. The resource is existing and in service.

2. The resource has an effective Generator Interconnection Agreement (GIA), not on suspension, and has approved long-term firm transmission service with an effective transmission service agreement.

3. The resource is approved by the TWG as meeting the requirements detailed in the Waiver Requests section of this manual.

4. The resource has been identified by SPP as necessary to solve a model and is approved for inclusion by the TWG, with considerations such as:
   a. Resources that are in the generator interconnection queue for study.
   b. Resources that have an effective GIA
   c. Resources have been included in an approved SPP-developed resource plan.


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2020 ITP Scope-Renewable Accreditation

Joshua Norton

October 11-12, 2018

Objective

- Review:
  - Governing language on renewable accreditation
  - MMU Presentation
  - Accreditation from 2019 ITP scope
- Discuss:
  - Renewable accreditation:
    - Existing resources
    - New resources

Review: Governing Language

- ITP Manual Section 2.2.2.1.2
  - Each pricing zone shall be assessed for resource adequacy by accounting for…new wind and solar additions, capacity accreditation for all renewable units"
- SPP Planning Criteria 7.1.5.3 (7)
  - Accreditation process for existing renewables
  - Included in Appendix

Review: MMU Presentation

Renewable Accreditation Summary

Renewable accreditation levels for new wind and solar resources

- No consistent accreditation approach across RTO markets:
  - Some use peak or super-peak hours
  - Some use performance during small set of highest load hours
  - Some use the incremental effect of the loss of load without resource
  - Some differentiate by location or type (coastal v. non-coastal, fixed versus tracking)

Wind and Solar Capacity Factors

SPP 2019 ITP - Accreditation		SPP MMU –July and August Market Observation	
Source/Type	**Capacity Factor**	**Type**	**Capacity Factor**
ITP-Wind	20.0%	Wind- peak hour Wind- super-peak hour	24% 23%
ITP-Solar	70.0%	Solar- peak hour Solar- super-peak hour	38% - 45% 53% - 64%

MMU asserted that the renewable accreditation values used in the 2019 ITP were too low for wind and too high for solar.

Review:
2019 ITP

Existing Resources:

SPP Planning Criteria 7.1.5.3 (7)

- Member submitted amounts for existing resources
  - Solar – 10% by default
  - Wind – 5% by default

New Resources:

Renewable Accreditation

- 20% for new wind
- 70% for new utility scale solar
- Accreditation cap on projected renewables of 12% of the total load for each zone

2020 ITP – Existing Resource Accreditation

- Member Submission:
  - Accreditation of existing renewable units will be determined by member data based on SPP Planning Criteria 7.1.5.3 (7) submitted through the Generation Review
- Default:
  - Option A (2019 ITP)
    - First, to previous ITP study data and secondly to 10% for solar and 5% for wind
  - Option A'
    - First, to previous ITP study data and secondly to the average of the submitted data for the existing resources in the 2020 ITP, capped at the accreditation values chosen for new resources
  - Option B (Strictly follow Criteria)
    - First, to previous ITP study data if the values are not 0, 5, or 10 and secondly to the SPP Planning Criteria 7.1.5.3 (7)
  - Option C
    - First, to previous ITP study data and secondly to accreditation values chosen for new resources

2020 ITP – New Resource Accreditation - Options

- Option A (Status Quo)
  - 20% for new wind
  - 70% for new utility scale solar
  - Accreditation cap on projected renewables of 12% of the total load for each zone
- Option B (MMU-based)
  - 23% for new wind
  - 60% for new utility scale solar
  - Accreditation cap on projected renewables of 12% of the total load for each zone

Next Steps

- 2020 ITP – New Resource Assignment/Allocation
  - To be discussed next meeting

Appendix

SPP Planning Criteria 7.1.5.3 (7)

- The recommended methodology to evaluate the net planning capability established for wind or solar facilities shall be determined on a monthly basis, as stated below. If a member's desire to use a more restrictive methodology to evaluate the net capability of wind or solar they may do so, however net capability determined by the alternative methodology employed cannot credit the wind or solar with a capability greater than determined with the methodology stated below:
  - (a) Assemble all available hourly net power output (MWH) data measured at the system interconnection point.
  - (b) Select the hourly net power output values occurring during the top 3% of load hours for the SPP Load Serving Entity for each month of each year for the evaluation period.

