Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

February 24th – 25th, 2016

Crowne Plaza Downtown, Kansas City, MO

• SUMMARY OF ACTIONS TAKEN •

1. None

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

February 24th – 25th, 2016

Crowne Plaza Downtown, Kansas City, MO

• 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 1:00 PM, welcomed those in attendance, and asked for introductions.

There were 41 in-person participants and 30 web conference participants, representing 16 of 16 ESWG members. (Attachment 1 – February 24th-25th, 2016 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC Great Plains) asked for any proxy statements. Two proxies were identified; Leon Howell (OGE) named Zac Hager (OGE) as his proxy and Jon Iverson (OPPD) named Kurt Stradley (LES) as his proxy beginning 11:00am, February 25th. (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. Staff requested to move the 2017 ITP10 Analysis Methodology agenda item to the first day. (Attachment 3 – February 24th-25th, 2016 Agenda)

Natasha Henderson (GSEC) made a motion; seconded by Bethany King (EDE) to adopt the agenda as modified. The motion was approved unanimously.

Agenda Item 2 – Review of Past Action Items

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

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

Meetings Minutes – January 21st, 2016 (Attachment 5 – ESWG 01.21.16 Minutes)

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

The consent agenda was approved unanimously.

Agenda Item 4 – Transmission Planning Improvement Task Force (TPITF) Update

Antoine Lucas (SPP Staff) gave an update on the activities of the TPITF and reviewed the details of the model development strawman proposed by the group. The proposal includes removal of the ITP20 from the traditional planning cycle, developing a common model to be used for all planning processes, combination of the ITPNT, ITP10 and TPL processes into a single 10-year study, increased standardization of study scopes, and increased accountability for Members and Staff. Al Tamimi (Sunflower) expressed concern about potential loss of strategic direction by removing the ITP20 from the normal process. The task force envisions the ITP20 to be performed every 5 years or as directed by the Board. Tim Owens (NPPD) expressed concern over the sustainability of overlapping the model development and assessment cycles. The task force plans to bring recommendations to MOPC and the Board in April with approval/endorsement in July. (Attachment 6 – ESWG 2-24-2016 TPITF Update_rev) (Attachment 7 – TPITF_ITP_Model_Development_Strawman)

Agenda Item 5 – Study Schedules

Agenda Item 5a – 2017 ITP10

Juliano Freitas (SPP Staff) gave an update on the status of the 2017 ITP10. (Attachment 8 – 2017 ITP10 Schedule)

Agenda Item 5b – RCAR II

Juliano Freitas (SPP Staff) gave an update on the status of the RCAR II. (Attachment 9 – RCAR II Schedule)

Agenda Item 6 – 2017 ITP10 Study Assumptions

Agenda Item 6a – CPP Considerations

Kelsey Allen (SPP Staff) presented Staff's considerations regarding carbon price modeling techniques and monitoring of emissions for the CPP futures. Staff recommends reflecting the cost of carbon in the energy costs of generators regulated under the CPP rule and utilizing a carbon cost to affect dispatch but not impact energy prices for generators not regulated under the CPP, as a proxy for other potential fuel and environmental constraints not considered in the modeling that may limit operation of those units. Some members expressed concern with reflecting the cost of carbon in energy prices at all; other members expressed concern with limiting the dispatch of generators unaffected by the CPP through the use of carbon pricing.

Kelsey then reviewed discussion that began at the January meeting regarding the monitoring of emissions throughout the study process. Staff recommends that all input decisions regarding the control of emissions should be set as a function of the resource planning phase. In order to accomplish this, carbon pricing has been set in an copper sheet transmission model (unconstrained), ensuring each future is meeting its carbon emission targets. Staff proposed multiple options to handle the changes in emissions moving forward in the process after inclusion of transmission constraints as well as the development of transmission plans. After discussion and a straw poll vote, the group favored the option of developing a transmission plan following normal processes expected to facilitate a reduction in carbon emissions (reliability, economic and policy assessments) with an additional informational assessment to determine any incremental upgrades necessary to ensure compliance with emission targets within each future. (Attachment 10 – 2017 ITP10 CPP Considerations)

Agenda Item 6b – Portfolio Consolidation Methodology

Kelsey Allen (SPP Staff) reviewed the previous discussions on portfolio consolidation methodology and offered a Staff proposal for discussion. The group is divided on the relative influence each future should have on a final recommended transmission plan. Stakeholders generally agree that carbon emissions are reducing regardless of the CPP but with the uncertainty surrounding the rule, some members expressed concern supporting a plan developed utilizing CPP futures. Other members argued that the study should continue forward with the original intent and factor in results of the CPP implementation. Other members suggested that any final recommended plan will likely not meet CPP compliance, but will facilitate a reduction in emissions. Regardless of the CPP, the group needs to decide the most prudent way to perform the analysis and describe the resulting plan in that context. After much discussion, the group favored the development of two plans for consideration, a consolidated CPP portfolio and a reference case portfolio. The group requested that Staff investigate the schedule impacts of calculated final benefit metrics on two project portfolios. (Attachment 11 – 2017 ITP10 Portfolio Consolidation)

ACTION ITEM: Staff to report on carbon emissions as the 2017 ITP10 study moves forward through the different milestones.

ACTION ITEM: Staff to identify the schedule impact of calculating final benefit metrics on multiple project portfolios.

Agenda Item 6c – Project Selection Methodology

Kelsey Allen (SPP Staff) reviewed the criteria that will be used for economic project selection. The group agreed with the approach. (Attachment 12 – 2017 ITP10 Project Selection.Grouping)

Agenda Item 6d – Project Grouping Methodology

Kelsey Allen (SPP Staff) reviewed the January discussion on project grouping methodology and proposed an approach to move forward with. The group agreed with the approach. (Attachment 12 – 2017 ITP10 Project Selection.Grouping)

Agenda Item 7 – SPP Wind Integration Study

Jason Tanner (SPP Staff) reviewed the process steps and inputs to the SPP Wind Integration study performed by SPP Operations. Jason then presented recommendations of the study, including formation of a new task force to modify and develop voltage criteria for SPP and acceleration of approved transmission projects to address issues seen in the analysis. The study implemented two methodologies to proxy the benefits of accelerating transmission; by calculating APC savings for the studied hour snapshot and extrapolating those benefits over the course of the year by targeting similar historical wind penetration levels and simply assuming that benefit every hour over the course of the year. The cost to accelerate the approved transmission projects has not yet been quantified. The group expressed some concern over the tools used to perform the economic analysis (PowerGem TARA) and the methodology used to calculate benefits. The group requested that SPP Operations Staff consult with Economic Planning Staff and be prepared to bring back other takes on the benefit calculations as well as the cost of accelerating the projects to a future meeting. (Attachment 13 - SPP Wind Integration Study)

ACTION ITEM: Staff to review the benefit calculations performed in the SPP Wind Integration Study and report on benefits and cost to accelerate approved transmission projects at a future meeting.

Agenda Item 8 – MOPC Action Item 255

Kelsey Allen (SPP Staff) reviewed a proposal to incorporate the cost of congestion due to outages of potential transmission rebuild solutions into the project analysis process. Staff concluded that the analysis results are very situational and due to the limitations of the constraint assessment, the results are likely understated. The group discussed the selective nature of implementing this methodology, pointing to other approved benefit metrics that are not being incorporated in the project selection process and likely have a much greater impact on the results, recognizing that it is not feasible to include all benefit analysis at this phase. Alan Myers (ITC Great Plains) suggested that this should be considered selectively, proposing two options; recommending this generally not be implemented and allowing Staff the discretion to consider these impacts or, due to the wide variability and applicability, recommending more time be spent to determine a methodology to selectively apply the analysis in order to avoid performing it for every rebuild solution proposed. (Attachment 14 - MOPC Action Item 255)

ACTION ITEM: Staff to develop a strawman recommendation for MOPC [on MOPC Action Item 255] to be considered by the ESWG in March.

Agenda Item 9 – RCAR II Update

Juliano Freitas (SPP Staff) gave a brief update of the activities of the RCARII study, detailing current work, upcoming work, and what is expected to be ready for stakeholder review in the coming months. Wayman Smith (AEP) reminded the group of the need to overhaul the RCAR process and asked when it is expected that this work will take place. The RARTF is aware of the larger issue but suggested that the interim fixes are not unreasonable enough to halt the RCAR II process, suggesting that the process be investigated in detail beginning in August, following completion of the RCAR II analysis. (Attachment 15 – RCAR II Update)

Agenda Item 10 – 2017 ITP10 Benchmarking Update

Nikki Roberts (SPP Staff) reviewed the benchmarking process for the 2017 ITP10 and presented preliminary results. Staff requested that the members continue to review the results presented and contact the economic planning team with any questions or comments on the data. Benchmarking is expected to be complete March 10th for approval at the March 17th meeting. (Attachment 16 – 2017ITP10 Benchmarking Update)

Agenda Item 11 – 2017 ITP10 Constraint Assessment Update

Clayton Mayfield (SPP Staff) reviewed the constraint assessment methodology for the 2015 ITP10 and detailed the adjustments made for the 2017 ITP10. The constraint assessment is expected to be complete March 3rd for approval by the TWG on March 17th. (Attachment 17 – 2017 ITP10 Constraint Assessment)

Closing Items

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

List of action items from the meeting:

1. Staff to report on carbon emissions as the 2017 ITP10 study moves forward through the different milestones.
2. Staff to identify the schedule impact of calculating final benefit metrics on multiple project portfolios.
3. Staff to review the benefit calculations performed in the SPP Wind Integration Study and report on benefits and cost to accelerate approved transmission projects at a future meeting.
4. Staff to develop a strawman recommendation for MOPC [on MOPC Action Item 255] to be considered by the ESWG in March.

The meeting was adjourned at 12:00 PM.

Respectfully Submitted,

Kelsey Allen
ESWG Secretary

Name	Email	Company
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Adam Mummert	amummert@burnsmcd.com	BMcD
Al Tamimi		Sunflower
Anita Sharma	asharma@aep.com	
Antoine Lucas		SPP
Bennie Weeks	bennie.weeks@xcelenergy.com	
Bethany King		EDE
Bill Leung (NPRB)	bleung@bjleung.com	
brenda harris	brenda_harris@oxy.com	
Bret Toplyn		ABB
Brian Rounds (AESL)	brian.rounds@aeslconsulting.com	
Bryan Ramler		Xcel (SPS)
Chris Giles		Tri County Electric Coop
Chris Jamieson	cjamieson@spp.org	
Cindy Ireland	cireland@psc.state.ar.us	
Clayton Mayfield	cmayfield@spp.org	
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Deral Danis	ddanis@cleanlineenergy.com	
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Jarrod Wolford		NTEC
Jason Davis		SPP
Jason Shook		GDS/ETEC
Jason Tanner		SPP
Jeff Knottek	jeff.knottek@cityutilities.net	
Jeremy Harris		Westar
Jeremy Severson		Basin Electric
Jody Holland		SCMCN
Joe Fultz	jfultz@grda.com	
John Bell		KCC
John Boshears	john.boshears@cityutilities.net	
Jon Iverson	jiverson@oppd.com	
Jordan Schmick	jordan.h.schmick@xcelenergy.com	
Juliano Freitas		SPP
Justin Radl		Xcel (SPS)
Kelsey Allen		SPP
Kip Fox	kmfox@aep.com	
Kirk Hall	khall@spp.org	SPP
Kurt Stradley		LES

Liz Gephardt (SPP)	lgephardt@spp.org	
Matt Lind		Burns & Mac
Meena Thomas		Texas PUC
Michael Massery		AECC
Michael Watt (OMPA)	mwatt@ompa.com	
Michael Wegner		ITC
Ming Zhou	ming.zhou@pseg.com	
Natasha Henderson		GSEC
Nikki Roberts (SPP)	nroberts@spp.org	
Noman Williams		SCMCN
Pat Hayes	phayes@ameren.com	
Pat McCool		KCPL
Randy Collier		City Utilities
Ray Bergmeier		Sunflower
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Sakshi Mishra		AEP
sam loudenslager (SPP)	sloudenslager@spp.org	
Steve Gaw		Wind Coalition
Tamika Barker	tbarker@spp.org	
Tim Owens		NPPD
Tim Soles	tim_soles@oxy.com	
Walt Cecil		MOPSC
Wayman Smith		AEP
Wayne Penrod		Sunflower
Zac Hager		OGE

Attendance

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SPP Southwest Power Pool

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

February 24 – 25, 2016

Crowne Plaza Hotel/Kansas City, MO

• ATTENDANCE LIST •

Name	Company
Zac Hager	OG+E
Michael Massery	AECC
Ray Bergmeier	Sunflower
Jeremy Harris	Westar
Al Tamimi	Sunflower
Antoine Lucas	SPP
Jason Davis	SPP
Juliano Freitas	SPP
Kelsey Allen	SPP
Jarrad Wolford	NTEC
Pat McCool	KCPL
Kirk Hall	SPP
Don Le	Next Era Energy Transmission
Aaron Pynan	LS Power
Chris Giles	TRi County Electric Coop
Eric Burkey	Ameren
Walt Cecil	MoPSC
Michael Wegner	ITC
Randy Collier	City Utilities

Southwest Power Pool

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

February 24 – 25, 2016

Crowne Plaza Hotel/Kansas City, MO

• ATTENDANCE LIST •

Name	Company
JOHN BELL	KCC
Justin Radl	Xcel (SPS)
BRYAN RAMLER	XCEL (SPS)
Wayman Smith	AEP
Sakshi Mishra	AEP
Jason Tanner	SPP
MIMOD OLAPURAYIL	ITC GRP
JASON SHOOK	GDS/ETEC
Natasha Henderson	GSEC
Bethany King	EDE
Meena Thomas	Texas PUC
Bret Toplyn	ABB
KURT STRUDER	GE
Tim Owens	NPPD
Matt Lind	BURNS & MAC
ADAM MUMMERT	BMCD
Jeremy Severson	Basin Electric
Gayle Nansel	WAPA-UGP

SPP Southwest Power Pool

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

February 24 – 25, 2016

Crowne Plaza Hotel/Kansas City, MO

• ATTENDANCE LIST •

Name	Company
Noman Williams	SCMCN
Jody Holland	SCMCN
Chris Giles	Tri County Elect. Coop
Justin Radl	Xcel
BRYAN RAMLER	XCEL
Wayman Smith	AEP
Sakshi Mishra	AEP
Jason Tanner	SPP
Kirk Hall	SPP
Eric Burke	Ameren
JASON SHOOK	GDS/ETEC
Natasha Henderson	GSEC
Bethany King	EDE
Meena Thomas	Texas PUC
Brett Toplyn	ABB
KURT STRADLEY	LES
Tim Owens	NPPD
ZAC HAGER	OG&E

Name	Company
Jeremy Severson	BEPC
Gayle Nansel	WAPA-UGP
Steve Gaw	Wind Coalition
Michael Massery	AECC
Walt Leck	MO PSC
Randy Collier	City Utilities - Spfd
Michael Wegner	ITC
AL Tamimi	SEPC
Ray Bergmeier	SEPC
Jeremy Harris	Westar
Dyane Penrod	Sunflower
Aaron Rupa	LS Power
Jarrod Walford	NTEC
Pat McCool	KCPL
Kelsey Allen	SPP

