



Southwest Power Pool
ECONOMIC STUDIES WORKING GROUP
December 11th, 2014
AEP Offices 8th Floor, Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the November 20th minutes.
2. Approved SPP Staff's completion of the 2015 ITP10 project staging process.



Southwest Power Pool
ECONOMIC STUDIES WORKING GROUP
December 11th, 2014
AEP Offices 8th Floor, Dallas, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC Great Plains) called the meeting of the Economic Studies Working Group (ESWG) to order at 9:30 AM, welcomed those in attendance, and asked for introductions.

There were 11 in-person participants and 47 web conference participants representing 11 of 13 ESWG members. (Attachment 1 – December 11th, 2014 Attendance List)

Agenda Item 1b – Receipt of Proxies

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

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC Great Plains) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – December 11th, 2014 Agenda)

Paul Dietz (Westar) made a motion to adopt the agenda. Kurt Stradley (LES) seconded. The motion was approved unanimously.

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP Staff) reviewed the list of past action items with the group. All items from the November meeting were marked complete. Kelsey Allen requested additional time for action item 057 regarding a straw man for generation siting in the ITP process. The group agreed to allow staff to bring a first draft to the March/April ESWG meeting. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The Consent Agenda included the following item:

Approval of Meetings Minutes – November 20th, 2014 (Attachment 5 – ESWG 11.20.14 Minutes)

The consent agenda was approved unanimously.

Agenda Item 4 – Study Schedules

Agenda Item 4a – 2015 ITP10

Juliano Freitas (SPP Staff) gave an update on the status of the 2015 ITP10. Staff will be presenting on the Project Staging, Metrics and Sensitivities in the meeting today. The report is scheduled to be completed and sent out December 26th. Staff requested the group be prepared for potential email approval by January 2, 2015. (Attachment 6 - 2015 ITP10 Schedule)

Agenda Item 4b – RCAR II

Juliano Freitas (SPP Staff) gave an update on the status of the RCAR II. The RARTF has not yet discussed the ESWG motion requesting additional time in the schedule for data and results review. The RARTF is scheduled to meet December 19th and will be discussing the request then. (Attachment 7 – RCAR II Schedule)

ACTION ITEM: SPP Staff to send the ESWG a synopsis of the RARTF discussion regarding the ESWG's request for more time in the RCAR II schedule after that group's December meeting.

Agenda Item 4c – SPP-MISO CSP

Juliano Freitas (SPP Staff) gave an update on the status of the SPP-MISO CSP Study. SPP and MISO are currently working on solution development and screening. The next IPSAC meeting is scheduled to be held February 16, 2015. The group asked about the purpose of a reliability assessment in the CSP study. Brett Hooton (SPP Staff) explained that SPP and MISO will be looking for issues not seen before with a new model and potential opportunity to work with MISO or an individual MISO Transmission Owner on project development. MISO may also investigate developing a process to cost share a project that is beneficial to both regions that doesn't currently meet the defined criteria. (Attachment 8 – SPP-MISO CSP Schedule)

Agenda Item 5 – 2015 ITP10

Agenda Item 5a – Staging

Rosemary Mittal (SPP Staff) presented process and results of the project staging portion of the 2015 ITP10. This included a list of projects meeting criteria to be recommended for NTCs, highlighting changes made after the November 20th staging presentation. SPP Staff recommended the ESWG to approve Staff's completion of the 2015 ITP10 staging process. (Attachment 9 – 2015 ITP10 Staging)

Kurt Stradley (LES) made a motion; seconded by Leon Howell (OGE) that the ESWG approve SPP Staff's completion of the 2015 ITP10 project staging process. The motion passed unanimously.

Agenda Item 5b – Metrics

Josh Ross (SPP Staff) presented the results of the 2015 ITP10 benefit metric calculations. The metrics were calculated on the full portfolio of projects, regardless of whether a project will be issued an NTC. The group gave good feedback to Staff regarding additional clarity and information that needs to be included in future presentations and the final report. (Attachment 10 – 2015 ITP10 Metrics)

Agenda Item 5c – Sensitivities

Kelsey Allen (SPP Staff) presented results of the 2015 ITP10 sensitivity analysis. The sensitivities were calculated on the full portfolio of projects, including those designated as reliability only. The group gave good feedback to Staff regarding additional clarity and information that needs to be included in future presentations and the final report. (Attachment 11 – 2015 ITP10 Sensitivities)

Agenda Item 7 – 2017 ITP10 Futures

Alan Myers (ITC Great Plains) and Paul Dietz (Westar) described the work that they have done on the drivers considered in the Futures discussion. The drivers were grouped and molded into potential Futures considering two different methodologies. The first was a "primary influence spheres" approach where only certain like drivers were grouped together to form a potential Future. Drivers were put into an Environmental, Financial, and/or Operational sphere. The second approach involved assuming a level of change for each driver to develop a low change high change and extreme change scenario, considering each driver at a certain increase or decrease. Both of these approaches assume change to an expected case that will have to be developed. Each driver being considered in the Futures development will have to be evaluated for its impact in an expected, historically "Business as Usual", scenario that will serve as a pivot point to develop other Futures.

There was much discussion by the group around how to accomplish this development and provide a useful message to other groups that will be involved in the process (MOPC, SPC). Some stakeholders expressed concern that we do not have definitions for Futures and the need for analysis to help shape what those definitions might be. At this point the group is not far enough along in discussions to make those types of determinations. In moving forward, the group must determine what each percentage of change means as well as conflicting drivers and how to implement those in each scenario.



For discussion with the MOPC and SPC, the group decided to take the information in a phased approach and cover all items discussed: Discussion of the drivers, discussion of the influence spheres, and discussion of other implied change Futures. (Attachment 12 – 2017 ITP10 Futures Priority_rev2)

Agenda Item 7 – ITP Manual Review

This item will be covered in a conference call to be scheduled for Monday, December 15th, 8:00 am – 10:00 am.

Agenda Item 8 – 2014 Organizational Group Survey

This item will be covered in a future meeting.

Closing Items

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

List of action items from the meeting:

1. SPP Staff to send the ESWG a synopsis of the RARTF discussion regarding the ESWG's request for more time in the RCAR II schedule after that group's December meeting.

The meeting was adjourned at 3:30 PM.

Respectfully Submitted,

Kelsey Allen
ESWG Secretary

Session detail for 'ESWG Meeting - 12/11/14':

Name	Email
David Spargo (OPPD)	dpspargo@oppd.com
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Kim McClafferty
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1. Kip Fox (AEP Transource) proxy to Wayman Smith (AEP)

From: Kip M Fox [<mailto:kmfox@aep.com>]
Sent: Friday, December 05, 2014 9:03 AM
To: Myers, Alan K.; Jfreitas@spp.org; 'Kelsey Allen' (kallen@spp.org)
Cc: Wayman L Smith
Subject: ESWG Proxy for 12/11 meeting

Alan/Juliano/Kelsy: Please accept this email as my designation of Wayman Smith as my proxy for the ESWG meeting on December 11, 2014. If you have any questions, please advise.

Thank you, Kip

Kip Fox
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ECONOMIC STUDIES WORKING GROUP

December 11th, 2014
AEP Offices 8th Floor, Dallas, TX

• A G E N D A •

9:30 am – 3:30 pm

1. Administrative items
 - a. Call to Order, Introductions..... Alan Myers (5 minutes)
 - b. Receipt of Proxies Kelsey Allen (1 minute)
 - c. Review of Agenda Alan Myers (1 minute)
2. Review of Past Action Items Kelsey Allen (5 minutes)
3. Consent Agenda (Approval Item) ¹ Alan Myers (5 minutes)
 - a. Approval of Meetings Minutes – November 20th, 2014
4. Study Schedules..... Juliano Freitas (15 minutes)
 - a. 2015 ITP10
 - b. RCAR II
 - c. SPP-MISO CSP
5. 2015 ITP10
 - a. Staging (Approval Item) ¹ SPP Staff (10 minutes)
 - b. Metrics SPP Staff (30 minutes)
 - c. Sensitivities..... SPP Staff (30 minutes)
6. 2017 ITP10 Futures All (120 minutes)
7. ITP Manual Review All (60 minutes)
8. 2014 Organizational Group Survey Kelsey Allen (30 minutes)
9. Closing Items All

¹ Background materials included

Relationship-Based • Member-Driven • Independence Through Diversity
Evolutionary vs. Revolutionary • Reliability & Economics Inseparable

Southwest Power Pool
ECONOMIC STUDIES WORKING GROUP
Pending Action Items Status Report
December 11th, 2014

ID	Action Item	Date Originated	Status	Comments
057	SPP staff will write a straw-man procedure or portion of the ITP manual that deals with conventional and wind generation planning and siting within the ITP process. The process should be in place by the Spring of 2015.	August 23, 2012	In Progress Staff	Staff will provide a draft report in November 2014 <u>March/April 2015</u> .
076	ESWG will analyze the aggregate studies impact on the 2015 ITP10 study for transmission service request.	May 16, 2013	In Progress ESWG Members	Item on hold, wait for Aggregate Studies new results
127	SPP Staff will develop a process to address interaction between SPP departments (Generation Interconnection, Aggregate Studies, Economic Planning, Steady State and Modeling) to detect basic errors in our models.	August 7, 2014	In Progress	
128	SPP Staff will explain to ESWG Members the process to submit data to model on demand.	August 7, 2014	In Progress	
135	Staff to specifically address the adjustments made to the ITP10 study in the report and MOPC presentations with regard to the seasonal ratings issue.	November 20, 2014	In Progress <u>Complete</u>	
136	Staff to add time in the March/April ESWG meeting agenda to discuss the 2nd semester 2015 meeting schedule.	November 20, 2014	In Progress <u>Complete</u>	
137	ESWG members sub-group to narrow down futures for the 2017 ITP10 and bring a proposal to the December meeting.	November 20, 2014	In Progress <u>Complete</u>	
138	ESWG members to review the updated ITP Manual and provide comments to Staff by December 5th.	November 20, 2014	In Progress <u>Complete</u>	
139	Staff to add an SPP-MISO Coordinated System Plan study schedule to the regular schedule updates.	November 20, 2014	In Progress <u>Complete</u>	
<u>140</u>	<u>SPP Staff to send the ESWG a synopsis of the RARTF discussion regarding the ESWG's request for more time in the RCAR II schedule after that group's December meeting.</u>	<u>December 11, 2014</u>	<u>In Progress</u>	



Southwest Power Pool
ECONOMIC STUDIES WORKING GROUP
November 20th, 2014
SPP Corporate Offices – Little Rock, AR

• SUMMARY OF ACTIONS TAKEN •

1. Approved the October 23rd and October 29th minutes.
2. Approved Staff's completion of the 2015 ITP10 portfolio consolidation per the 2015 ITP10 Scope as modified and does not endorse or approve any specific project in the 2015 ITP10.
3. Directed Staff to move forward with calculating 2015 ITP10 benefit metrics on the entire final consolidated portfolio.
4. Accepted Staff's proposal for analysis of the HVDC sensitivities.
5. Approved the changes to the 2015 ITP10 scope as presented today.
6. Cut the list of possible 2017 ITP10 Futures to further develop at a score of 2 for the proposed scenarios, and keep the remaining scenarios as possible sensitivities.



Southwest Power Pool
ECONOMIC STUDIES WORKING GROUP
November 20th, 2014
SPP Corporate Offices – Little Rock, AR

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC Great Plains) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:07 AM, welcomed those in attendance, and asked for introductions.

There were 21 in-person participants and 40 web conference participants representing 12 of 13 ESWG members. (Attachment 1 – November 20th, 2014 Attendance List)

Agenda Item 1b – Receipt of Proxies

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

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC Great Plains) presented the agenda for review and asked for any additions or corrections. (Attachment 3 – November 20th, 2014 Agenda)

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

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP Staff) reviewed the list of past action items with the group. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The Consent Agenda included the following item:

- Approval of Meetings Minutes – October 23rd, 2014 (Attachment 5 – ESWG 10.23.14 Minutes)
- Approval of Meetings Minutes – October 29th, 2014 (Attachment 6 – ESWG 10.29.14 Minutes)

The consent agenda was approved unanimously.

Agenda Item 4a – 2015 ITP10 Study Schedule

Juliano Freitas (SPP Staff) gave an update on the status of the 2015 ITP10. Staff has completed rework of the final portfolio analysis, consolidation, and staging and has begun the final assessments. Staff has passed base models and proposed NTC projects to Brattle for metrics calculation. The group expressed concern about calculating metrics only on projects projected to receive NTCs from the BOD. (Attachment 7 - 2015 ITP10 Schedule)

Agenda Item 4b – RCAR II Study Schedule

Juliano Freitas (SPP Staff) gave an update on the status of the RCAR II. Staff has discussed the ESWG motion to request more time in the RCAR II schedule, for member review, internally with Regulatory. This request will be discussed by the RARTF at an upcoming meeting. (Attachment 8 – RCAR II Schedule)

Agenda Item 5a – 2015 ITP10 Final Portfolios

Kelsey Allen (SPP Staff) presented the final portfolios for the 2015 ITP10. The group discussed concerns related to the seasonal ratings issue and the impact this had on the study needs and associated rework.

There is concern that by deferring new needs to be re-evaluated in future studies we are not following the full scope of this ITP10. Staff is working under the assumption that the subsequent approvals by the working groups to address the issue effectively drive the scope of the study. The group directed Staff to make sure our handling of the situation is clearly stated in the report and presentations to MOPC. A number of other clarifications were suggested for the final materials including refining of the cost and benefit numbers for consistency and delineation of reliability and economic components of each project. Tim Owens (NPPD) made a motion to approve Staff's completion of the 2015 ITP10 portfolio consolidation per the 2015 ITP10 Scope and does not endorse or approve any specific project in the 2015 ITP10. Bennie Weeks (SPS) seconded the motion. After much discussion, Tim Owens (NPPD) accepted a friendly amendment by Paul Dietz (Westar) to include an as modified qualifier in the motion. (Attachment 9 – 2015 ITP10 Final Portfolios)

Tim Owens (NPPD) made a motion to approve Staff's completion of the 2015 ITP10 portfolio consolidation per the 2015 ITP10 Scope as modified and does not endorse or approve any specific project in the 2015 ITP10. Bennie Weeks (SPS) seconded the motion. The motion passed unopposed.

ACTION ITEM: Staff to specifically address the adjustments made to the ITP10 study in the report and MOPC presentations with regard to the seasonal ratings issue.