SPP Planning Criteria 7.1.5.3 (7)

- Select the hourly net power output value that can be expected from the facility 60% of the time or greater. For example, for a 5 year period with the 110 hourly net power output values ranked from highest to lowest, the capacity of the facility will be the MW value in the 65th data point.
- (d) A seasonal or annual net capability may be determined by selecting the appropriate monthly MW values corresponding to the Load Serving Entity's peak load month of the season of interest (e.g., 22 hours for a typical 30 day month and 110 hours for a 5 year period).

- The net capability calculation shall be updated at least once every three years.

SPP Planning Criteria 7.1.5.3 (7)

- Facilities in commercial operation 3 years or less:
  - (i) The data must include the most recent 3 years.
  - (ii) Values may be calculated from wind or solar data, if measured MW values are not yet available. Wind data correlated with a reference tower beyond fifty miles is subject to Generation Working Group approval. Solar data correlated with a reference measuring device beyond two hundred miles is subject to Generation Working Group approval. For calculated values, at least one year must be based on site specific data.
  - (iii) If the Load Serving Entity chooses not to perform the net capability calculations as described above during the first 3 years of commercial operation, the Load Serving Entity may submit 5% for wind facilities and 10% for solar facilities of the site facility's nameplate rating.

SPP Planning Criteria 7.1.5.3 (7)

- Facilities in commercial operation 4 years and greater:
  - (i) The data must include all available data up to the most recent 10 years of commercial operation.
  - (ii) Only metered hourly net power output (MWH) data may be used.
  - (iii) After three years of commercial operations, if the Load Serving Entity does not perform or provide the net capability calculations to SPP as described above, then the net capability for the resource will be 0 MW.


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2020 ITP Generation and Load Review Update

October 11-12, 2018

Theva Coleman

Objective

- Provide update on the current status of the Generation and Load review process

Stakeholder Review

Resource Addition Request (RAR) and Waiver Request

- Inclusion Criteria Outline
  - Base Reliability Models – ITP Manual Section 2.1.1.1
  - Economic Models – ITP Manual Section 2.2.1.4
- For resources to be considered for inclusion, a request must be made to SPP via RAR and Waiver request form.
- The data submitted will be used to determine the generation resource inclusion to the appropriate model(s).
- For requests that do not meet the inclusion criteria, stakeholders will have the opportunity to present to the appropriate working group for approval.

Stakeholder Review-RAR & Waiver

- RAR and Waiver Request form is available on SPP website under the Transmission Planning documents
- RAR and Waiver Request Timeline
  - Began - 9/24/2018
  - Deadline – 10/26/2018
  - ESWG Approval – 11/14 – 11/15/2018

Stakeholder Review-Pass 2

- Pass 2 Generation and Load Workbook – Post on 10/12/2018
- Pass 2 Stakeholder Review Period
  - Begins – 10/15/2018
  - Deadline – 10/26/2018

Stakeholder Gen Review-Pass 2

- Items to be surveyed:
  - Unit Ownership percentages
  - Wind and Solar Accreditation
  - Unit Retirement dates

- ABB F17 base data parameters to be reviewed:
  - Generator name and short name
  - Category type
  - Conventional Fixed and Variable O&M Cost ($/MWh)
  - Heat rate and profiles
  - Physical state location
  - Annual Maintenance hours
  - Forced outage rate
  - Effluents (percentage removed)
  - Emission rates
  - Fuel forecast
  - Hydro energy limits
  - Unit Commission dates
  - Season max capacity by year
  - Must-run designation