1. **Leon Howell (OGE) proxy to Zac Hager (OGE)**

From: Howell, Leon [mailto:HowellLC@oge.com]
Sent: Wednesday, February 24, 2016 9:25 AM
To: Myers, Alan; Kelsey Allen
Cc: Hager, Zac
Subject: proxy

Gentlemen,
Zac Hager has my proxy for the ESWG on 2/24 and 2/25. I plan to listen in by phone but will be in and out.
Leon

2. **Jon Iverson (OPPD) proxy to Kurt Stradley (LES)**

From: IVERSON, JON S [mailto:jiverson@oppd.com]
Sent: Thursday, February 25, 2016 8:12 AM
To: Kelsey Allen; Myers, Alan
Cc: Stradley, Kurt
Subject: OPPD Proxy, 2/25/16 ESWG meeting

Kelsey, Alan,
I have to drop off the meeting at 11:00 a.m. today, 2/25. I grant my proxy to Kurt Stradley of LES for the remaining meeting.
Thanks,
Jon

Jon Iverson, PE
Manager - Planning and Analysis
Energy Marketing and Trading
Omaha Public Power District
444 South 16th Street Mall, 10E/EP-1, Omaha, NE 68102
402-514-1015

ECONOMIC STUDIES WORKING GROUP

February 24th – 25th, 2016

Crowne Plaza Downtown – Kansas City, MO

• A G E N D A •

Wednesday 1:00pm – 5:00pm

1. Administrative items
    a. Call to Order, Introductions ..... Alan Myers (5 minutes)
    b. Receipt of Proxies ..... Kelsey Allen (1 minute)
    c. Review of Agenda[1] ..... Alan Myers (1 minute)
2. Review of Past Action Items[1] ..... Kelsey Allen (5 minutes)
3. Consent Agenda[1] (Approval Item) ..... Alan Myers (5 minutes)
    a. Approval of Meeting Minutes – January 21st, 2016
4. Transmission Planning Improvement Task Force (TPITF) Update[1] ..... Antoine Lucas (30 minutes)
5. Study Schedules[1] ..... Juliano Freitas (20 minutes)
    a. 2017 ITP10
    b. RCAR II
6. 2017 ITP10 Analysis Methodology ..... Kelsey Allen (120 minutes)
    a. CPP Considerations[1]
    b. Portfolio Consolidation Methodology

Thursday 8:00am – 12:00pm

    c. Project Selection Methodology
    d. Project Grouping Methodology
7. SPP Wind Integration Study ..... Jason Tanner (45 minutes)
8. MOPC Action Item 255[1] ..... Kelsey Allen (60 minutes)
9. RCAR II Update[1] ..... Juliano Freitas (15 minutes)
10. 2017 ITP10 Benchmarking Update[1] ..... Nikki Roberts (30 minutes)
11. 2017 ITP10 Constraint Assessment Update[1] ..... Clayton Mayfield (15 minutes)

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[1] Background Material Included

12. Closing Items ..... All (5 minutes)
    a. Summary of Action Items (Kelsey Allen)
    b. Future Meetings
        i. March 17th, 2016: 8th Floor AEP Offices, Dallas, TX
        ii. April 21st, 2016: OGE Offices, Oklahoma City, OK
        iii. May 18th-19th, 2016: TBD, Omaha, NE
        iv. June 16th, 2016: 8th Floor AEP Offices, Dallas, TX

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

February 24th-25th, 2016

	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 23rd, 2012	In Progress Staff	In preparation for scope standardization being proposed by the TPITF, a draft whitepaper will be completed for review mid-2016.
151	Staff to look into optional software tools for use in ITP studies.	May 20th, 2015	In Progress Staff	Staff is meeting with software vendors and users and expects to have a recommendation on any potential software changes by 4th quarter 2016.
153	MOPC action item 255: Review the method to determine the cost of congestion, as it relates to outages for rebuilds approved.	July 9th, 2015	In Progress ESWG	September 23rd: ERCOT does not include this cost in their analysis of transmission projects. January 21st: this item will be discussed with MOPC recommendation expected for their April meeting.
160	SPP Staff and the ESWG are to formalize standard procedures for data requests and member review of information related to ITP studies.	January 21st, 2016	In Progress Staff/ESWG	Combined item representative of AI148 and AI149.
161	Staff to report on carbon emissions as the 2017 ITP10 study moves forward through the different milestones.	February 24th-25th, 2016	In Progress Staff	
162	Staff to identify the schedule impact of calculating final benefit metrics on multiple project portfolios.	February 24th-25th, 2016	In Progress Staff	
163	Staff to review the benefit calculations performed in the SPP Wind Integration Study and report on benefits and cost to accelerate approved transmission	February 24th-25th, 2016	In Progress Staff	

	projects at a future meeting.			
164	Staff to develop a strawman recommendation for MOPC [on MOPC Action Item 255] to be considered by the ESWG in March.	February 24th-25th, 2016	In Progress Staff	

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

January 21st, 2016

Golden Spread Offices, Lubbock, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved the use of a 1-year B/C ratio requirement of 0.5 for initial economic project screening.

Via email vote:

2. Approved the 2017 ITP10 External Resource and Siting Plan, as posted to TrueShare on 1/29/2016.
3. Approved the use of the 2017 ITP10 Pass 4 economic models posted on 2/1/16 for completion of benchmarking and constraint assessment milestones.

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

January 21st, 2016

Golden Spread Offices, Lubbock, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

Chair Alan Myers (ITC Great Plains) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:20 AM, welcomed those in attendance, and asked for introductions.

There were 15 in-person participants and 52 web conference participants, representing 17 of 17 ESWG members. (Attachment 1 – January 21st, 2016 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC Great Plains) asked for any proxy statements. Two proxies were identified; Al Tamimi (Sunflower) named Wayne Penrod (Sunflower) as his proxy and 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. Staff requested an agenda item to discuss the current status of the 2017 ITP10 external resource plan. (Attachment 3 – January 21st, 2016 Agenda)

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

Agenda Item 2 – Review of Past Action Items

Kelsey Allen (SPP Staff) reviewed the list of past action items. SPP Staff previously met with Chair Alan Myers to discuss action plans for the remaining list. (Attachment 4 – Past Action Items)

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

> Meetings Minutes – December 10th, 2015 (Attachment 5 – ESWG 12.10.15 Minutes)
> Meetings Minutes – December 17th, 2015 (Attachment 6 – ESWG 12.17.15 Minutes)

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

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

Agenda Item 4 – Transmission Planning Improvement Task Force (TPITF) Update

Alan Myers (ITC Great Plains) gave an update on the activities of the TPITF. The TPITF is reviewing a whitepaper detailing model requirements for the ITP and TPL analyses. The group has requested Staff to develop a timeline of implementation and transition into the new overlapping 18-month ITP process.

Agenda Item 5 – Study Schedules

Agenda Item 5a – 2017 ITP10

Juliano Freitas (SPP Staff) gave an update on the status of the 2017 ITP10. Staff is working to complete the latest adjustments to the economic model and expects to post tomorrow with solicitation for approval next week. (Attachment 7 – 2017 ITP10 Schedule)

Agenda Item 5b – RCAR II

Juliano Freitas (SPP Staff) gave an update on the status of the RCAR II. Preliminary work on metrics calculation is set to begin early February and Staff expects to start bringing more detailed information for discussion and review in upcoming meetings. (Attachment 8 – RCAR II Schedule)

Agenda Item 6 – Woodward Frequently Constrained Area (FCA)

Steve Gaw (Wind Coalition) began discussion on gaps between operational issues and how they are being addressed in planning studies, highlighted by the frequently constrained area around Woodward. Planning studies have identified the Woodward area as problematic and has developed solutions that are in development but are at least 5 years off from being realized. Steve suggested generally, operational congestion issues need more awareness in the planning realm, and are the appropriate decisions being made. The group discussed the changes proposed by the TPITF and whether bringing economic analysis into the near term study years would help solve the issue, but there was still some concern about whether true operational conditions would be reflected in even a near term planning model without operational outages and dispatch decisions. (Attachment 9 - Woodward Frequently Constrained Area)

Agenda Item 7 – MOPC Action Item 255

Kelsey Allen (SPP Staff) reviewed a proposal to incorporate the cost of congestion due to outages of potential transmission rebuild solutions into the project analysis process. The group agreed with the general principle of incorporating a case by case analysis with a defined assumption for duration of outages but requested examples of implementation to continue discussion. The group also discussed whether or not the additional cost would be impactful enough to implement but remained split. Jeremy Harris (Westar) suggested that this cost could potentially be significant enough to affect project selection and that it would be a case by case situation, even in implementation. (Attachment 10 - MOPC Action Item 255)

ACTION ITEM: Staff to bring back examples of the proposed implementation of MOPC Action Item 255.

Agenda Item 8 – 2017 ITP10 Model Development Update

Chris Jamieson (SPP Staff) gave a brief update of the model development status of the 2017 ITP10.

Agenda Item 8a – External Resource Plan

Liz Gephardt (SPP Staff) presented information on the resource plan for non-SPP entities being included in the 2017 ITP10 simulations. Looking at some of the assumptions, the group questioned the renewable additions for external companies. In further review, the data leveraged to develop the resource plan assumptions for MISO are more consistent with the SPP assumptions than the alternative available. Bethany King (EDE) displayed concern of the solar only renewable additions for Associated Electric Cooperative (AECI). While there is concern of schedule impacts to make any adjustment at this time, SPP Staff will investigate the potential. (Attachment 11 – 2017 ITP10 Resource and Siting Plan - External)

ACTION ITEM: Staff to investigate potential adjustments to AECI renewable expansion in the 2017 ITP10 CPP futures.

Agenda Item 9 – 2017 ITP10 Study Assumptions

Agenda Item 9a – Project Selection Methodology

Kelsey Allen (SPP Staff) reviewed the approach to economic project selection utilized in the previous ITP10 assessment. Staff suggested two minor adjustments to the criteria, initial screening of economic seams projects should utilize the APC benefit split to determine cost sharing and clarification that policy projects mitigating defined needs will then be evaluated by economic performance. The group agreed with the changes and focused discussion on the B/C threshold used for economic project screening, noting that the 0.75 1-year B/C might be too high. (Attachment 12 – 2017 ITP10 Project Selection)

Wayman Smith (AEP) made a motion; seconded by Don Le (NextEra Energy) to reduce the initial project screening criteria from 0.75 to 0.5. The motion was approved with four no votes,

Al Tamimi (Sunflower), Jon Iverson (OPPD), Kurt Stradley (LES) and Tim Owens (NPPD), and one abstention, Natasha Henderson (GSEC).

Tim Owens voted no for the following reasons: "NPPD voted no on the motion to reduce the 1-year B/C ratio requirement for initial economic project screening from 0.75 to 0.5, because it seems that it is substituting one somewhat arbitrarily chosen number for another, without a clear rationale for the new number"

Discussion continued with regard to the Clean Power Plan (CPP) futures. Staff has discussed internally the impact of carbon prices and whether or not it should be limited to simply affecting dispatch. There are modeling options that can be employed to include or exclude the cost of carbon from the reported adjusted production costs. Staff also posed the question of some form of consideration of emissions reductions in the project selection process.

ACTION ITEM: Staff to investigate the APC benefit impact of including versus excluding the cost of carbon from APC reporting.

Agenda Item 9a – Project Grouping Methodology

Kelsey Allen (SPP Staff) reviewed the project grouping methodology and went into detail regarding the issue being solved by the 70% congestion relief threshold criteria employed during the 2015 ITP10 project grouping process. In order to address the concerns raised, Staff proposed process adjustments for discussion. The previous grouping process was much more targeted, looking need by need for projects relieving system congestion. Staff proposes keeping this process, with a congestion threshold relief, but adding an additional grouping process that removes the threshold and looks for more regional relief. With both of these processes, the traditional cost effective or highest net APC benefit criteria could be utilized to develop different groupings. Staff recommends removing the highest gross APC benefit criteria. (Attachment 13 – 2017 ITP10 Project Grouping)

ACTION ITEM: Staff to work through examples of the proposed grouping methodologies to develop details of implementation.

Discussion continued with regard to the CPP futures. Staff has discussed internally the consideration of emissions compliance throughout the portfolio development process and whether or not a final plan for any given future should allow the model to show compliance within the defined future. There was much discussion around what a plan that facilitates compliance should be and whether or not the model should show compliance and at what stage in the process consideration of emissions should be taken into account. Compliance with emission targets has been considered in the model development phase.

Agenda Item 9a – Portfolio Consolidation Methodology

Kelsey Allen (SPP Staff) reviewed the previous discussions on portfolio consolidation methodology and offered a Staff proposal for discussion. The group agreed that a CPP and a non-CPP portfolio should be developed, highlighting common projects between the two.

Discussion on whether a recommended plan for CPP compliance should show that the model is in compliance continued. Staff suggested that consideration for each individual future should be discussed, but a final consolidated plan should not have to show either individual future model as being compliant. The group was uncertain of where to draw the line of compliance in the process. (Attachment 14 – 2017 ITP10 Portfolio Consolidation)

ACTION ITEM: Staff to continue development of the details of the portfolio consolidation methodology following the proposals discussed today.

Agenda Item 10 – 2015 Organizational Group Effectiveness Survey

Alan Myers (ITC Great Plains) opened discussion on the results of the 2015 organizational effectiveness survey, pointing out some specific scores and comments pertinent to the ESWG. Staff noted things that they will work on moving into 2016, namely timeliness of materials both before and after the meetings. Alan and Staff encouraged the members to provide any additional feedback in either a public or private

forum. (Attachment 15 – 2015 Organizational Effectiveness Survey) (Attachment 16 – 2015 Organizational Effectiveness Survey Analysis)

Email Voting 2/4 – 2/9

Tim Owens (NPPD) made a motion; seconded by Kurt Stradley (LES) to approve the 2017 ITP10 External Resource and Siting Plan, as posted to TrueShare on 1/29/2016. With 10 votes received, the motion was approved with one abstention, Jon Iverson (OPPD).

Jon Iverson abstained for the following reasons: OPPD is unable to vet in a timely manner (in time for voting on this motion) the recently communicated AECI external resource plan which involves adding renewable resources on the SPP transmission system.

Leon Howell (OKGE) made a motion; seconded by Jeremy Severson (BEPC) to approve the use of the 2017 ITP10 Pass 4 economic models posted on 2/1/16 for completion of benchmarking and constraint assessment milestones. With 11 votes received, the motion was approved with two abstentions, Bethany King (EDE) and Natasha Henderson (GSEC).

Bethany King abstained for the following reasons:

• The requirements needed to receive an exception for the retirement of a coal unit (Futures 1 and 2) are unclear.

• Exceptions have not been allowed for coal units in other aspects to the 2017 ITP10 (Example: No coal units were allowed a Must Run status even when the unit and majority ownership is outside the SPP footprint).

• It is EDE's belief the exceptions invalidate the retirement ranking list independently created by SPP staff and previously approved.

Closing Items

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

List of action items from the meeting:

1. Staff to analyze the proof of concept implementation of MOPC Action Item 255 utilizing data from previous studies.
2. Staff to investigate potential adjustments to AECI renewable expansion in the 2017 ITP10 CPP futures.
3. Staff to investigate the APC benefit impact of including versus excluding the cost of carbon from APC reporting
4. Staff to work through examples of the proposed grouping methodologies to develop details of implementation.
5. Staff to continue development of the details of the portfolio consolidation methodology following the proposals discussed today.