Agenda Item 5b – 2015 ITP10 Project Staging

Rosemary Mittal (SPP Staff) presented the results of the 2015 ITP10 project staging. She reviewed the staging criteria outlined in the scope and the final list of recommended NTC projects. In their meeting on November 18th, the TWG amended the study scope, requesting that Staff stage voltage violations based on an interpolation between needs in the 2019 and 2024 models, and not just stage in 2024. The ESWG agreed with the TWG decision and deferred any action on staging to the December meeting. Discussion continued on the handling of approved projects in the final assessments, specifically the benefit metrics analysis. Staff has directed the consultant performing the benefit metrics to only include projects with projected NTCs in the analysis. After discussion, members directed Staff to calculate final assessments using the full portfolio of projects. (Attachment 10 – 2015 ITP10 Project Staging)

Paul Dietz (Westar) made a motion to direct Staff to move forward with calculating 2015 ITP10 benefit metrics on the entire final consolidated portfolio. Bennie Weeks (SPS) seconded the motion. The motion passed with one abstention, Wayman Smith (AEP).

Agenda Item 5c – 2015 ITP10 Sensitivities

Kelsey Allen (SPP Staff) presented on the details of the 2015 ITP10 sensitivity analysis. Staff is requesting input from members on the specifics of the HVDC sensitivity analyses, which were left to be determined by the group. There was discussion on the details of the Clean Line Plains and Eastern project analysis in relation to the intended implementation of the project. Jonathan Abebe (Clean Line Energy Partners) clarified the size of the HVDC project (4GW) and stated that evaluation of the intended implementation of the project would provide no value to the group; that the intent of the sensitivity was to look at the impact of potential alternatives. (Attachment 11 – 2015 ITP10 Sensitivities)

Wayman Smith (AEP) made a motion to accept Staff's proposal for analysis of the HVDC sensitivities. Pat McCool (KCPL) seconded. The motion passed unopposed.

Agenda Item 5d – 2015 ITP10 Scope (Stability Analysis)

Kelsey Allen (SPP Staff) presented changes made stability analysis section of the scope. Staff is proposing to remove the transient stability analysis from the 2015 ITP10 study. The TWG approved this change in their November 18th meeting as well as adding language related to staging of projects selected to mitigate voltage needs. (Attachment 12 – 2015 ITP10 Scope Final MOPC_redline_TWG_redline)

Paul Dietz (Westar) made a motion to approve the changes to the 2015 ITP10 scope as presented today. Wayman Smith (AEP) seconded the motion. The motion passed unopposed.

Agenda Item 6 – 2015 ESWG Meeting Schedule

Kelsey Allen (SPP Staff) proposed updated dates for 2015 ESWG face to face meetings. Three of the meetings for the first semester of 2015 were changed to 2-day meetings to help facilitate the expected workload. The group endorsed the proposed 1st semester meeting schedule dates and locations. (Attachment 13 – 2015 ESWG Meeting Schedule)

ACTION ITEM: Staff to add time in the March/April ESWG meeting agenda to discuss the 2nd semester 2015 meeting schedule.

Agenda Item 7 – 2017 ITP10 Scope and Futures

The group began discussion on possible Futures for the 2017 ITP10. Alan Myers (ITC Great Plains) asked for any additions to the list discussed at the October meeting. One suggestion was added per conversation at the November 18th TWG meeting. After discussion on ways to cull down and prioritize the list, the group began to prioritize by voting on the probability that each scenario might occur. Staff tallied the votes and determined a weighted average for each of the possible drivers. Paul Dietz (Westar) made a motion to cut the list of possible 2017 ITP10 Futures to further develop at a score of 2 for the proposed scenarios. Wayman Smith (AEP) seconded the motion. Noman Williams (Southcentral MCN) offered a friendly amendment to the motion to capture those drivers that do not make the list of potential Futures and include them as potential sensitivities. Alan Myers (ITC Great Plains) suggested that a sub-group of members further refine the list of possible Futures, acknowledging that many of the scenario ideas could be expanded into multiple Futures or combined into a single Future. Alan Myers (ITC Great Plains) and Paul Dietz (Westar) offered to take on this refinement. (Attachment 14 – 2017 ITP10 Futures) (Attachment 15 – 2017 ITP10 Futures Priority)

Paul Dietz (Westar) made a motion to cut the list of possible 2017 ITP10 Futures to further develop at a score of 2 for the proposed scenarios, and keep the remaining scenarios as possible sensitivities. Wayman Smith (AEP) seconded the motion. The motion passed unopposed.

ACTION ITEM: ESWG members sub-group to narrow down futures for the 2017 ITP10 and bring a proposal to the December meeting.

Agenda Item 8 – Planning Improvements Task Force

Kirk Hall (SPP Staff) presented a draft charter document for an upcoming Planning Improvements Task Force. This task force is the result of a strategic initiative to review, check and adjust the SPP planning processes. The group was asked to review the scope of activities and provide feedback. Currently, the intent is to have a charter document to share with MOPC and SPC in the January 2015 meetings. (Attachment 16 – Planning Improvements Task Force Scope edited_TWG)

Agenda Item 9 – ITP Manual Task Force Update

Paul Dietz (Westar) gave an update to the group on the activities of the task force. The members have gone through two rounds of edits since the approval of the legacy staff edits. Comments have been consolidated by Staff and the document is ready to be reviewed by the ESWG membership. Paul requested that members review and provide comments by December 5th; the goal is to bring an ESWG approved version of the manual to TWG in January. Paul requested an hour on the December agenda to review and approve the document. (Attachment 17 - ITP_Manual - Task Force - combined edits_v2)

ACTION ITEM: ESWG members to review the updated ITP Manual and provide comments to Staff by December 5th.

Agenda Item 10 – ITP Load and Generation Review Update

Kelsey Allen (SPP Staff) gave an update on the proposed changes to the ITP load and generation review. Staff brought a draft of the dataset that the MDWG would be reviewing to that group at their November meeting. The list was narrowed down from the original proposal to the ESWG to only data pertaining to both powerflow and economic models. The MDWG members requested more detail and definitions of the proposed data to be reviewed, but were amenable to the addition in their data review process.



Closing Items

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

Kelsey Allen (SPP Staff) reviewed the list of action items from the meeting.

1. Staff to specifically address the adjustments made to the ITP10 study in the report and MOPC presentations with regard to the seasonal ratings issue.
2. Staff to add time in the March/April ESWG meeting agenda to discuss the 2nd semester 2015 meeting schedule.
3. ESWG members sub-group to narrow down futures for the 2017 ITP10 and bring a proposal to the December meeting.
4. ESWG members to review the updated ITP Manual and provide comments to Staff by December 5th.
5. Staff to add an SPP-MISO Coordinated System Plan study schedule to the regular schedule updates.

The meeting was adjourned at 1:45 PM.

Respectfully Submitted,

Kelsey Allen
ESWG Secretary

2015 ITP10 Schedule

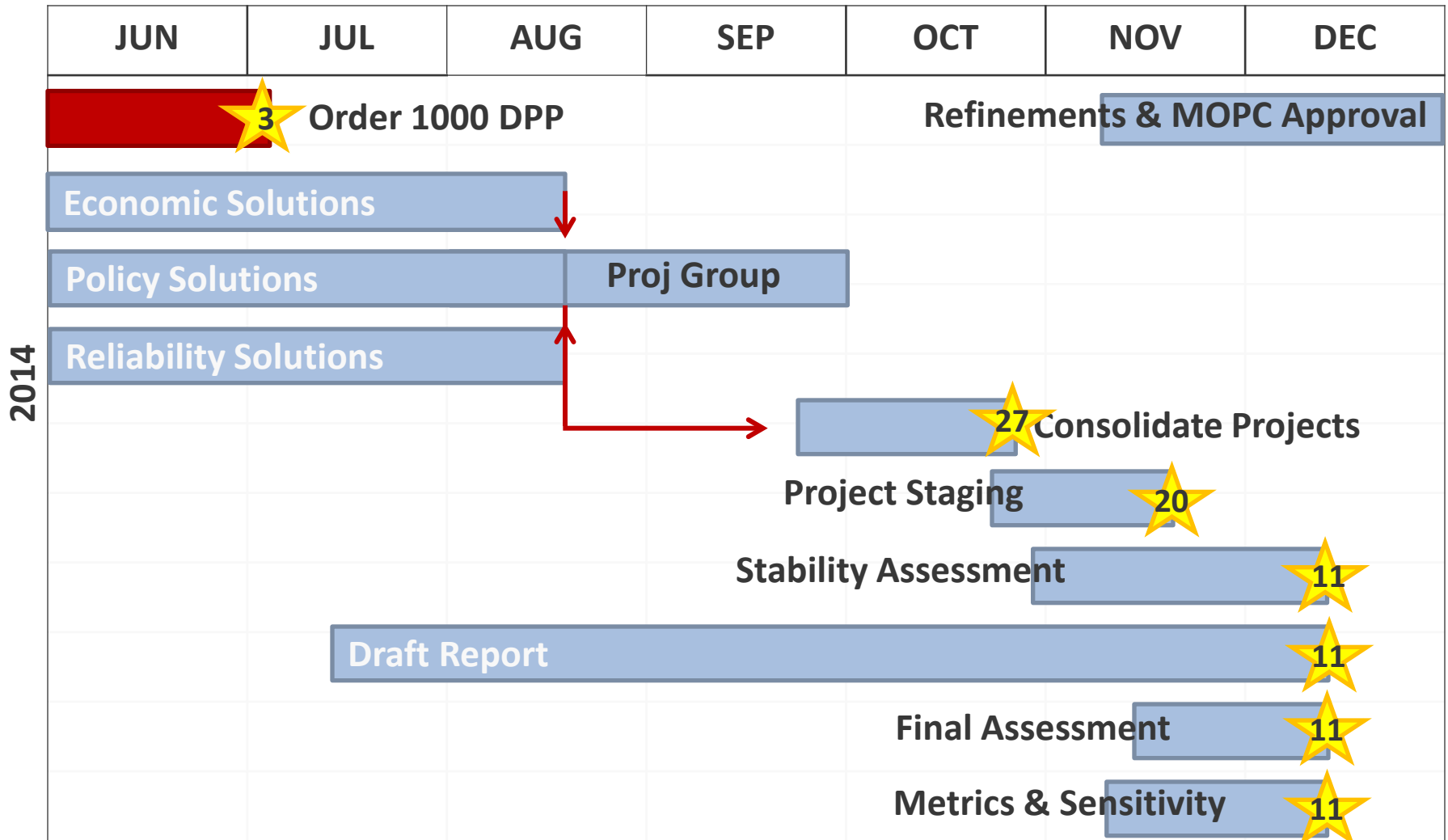
December 11th, 2014

ESWG

Juliano Freitas



ITP10 Milestone Schedule (Jun-Dec 2014)



ESGW Approval



Member Review/Feedback Period



Milestone Period



ITP10 Milestone Schedule - Summary

Task Name	Start	Finish	Member Feedback	ESWG Approval
Scoping	April	October	17 weeks	10/2
Policy Survey	May	August	9 weeks	12/04
Load and Generation Review	May	September	10 weeks	9/5
Resource Plan	August	October	3 weeks	12/04
Siting Plan	September	October	2 weeks	12/04
Economic Model development	June	February	7 weeks	Feb 21/2014
Benchmarking	November	January '14	1 week	Feb 13/2014
Constraint assessment - TWG Approval	November	March '14	1 week	
DC to AC Conversion of Peak Hours	January	March	2 weeks	
Reliability Assessment	March	May		
Reliability Solutions	May	July	30 days	
Economic assessment	February	May		
Economic Solutions	May	August	30 days	
Policy Assessment	May	August		
Policy Solutions	May	August	30 days	
Stability Assessment	October	December		
Project Grouping	August	September	1 week	
Consolidate Projects	September	October		Oct 27/2014
Project Staging	October	November		Nov 20/2014
Draft Report	July	December	3 weeks	Dec 11/2014
Final Assessment	November	December		Dec 11/2014
Benefit Calculation	November	December	3 weeks	
Refinements and MOPC Presentation	November	January '15		

2013

2014

RCAR II Schedule

December 11th, 2014

ESWG

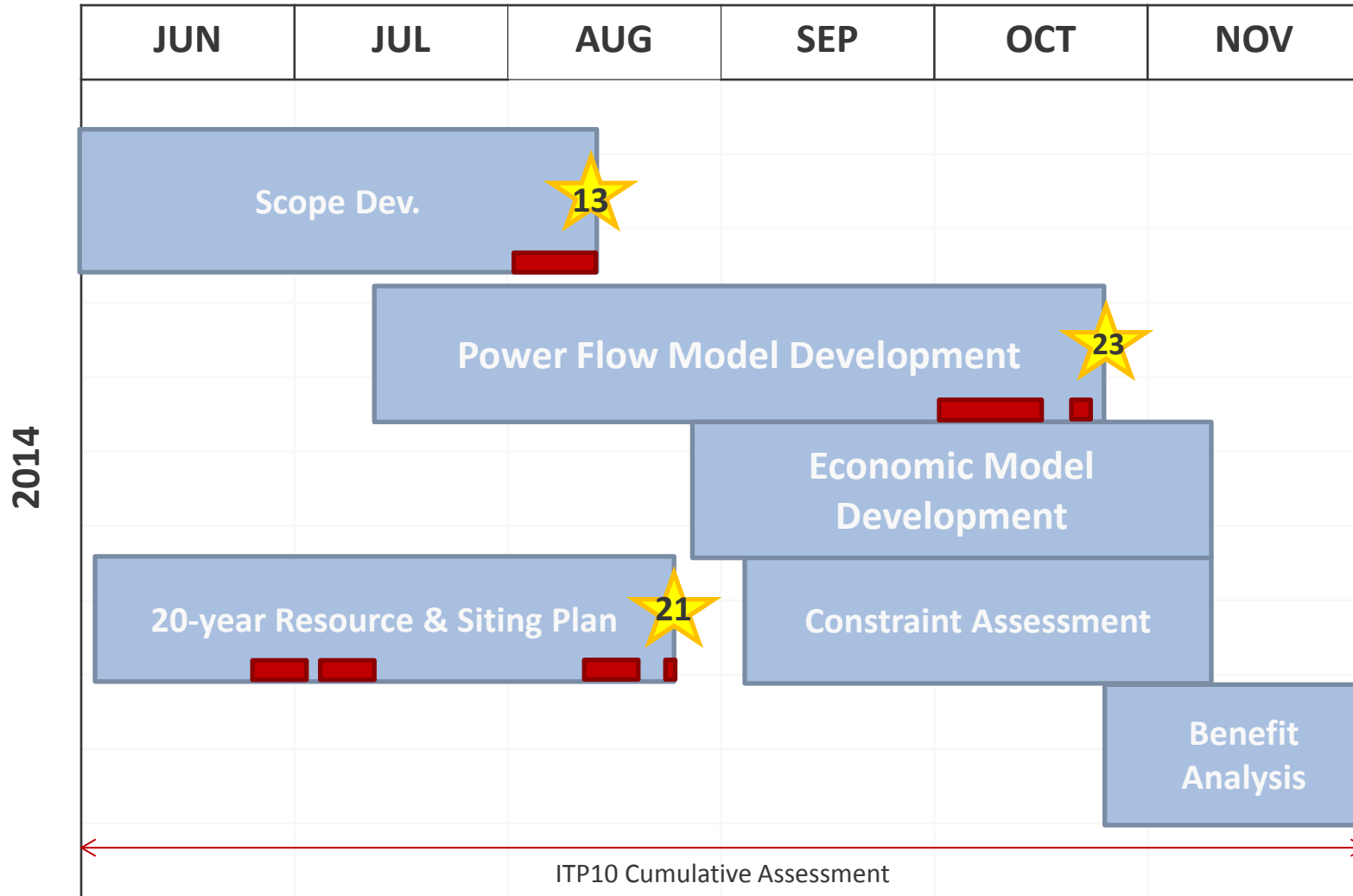
Juliano Freitas



Schedule

- **ITP10 Cumulative Assessment**
 - **Preliminary RCAR II results; subject to change; non-binding**
 - **Will be included in ITP10 Report**
- **RCAR II Final Assessment**
 - **Concludes April 2015**
 - **Will include stakeholder vetting of PROMOD models, constraints**