Stakeholder Load Review-Pass 2

- Items to be surveyed:
  - Load factors by Demand Group
  - Loss factors by Demand Group
- Items to be reviewed:
  - Demand Group Mapping (Economic Load Ownership Legend)
  - Non-Scalable and Scalable Loads
  - Station Service Loads
- ABB F17 base data to be reviewed:
  - Hourly Load Profiles
  - Monthly Peak & Energy Percentages

Workbook updates

Pass 2 – Gen Review Workbook updates

- Instructions tab
  - Additional instructions for tabs
- Economic Model Gen tab
  - Future Exception column
- Annual Capacity tab
  - ABB data with ***NO*** Staff edits
  - Monthly MW values instead of monthly multipliers
- Heat rate profile tab

Stakeholder Data Submission

Stakeholder Data Submission

- All stakeholder feedback is to be submitted to SPP via the Request Management System (RMS)
- SPP Staff Contact:
  - Theva Coleman
    - Phone: 501-482-2336
    - Email: tcoleman@spp.org

Appendix

Base Reliability Models Inclusion Criteria

2.1.1.1 Waiver Requests

Certain generation resources and associated transmission service requests that have not fully completed the processes defined in Attachment V and Z1 of the SPP tariff but have a high probability of going into service or obtaining an effective transmission service agreement can be included in the base reliability model. Generation resources that meet all of the following requirements will be included:

1. A formal request has been sent to SPP requesting the generation resource be included in the base reliability model.
2. The generation resource has an effective interim GIA.
3. The generation resource has entered the aggregate transmission service study or equivalent transmission service study publicly posted on OASIS and has a completed facility study that is awaiting final results without unmitigated third-party impacts.
4. The generation resource has acquired air and environmental permits where applicable.
5. The generation resource has started construction with major equipment funding and procurement contracts awarded.

Base Reliability Models Inclusion Criteria (cont'd)

If a generation resource does not meet all of the above requirements, a formal request for resource inclusion in the base reliability model can be submitted to the TWG for approval. The TWG will take the following information into account in deciding whether to approve the waiver:

1. A formal request has been sent to SPP requesting the generation resource be included in the base reliability model, including any additional information deemed relevant by the requesting entity. The request should identify which transmission upgrades will be deferred, if applicable.
2. The generation resource has a mitigation plan for the deferred transmission upgrades until it makes a financial commitment to complete the required upgrades.
3. A Definitive Interconnection System Impact Study (DISIS) agreement for the generation resource has been executed, an interim GIA has been requested, and a GIA will be entered into when applicable.
4. An RFP for the generation resource has been awarded, if applicable.

Economic Model Inclusion Criteria

2.2.1.4 Generation Resource Inclusion

Generation resources included in the base reliability model will be incorporated into the economic model, as appropriate.[16] Resources identified by SPP as necessary to solve the base reliability model shall not be included in the economic and powerflow models, unless the resources meet the requirements of adding generation described in this section.

Incremental to the resources included in the base reliability models, a generator interconnection resource and its associated network upgrades will be included in the economic models if they meet all of the following requirements:

1. A formal request has been sent to SPP[17] requesting the generation capacity be included.
2. The generating resource has an effective GIA that is not on suspension or an effective interim GIA.
3. The generating resource will have a firm contract for delivery through ownership and operation of the resource or procurement of a purchase power agreement (PPA) from the generation owner.

Economic Model Inclusion Criteria (cont'd)

If a generating resource does not meet all the above requirements, a request for generation capacity to be included in the economic models can be made to ESWG and TWG on a case-by-case basis. ESWG and TWG will, at a minimum, consider the following points:

1. A DISIS agreement for the generating resource has been executed, an interim GIA has been requested, and a GIA will be entered into, when applicable.
2. An RFP for the generating resource has been awarded, if applicable.

All other resource expansion needs will be determined through the SPP resource expansion planning process as detailed in the Resource Expansion Plan section.