The meeting was adjourned at 3:00 PM.

Respectfully Submitted,

Kelsey Allen
ESWG Secretary


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RELIABILITY THROUGH RELATIONSHIPS

Transmission Planning Improvement Task Force (TPITF)

Antoine Lucas

TWG – February 23, 2016

TPITF Scope

- Evaluate and propose recommendations on:
  - The methodologies and modeling practices used in the studies
  - Utilization of data to ensure consistency in the planning process
  - The appropriateness of the planning cycle and assessments
- Recommendations will be presented to MOPC, SPC, and Board in April 2016 and finalized in July 2016

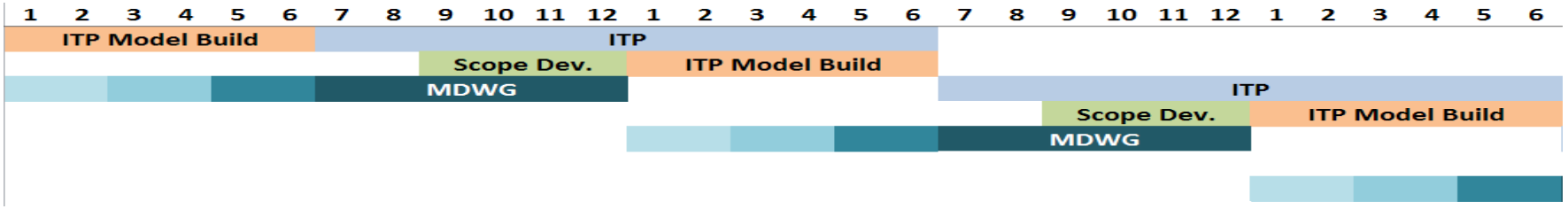
Key Issues Identified

- A three-year planning cycle is not timely
- Stakeholder process approvals and model development are bottlenecks and can limit the frequency of the planning process
- Duplication and variance of modeling in planning processes and studies create inefficiencies and add additional time
- Real-time operations data not always considered in the planning process
- The ITP20 is resource intensive and provides primarily strategic value and not actionable results

TPITF Recommendation Items

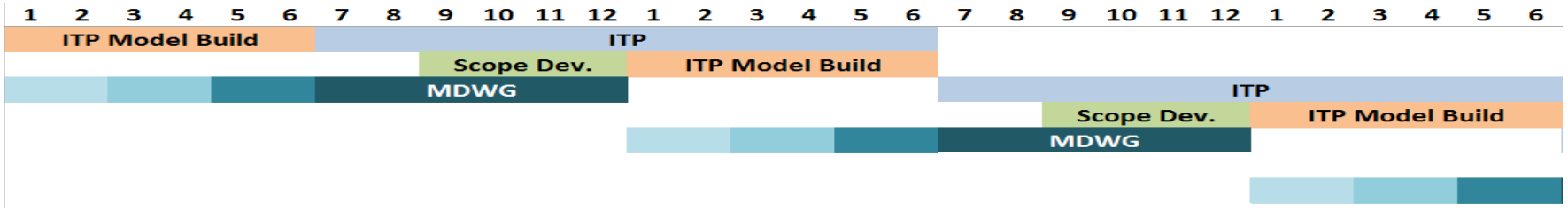
- **18-month planning cycle**
  - 10-year ITP study; remove ITP20 from planning cycle
  - Produce annual ITP Report
- **Common planning model (ITP)**
  - Common base scenario model for *all* planning processes
- **Holistic planning process**
  - Combine the ITPNT, ITP10, and TPL processes into one 10-year study
- **Standardized scope**
  - Standardize traditional scope items
  - Incorporate assumptions document
  - Develop RR process for change requests
- **Member/Staff accountability**
  - Document expectations for members and SPP staff to avoid unnecessary process delays
  - Reporting mechanism for MOPC and BOD

ITP Model



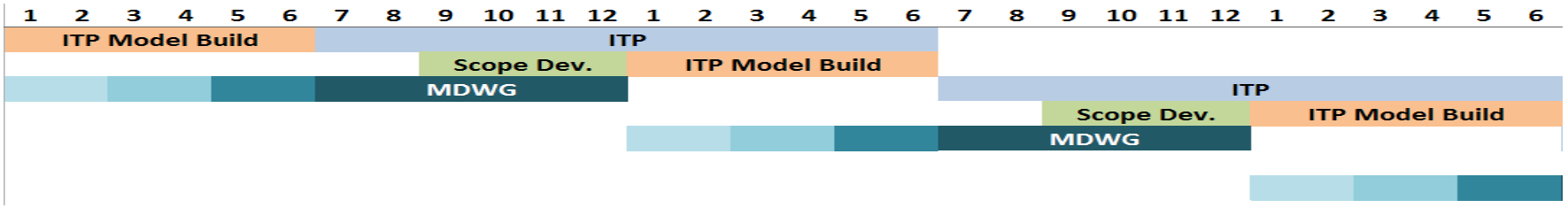
- **One (1) base scenario reliability model**
  - Year 2
    - More consistent with existing ITPNT process to confirm system reliability with firm generation and firm transactions
  - Year 5
    - More consistent with existing ITPNT process to confirm system reliability with firm generation and firm transactions
  - Year 10
    - Only needed if TPL rolled into ITP
  - Wind: higher of the facility's accredited capacity or its highest on-peak within the last three years per facility and off-peak and light load at 100% (with firm service)
  - Base scenario reliability model: all TPL studies

ITP Model cont.



- **Economic models for Years 2, 5, and 10**
  - Year 2
    - Gen, load, topology, and fuel assumptions should be more aligned with real time operations
    - One future; coincident peak; 8760 hrs
    - 1 model
  - Year 5
    - Up to three futures; coincident peak; 8760 hrs
    - Up to 3 models
  - Year 10
    - Up to three futures; coincident peak; 8760 hrs
    - Up to 3 models

ITP Model cont.



- **CBA powerflow model**
  - PROMOD economic model
  - Year 2
    - Gen, load, topology, and fuel assumptions should be more aligned with real time operations
    - One future; coincident peak
    - On/off-peak hour - 2 models
  - Year 5
    - Up to three futures; coincident peak
    - On/off-peak hour for each future – up to 6 models
  - Year 10
    - Up to three futures; coincident peak
    - On/off-peak hour for each future – up to 6 models
  - CBA powerflow model: TPL sensitivity case

Next Steps

- ESWG review of model development strawman
- Recommendations to MOPC and BOD in April 2016
- Approve/Endorse at July MOPC, SPC, and BOD
  - Identify appropriate Working Group(s)

Transmission Planning Improvement Task Force (TPITF)

ITP Model Development

Strawman Proposal

Background

The Transmission Planning Improvement Task Force (TPITF) is responsible for developing recommendations that will produce more progressive, forward-thinking, regional planning processes that are more responsive to the continued growth of SPP's transmission system, markets, challenges, and opportunities presented by changing federal and state energy and environmental regulations, and NERC compliance requirements.

The TPITF is proposing the consolidation of the ITPNT, ITP10, and TPL Steady State assessments into an 18-month ITP process that will produce an annual report including project recommendations.

Purpose

This strawman proposal was developed to provide a framework around which working groups can focus their discussion on the development of reliability and economic model sets for the consolidated ITP process. These models sets will also serve as the basis for Generation and Transmission Service studies as well as future ad-hoc studies.

Current Models

Description	Year 1	Year 2	Year 5	Year 10	Total
2016 ITPNT Reliability	----	Scenario 0: ITPNT 2017 SP & WP Scenario 5: ITPNT 2017 SP & WP CBA: ITPNT 2017 SP & WP	Scenario 0: ITPNT 2020 SP & WP Scenario 5: ITPNT 2020 SP & WP CBA: ITPNT 2020 SP & WP Scenario 0, 5, & CBA (off-peak): ITPNT 2020 L	----	15
ITP10 Economic	----	----	Futures (1/2/3): 8760 hrs	Futures (1/2/3): 8760 hrs	6
ITP10 Reliability	----	----	DC/AC Future (1/2/3): S & L	DC/AC Future (1/2/3): S & L	12
TPL - 2015 Steady State Assessment	R2.1.1 Y-1 Peak: MDWG 2016 S (base) & ITPNT 2016 SP5 (sensitivity) R2.1.2 Y-1 Off-Peak: MDWG 2016 L (base) & ITPNT 2016 L5 (sensitivity)	----	R2.1.1 Y-5 Peak: MDWG 2020S (base) & ITPNT 2020 SP5 (sensitivity)	R2.2.1 Y-10 Peak: MDWG 2025 S (base)	0

Proposed Models

The TPITF is proposing the development of reliability, compliance, and economic models for Years 2, 5, and 10. Descriptions of the various model sets are as follows.

Description	Year 2	Year 5	Year 10	Total Model Sets
Reliability: CBA (TPL Sensitivity Case)	One Future Coincident Peak On/Off-Peak (2)	Up to Three Futures Coincident Peak On/Off-Peak (6)	Up to Three Futures Coincident Peak On/Off-Peak (6)	14
Reliability: Base Scenario	Summer Winter Light Load Non-coincident Peak (3)	Summer Winter Light Load Non-coincident Peak (3)	Summer Winter Light Load Non-coincident Peak On-Peak (3)	9
Economic	One Future Coincident Peak 8760 (1)	Up to Three Futures Coincident Peak 8760 (3)	Up to Three Futures Coincident Peak 8760 (3)	7
TPL: Powerflow	Base Scenario	Base Scenario	Base Scenario	0

Reliability

Regional and Sub-Regional Planning (ITP Models)

CBA: The CBA powerflow models will be developed as an indicative representation of how entities within SPP responsible for serving network load would serve network load in the SPP Integrated Marketplace. This CBA model will be built from PROMOD output and will consist of coincident peak load forecasts for the SPP region and the security constrained commitment and dispatch of both firm and non-firm generating resources derived from economic planning models. Interchange between SPP and Tier 1 will be determined based on price differentials that may include hurdle rates as developed with the existing economic process. TPL assessments will utilize the CBA powerflow models as the sensitivity case to demonstrate the impact of changes to the basic assumptions used in the assessment model.

Base Scenario: At least one (1) scenario powerflow model will be required in order to meet the reliability planning requirements for the SPP region. This scenario model will be developed as an indicative representation of how entities within SPP responsible for serving network load would serve network load utilizing firm resources only. This scenario model would consist of non-coincident peak load forecasts, assumed firm transmission service usage levels, and expected conventional and renewable resource output levels. The TPITF recommends the modeling of wind facilities at the higher of the facility's accredited capacity or its highest on-peak within the last three years per facility and off-peak and light load at 100% (with firm service). For new wind resources, the average of facility peaks within the new resource's area will be used to model the resources output.

TPL

The Year 2, 5, and 10 Base Scenario model set utilized for regional and sub-regional reliability planning would be utilized as the base model sets for TPL assessments. As noted above, the CBA powerflow model will be used as the sensitivity case required in addition to the base case model for TPL compliance.

Transmission Service

The Year 2, 5, and 10 Base Scenario model set utilized for regional and sub-regional reliability planning would be utilized as the base model(s) for transmission service studies. However, these base model(s) will be adjusted as necessary to execute the study of aggregate transmission service requests consistent with the tariff provisions and business practices that govern the process.

The base model set will not include the consolidated balancing authority (CBA) model, but instead only the Base scenario in which each entity's firm resources and transactions are dispatched to serve each entity's network load. As a result, upgrades resulting from the transmission service process should represent those necessary to support the firm transmission service requests that were added to the base model for study; also ensuring transmission facilities are not approved to support non-firm market transactions. This should also maintain consistency between the firm system capacity utilized to honor the transmission service and the firm system capacity that may be utilized as ARRs and ultimately TCRs in the TCR market.

Generator Interconnection

The Year 2, 5, and 10 Base Scenario model sets utilized for regional and sub-regional reliability planning will be utilized as the base model sets for generator interconnection studies. However, the base model set will be adjusted as necessary to execute the study of generator interconnection service requests consistent with the tariff provisions and business practices that govern the process.

Economic

Economic models will be developed to identify and assess solutions to the public policy and economic needs of the SPP system. Economic models will be developed for three (3) study years (Years 2, 5, and 10). One (1) economic model will be developed for the reference case future in Year 2. It is assumed that multiple future cases are not necessary for Year 2 due to the limited uncertainty in policy or other factors impacting the system that could be implemented in such a short time frame. One (1) economic model will be developed for the reference case future in Year 5 plus up to an additional two (2) economic models for two (2) incremental futures. One (1) economic model will be developed for the reference case future in Year 10 plus up to an additional two (2) economic models for two (2) incremental futures as well. As a result, up to seven (7) total economic models may be developed to support economic assessments.

The current economic and policy study processes for the ITP10 call for needs assessments for Year 10 only. The proposal above will add additional economic and policy needs assessments for Years 2 and 5 which will require the development of up to two (2) additional economic model sets.

Working Group Considerations

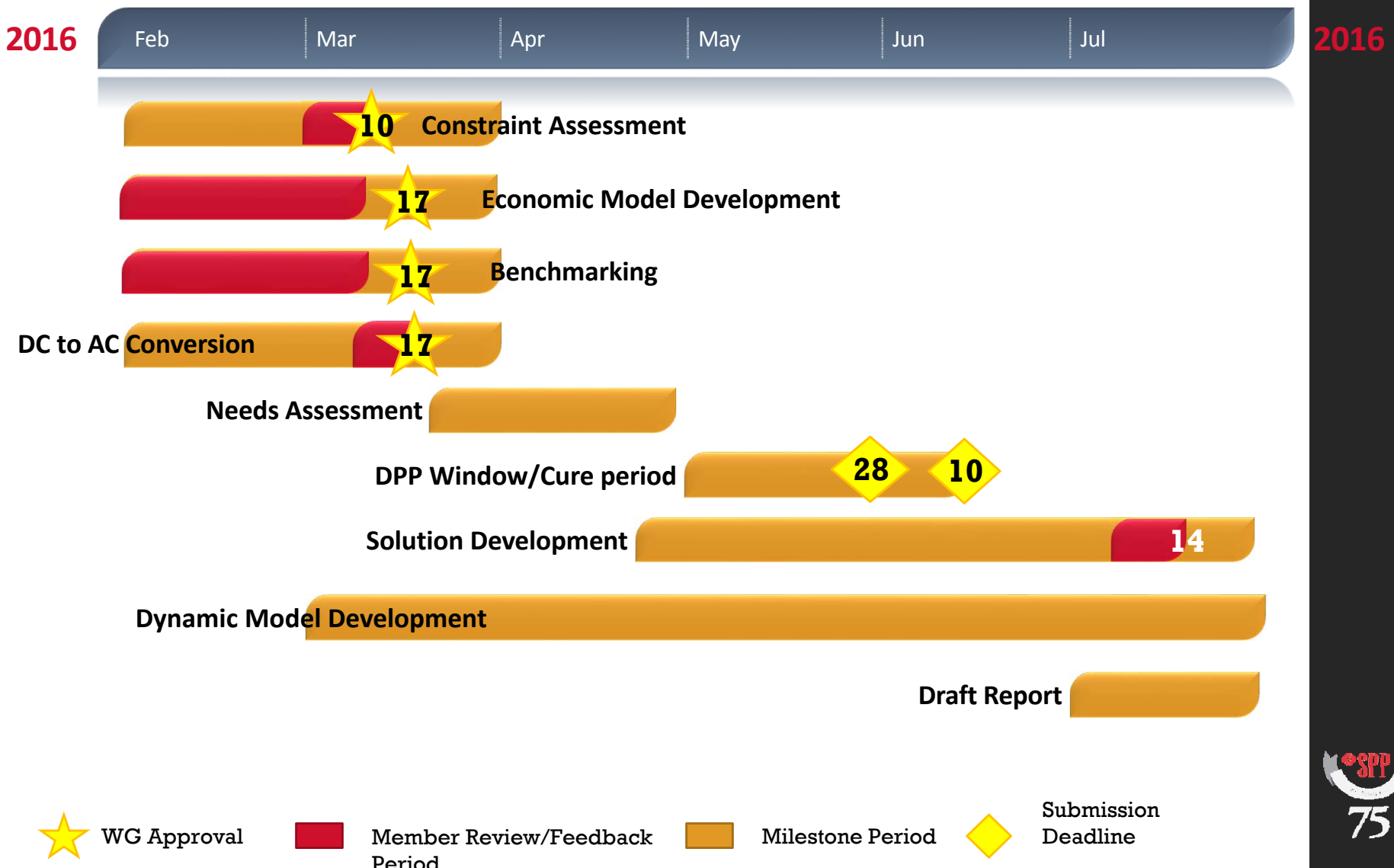
As working groups discuss the proposed models, consideration is asked to given to:

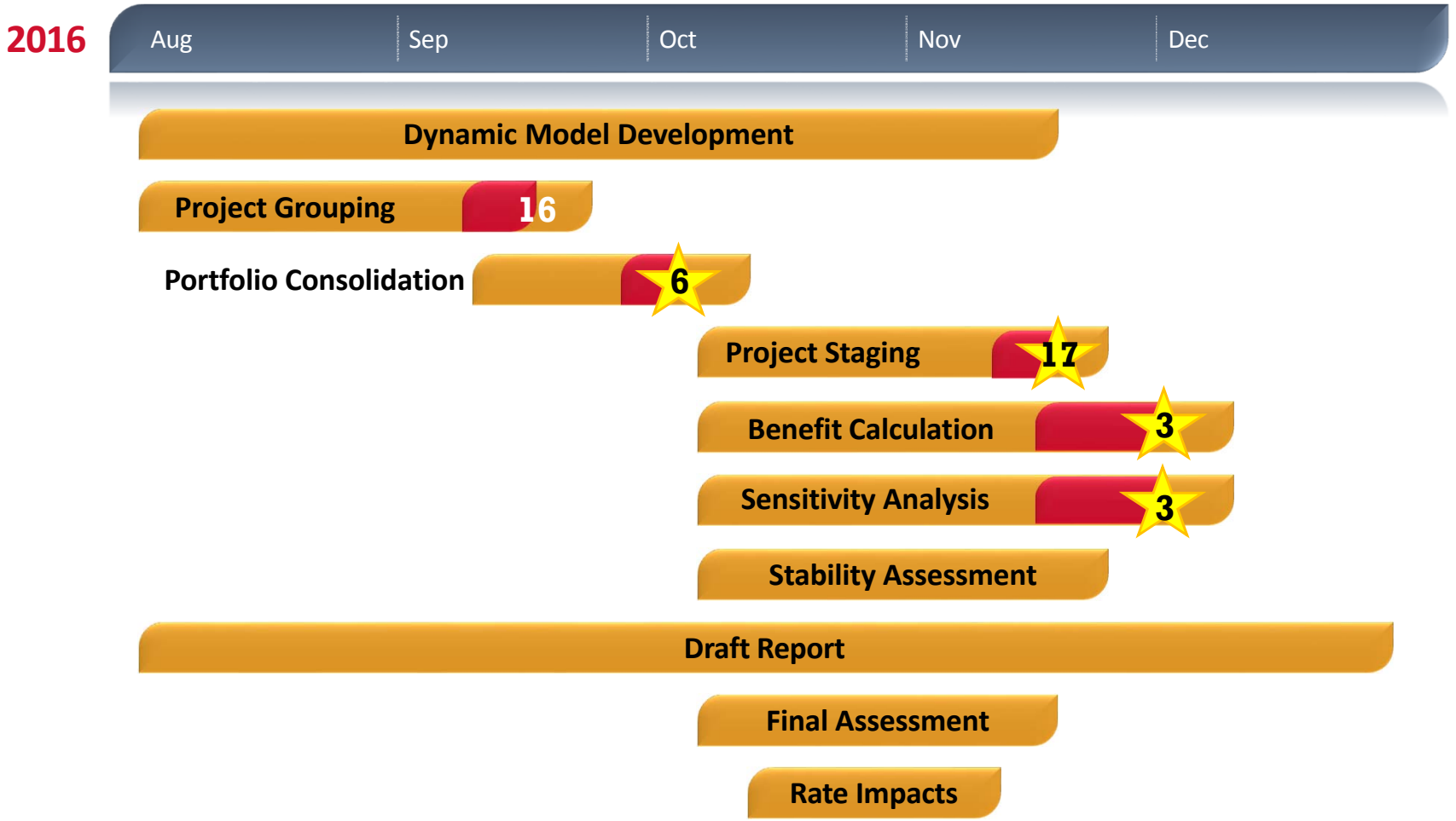
- Use of coincident verses non-coincident peaks for CBA powerflow models - TWG
- DC tie modeling – TWG
- Use of the CBA model for TPL sensitivity analysis - TWG
- Intermittent generation dispatch modeling – ESWG/TWG
- Firm transmission service accounting – TWG
- CBA topology rules for Year 2 and 5 – TWG/ESWG
- Potential need for TSS shoulder case for Year 10

2017 ITP10 Schedule

ESWG

February 24-25, 2016


2016
Feb
Mar
Apr
May
Jun
Jul
2016
10
Constraint Assessment
17
Economic Model Development
17
Benchmarking
DC to AC Conversion
17
Needs Assessment
DPP Window/Cure period
28
10
Solution Development
14
Dynamic Model Development
Draft Report
WG Approval
Member Review/Feedback Period
Milestone Period
Submission Deadline


2016
Aug
Sep
Oct
Nov
Dec
2016
Dynamic Model Development
Project Grouping
16
Portfolio Consolidation
6
Project Staging
17
Benefit Calculation
3
Sensitivity Analysis
3
Stability Assessment
Draft Report
Final Assessment
Rate Impacts
WG Approval
Member Review/Feedback Period
Milestone Period

Upcoming Meetings:

- February
  - Benchmarking Update
  - Constraint Assessment Update
  - Project Selection, Grouping, & Consolidation (Discussion)
- March
  - Benchmarking (Approval)
    - Hurdle Rates and Prototype Review
  - 40 Year Financial Analysis (Decision)
  - Project Selection, Grouping, & Consolidation (Approval)
  - MOPC Action Item 255 (Decision)
  - Economic Model (Approval)

ITP10 Milestone Schedule

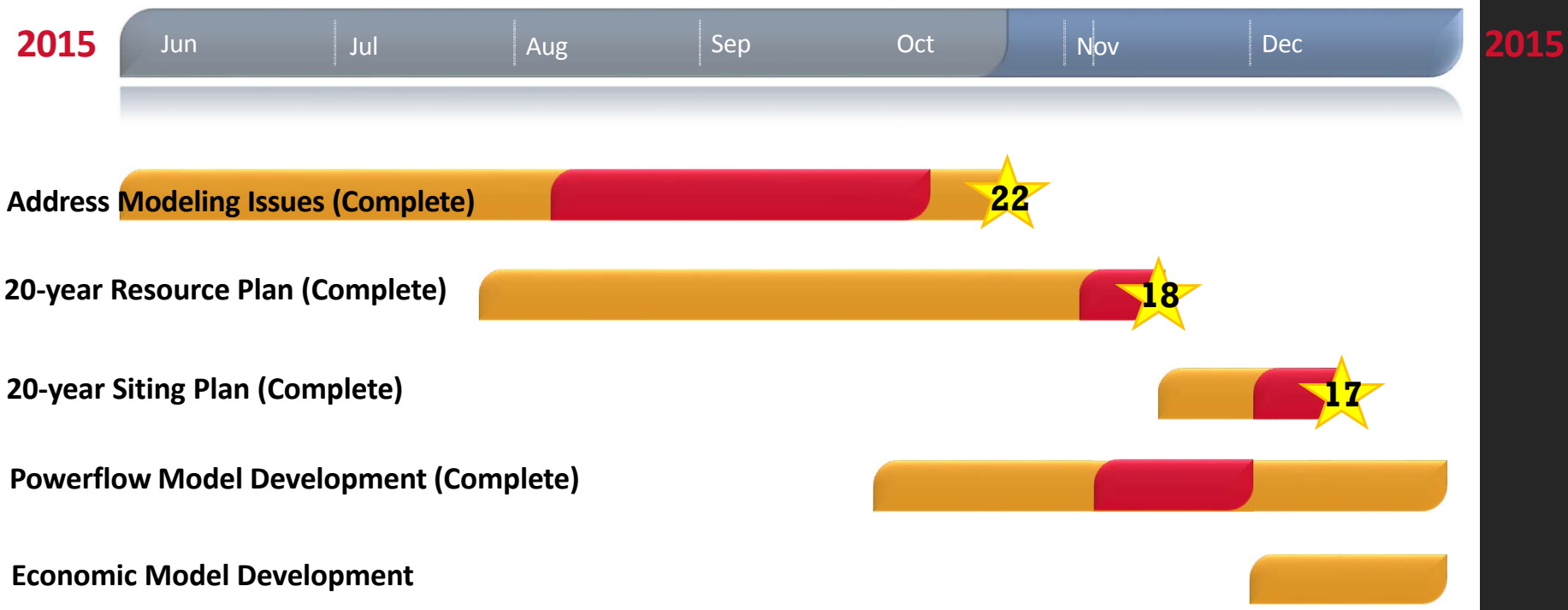
Task Name	Start	Finish	Review Period	Feedback Cutoff	ESWG Approval
Scoping	**October '14**	**October '15**	Multiple Reviews		9/23/15
Load Review	**February**	**July**	Thru 6/2/2015	6/2/2015	6/18/15
Renewable Survey	**May**	**July**	Thru 6/4/15	6/4/2015	7/8/15
Generation Review	**February**	**July**	Thru 6/2/2015	6/2/2015	6/18/15
Resource Plan Phase 1	**June**	**August**	7/14/15 - 7/28/15		7/29/15
Resource Plan Phase 2	**June**	**October**	9/3/15 - 9/17/15		11/19/15
Siting Plan	**September**	**December**	11/12/15 - 12/10/15		12/10/15
Powerflow Model Development	**May '15**	**January '16**	1/4/16 - 1/19/16		January '16
Economic Model Development	**June '15**	**March '16**	12/21/15 – 3/10/16		3/17/16
Benchmarking	**June**	**March'16**	11/12/15 - 3/10/16		3/17/16
Constraint Assessment (TWG)	**August '15**	**March '16**	2/17/16 – 2/23/16		3/10/16
Generator Outlet Facilities	**October**	**December**	12/1/15 - 1/14/16		1/21/16
DC-to-AC Conversion	**February '16**	**March '16**	3/10/15 - 3/10/16		3/18/16
Needs Assessments	**March '16**	**April '16**			
DPP Window/Cure Period	**April '16**	**June '16**	4/27/16 - 5/27/16 5/30/16 - 6/13/16	5/27/2016	
Solution Development	**April '16**	**July '16**	7/7/16 - 7/14/16		
Project Grouping	**August '16**	**September '16**	9/9/16 - 9/16/16		Sept '16
Portfolio Consolidation	**September '16**	**October '16**	9/29/16 - 10/5/16		October '16
Project Staging	**October '16**	**November'16**	11/9/16 - 11/16/16		November '16
Sensitivity Analysis	**October '16**	**December '16**	11/18/16 - 12/2/16		December '16
Benefit Calculation	**October '16**	**December '16**	11/18/16 - 12/2/16		December '16
Draft Report	**July '16**	**December '16**	Multiple Reviews		December '16

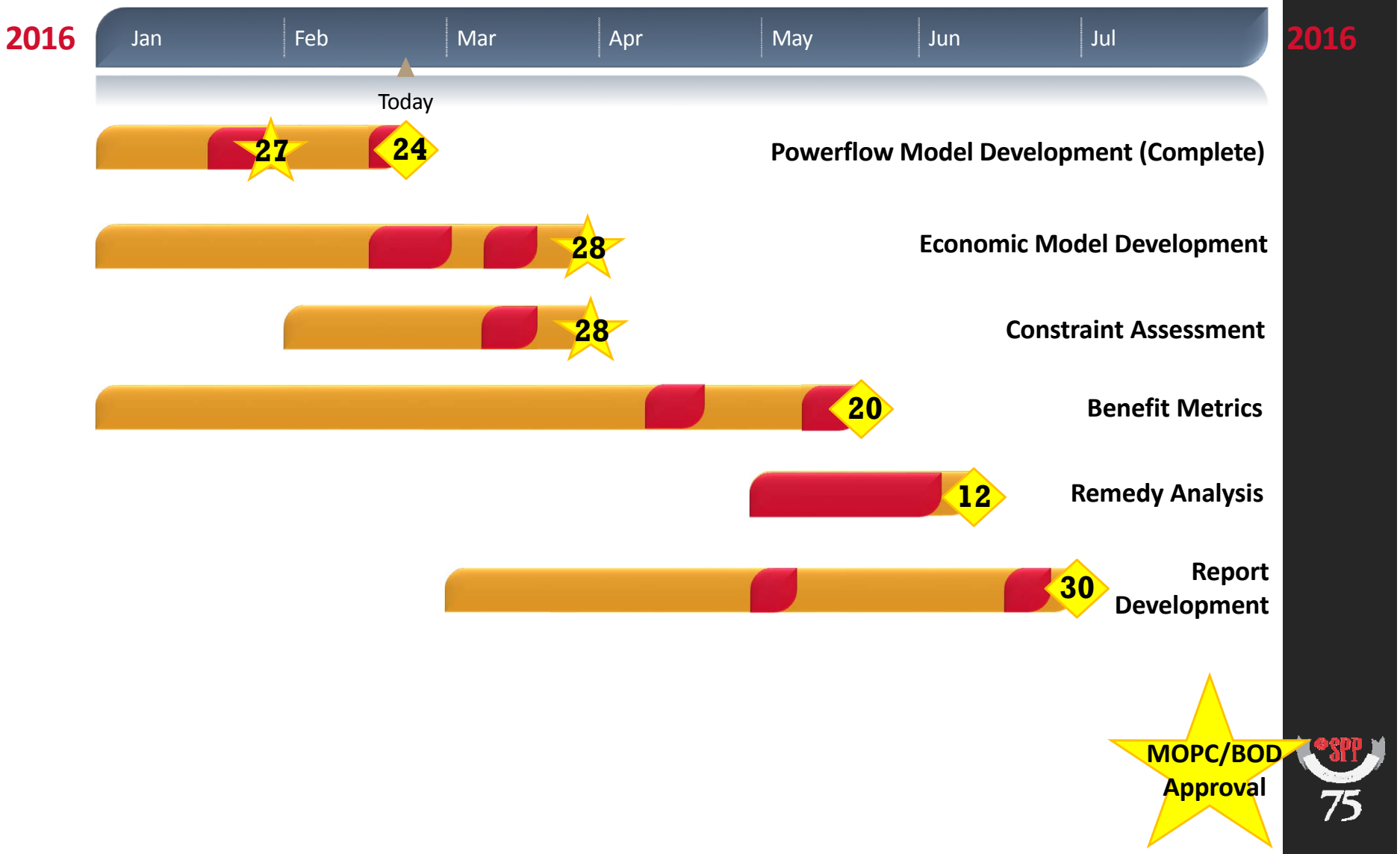
Note: Most review period dates are subject to change based on future WG meeting schedules and do not include normal meeting material review times (generally 1 week).