RCAR II Milestone Schedule (June-Nov 2014)



Working Group/Task Force Approval

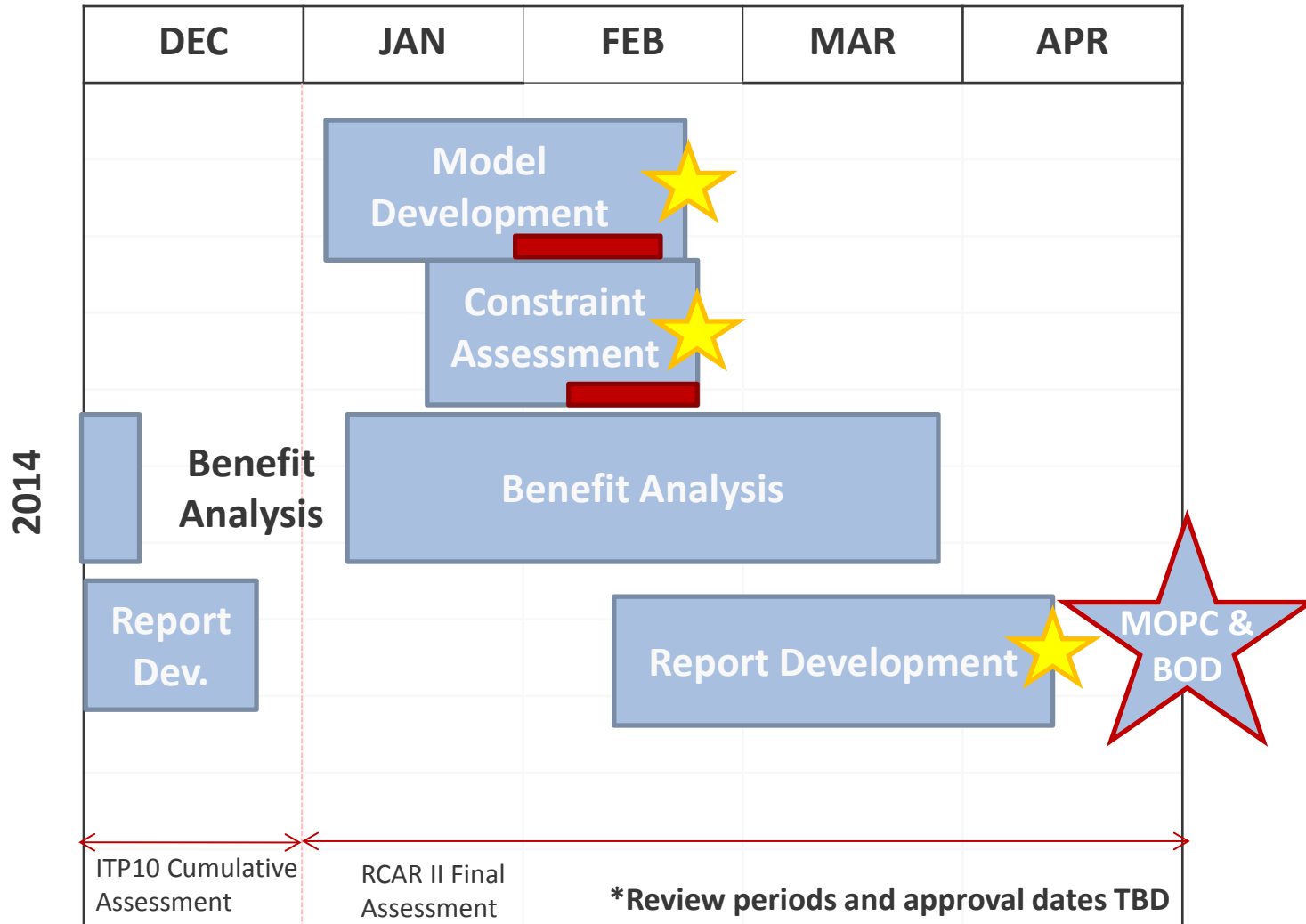


Member Review/Feedback Period



Milestone Period

RCAR II Milestone Schedule (Dec 2014-Apr 2015)



Working Group/Task Force Approval



Member Review/Feedback Period



Milestone Period

SPP-MISO CSP

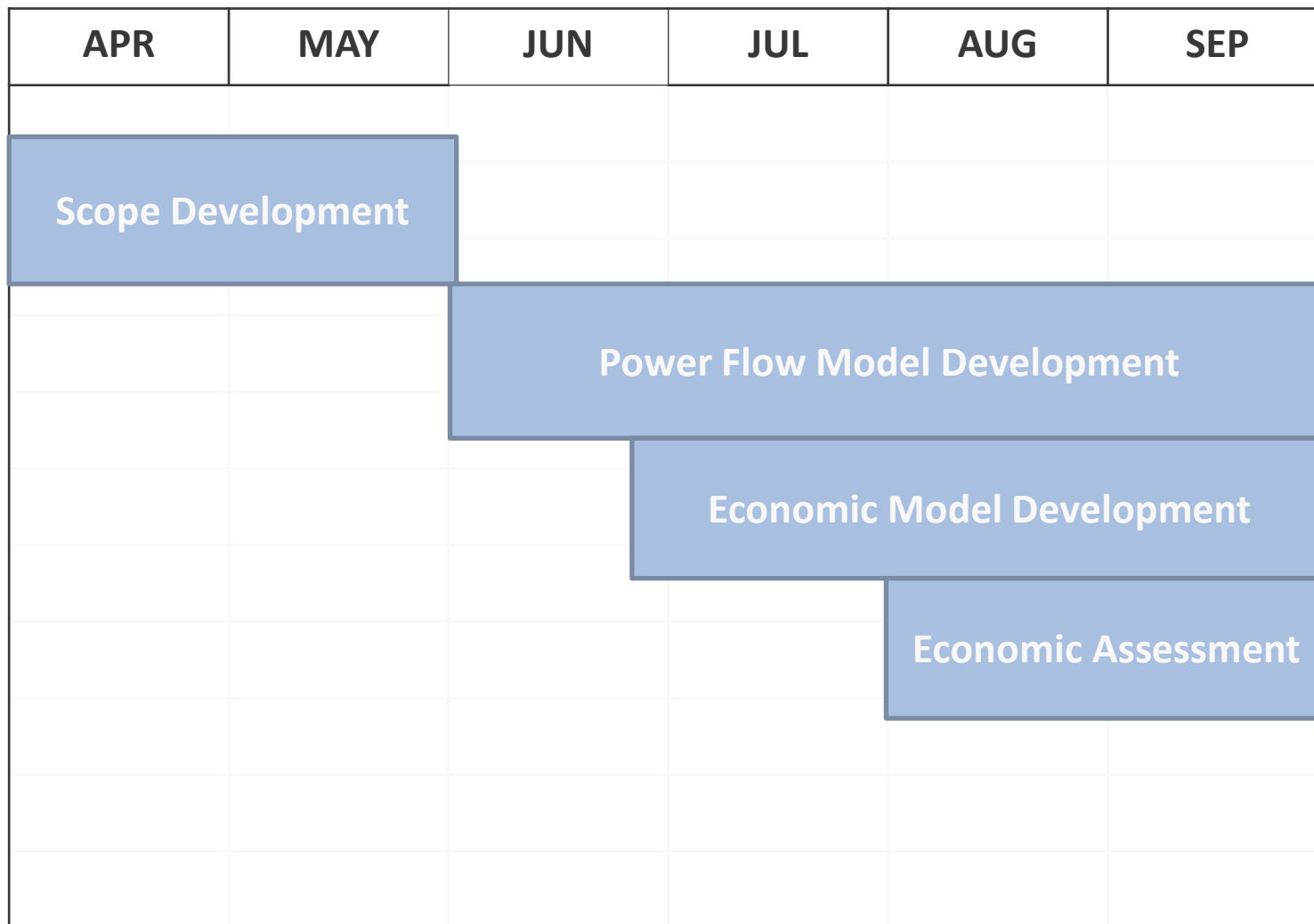
December 11th, 2014

ESWG

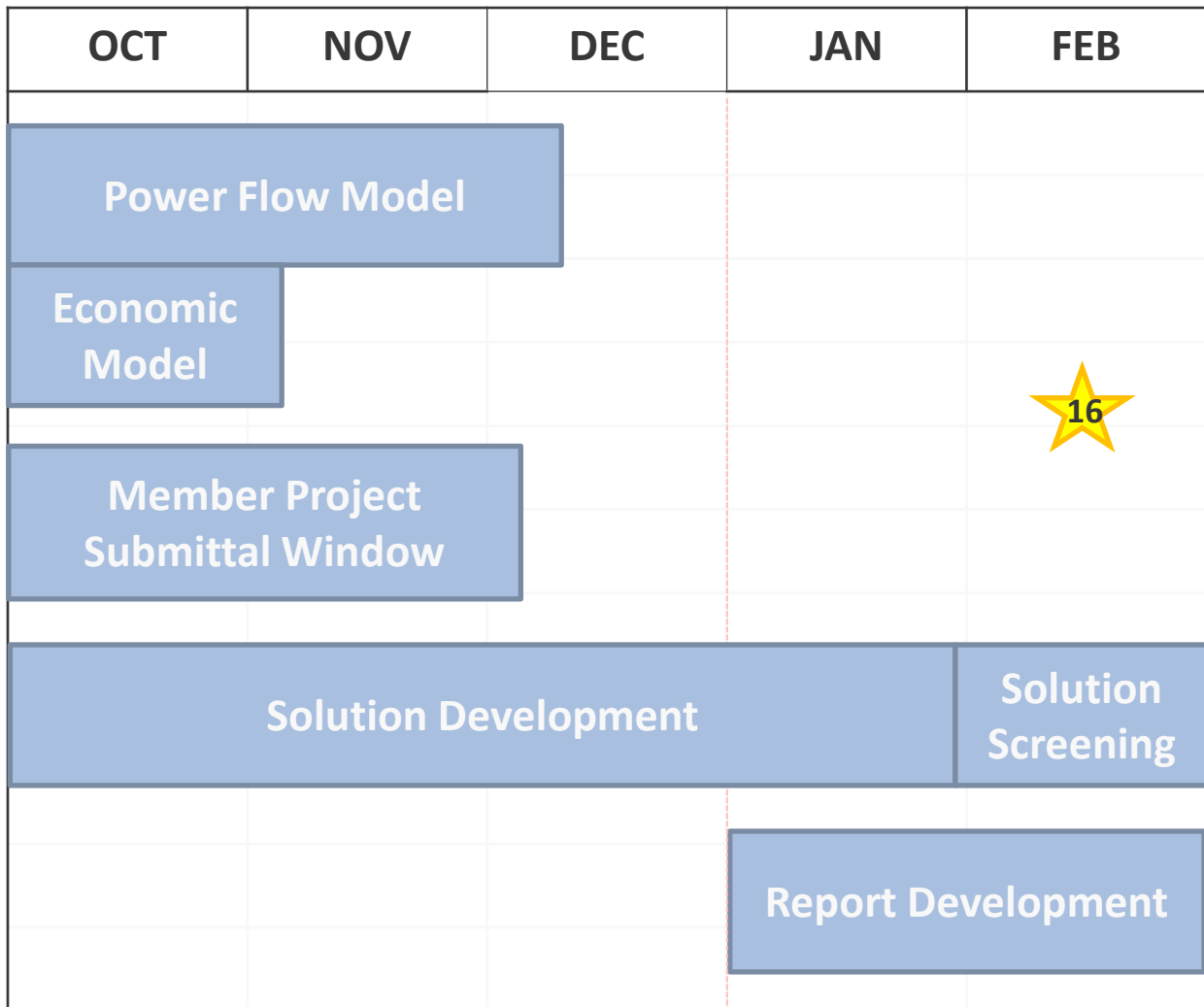
Juliano Freitas




MISO SPP CSP Milestone Schedule (Apr-Sep 2014)



MISO SPP CSP Milestone Schedule (Oct 2014-Feb 2015)



 Stakeholder Meeting

 Milestone Period

2015 ITP10 Staging

December 11, 2014

ESWG



2015 ITP10

METHODOLOGY

Scope

Single Project Classification

- **Economic**
 - Future 1- Stage projects based on linear interpolation of B/C ratios from 2019 to 2024
 - Future 2- Stage with a 2024 need date
 - Economic projects one-year B/C ratio threshold crosses 1.0
- **Policy**
 - Stage projects to meet renewable requirements
 - No policy needs were identified in this study

Scope

Single Project Classification (cont.)