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ITP
Planned Generation Retirement Consistency

ESWG/MDWG/TWG

August, 2018

Objective

- Cover 2019 ITP Base Reliability and SPP BA Gen Review lessons learned regarding consistency in planned generation retirements between the two models with ESWG/MDWG/TWG
- Discuss 2020 ITP Base Reliability Powerflow and BA Gen Review improvement recommendations to have consistency in planned generation retirements

Background

- Transmission Planning Improvement Task Force recommended a common planning model
  - "To meet the goal of consistency in the planning process, the TPITF recommends the building of a common base reliability model that will be used for all SPP planning processes including Transmission Service and Generation Interconnection as well as the ITP."
- SPP staff compared the stakeholder reviewed ITP BA gen review workbook and the base reliability model planned generation retirements
- SPP staff found inconsistencies between the two data sets
  - Initiated an ad hoc planned generation retirement review for stakeholders to check and adjust to establish consistency

Data Coordination Issues

- Under the new process stakeholders and staff are adjusting internal coordination efforts
- ITP manual and process has two mechanisms (Powerflow & Gen Review) to reflect a planned generation retirement for the common planning model

ITP Manual Section 2 Model Development

Powerflow

2.1 Base Reliability Model Overview

2.1.1 Generation Resources

Generation resources may be modeled, but are not available for dispatch, if:

1. The resource does not have approved long-term firm transmission service.
2. The resource is mothballed or planned for retirement.

Generation resources that have been mothballed or are planned for retirement must be submitted to SPP through SPP's modeling database tool and the SPP Request Management System (RMS) for the base reliability model. Upon receiving this information, these resources will remain in the models until such time they are officially decommissioned. Until this decommission occurs, the resources will be given a P_{Min}, P_{Max}, Q_{Min}, and Q_{Max} value of zero within the models to ensure that the units are not dispatched.

Generation Review

2.2 SPP BA Economic Model Overview

2.2.1.5 Generation Resources

Third-party vendor data will be used as the starting point for generation parameters needed for the economic model set. Data related to the physical characteristics of generators will be reviewed and updated as needed by the SPP stakeholders to provide company-specific values through the SPP annual data request.

The third-party vendor data to be utilized as a starting point may include:

- Generator name
- …
- Commission date
- Retirement date

Improvement Recommendations

- Short-term
  - Adjust staff and stakeholder internal coordination as needed during the 2020 ITP powerflow and gen review milestones
  - Incorporate a consistency check and report inconsistencies in powerflow and gen review passes for stakeholders to internally establish a common planned retirement date between the two data sets
- Long-term
  - Propose ITP manual changes that best facilitates consistency between the two data sets as appropriate to meet TPITF expectation of a common planning model


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Action Item 186: Data Submission Guidelines

Nikki Roberts

September 12-13, 2018

Objective

- Provide a summary of changes made to the Data Submission Guidelines document
- Seek approval of completion of Action Item 186

Background

- Draft posted for Stakeholder review on August 8, 2018
  - Feedback period: August 8 – August 24
- Overview of document presented to ESWG on August 15, 2018
- SPP has reviewed internal and external feedback and made appropriate changes to document

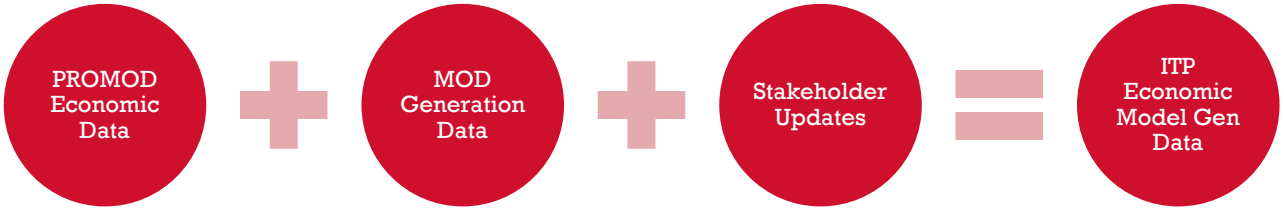
Summary of Updates

- Updated Generation and Load Review flow charts to show stakeholder feedback loop
- Added additional details and clarifying language for the Annual Capacity Adjustments
- Added additional details for the "Select Gen & Load Updates from Previous Study" step of the Economic Model Build
- Added details for Heat Rate Profiles

Summary of Updates cont.