RCAR II Schedule

ESWG

February 24-25, 2016


2015
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2015
Address Modeling Issues (Complete)
22
20-year Resource Plan (Complete)
18
20-year Siting Plan (Complete)
17
Powerflow Model Development (Complete)
Economic Model Development
WG Approval
Member Review/Feedback Period
Milestone Period


2016
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Feb
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2016
Today
27
24
Powerflow Model Development (Complete)
28
Economic Model Development
28
Constraint Assessment
20
Benefit Metrics
12
Remedy Analysis
30
Report Development
MOPC/BOD Approval
WG Approval
Member Review/Feedback Period
Milestone Period

RCAR II Milestone Schedule Summary

Task Name	Start	Finish	Review Period	Feedback Cutoff	End of Milestone
Address Modeling Issues	**April '15**	**October '15**	Multiple Reviews	10/15/15	10/22/15
20-year Resource Plan	**July '15**	**November '15**	11/02/15 – 11/09/15	11/09/15	11/18/15
20-year Siting Plan	**October '15**	**December '15**	11/12/15 - 12/10/15	12/10/15	12/17/15
Powerflow Model Development	**October '15**	**February '16**	Multiple Reviews	1/20/16	2/16/16
Economic Model Development	**November '15**	**March '16**	02/16/16 – 03/01/16, 03/07/16 – 03/15/16	03/01/16, 03/15/16	03/15/16
Constraint Assessment	**February '16**	**March '16**	03/03/16 – 03/17/16	03/17/16	03/28/16
Benefit Metrics	**January '16**	**April '16**	April, May '16		05/20/16
Remedy Analysis	**May '16**	**June '16**	May, June '16		06/12/16
Report Development	**March '16**	**June '16**	May, June '16		06/30/16
Study Concludes		**July '16**			Late July, 2016

Note: Most review period dates are subject to change based on future WG meeting schedules.


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2017 ITP10 Analysis Methodology

ESWG

February 24th, 2016

Considering the Clean Power Plan

2017 ITP10

Reflecting the Price of Carbon

- PROMOD has options on modeling carbon price
  - Affect dispatch only
    - Price of carbon reflected only by way of increased use of higher fuel cost units
  - Affect dispatch and LMPs
    - Price of carbon reflected in marginal energy component of LMPs, impacting the calculated purchases/sales of the APC
  - Affect dispatch, LMPs, and APC
    - Price of carbon reflected in the cost of energy
- Considerations
  - Should the cost of carbon be reflected in APC calculations or just as a means to affect dispatch?
  - Should the carbon price be applied to all units or just affected EGUs?

Reflecting the Price of Carbon Recommendation

- Cost of carbon should be reflected in energy costs of affected EGUs
  - Generators will be bidding into the market will assume the price of carbon
    - It is a true cost that needs to be recovered
    - It is can be an incurred cost or a lost opportunity cost, therefore should apply regardless of whether the utility needs to buy allowances/credits to actually generate
  - A positive direction in determining the additional economic benefit of transmission projects that reduce emissions
- Non-affected EGUs should be limited in the model due to constraints that we have limited way of considering: fuel supply, air permit requirements, water availability
  - Cost of carbon should be utilized as a modeling technique to affect dispatch of non-affected EGUs
  - Without this tool, we expect peaking units to experience unreasonable operation in our simulations (e.g. CTs at >%50 CF)

Monitoring Emissions

- At what point do we stop making decisions that control emissions and let the approved process define the recommended projects?
  - Resource plan
  - Copper plate final model
  - Transmission constrained final model
  - Project selection
  - Individual Futures portfolio
  - Consolidated portfolio

Monitoring Emissions

- Economic Planning recommendations to date
  - CPP compliance has been targeted during resource planning
  - Compliance should be targeted on a copper plate PROMOD model, not a constrained model
    - PROMOD needed in order to appropriately price carbon for external regions and on a state by state basis (software limitations)
    - Carbon pricing should be determined as a function of resource planning decisions to reflect realities
      - The price of carbon in a trading market will be much more heavily driven by long term decisions of utilities than system flow patterns and congestion
  - Compliance should not be considered for the consolidated portfolio
    - One portfolio will most likely not make either the regional or state model compliant

Compliance of the Transmission Plan

- Should the Final portfolio per future show compliance in the model? Two schools of thought.
  - 1: The final portfolio must demonstrate CPP compliance
    - Via the model showing compliance
    - We have developed a reasonable scenario for which to comply with emissions targets and we should develop a transmission plan that demonstrates compliance.
  - 2: The final portfolio must facilitate CPP compliance
    - Via the model showing reduced emissions
    - With the uncertainties of the CPP, development of a plan through traditional methodologies within the context of our modeling assumptions is both a sufficient and appropriate path to CPP compliance
- Does our current process fall short if school 1 is preferred?
  - How do we define an emission need?
  - How do we define a process to enforce compliance?
  - How do we define the benefit of reduced emissions in a way that is clear to all stakeholders?

Implementing the Schools

- School 2
  - Follow normal process
  - Develop a plan that potentially leaves the model out of compliance
- School 1a
  - Follow the normal process
  - Develop a plan that potentially leaves the model out of compliance
  - Use engineering judgment to determine incremental upgrades that will achieve compliance for informational purposes only
    - Within or out of the context of the ITP10
- School 1b
  - Post emission targets for affected EGUs as needs
    - F1 by region
    - F2 by state
  - Are these policy needs?
    - What impacts does this have on other parts of the process? (e.g. policy benefit metric)

Recommendation

- Develop portfolios for Future 1 and Future 2 following School 1a
  - Follow normal process
  - Identify potential additional projects needed to meet emission targets for informational purposes
    - Provide information within the ITP10 results and report


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2017 ITP10 Analysis Methodology

ESWG

February 24th, 2016

Portfolio Consolidation

2017 ITP10

Previous Discussion

- Develop 2 final portfolios for MOPC/BOD consideration, CPP and non-CPP
- Highlight "no regrets" projects selected for all futures
- Portfolios
  - Reference case portfolio
  - Consolidate CPP futures using weighted benefit methodology
    - Equal weighted sum 1-year APC B/C, 0.9 or greater

Staff Considerations

- Multiple plans should be presented to the broader Stakeholder group for informational purposes, highlighting differences between CPP and non-CPP plans.
- The uncertainty of the CPP should be considered in developing a recommended (consolidated) plan
  - Uncertainty of CPP implementation specifics
  - Supreme Court stay of final rule
- SPCTF CPP discussion: Stakeholders agree that regardless of the status of the CPP, CO2 emissions will continue to decrease

Staff Conclusions

- A transmission plan developed for Future 3 will likely raise emissions with respect to the base case due to coal continuing to be least cost conventional generation
- Future 2, while providing valuable information, is a more extreme representation of CPP implementation
- Future 1 is a reasonable representation of CPP implementation will produce a transmission plan that will reduce emissions
- In light of recent events, stakeholder input, and internal discussion, Future 1 should be the basis of a recommended plan

Staff Recommendation

- Develop multiple plans to present for valuable information
- Recommend NTC based on Future 1 traditional reliability and economic analysis expected to facilitate CPP compliance


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2017 ITP10 Analysis Methodology

ESWG

February 24th, 2016

Project Selection

2017 ITP10

2017 ITP10 Project Selection

- Economic Project Criteria
  - Set an APC based 1-year individual project B/C threshold
    - ≥ 0.5 to pass screening
    - ≥ 0.9 for inclusion in a final portfolio
- Policy Project Criteria
  - Must allow the utilities to meet the regulatory/statutory mandates and goals
    - Economic performance criteria used to select top projects
- Economic seams projects evaluated for benefit to external zones with a cost sharing split based on benefit share

Project Grouping

2017 ITP10

Project Grouping (Previously Proposed)

- Grouping(s) A
  - Create grouping(s) based on project per need development
  - Targeted constraint relief with potentially smaller, local project development
  - Include % threshold for constraint relief
- Grouping(s) B
  - Develop grouping(s) without constraint relief threshold
  - Potentially allow for more EHV projects addressing multiple needs
  - Potentially results in less overall system congestion relief
- Could utilize cost effective and/or highest net APC criteria for each A and B grouping
- Multi-Variable
  - Allow Staff to layer projects from other two groupings or additional analysis to develop portfolio
- Project grouping with the highest net APC as a portfolio is selected as the final portfolio for each future

Project Grouping (Recommended)

- Different approach based on realizations from implementation of Grouping(s) B approach
- Cost-Effective
  - Total project cost / total flowgate congestion cost relief
  - Project selection per economic need
    - Avoids the issue of determining which flowgates should be included or excluded from the total congestion cost relief
- Highest net APC benefit
  - The cost of the projects will be subtracted from the APC benefit provided
  - Project selection per total SPP net APC benefit
    - Avoids the issue of potentially excluding candidate projects that may have minor relief on multiple flowgates
- Multi-Variable
  - Allow Staff to layer projects from other two groupings or additional analysis to develop portfolio
- Project grouping with the highest net APC as a portfolio is selected as the final portfolio for each future

2016 Wind Integration Study: Estimated Value of Identified Projects

February 24, 2016

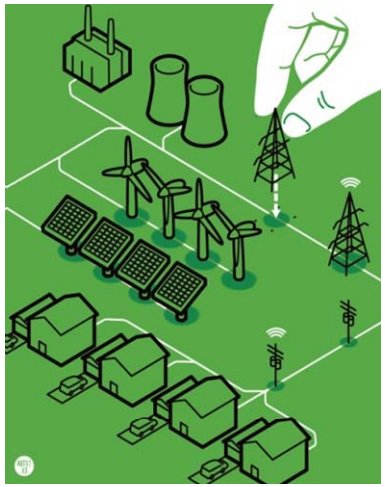
Jason Tanner
SPP Operations

Study Overview

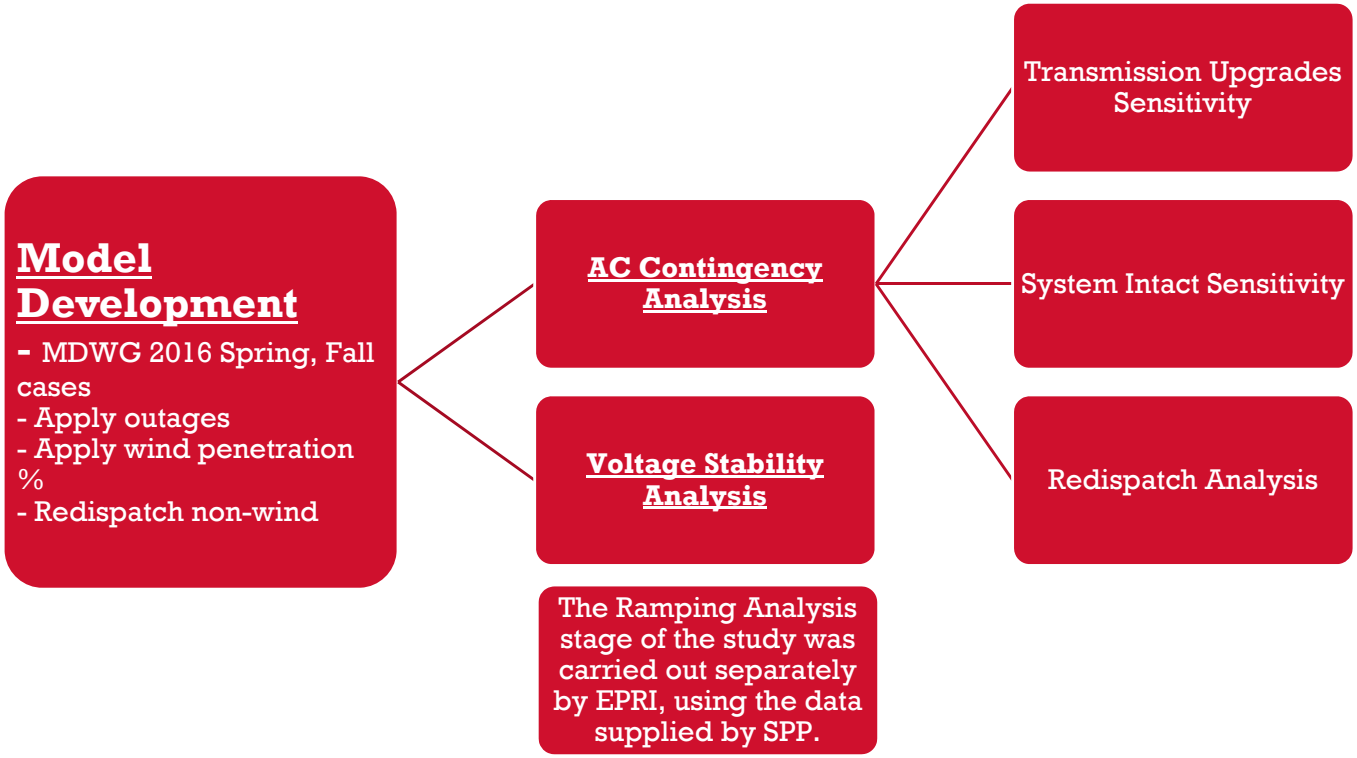
Section 1

Wind Integration Study

- The 2016 Wind Integration Study analyzed the reliability impacts of the SPP Transmission system as new resources become available.
- The studies performed were strictly reliability based and not an economic based solution.



Study Process and Inputs (Cont.)