- **Reliability**
 - **Future 1**
 - Thermal projects- Stage projects based on linear interpolation of thermal loadings from 2019 to 2024
 - Voltage projects- **Same as thermal per the 18 Nov TWG meeting**
 - **Future 2- Stage with a 2024 need date**
 - **Projects solving both Thermal and Voltage needs staged to meet earliest occurrence of either thermal or voltage need**

Multiple Project Classification

- **Project will be staged to meet the earliest need date established through the Single Project Classification process**

Economic Staging

- **2019 Models**
 - **Base case- 2019 Future 1 model plus 2019 reliability projects needed in 2019**
 - **Change case- Each individual Economic project applied to the base case**
- **2024 Models**
 - **Base case- 2024 Future 1 model plus all solely reliability projects**
 - **Change case- Each individual Economic project applied to the base case**

Recommended NTCs

Project Description	Lead Time (Months)	ITP10 Need Date	Expected Financial Expenditure Date
New wave trap at Amoco and Sundown, increasing rating on Sundown-Amoco 230 kV line	18	1/1/2019	7/1/2017
Voltage conversion of Iatan-Stranger Creek 161 kV line to 345 kV	36	1/1/2019	1/1/2016
Rebuild North Platt-Stockville-Red Willow 115 kV line to 240/240 MVA, new 345/115 kV transformer at Mingo	30	1/1/2019	7/1/2016
New 345/115 kV transformer at Road Runner	24	6/1/2019	6/1/2017
Install two stages of 14.4 MVar capacitor banks on the Ochoa 115 kV bus	24	6/1/2020	6/1/2018
Tap Reno-Wichita 345 kV line into Moundridge, new 345/138 kV transformer at Moundridge	24	6/1/2019	6/1/2017
Reconductor Gracemont-Anadarko 138 kV line to 286/286 MVA	24	4/1/2019	4/1/2017
Reconductor Martin-Pantex North 115 kV line to 240/240 MVA and replace wave trap at Pantex substation	24	4/1/2019	4/1/2017
Reconductor Pantex North-Pantex South 115 kV line to 240/240 MVA	24	4/1/2019	4/1/2017
Reconductor Highland Park-Pantex South 15 kV line to 240/240 MVA and replace wave trap and switch at Pantex South and Highland Park tap	24	4/1/2019	4/1/2017
Install 14.4 MVar capacitor bank at LE Plains Interchange 115 kV	24	6/1/2019	6/1/2017
Replace wave trap at Claremore 161 kV	18	6/1/2019	12/1/2017
Rebuild South Shreveport-Wallace Lake 138 kV line to 246/246 MVA	24	6/1/2019	6/1/2017
Install 20 MVar capacitor at Russell 115 kV, Install 9 MVar capacitor at Waldo 115 kV	24	6/1/2019	6/1/2017
Install 6 MVar capacitor bank at Mile City 115 kV	24	6/1/2019	6/1/2017
Upgrade wave traps and switches on Cimarron-McClain 345 kV line	18	4/1/2019	10/1/2017
New 345/161 kV transformer at S3459	24	6/1/2019	6/1/2017
New 115/69 kV transformer at Lovington	24	6/1/2020	6/1/2018
Tap Hitchland-Finney 345 kV line at new substation and install new 345/115 kV transformer, and build new 23 mile 115 kV line from new station to Walkemeyer and continue to North Liberal	36	6/1/2019	6/1/2016

Staff Recommendation

- **SPP staff recommends the ESWG to approve staff's completion of the 2015 ITP10 staging process.**

2015 ITP10 Metrics

December 11, 2014

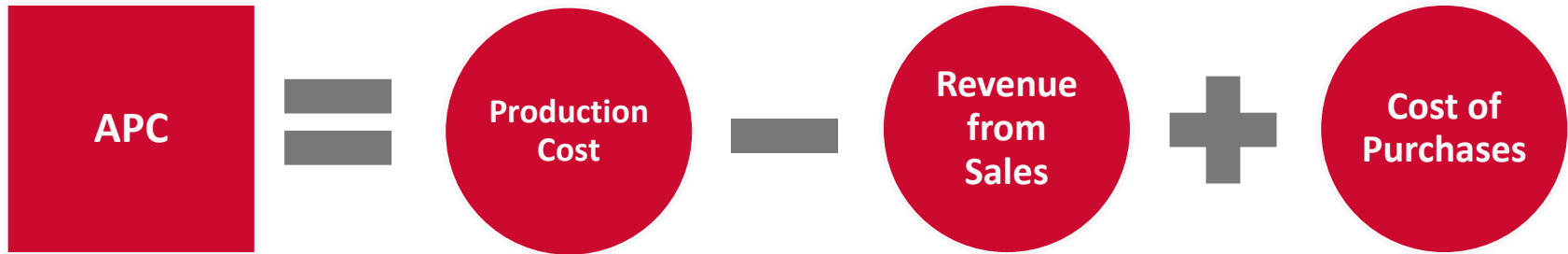


Benefit Metrics

*Metrics were calculated for full Consolidated Portfolio for both futures

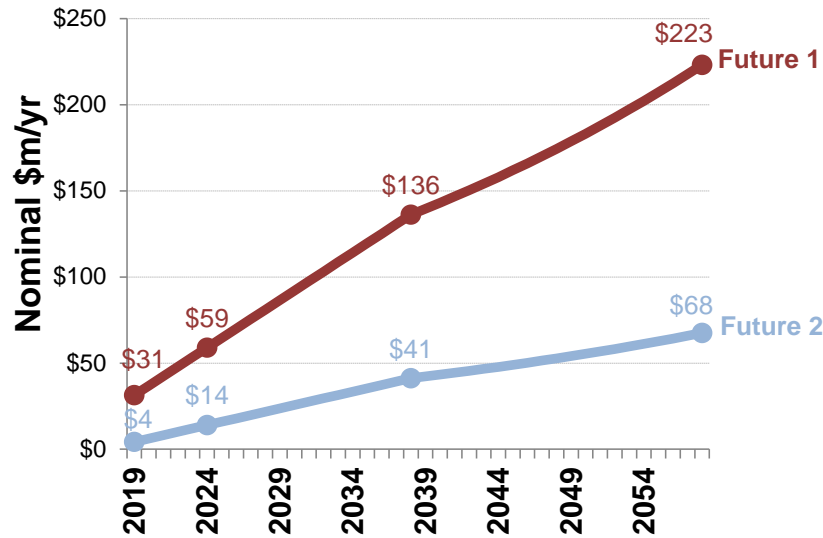
- **APC Savings**
 - Includes Reduction of Emission Rates and Values
 - Includes Savings Due to Lower Ancillary Service Costs
- **Avoided or Delayed Reliability Projects**
- **Capacity Cost Savings Due to Reduced On-Peak Transmission Losses**
- **Assumed Benefit of Mandated Reliability Projects**
- **Benefit from Meeting Public Policy Goals**
- **Mitigation of Transmission Outage Costs**
- **Increased Wheeling Through and Out Revenues**
- **Marginal Energy Losses Benefit**

APC Savings



- **APC monetizes costs associated with fuel prices, grid congestion, unit operating costs, purchases and sales**
- **2019 and 2024 analyzed for APC Savings**
 - Savings extrapolated through the first 20 years
 - Terminal value used for the last 20 years

APC Savings Results



	Future 1			Future 2		
	2019 (nom. \$m)	2024 (nom. \$m)	40-yr NPV (2015 \$m)	2019 (nom. \$m)	2024 (nom. \$m)	40-yr NPV (2015 \$m)
AEPW	\$1.0	\$0.3	(\$4.6)	\$1.8	\$0.9	\$2.0
CUS	\$0.1	\$0.1	\$1.6	(\$0.0)	(\$0.1)	(\$0.9)
EDE	\$0.2	\$0.4	\$7.5	\$0.1	\$0.0	(\$0.4)
GMO	(\$0.3)	(\$0.1)	(\$0.2)	(\$0.1)	(\$0.3)	(\$4.3)
GRDA	(\$0.3)	(\$0.8)	(\$15.8)	\$0.0	(\$0.0)	(\$1.1)
KCPL	\$4.8	\$11.0	\$202.8	\$0.5	\$0.8	\$13.2
LES	\$0.0	(\$0.1)	(\$2.0)	(\$0.0)	(\$0.3)	(\$5.6)
MIDW	\$3.4	\$2.0	\$9.8	\$0.3	\$0.1	(\$0.2)
MKEC	\$4.0	\$4.4	\$56.6	\$1.2	\$1.5	\$20.0
NPPD	\$6.3	\$9.2	\$143.4	\$0.9	\$0.8	\$9.2
OKGE	(\$0.3)	\$1.8	\$44.3	\$0.3	(\$0.0)	(\$3.8)
OPPD	\$1.9	\$4.3	\$77.5	\$0.2	\$6.6	\$149.8
SUNC	\$2.7	\$2.8	\$34.4	\$0.4	\$0.4	\$5.7
SWPS	\$1.5	\$10.3	\$222.3	(\$1.9)	\$1.7	\$60.1
WEFA	(\$0.6)	(\$1.2)	(\$20.5)	\$0.1	\$0.3	\$5.4
WRI	\$7.4	\$13.6	\$234.9	\$0.6	\$1.3	\$24.0
Sub-Total	\$31.7	\$57.9	\$991.8	\$4.2	\$13.8	\$273.2
BASIN	(\$2.4)	(\$2.8)	(\$37.9)	(\$0.1)	\$0.1	\$3.0
HCPD	\$0.5	\$0.8	\$14.4	\$0.1	\$0.1	\$1.2
WAPA	\$2.8	\$4.7	\$77.1	\$0.2	\$0.2	\$1.5
CBPC	(\$1.2)	(\$1.7)	(\$25.3)	(\$0.2)	(\$0.2)	(\$1.9)
Sub-Total	(\$0.3)	\$1.1	\$28.3	\$0.0	\$0.2	\$3.7
TOTAL	\$31.4	\$59.0	\$1,020.1	\$4.3	\$14.0	\$276.9

Avoided or Delayed Reliability Projects

- Metric analyzes economic and policy projects to see if they mitigate any reliability overloads
 - The cost of the project needed to mitigate the reliability need is identified as benefit
- 2 economic projects in ITP10
 - Neither project mitigates any reliability overloads
 - Benefit is \$0 in both futures

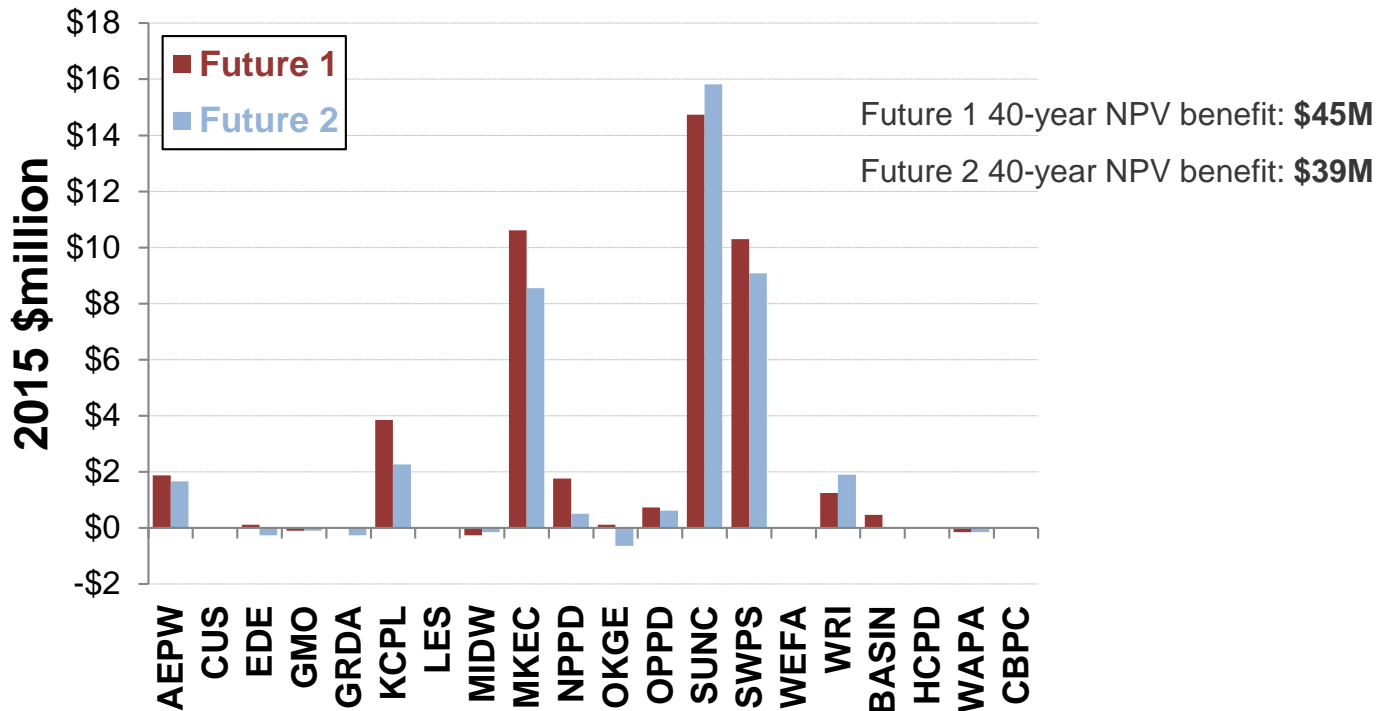
Capacity Cost Savings Due to Reduced On-Peak Transmission Losses



- **Net CONE = \$82/kW-yr (in 2015\$) for new CT**
 - Based on EIA AEO 2014, SPP State of Market Report

Capacity Cost Savings Results

	2019			2024		
	Loss Reduction (MW)	Capacity Savings (MW)	Capacity Savings (nom. \$m)	Loss Reduction (MW)	Capacity Savings (MW)	Capacity Savings (nom. \$m)
Future 1	14.4	16.1	\$1.5	23.1	25.9	\$2.6
Future 2	15.2	17.0	\$1.5	21.0	23.5	\$2.4



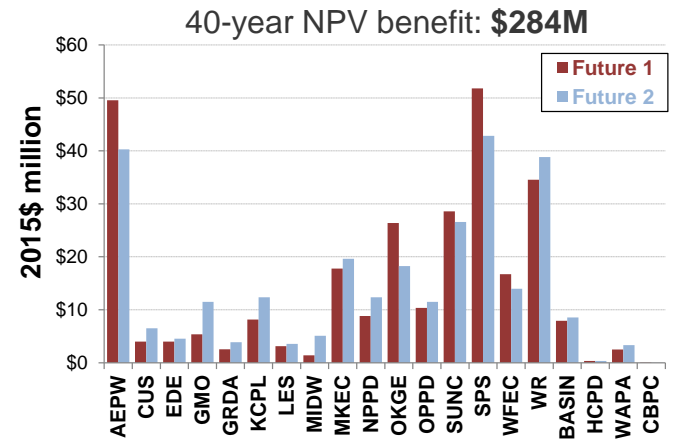
Assumed Benefit of Mandated Reliability Projects

- **Monetizes the reliability benefits of mandated reliability projects**
 - **40-year benefits = 40-year costs**
 - **Allocated based on ESWG-approved methodology**
 - **Hybrid of System Reconfiguration, Load Ratio Share**

< 100 kV	100 – 300 kV		> 300 kV	
100% SR	66.7% SR	33.3% LRS	33.3% SR	66.7% LRS

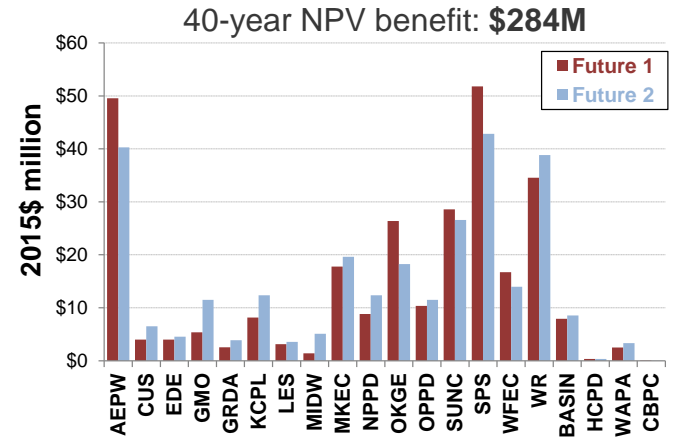
Mandated Reliability Project Benefit – F1 Results