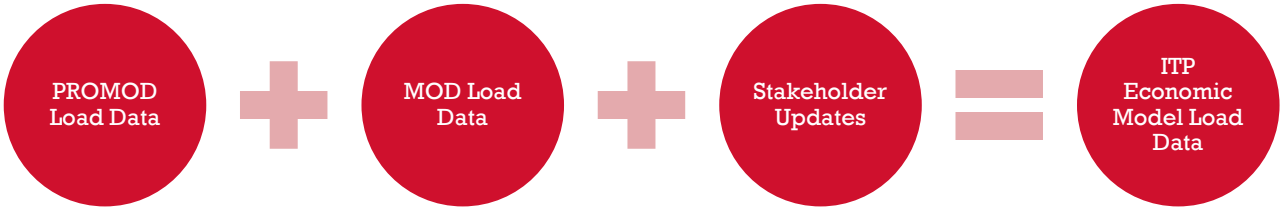
- Rearranged and added sections in order to reflect workbook tabs and formatting of the 2020 ITP Gen and Load review posted on September 14, 2018
  - Ownership
  - Renewable Accreditation
  - Curtailment Pricing
  - Energy Limits
  - Station Service Load
- Minor language and formatting edits throughout

Generation Review Overview



- Data Sources
  - PROMOD Data: ABB Simulation Ready Reference Case
  - MOD Data: MOD submittals for appropriate ITP powerflow build

Load Review Overview



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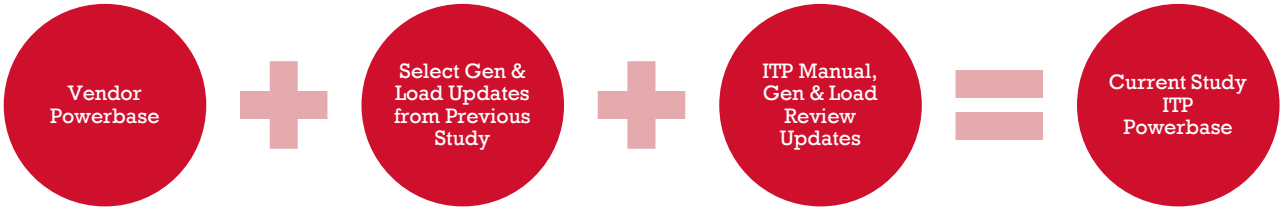
Economic Model Build



- Previous study updates may include existing generation resources not in the latest Vendor data, and generation parameters updated for model reasonableness.

Recommendation

- SPP Staff recommends that Action Item 186 be considered complete.


SPP
Southwest
Power Pool
HELPING OUR MEMBERS WORK TOGETHER
TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE.

2019 ESWG Meetings

Amber Greb

Proposed ESWG Meetings			
2019			
Month	**Day**	**Weekday**	**Location**
January	9th-10th	W-Th	Dallas (AEP)
February	6th-7th	W-Th	Dallas (AEP)
March	12-13th	Tu-W	Dallas (AEP)
April	10th-11th	W-Th	Lubbock
May	15-16	W-Th	KCPL
June	12th-13th	W-Th	Dallas (AEP)
July	10th-11th	W-Th	Detroit, MI
August	7th-8th	W-Th	Billings, MT
September	5-6th	Th-F	Dallas
October	9-10th	W-Th	Little Rock
November	6th-7th	W-Th	Dallas (AEP)
December	11th-12th	W-Th	Dallas (AEP)

Recommendation

- Staff recommends that the ESWG approve the meeting locations and dates for January – June 2019.