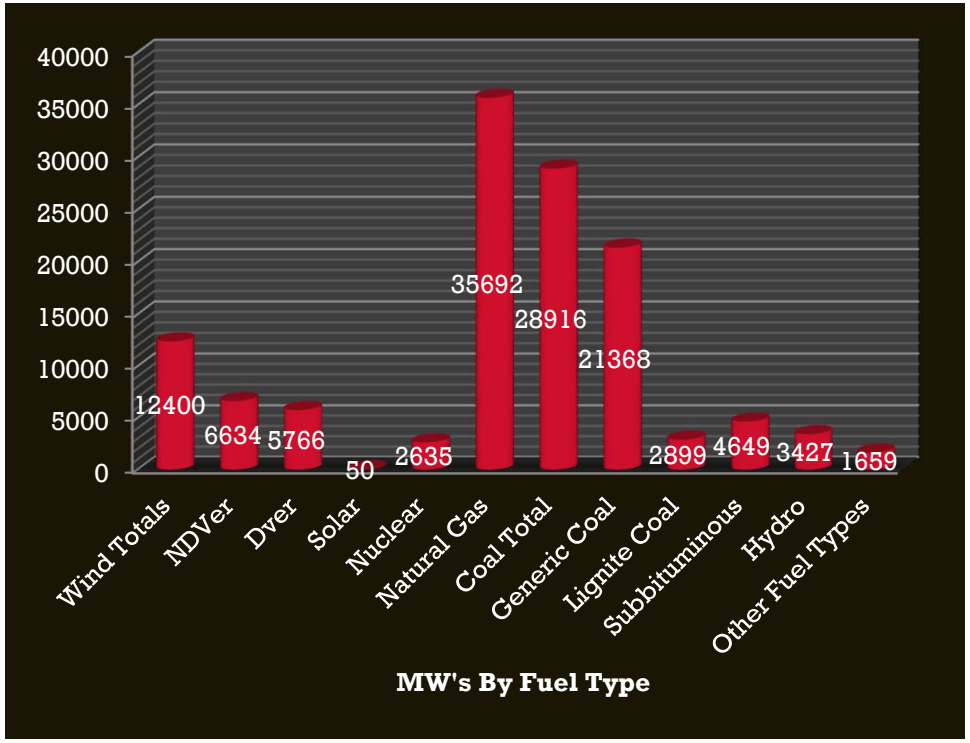


System Capacity Totals

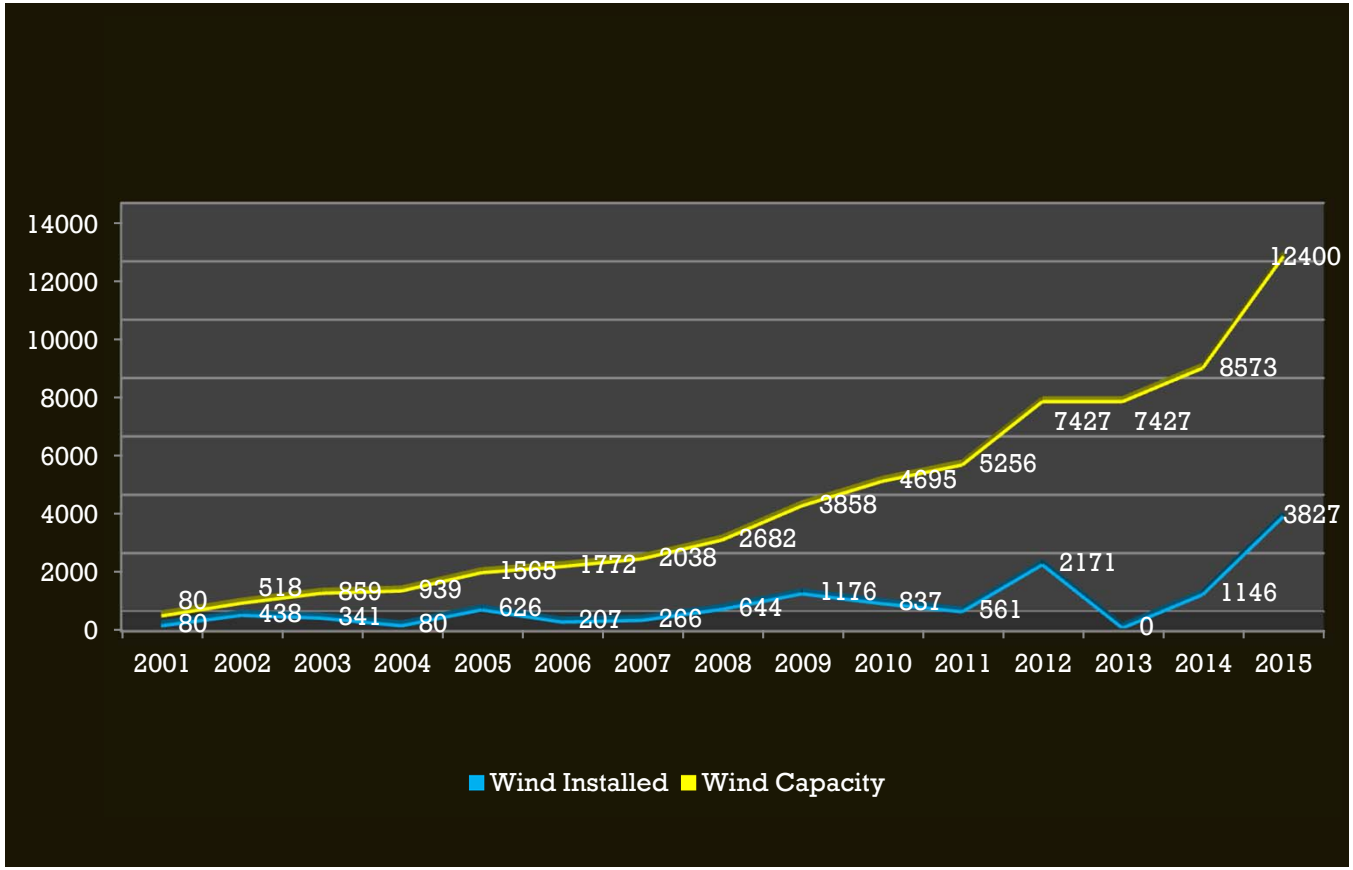
Section 2

Current MWs By Fuel Type

- Wind Totals 12400 MWs
  - NDVer 6634 MWs
  - DVer 5766 MWs
- Solar 50 MWs
- Nuclear 2635 MWs
- Natural Gas 35692 MWs
- Coal 28916 MWs
  - Generic Coal 21368 MWs
  - Lignite Coal 2899 MWs
  - Subbituminous 4649 MWs
- Hydro 3427 MWs
- Other Fuel Types (Oil, Agricultural Byproducts, Municipal Solid Waste) 1659 MWs



Wind Capacity Installed by Year



WIS Recommendation

Section 3

Wind Integration Study Recommendations

1. **Install Voltage reactive support capabilities for existing wind farms install enhanced operations tools for Dynamic Reactive Reserves and develop criteria requirements for real-time operations.**
2. Install real-time operations tools to calculate and monitor real-time voltage stability limits using an applicable real-time software suite.
3. Provide additional flexibility to the Reliability Coordinator for NDVER redispatch.
4. Develop additional planning criteria to enhance analysis requirements for incorporating a more robust scenario development.
5. **Expedite approved ITP projects.**
6. Evaluate the bulk electric system impacts with the addition of Solar PV in combination with wind.
7. Perform an additional evaluation of PMU applications to provide real-time situational awareness.

Wind Integration Study

- Create a new SPP Voltage Task Force (VTF)
  - The ORWG is in the process of developing a new Voltage Task Force.
  - Task Force will consist of operations and planning member personnel.
  - The VTF will review, modify and develop any necessary SPP voltage criteria:

Recommendation #5

Section 3

Methodology

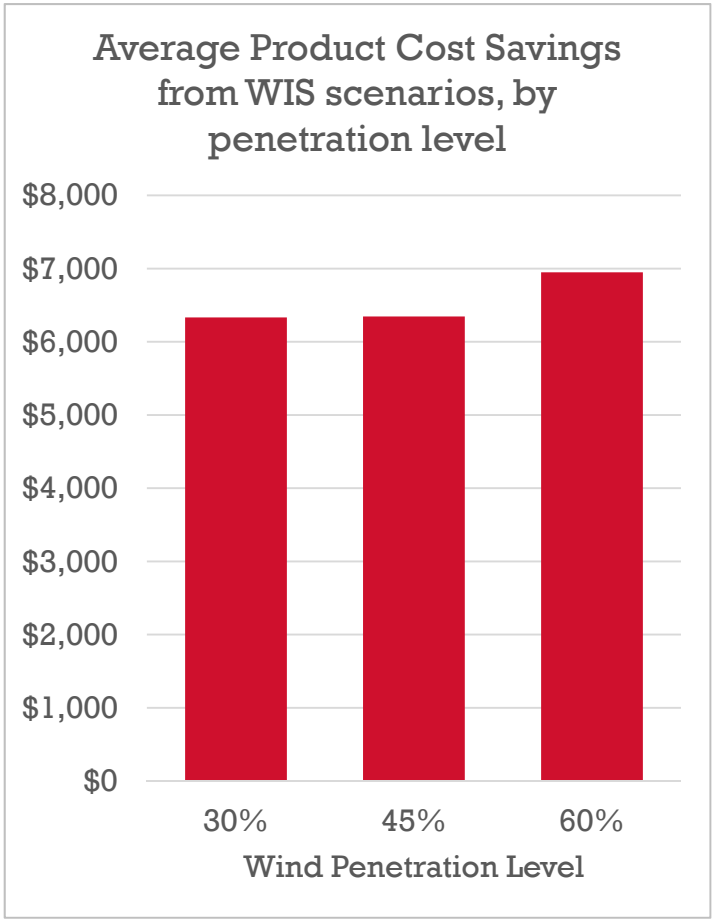
- Use the six WIS base models (Spring/Fall, 30/45/60% penetration)
- Create six new models that include projects identified in the WIS with NTCs active for them
- Run in PowerGem TARA with unit commitment enabled
- Compare production costs of base case and upgrade case – difference would be assumed benefit for the operating hour
- Extrapolate results to include the remainder of the year

Upgrades

- Only used upgrades identified in WIS that had active NTCs
  - Cimarron – Draper 345kV (Project 30843) 2015 ITP10 (In service 4-1-19)
  - Sundown – Amoco 230kV (Project 30844) 2015 ITP10 (In service 4-1-19)
  - Woodward – Tatonga – Mathewson – Cimarron 345kV (Project 30364) 2012 ITP10 (In service 3-1-21)
  - Canyon East – Canyon West 115kV (Project 30509) SPP-2011-AG3-AFS-11 (In service 5-31-16)
  - Canyon West – Dawn 115kV (Project 30817) 2015 ITPNT (In service 4-1-18)
  - Buckner – Spearville 345kV (Project 30916) 2015 ITPNT (In service 12-31-16)
  - Elm Creek – Summit 345kV (Project 30367) 2012 ITP10 (In service 3-1-18)
  - Highland – Pantex South – Pantex North – Martin 115kV (Project 30842) (In service 4-1-19) Withdrawn 11/3/15

Results

- Roughly $6-$7k in reduced costs per hour
- Slightly higher benefits at higher penetration levels, but no substantial drop in benefits as wind penetration decreases



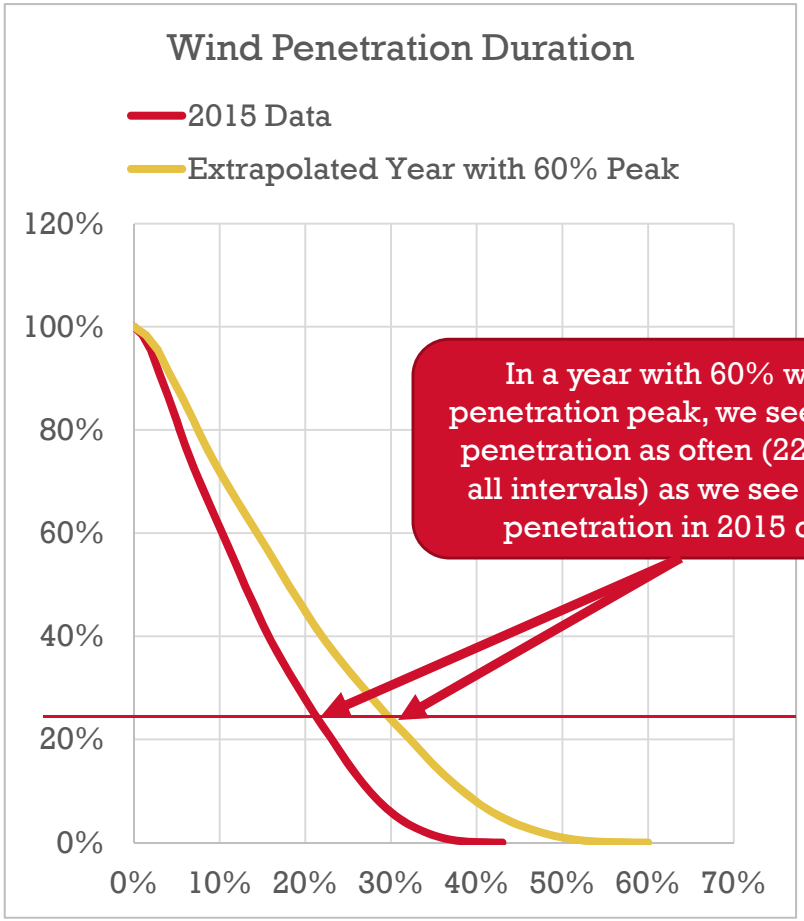
Extrapolating results

- Results varied by case and scenario, but average was **$6,543** per scenario

- This is a one-hour benefit value. To extrapolate to an annual value, there are two methods
  1. Only assume benefits are valid for 30% - 60% penetration cases studied and estimate benefits based on the projected frequency of occurrence of those penetration levels throughout the year
  2. Assume benefits are valid for all times during the year and multiply hourly benefit times all hours in the year. This is partially supported by relatively flat level of benefits seen.

Method #1

- Use 2015 data for "unconstrained wind penetration" occurrences
  - "unconstrained wind penetration" may be lower than actuality due to NDVER self-curtailments
- This 2015 had max "unconstrained wind penetration" of 43%
- Use frequency of occurrence distribution and scale linearly to find expected occurrence for a year with peak "unconstrained" wind penetration of 60%



Method #1 (cont'd)

- In other words, in a year with 60% peak unconstrained wind penetration, we will only evaluate the time where wind penetration is between 30% and 60% (study scenarios)
- To compare to a reference year of 2015, which had a peak unconstrained wind penetration of 43%, we would need to compare to the time where wind penetration was in the 22% to 43% range (30% will be the new 22%, 60% will be the new 43%)
- This corresponds to roughly 22.6% of the intervals in the year, based on the data from the reference year 2015 (see previous slide)

- So we multiply hourly benefit ($6,543) times the number of hours we expect to see 30-60% penetration in the future year (8,760 hours x 22.6%)
  - $6,543 * (8760 * 0.226)
  - ***= $12.95 million/year using method #1***

Method #2

- Assume benefits are valid for all times during the year and multiply hourly benefit times all hours in the year. This is partially supported by relatively flat level of benefits seen, but may be exaggerated.
  - 30% scenario $6,333
  - 45% scenario $6,347
  - 60% scenario $6,948
  - Average $6,543
- Take average benefits/hours ($6,543) and multiply times hours in year (8760)
  - $6,543 * (8760)
  - ***= $57.32 million/year using method #2***

Recommendation

- SPP Staff Recommends Stakeholder Approval to begin accelerating the ITP projects that were recommended in the Wind Integration Study that have approved NTC.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MOPC Action Item #255

ESWG

February 24th, 2016

MOPC Action Item #255

- Review the method to determine the cost of congestion as it relates to outages for rebuilds approved.