All Projects		< 100 kV	100–300 kV			> 300 kV		
SPP-wide Benefits								
Total	\$284.0	\$2.6	\$281.2			\$0.1		
Analyzed*	\$284.0	\$2.6	\$281.2			\$0.1		
	Approved Hybrid Approach	100% SR	66.7% SR	33.3% LRS	Wtd. Avg.	33.3% SR	66.7% LRS	Wtd. Avg.
Zone								
AEPW	17.5%	0.0%	16.3%	20.3%	17.6%	0.4%	20.3%	13.7%
CUS	1.4%	0.0%	1.4%	1.4%	1.4%	0.0%	1.4%	0.9%
EDE	1.4%	0.0%	1.0%	2.3%	1.4%	4.2%	2.3%	3.0%
GMO	1.9%	0.0%	0.9%	3.8%	1.9%	10.7%	3.8%	6.1%
GRDA	0.9%	0.0%	0.4%	1.8%	0.9%	31.4%	1.8%	11.7%
KCPL	2.9%	0.0%	0.8%	7.1%	2.9%	10.9%	7.1%	8.4%
LES	1.1%	0.0%	0.8%	1.8%	1.1%	5.9%	1.8%	3.2%
MIDW	0.5%	0.0%	0.4%	0.8%	0.5%	0.0%	0.8%	0.5%
MKEC	6.3%	0.0%	8.8%	1.3%	6.3%	0.0%	1.3%	0.9%
NPPD	3.1%	0.0%	1.6%	6.3%	3.1%	12.6%	6.3%	8.4%
OKGE	9.3%	0.0%	7.5%	13.0%	9.4%	7.1%	13.0%	11.1%
OPPD	3.6%	0.0%	3.1%	4.9%	3.7%	0.0%	4.9%	3.3%
SUNC	10.1%	0.0%	14.8%	1.0%	10.2%	0.2%	1.0%	0.7%
SPS	18.2%	100.0%	20.3%	12.0%	17.5%	0.8%	12.0%	8.3%
WFEC	5.9%	0.0%	7.3%	3.1%	5.9%	0.7%	3.1%	2.3%
WR	12.2%	0.0%	13.3%	10.3%	12.3%	0.4%	10.3%	7.0%
Sub-Total	96.2%	100.0%	98.5%	91.4%	96.1%	85.5%	91.4%	89.4%
BASIN	2.8%	0.0%	0.1%	8.3%	2.8%	0.0%	8.3%	5.5%
HCPD	0.1%	0.0%	0.0%	0.4%	0.1%	0.0%	0.4%	0.2%
WAPA	0.9%	0.0%	1.3%	0.0%	0.9%	14.3%	0.0%	4.8%
CBPC	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.1%
Sub-Total	3.8%	0.0%	1.5%	8.6%	3.9%	14.5%	8.6%	10.6%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



Mandated Reliability Project Benefit – F2 Results

All Projects		< 100 kV	100–300 kV			> 300 kV		
SPP-wide Benefits								
Total	\$284.0	\$2.6	\$281.2			\$0.1		
Analyzed*	\$284.0	\$2.6	\$281.2			\$0.1		
	Approved Hybrid Approach	100% SR	66.7% SR	33.3% LRS	Wtd. Avg.	33.3% SR	66.7% LRS	Wtd. Avg.
Zone								
AEPW	14.2%	0.0%	11.3%	20.3%	14.3%	1.1%	20.3%	13.9%
CUS	2.3%	0.0%	2.8%	1.4%	2.3%	0.6%	1.4%	1.1%
EDE	1.6%	0.0%	1.3%	2.3%	1.6%	2.5%	2.3%	2.4%
GMO	4.1%	0.0%	4.2%	3.8%	4.1%	13.9%	3.8%	7.2%
GRDA	1.4%	0.0%	1.2%	1.8%	1.4%	20.8%	1.8%	8.2%
KCPL	4.4%	0.0%	3.0%	7.1%	4.4%	0.0%	7.1%	4.7%
LES	1.3%	0.0%	1.0%	1.8%	1.3%	4.4%	1.8%	2.7%
MIDW	1.8%	0.0%	2.3%	0.8%	1.8%	0.1%	0.8%	0.5%
MKEC	6.9%	1.0%	9.8%	1.3%	7.0%	2.5%	1.3%	1.7%
NPPD	4.4%	0.0%	3.4%	6.3%	4.4%	3.8%	6.3%	5.5%
OKGE	6.4%	1.0%	3.2%	13.0%	6.5%	19.6%	13.0%	15.2%
OPPD	4.1%	0.0%	3.7%	4.9%	4.1%	0.6%	4.9%	3.5%
SUNC	9.4%	0.0%	13.7%	1.0%	9.5%	9.5%	1.0%	3.8%
SPS	15.1%	97.9%	15.5%	12.0%	14.3%	0.0%	12.0%	8.0%
WFEC	4.9%	0.0%	5.9%	3.1%	5.0%	7.6%	3.1%	4.6%
WR	13.7%	0.0%	15.5%	10.3%	13.8%	1.5%	10.3%	7.4%
Sub-Total	95.7%	100.0%	97.8%	91.4%	95.6%	88.6%	91.4%	90.4%
BASIN	3.0%	0.0%	0.4%	8.3%	3.0%	0.0%	8.3%	5.5%
HCPD	0.1%	0.0%	0.0%	0.4%	0.1%	0.0%	0.4%	0.2%
WAPA	1.2%	0.0%	1.8%	0.0%	1.2%	11.4%	0.0%	3.8%
CBPC	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Sub-Total	4.3%	0.0%	2.2%	8.6%	4.4%	11.4%	8.6%	9.6%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

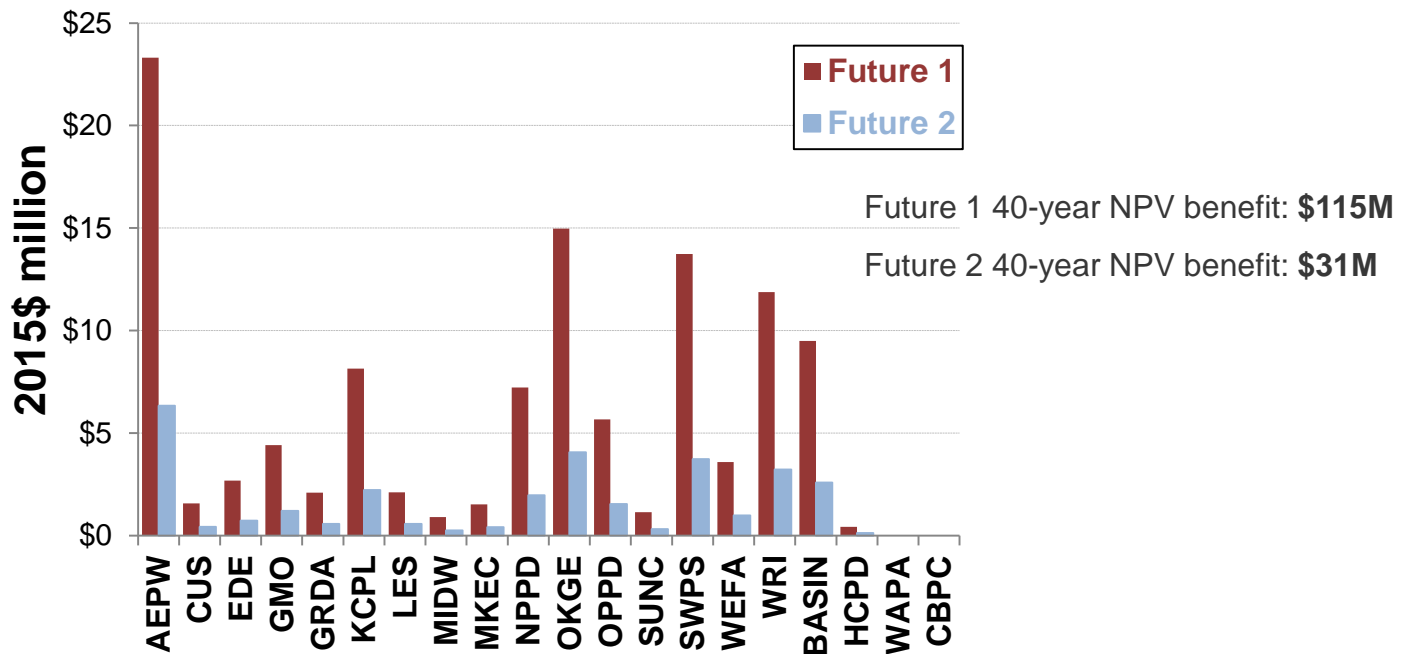


Benefit from Meeting Public Policy Goals

- Evaluates benefits for facilitating public policy goals related to renewable energy
 - Benefits = costs of transmission upgrades
- No public policy needs or projects were identified, thus benefit is \$0 in both futures

Mitigation of Transmission Outage Costs

- Measures the APC benefit of transmission upgrades during outages of existing transmission facilities
 - Allocated to zones based on Load Ratio Share



Increased Wheeling Through and Out Revenues

- Increased ATC with neighbors can lead to increased through and out transactions which would increase SPP wheeling revenues
- Determine long-term wheeling service (TSRs) that SPP was able to sell due to upgrades and calculate ratio

$$\frac{\text{Incremental LT Wheeling Service Sold}_{2010-2014}}{ATC_{\text{Change Case,2014}} - ATC_{\text{Base Case,2014}}}$$

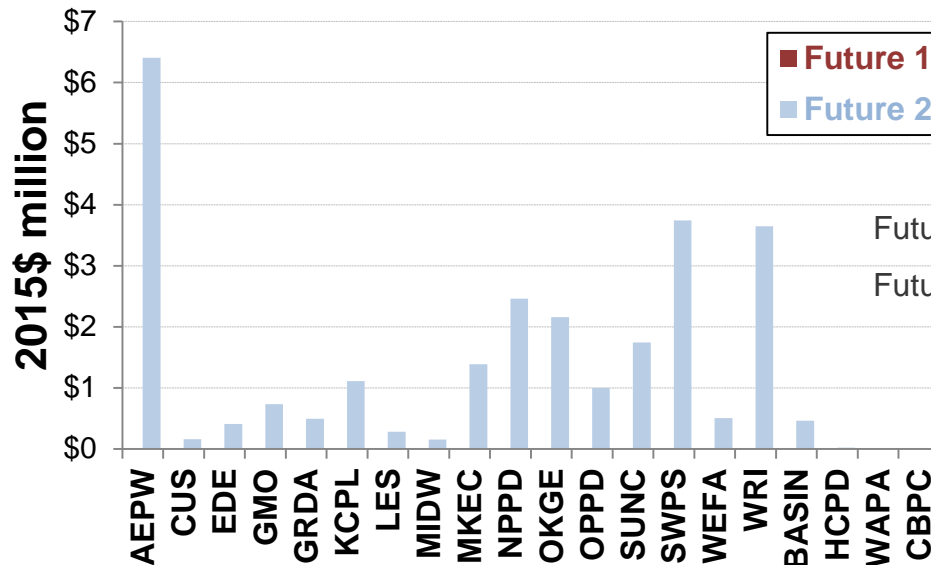
- Historical ratio utilized to determine wheeling MW and revenues for export-ATC increases due to ITP10 transmission upgrades

Increased Wheeling Through and Out Revenues

– Results

Point of Delivery	Number of Firm PtP Service Requests	MW Capacity Granted	2014 Wheeling Revenues in \$million			
			Sch 7 Zonal	Sch 11 Reg-Wide	Sch 11 Thru & Out Zonal	TOTAL
AECI	5	515	\$5.4	\$4.8	\$2.4	\$12.6
MISO	2	101	\$1.1	\$0.9	\$0.5	\$2.5
Entergy	6	586	\$8.1	\$5.5	\$2.7	\$16.3
TOTAL	13	1,202	\$14.6	\$11.2	\$5.5	\$31.3

	Historical 2014	Future 1 2019	Future 1 2024	Future 2 2019	Future 2 2024
Export ATC Increase (MW)	1,142	-	-	41	52
Wheeling Revenues (\$m/yr)	\$31.3	\$0.0	\$0.0	\$1.3	\$1.8



Future 1 40-year NPV benefit: **\$0M**

Future 2 40-year NPV benefit: **\$27M**

Marginal Energy Losses

- Metric captures savings from reduced MWh quantity of losses through hourly post-processing of Marginal Loss Component (MLC) by zone

❖ **Loss Factor_{Gen,Base}** = $0.5 \times (\text{MLC}_{\text{Load, Base}} - \text{MLC}_{\text{Gen, Base}}) / \text{LMP}_{\text{Gen, Base}}$

❖ **Loss Factor_{Gen,Change}** = $0.5 \times (\text{MLC}_{\text{Load, Change}} - \text{MLC}_{\text{Gen, Change}}) / \text{LMP}_{\text{Gen, Change}}$

❖ **Loss Savings in MWh_{Gen}** = $(\text{Loss Factor}_{\text{Gen,Base}} - \text{Loss Factor}_{\text{Gen,Change}}) \times \text{Gen}$

❖ **Loss Factor_{Imp,Base}** = $0.5 \times (\text{MLC}_{\text{Load, Base}} - \text{MLC}_{\text{Imp, Base}}) / \text{LMP}_{\text{Imp, Base}}$

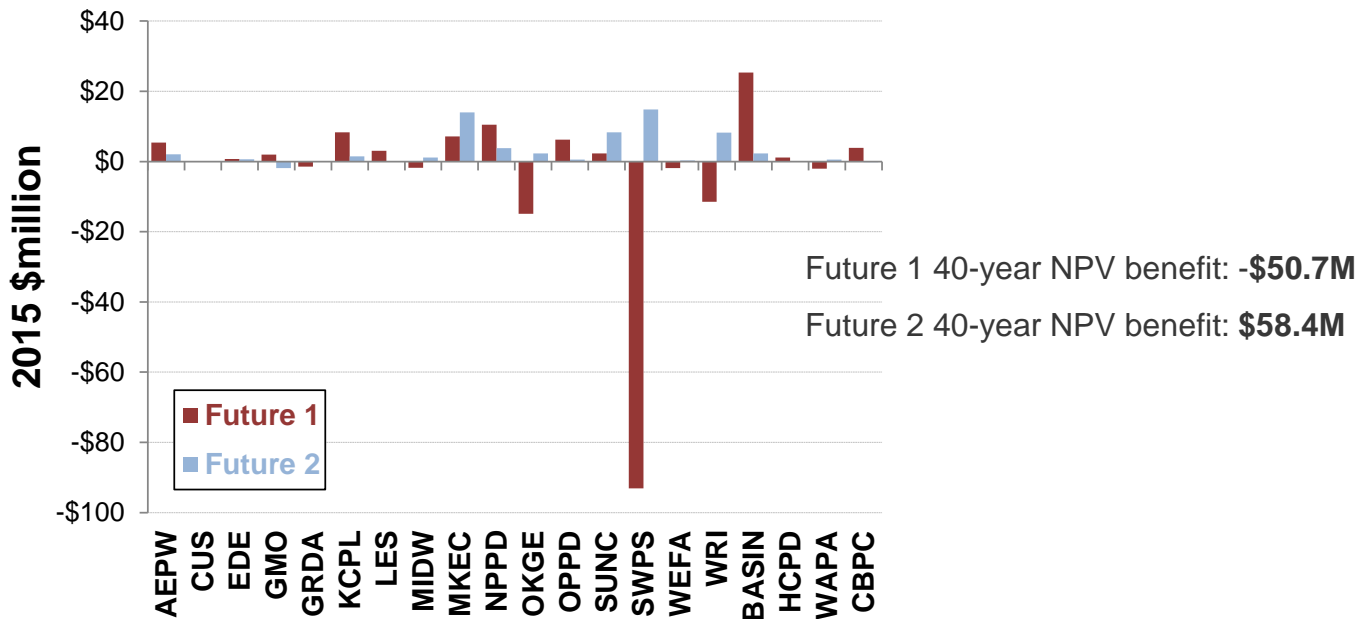
❖ **Loss Factor_{Imp,Change}** = $0.5 \times (\text{MLC}_{\text{Load, Change}} - \text{MLC}_{\text{Imp, Change}}) / \text{LMP}_{\text{Imp, Change}}$

❖ **Loss Savings in MWh_{Imp}** = $(\text{Loss Factor}_{\text{Imp,Base}} - \text{Loss Factor}_{\text{Imp,Change}}) \times \text{Imports}$

❖ **Loss Savings in \$** = $\text{MWh Loss Savings}_{\text{Gen}} \times \text{LMP}_{\text{Gen, Change}}$
 + $\text{MWh Loss Savings}_{\text{Imp}} \times \text{LMP}_{\text{Imp, Change}}$

Marginal Energy Losses – Results

	2019		2024		40-yr NPV of Savings (2015 \$m)
	Loss Reduction (MWh)	Energy Savings (nom. \$m)	Loss Reduction (MWh)	Energy Savings (nom. \$m)	
Future 1	(111,488)	(\$4.4)	(114,140)	(\$4.3)	(\$50.7)
Future 2	(1,812)	\$0.2	44,036	\$2.6	\$58.4



Summary of Benefits – Future 1

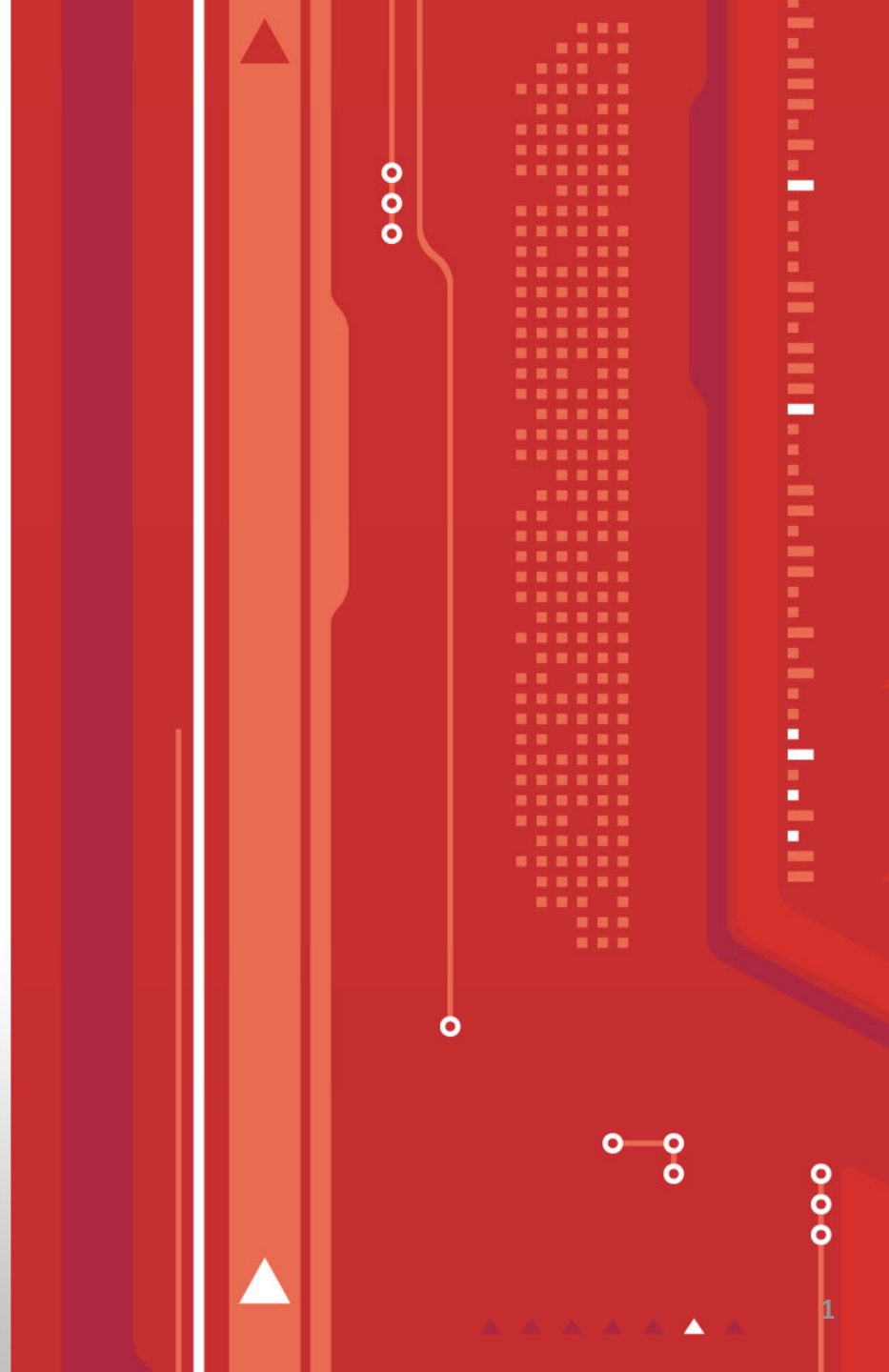
	Present Value of 40-yr Benefits for the 2019-2058 Period (in 2015 \$million)									Total Benefits	Present Value of 40-yr ATRRs (in 2015 \$million)	Est. Benefit/Cost Ratio
APC Savings	Avoided or Delayed Reliability Projects	Capacity Savings from Reduced On-peak Losses	Assumed Benefit of Mandated Reliability Projects	Benefit from Meeting Public Policy Goals	Mitigation of Transmission Outage Costs	Increased Wheeling Through and Out Revenues	Marginal Energy Losses Benefits					
AEPW	(\$5)	\$0	\$2	\$50	\$0	\$23	\$0	\$5	\$76	\$87	0.87	
CUS	\$2	\$0	\$0	\$4	\$0	\$2	\$0	\$0	\$7	\$2	3.65	
EDE	\$8	\$0	\$0	\$4	\$0	\$3	\$0	\$1	\$15	\$3	4.51	
GMO	(\$0)	\$0	(\$0)	\$5	\$0	\$4	\$0	\$2	\$11	\$5	2.09	
GRDA	(\$16)	\$0	\$0	\$3	\$0	\$2	\$0	(\$1)	(\$13)	\$3	-4.49	
KCPL	\$203	\$0	\$4	\$8	\$0	\$8	\$0	\$8	\$231	\$10	22.83	
LES	(\$2)	\$0	\$0	\$3	\$0	\$2	\$0	\$3	\$6	\$3	2.38	
MIDW	\$10	\$0	(\$0)	\$1	\$0	\$1	\$0	(\$2)	\$10	\$1	8.91	
MKEC	\$57	\$0	\$11	\$18	\$0	\$2	\$0	\$7	\$94	\$30	3.13	
NPPD	\$143	\$0	\$2	\$9	\$0	\$7	\$0	\$10	\$172	\$43	4.01	
OKGE	\$44	\$0	\$0	\$26	\$0	\$15	\$0	(\$15)	\$71	\$23	3.14	
OPPD	\$77	\$0	\$1	\$10	\$0	\$6	\$0	\$6	\$100	\$12	8.15	
SUNC	\$34	\$0	\$15	\$29	\$0	\$1	\$0	\$2	\$81	\$39	2.05	
SWPS	\$222	\$0	\$10	\$52	\$0	\$14	\$0	(\$93)	\$205	\$59	3.46	
WEFA	(\$21)	\$0	\$0	\$17	\$0	\$4	\$0	(\$2)	(\$2)	\$4	-0.47	
WRI	\$235	\$0	\$1	\$35	\$0	\$12	\$0	(\$11)	\$271	\$40	6.83	
Sub-Total	\$992	\$0	\$45	\$273	\$0	\$105	\$0	(\$79)	\$1,336	\$365	3.66	
BASIN	(\$38)	\$0	\$0	\$8	\$0	\$9	\$0	\$25	\$5	\$12	0.44	
HCPD	\$14	\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$16	\$1	31.59	
WAPA	\$77	\$0	(\$0)	\$3	\$0	\$0	\$0	(\$2)	\$77	-	-	
CBPC	(\$25)	\$0	\$0	\$0	\$0	\$0	\$0	\$4	(\$21)	-	-	
Sub-Total	\$28	\$0	\$0	\$11	\$0	\$10	\$0	\$28	\$78	\$13	6.18	
TOTAL	\$1,020	\$0	\$45	\$284	\$0	\$115	\$0	(\$51)	\$1,413	\$377	3.75	

Summary of Benefits – Future 2

	Present Value of 40-yr Benefits for the 2019-2058 Period (in 2015 \$million)								Total Benefits	Present Value of 40-yr ATRRs (in 2015 \$million)	Est. Benefit/Cost Ratio
APC Savings	Avoided or Delayed Reliability Projects	Capacity Savings from Reduced On-peak Losses	Assumed Benefit of Mandated Reliability Projects	Benefit from Meeting Public Policy Goals	Mitigation of Transmission Outage Costs	Increased Wheeling Through and Out Revenues	Marginal Energy Losses Benefits				
AEPW	\$2	\$0	\$2	\$40	\$0	\$6	\$6	\$2	\$59	\$87	0.68
CUS	(\$1)	\$0	\$0	\$7	\$0	\$0	\$0	\$0	\$6	\$2	3.25
EDE	(\$0)	\$0	(\$0)	\$5	\$0	\$1	\$0	\$1	\$6	\$3	1.70
GMO	(\$4)	\$0	(\$0)	\$12	\$0	\$1	\$1	(\$2)	\$7	\$5	1.31
GRDA	(\$1)	\$0	(\$0)	\$4	\$0	\$1	\$0	(\$0)	\$4	\$3	1.25
KCPL	\$13	\$0	\$2	\$12	\$0	\$2	\$1	\$1	\$33	\$10	3.21
LES	(\$6)	\$0	\$0	\$4	\$0	\$1	\$0	\$0	(\$1)	\$3	-0.41
MIDW	(\$0)	\$0	(\$0)	\$5	\$0	\$0	\$0	\$1	\$6	\$1	5.52
MKEC	\$20	\$0	\$9	\$20	\$0	\$0	\$1	\$14	\$64	\$30	2.14
NPPD	\$9	\$0	\$1	\$12	\$0	\$2	\$2	\$4	\$30	\$43	0.71
OKGE	(\$4)	\$0	(\$1)	\$18	\$0	\$4	\$2	\$2	\$22	\$23	0.99
OPPD	\$150	\$0	\$1	\$12	\$0	\$2	\$1	\$1	\$165	\$12	13.39
SUNC	\$6	\$0	\$16	\$27	\$0	\$0	\$2	\$8	\$58	\$39	1.48
SWPS	\$60	\$0	\$9	\$43	\$0	\$4	\$4	\$15	\$134	\$59	2.27
WEFA	\$5	\$0	\$0	\$14	\$0	\$1	\$1	\$0	\$21	\$4	4.75
WRI	\$24	\$0	\$2	\$39	\$0	\$3	\$4	\$8	\$80	\$40	2.01
Sub-Total	\$273	\$0	\$39	\$272	\$0	\$28	\$27	\$56	\$695	\$365	1.90
BASIN	\$3	\$0	\$0	\$9	\$0	\$3	\$0	\$2	\$17	\$12	1.40
HCPD	\$1	\$0	\$0	\$0	\$0	\$0	\$0	(\$0)	\$2	\$1	2.93
WAPA	\$1	\$0	(\$0)	\$3	\$0	\$0	\$0	\$1	\$5	-	-
CBPC	(\$2)	\$0	\$0	\$0	\$0	\$0	\$0	(\$0)	(\$2)	-	-
Sub-Total	\$4	\$0	(\$0)	\$12	\$0	\$3	\$0	\$3	\$22	\$13	1.71
TOTAL	\$277	\$0	\$39	\$284	\$0	\$31	\$27	\$58	\$716	\$377	1.90

2015 ITP10 Sensitivities

December 11, 2014



Sensitivities Overview

- Demand and Natural Gas Sensitivities
- HVDC Sensitivities
- Increased Input Prices Sensitivity
- Sensitivities not used for transmission development but to test robustness of consolidated portfolio in BAU