Implementation

- Perform analysis in study model
  - Outage line proposed to be rebuilt
  - Determine duration from historical data by kV and mileage
- Add congestion cost to project E&C cost during project selection phase
  - Assume congestion cost to be an annuity payment to be paid down concurrent with transmission investment
  - Calculate 1-year B/C

Example Results

Project	E&C Cost*	Benefit**	Old B/C	Congestion Cost***	New B/C
Project A	$14,387,085	$13,469,000	0.94	($147,686)	0.95
Project B	$3,064,773	$24,979,000	8.15	$908,966	6.29
Project C	$5,557,498	$6,784,000	1.22	($105,440)	1.24
Project D	$522,527	$999,000	1.91	$49,241	1.75

*1-year conceptual cost
**All results from test runs on 2015 ITP10 base model
***1-year annuity payment, 2.5% rate

Observations

- Example results potentially overstate cost due to assumed outage duration
- All runs will likely understate cost due to constraint assessment limitations
- Historically constrained areas will likely show higher and more accurate costs than future constrained areas
- APC benefit would need to be negated by cost by more than 25% to have an impact
  - Assuming new parallel project to rebuild project
  - Assuming typical rebuild cost of 75% that of new line costs

RCAR II Update

ESWG

February 23-24, 2016

RCAR II Update

- What we've been working on
  - 2020, 2025, 2035 base and change case
    - Powerflow models
    - Economic models
- What's coming up
  - Constraint assessment (25B, 35B, 35C)
  - Metric calculations
    - Powerflow-based
    - PROMOD-based
- What we will be bringing in the next few months
  - Economic models – approval
  - Constraints
  - Metric calculations
    - April and May

2017 ITP10 Benchmarking Update

Nikki Roberts

2017 ITP10 Benchmarking Process

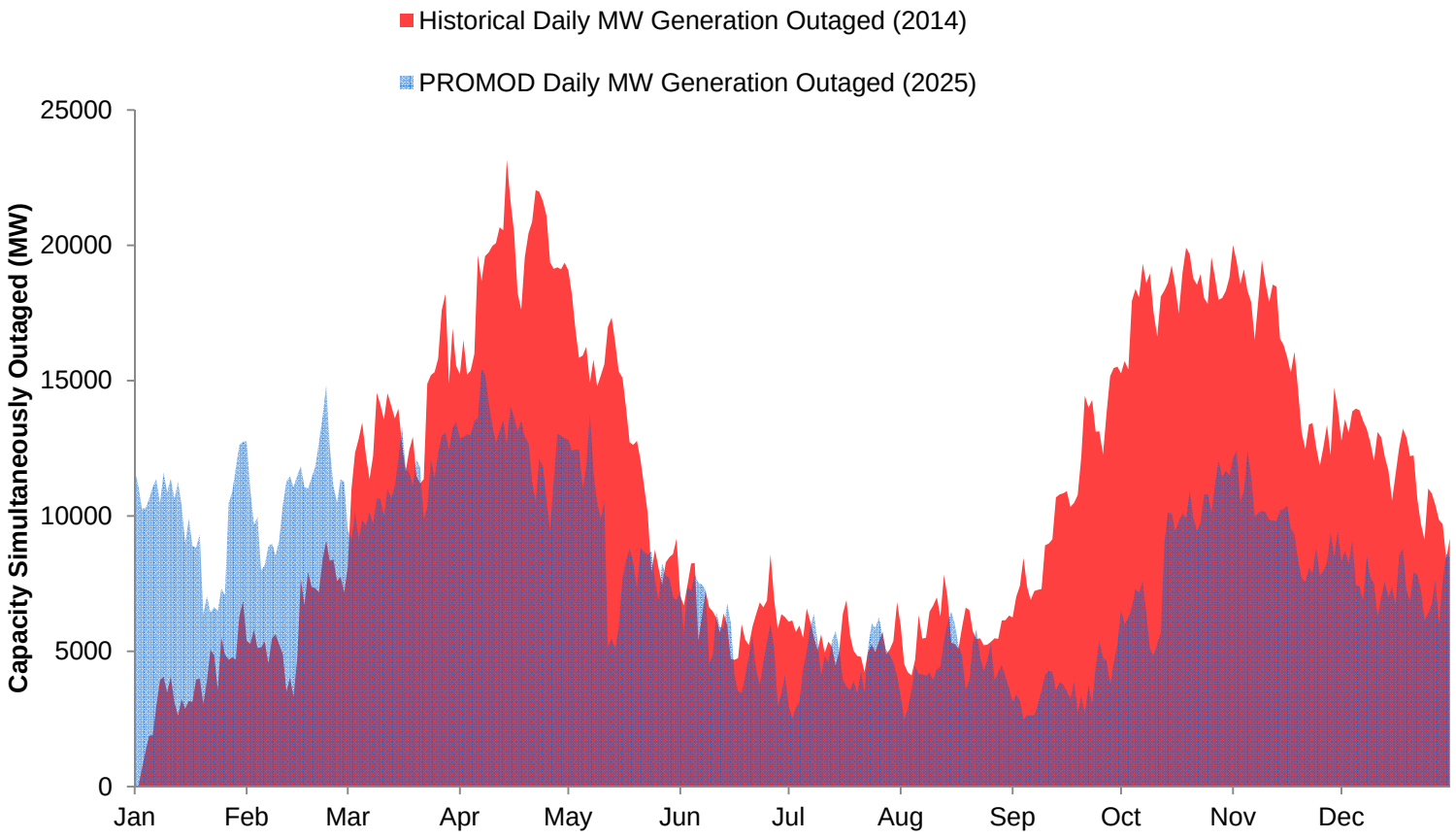
1. Develop "Model QA Checklist" that outlines what outputs need to be compared/verified between historical data and current ITP10 model(s)
2. Gather historical statistics and measurements
3. Make all necessary PROMOD runs for comparison and assessment
4. Compare 2017 ITP10 Future 3(BAU) model to historical data and 2015 ITP10 Future 1 (BAU) following the "Model QA Checklist".
5. Validate 2017 ITP10 CPP Futures following the "Model QA Checklist".
5. Adjust inputs if needed for reasonable model behavior
6. Apply necessary changes to current ITP10 models

Compare to Historical Data

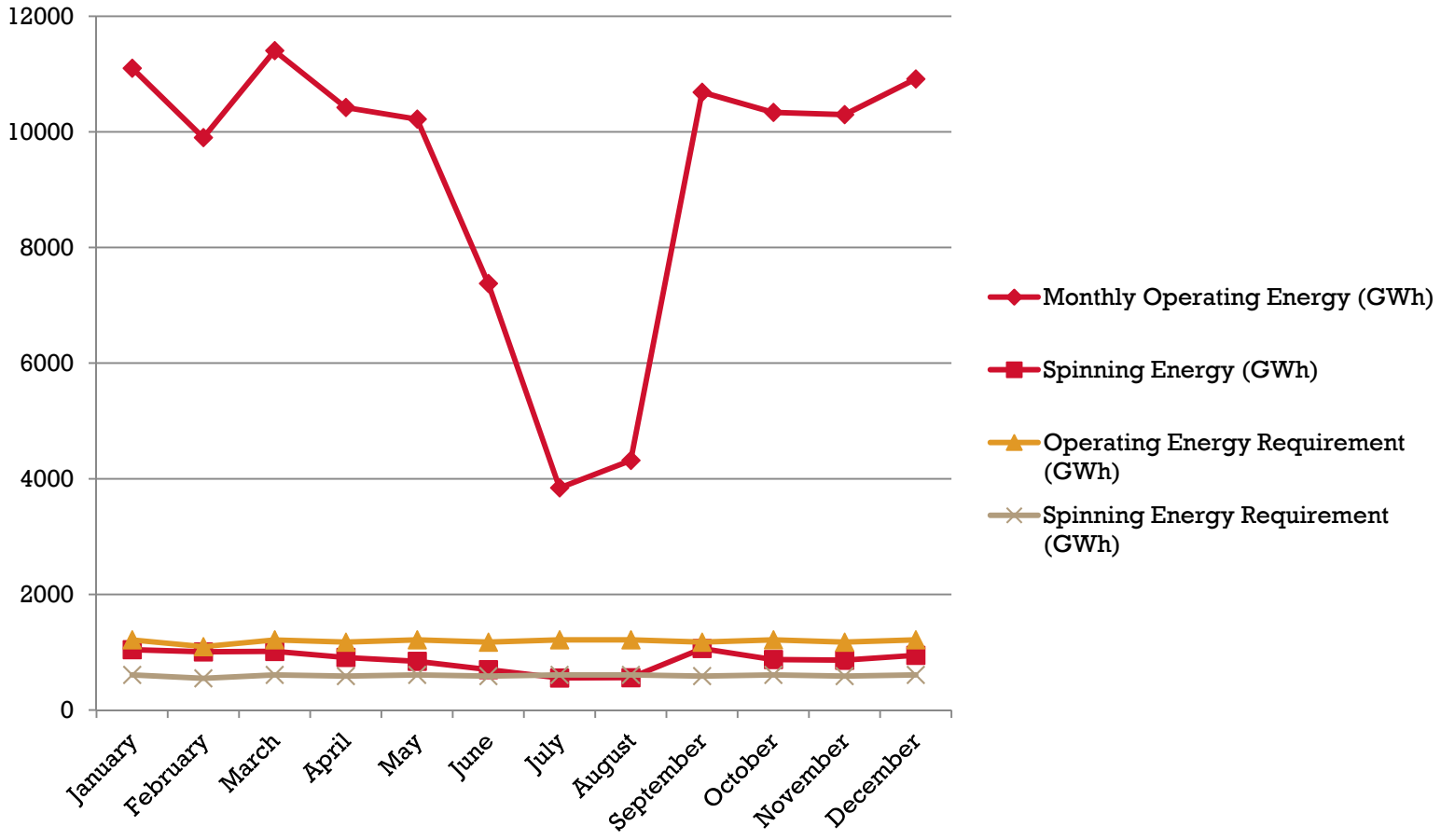
- Capacity Factor by Unit Type
- Maintenance Outages
- Operating and Spinning Reserves
- Flowgate Loading

*All results based on unconstrained model

Generator Outages



Operating and Spinning Reserves



Benchmark against 2015 ITP10 model

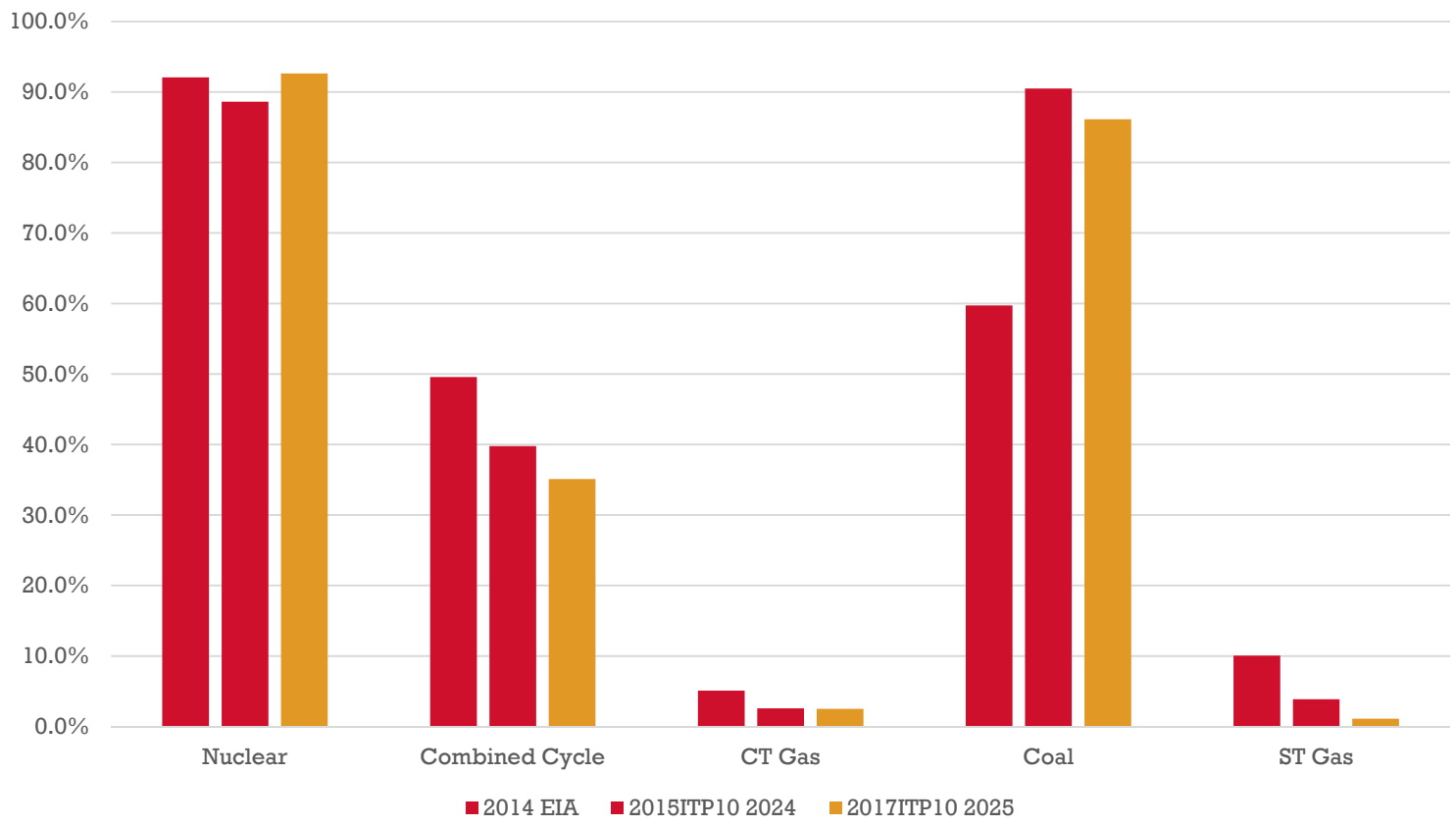
- Capacity Factors and Average Cost per MWH
- System LMPs
- Interchange (Import/Export)
- Renewable Generation Profiles (Solar and Wind Output)
- Zonal Purchases and Sales (APC comparison)