2015 ITP10

DEMAND AND NATURAL GAS

Demand and Natural Gas

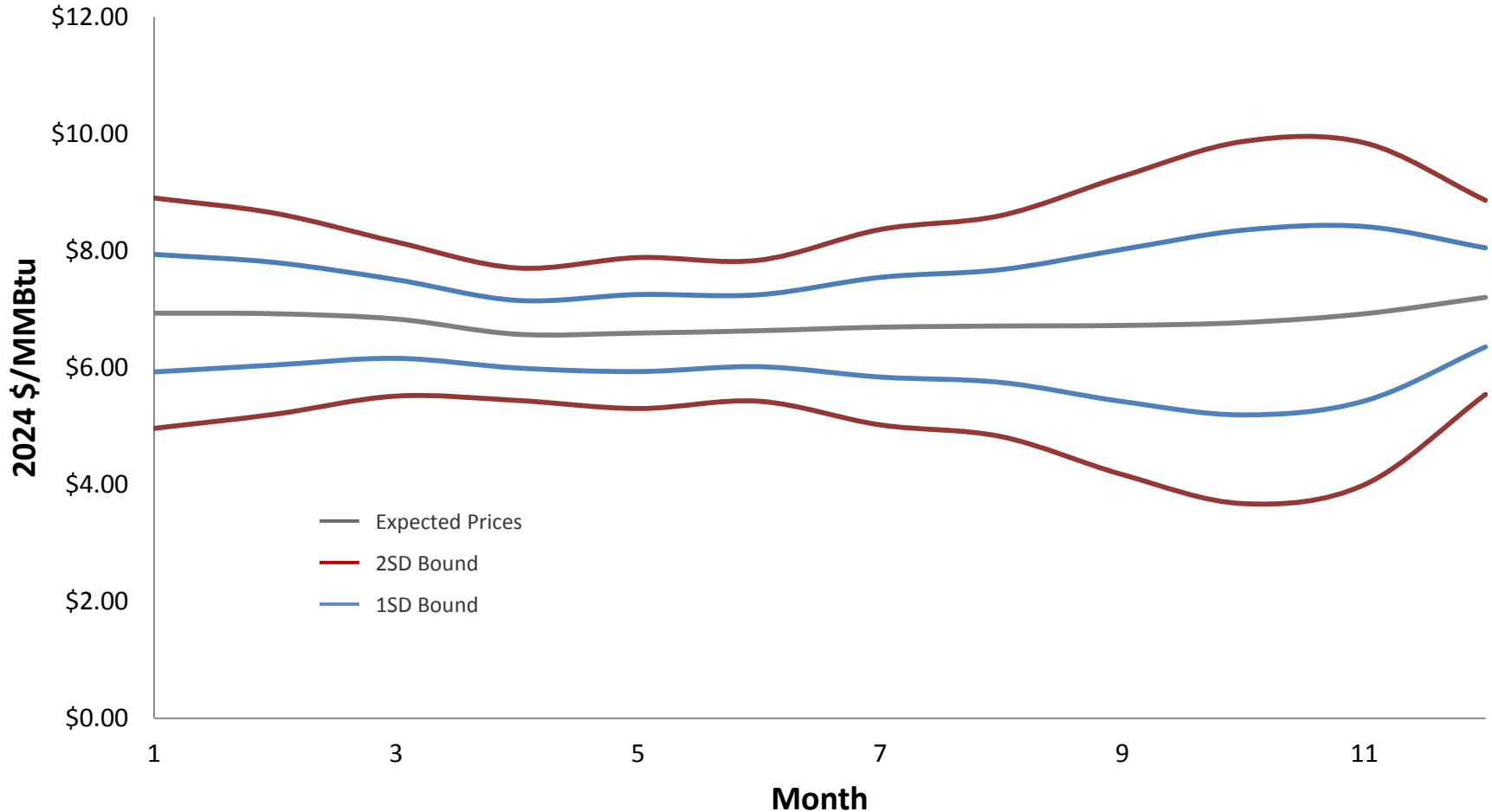
Sensitivity	Peak Demand and Energy*	Natural Gas Price 2024 (\$/MMBtu)~
Expected Demand & NG	No change	\$6.83 (No change)
High Demand	7.8% Increase	No change
Low Demand	7.8% Decrease	No change
High Natural Gas	No change	\$8.69
Low Natural Gas	No change	\$4.96

*SPP Regional Average

~ Henry Hub 2024 monthly average

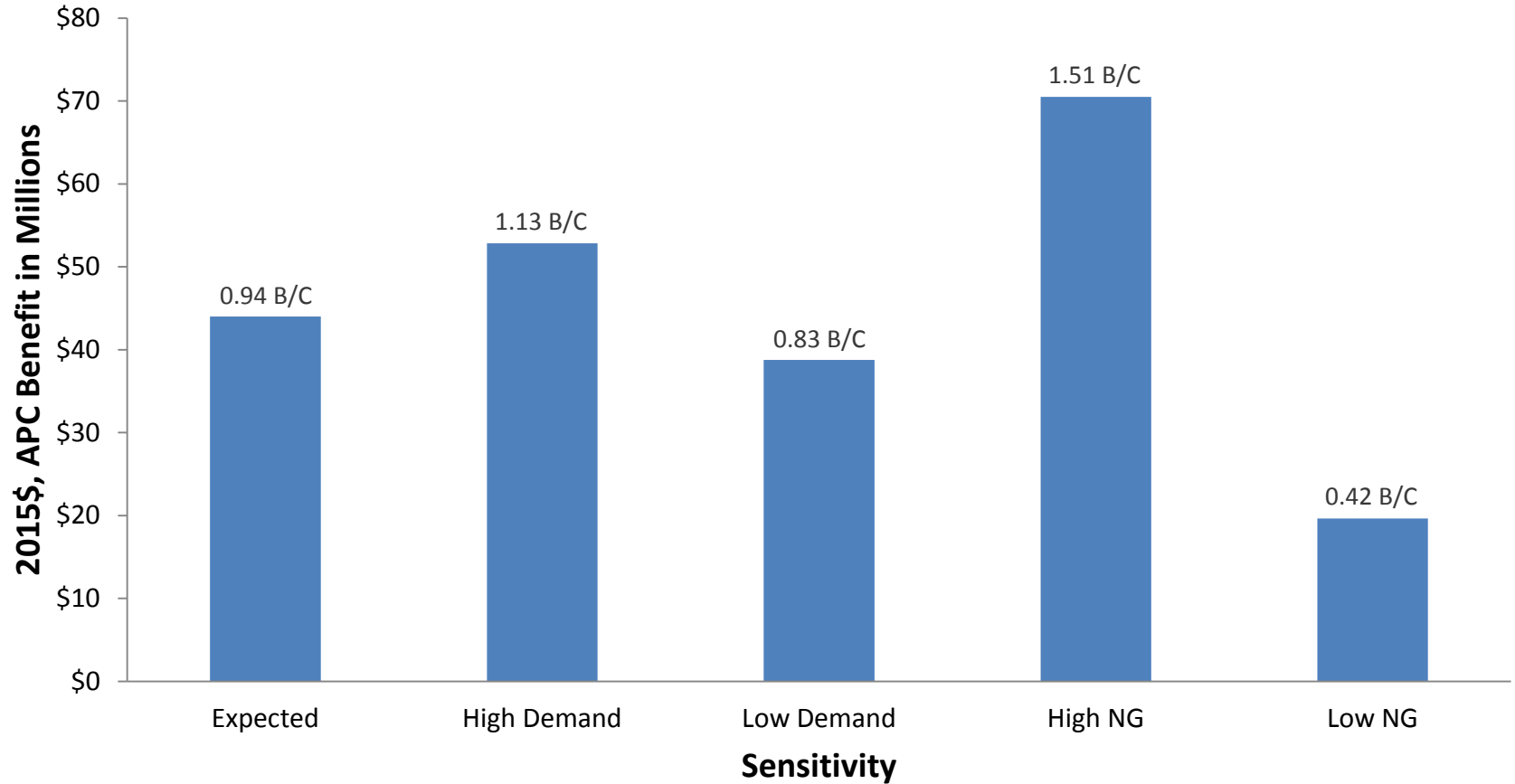
Natural Gas Price Sensitivity

2024 Monthly Natural Gas Price Values



Demand and Natural Gas

Consolidated Portfolio Benefit



2015 ITP10

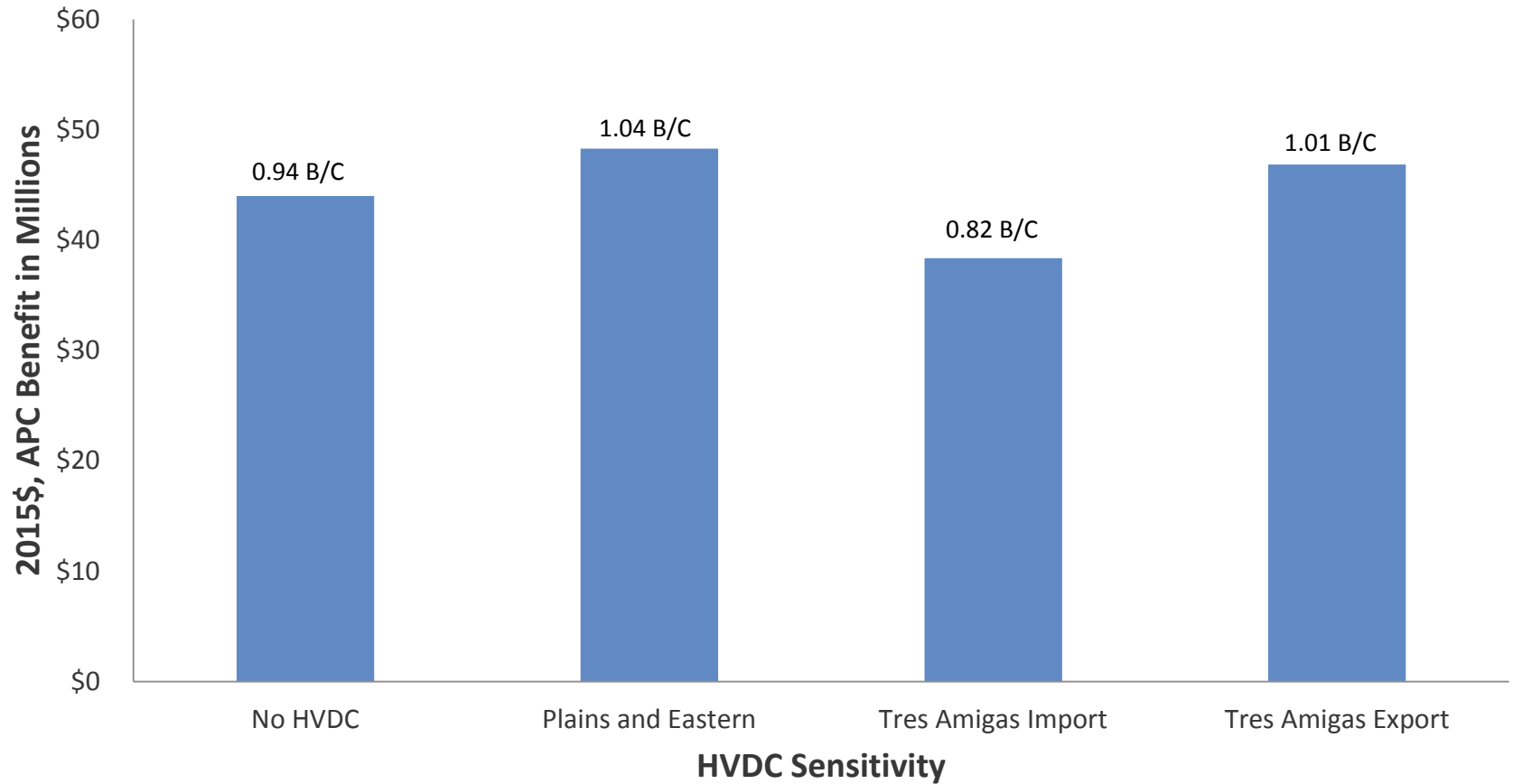
HVDC

HVDC Sensitivity – Plains and Eastern

- **Assess the impact to the SPP system of power transfers across the footprint**
- **Clean Line Plains and Eastern**
 - 2,000 MW exporting from SPP
 - Utilize SPP Wind (with Hitchland area wind profile)
- **Tres Amigas**
 - 750 MW importing into SPP
 - 750 MW exporting from SPP
 - 100% annual capacity factor
- **No change to model constraints**

HVDC Results

Consolidated Portfolio Benefit



2015 ITP10

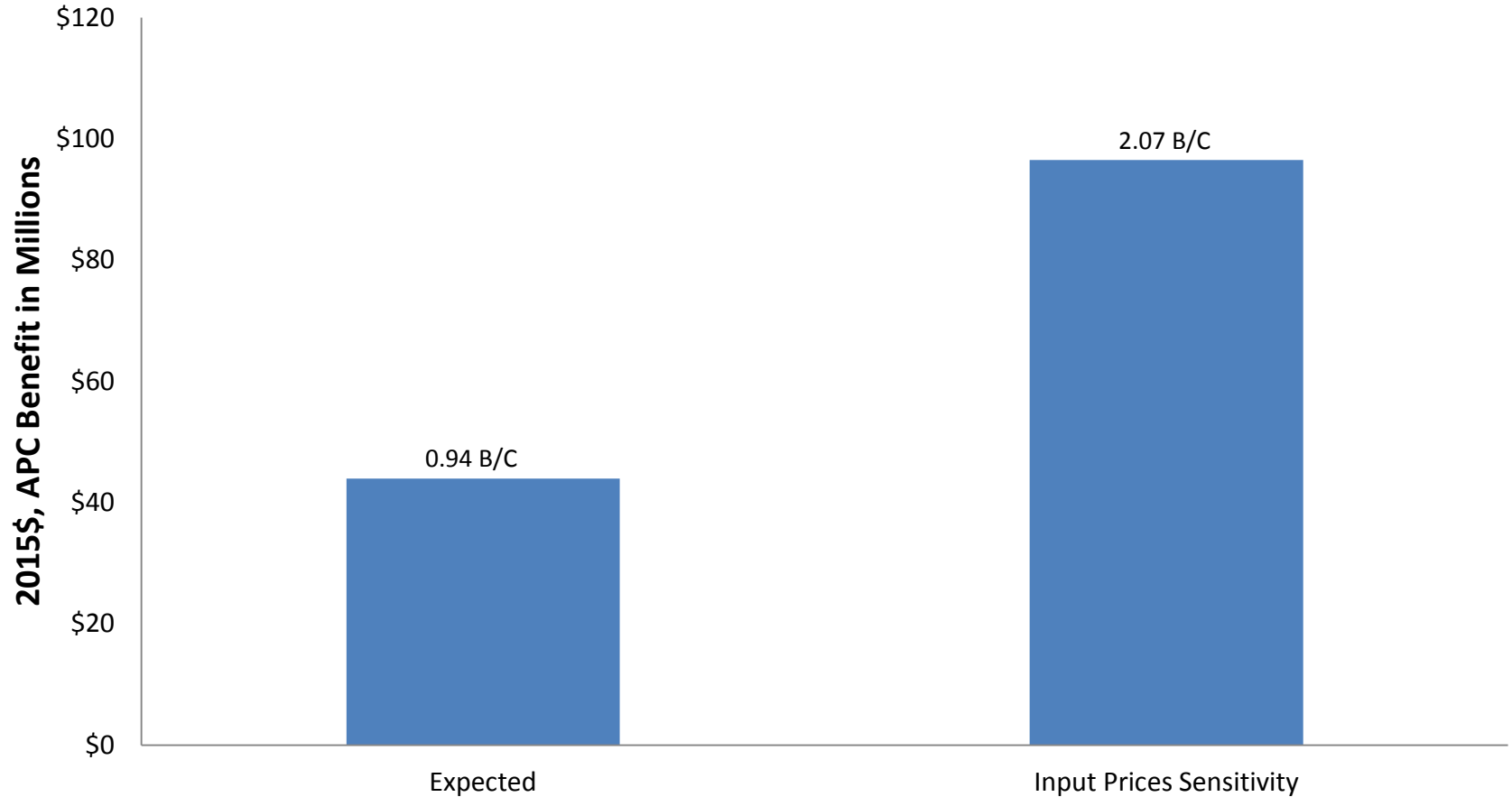
INCREASED INPUT PRICES

Increased Input Prices

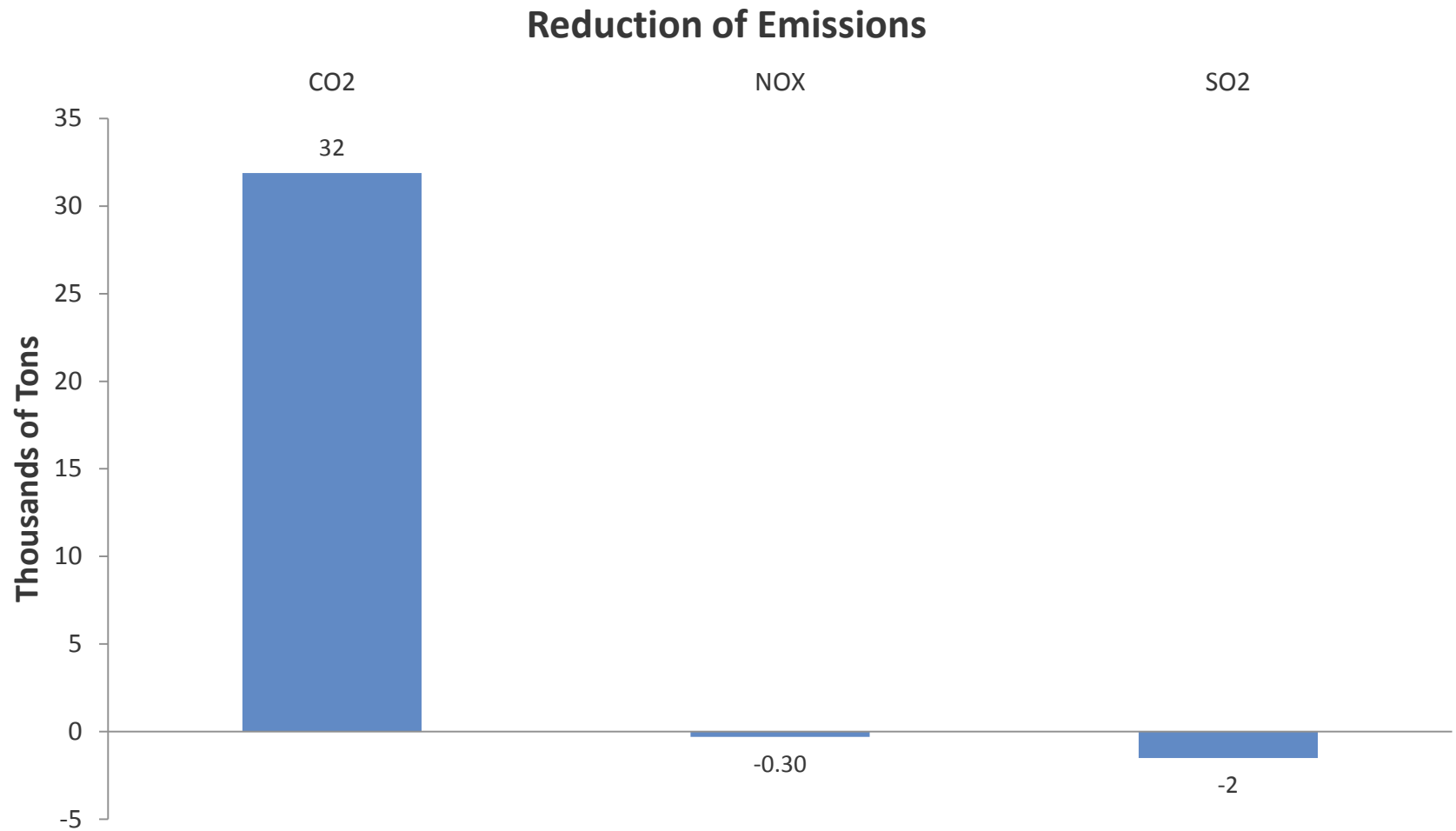
- Performed using the Business as Usual model
- \$36/ton carbon tax
- Threefold increase of natural gas prices
- Reduction in the rate of load growth of 1% per year
- Benefit Metrics
 - APC
 - Reduction of emission rates and values
 - NO_x , SO_2 , and CO_2
- Base and Change case comparison of pool annual emissions and emission rate

Increased Input Prices Results

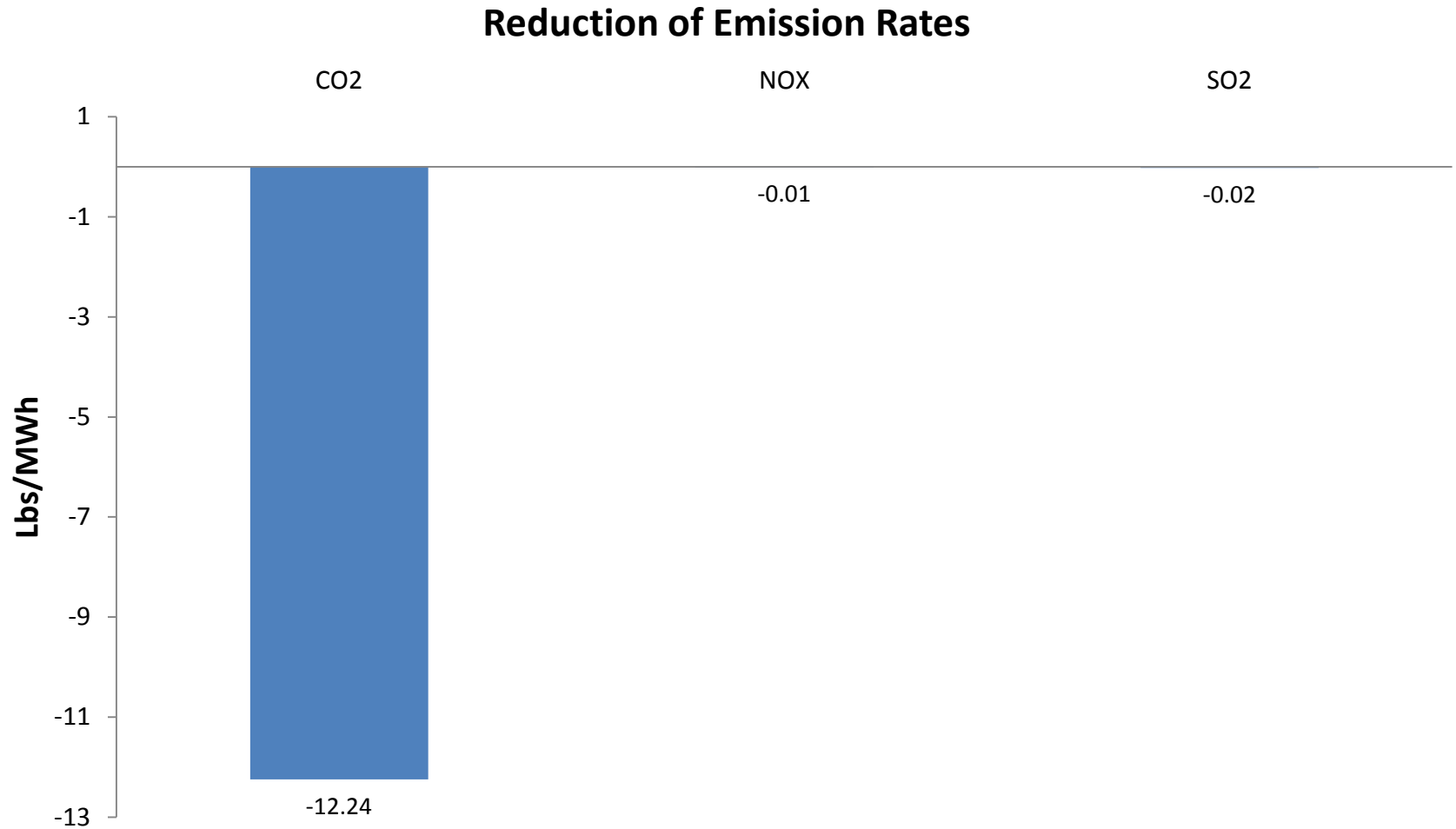
Consolidated Portfolio Benefit



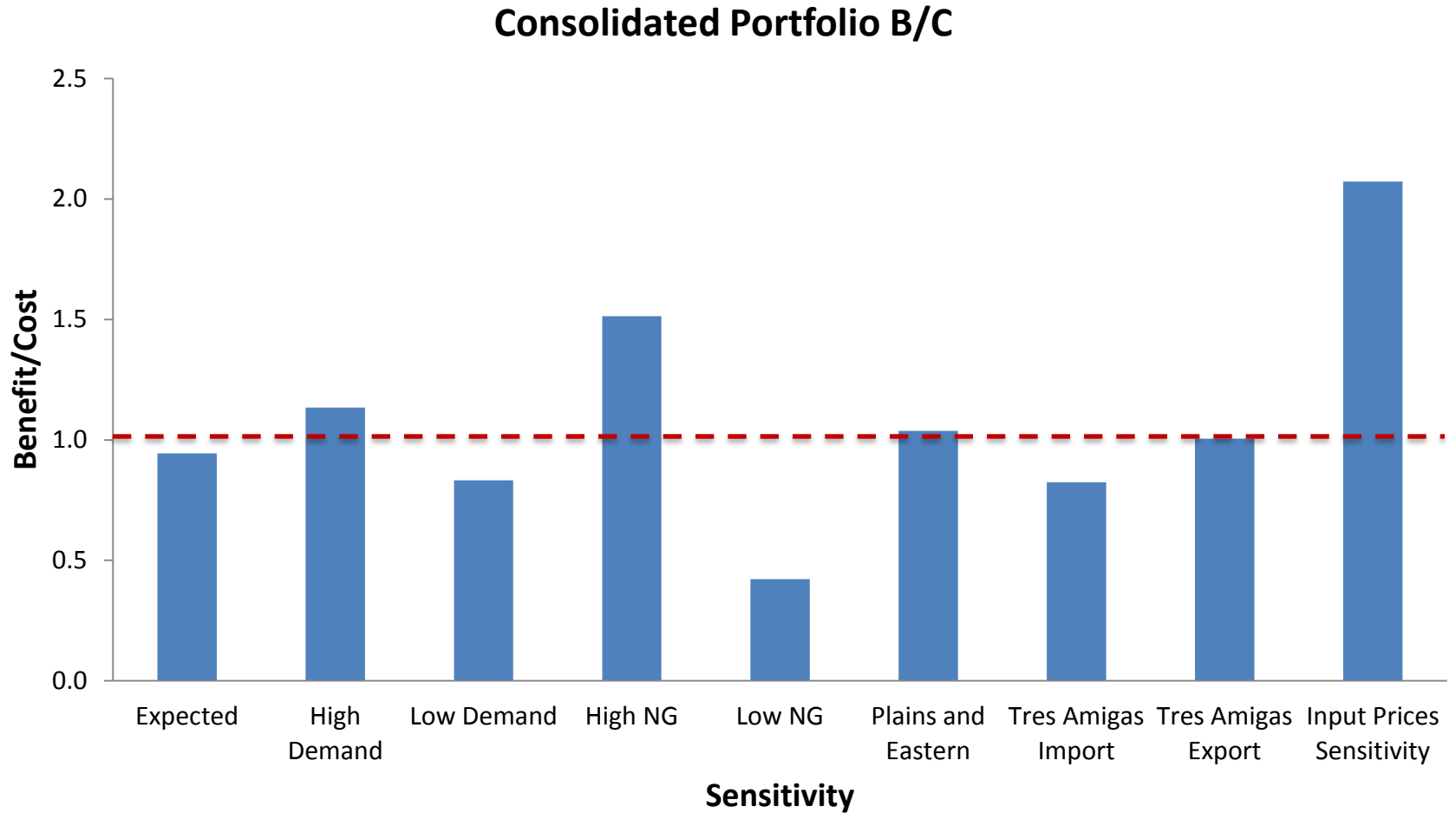
Reduction of Emissions Rates and Values



Reduction of Emissions Rates and Values



Overall Sensitivity Results



Probability

These items are being considered in the ESWG futures analysis:					
Items Considered:	ESWG Members' Voting Results				
	1	2	3	4	Total Votes
EPA 111D	8	2			10
Competitive Wind	7	5			12
NG Supply	1	9	2		12
Severe Weather	1	8	3	1	13
Green Future	1	4	5		10
Technology Advancement	3	2	6	1	12
Changing Renewable Portfolio Standards	1	6	4	1	12
Cost of Capital changes	1	5	5	1	12
Solar Development		6	6		12
Impact on Generation due to Constraints		4	8		12
Physical Security		1	8		9
WECC Connectivity	1		7	2	10
Load Growth		2	8	2	12

Items below this line are not being considered in the ESWG futures Analysis:					
Low-Supply NG		0	6	2	8
Smart Grid and Low Risk Op guides		3	0	6	9
Large number of electric vehicles		1	6	6	13
Financial Expansion cap		1	4	6	11
Significant Deregulation		1	3	8	12
Environmental regulations due to climate			4	6	10
Economic Collapse			4	8	12
ERCOT joins an Interconnect				11	11

Score	Average
38	3.8
43	3.583333
35	2.916667
35	2.692308
26	2.6
31	2.583333
31	2.583333
30	2.5
30	2.5
28	2.333333
19	2.111111
20	2
24	2

Base - 'Expected'	Primary Influence Spheres			Level of Drive
	Environmental	Financial	Operational	Low Change
50%	75%	75%	75%	25%
50%	50%	75%	50%	25%
50%	50%	75%	75%	25%
50%	75%		50%	
50%	75%	50%	50%	25%
50%	50%	50%	75%	n/a
50%	75%	50%	50%	25%
50%	50%	75%	50%	zero bound
50%	75%	50%	75%	n/a
50%	50%	75%	75%	
50%	50%	50%	75%	
50%	50%	75%	50%	
50%	50%	75%	75%	25%

14	1.75
15	1.666667
21	1.615385
17	1.545455
17	1.416667
14	1.4
16	1.333333
11	1

"expected" or, p

- Thought map for data shown above:
- 1) 7 Futures are implied by this analysis (could l
 - 2) In Base, Low Change, High Change, and Extre
 - 3) 50% represents our expectation, higher perc
 - 4) In Environmental, Financial, and Operational

Impact Reference Cases

High Change	Extreme
75%	95%
75%	75%
75%	75%
50%	75%
75%	75%
75%	95%
75%	75%
75%	95%
75%	75%
75%	95%
75%	95%
75%	95%
75%	95%

probable implementation of driver

be reduced to six by eliminating the Extreme future)

High Change futures: all considered items will be modeled with varying degrees of expression.

High Change futures: represent higher than expected expressions, etc.

Extreme futures: Only those color coded considered items will be included as changing factors.