*All results based on unconstrained model

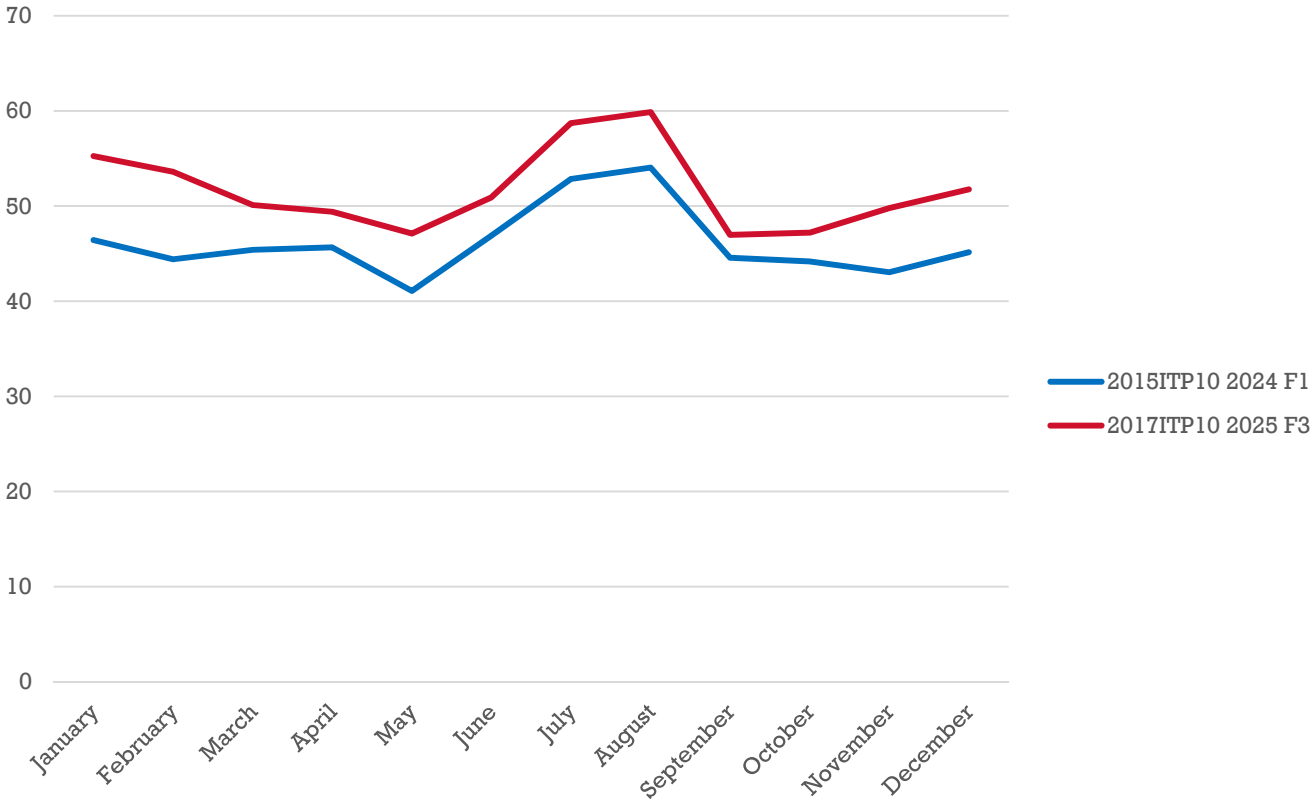
Capacity Factors and Average Cost

Unit Type	2014 EIA Capacity Factor	2015ITP10 F1 2024 Capacity Factor	2015ITP10 2024 Average Energy Cost ($/MWh)	2017ITP10 F3 2025 Capacity Factor	2017ITP10 F3 2025 Average Energy Cost ($/MWh)
Nuclear	92.1%	88.6%	16.00	92.6%	16.07
Combined Cycle	49.6%	39.8%	49.44	35.1%	56.09
CT Gas	5.1%	4.4%	77.78	2.5%	87.37
Coal	59.7%	94.1%	26.59	86.1%	31.79
ST Gas	10.1%	4.1%	55.95	1.1%	88.42

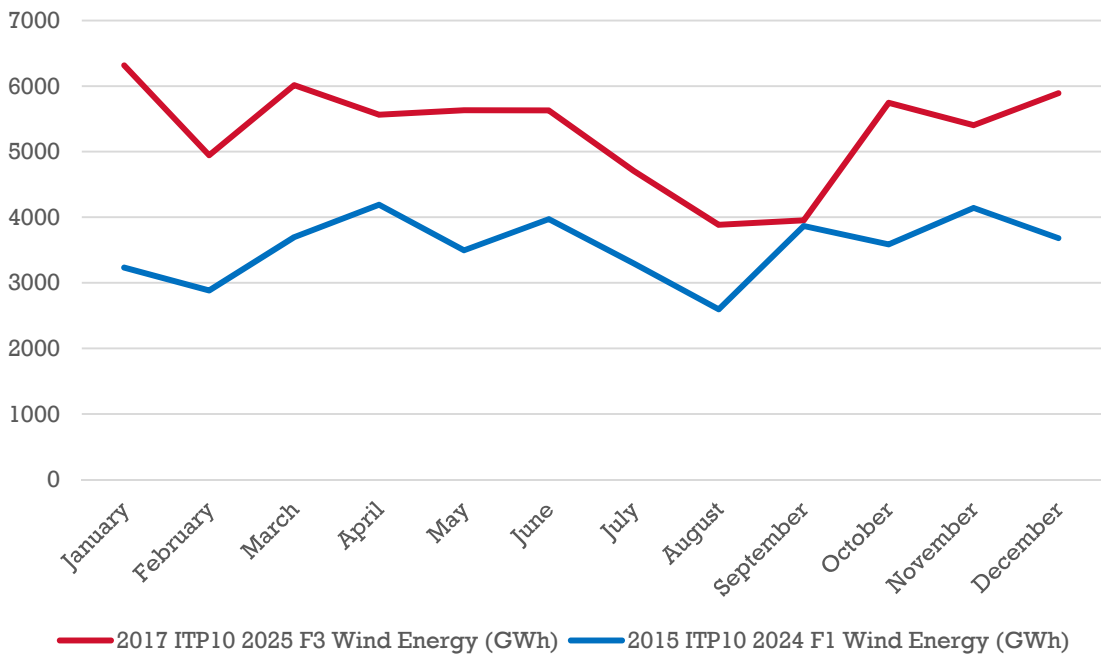
Capacity Factors by Unit Type



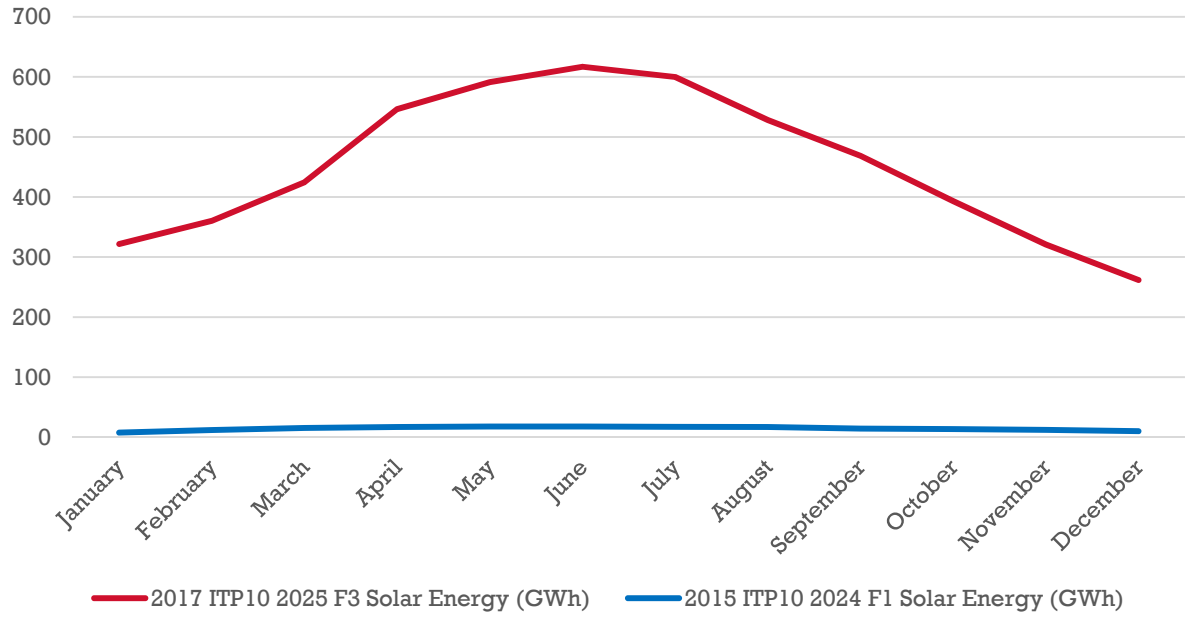
System LMPs


70
60
50
40
30
20
10
0
January
February
March
April
May
June
July
August
September
October
November
December
2015ITP10 2024 F1
2017ITP10 2025 F3

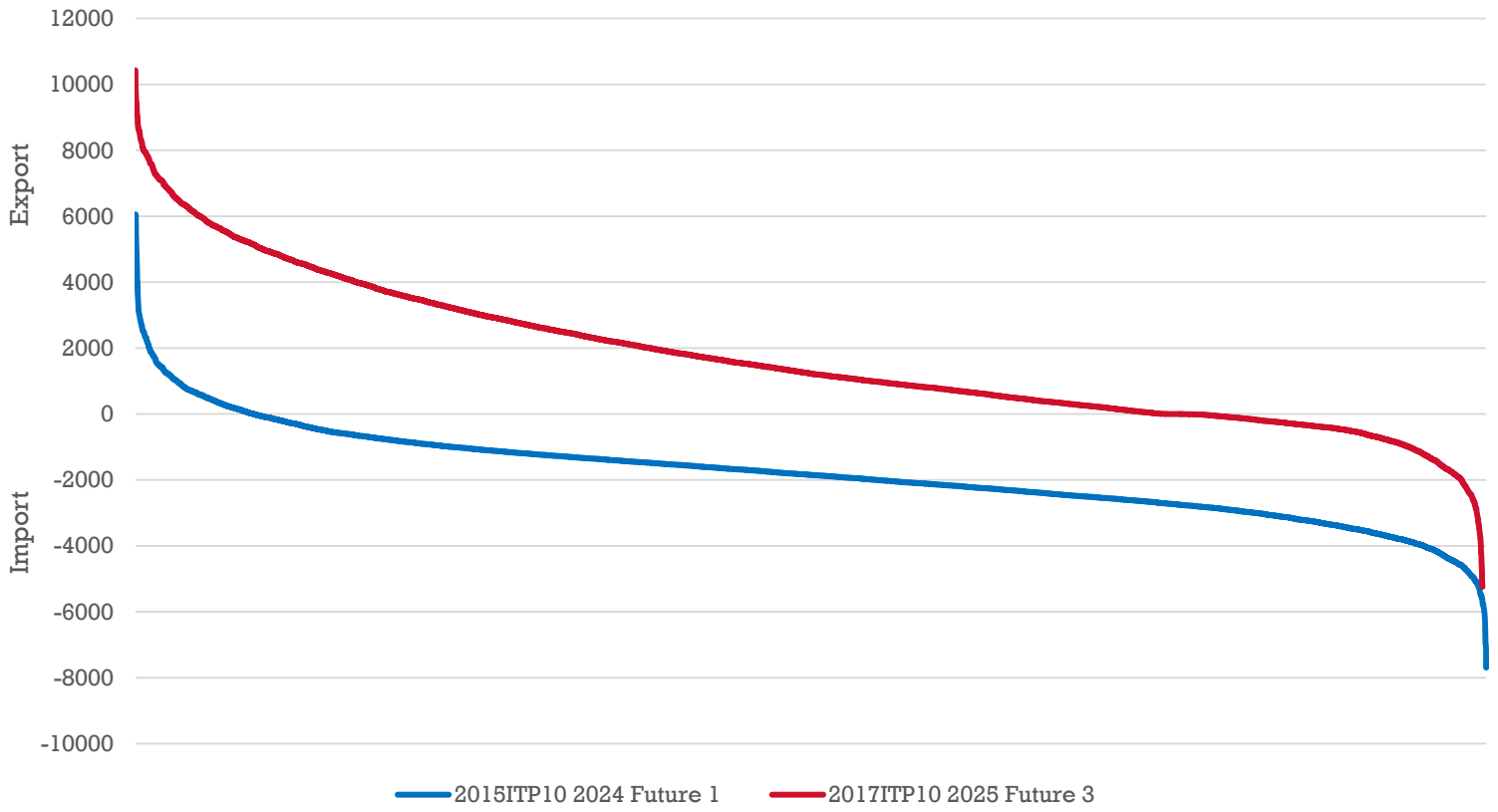
SPP Wind Output



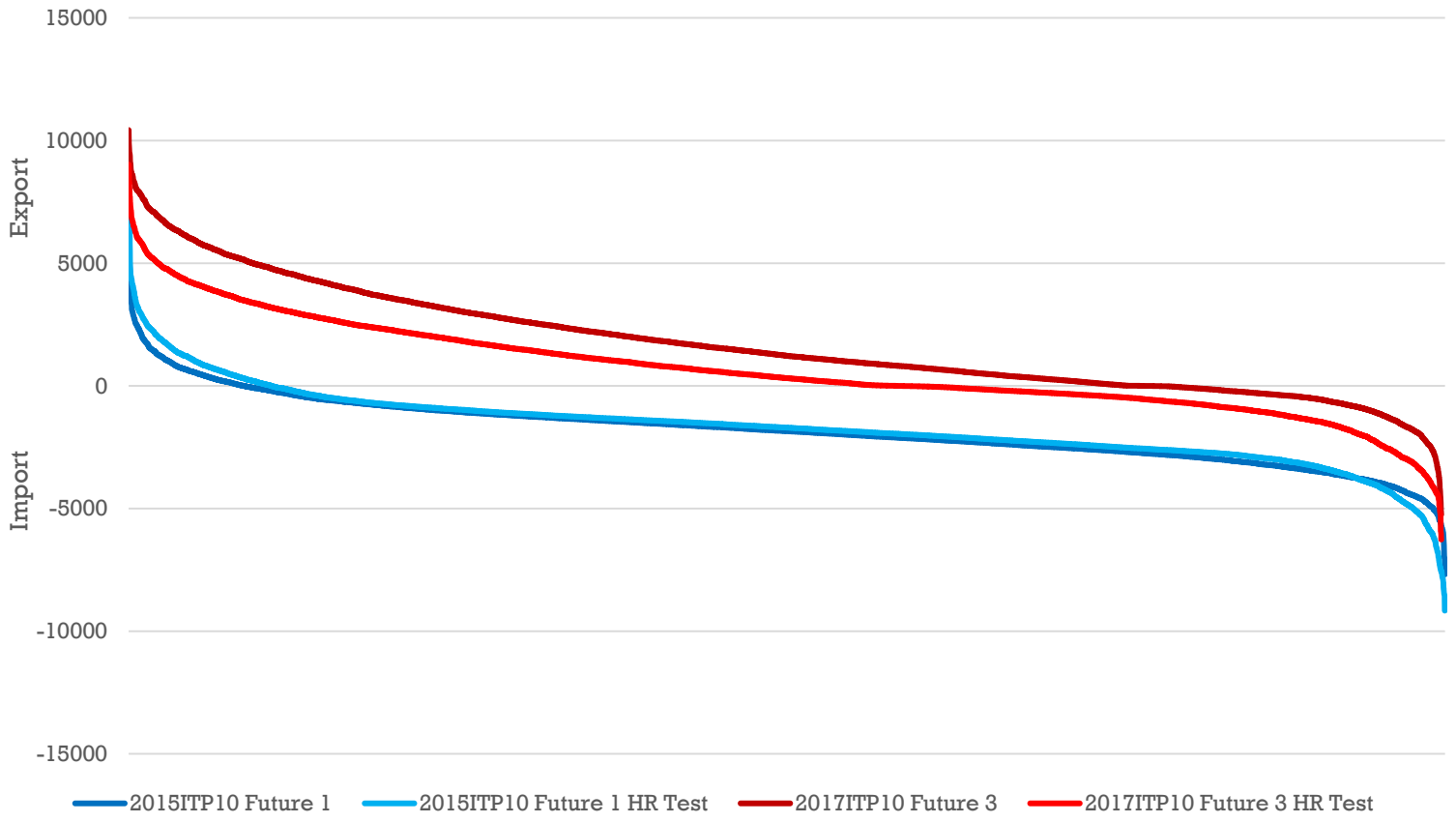
SPP Solar Output



Interchange



Hurdle Rate Testing



CPP Future Validation

- Capacity Factors and Average Cost per MWH
- Interchange (Import/Export)
- Renewable Generation Profiles
- Conventional Unit Behavior

*All results based on unconstrained model

Capacity Factors by Unit Type

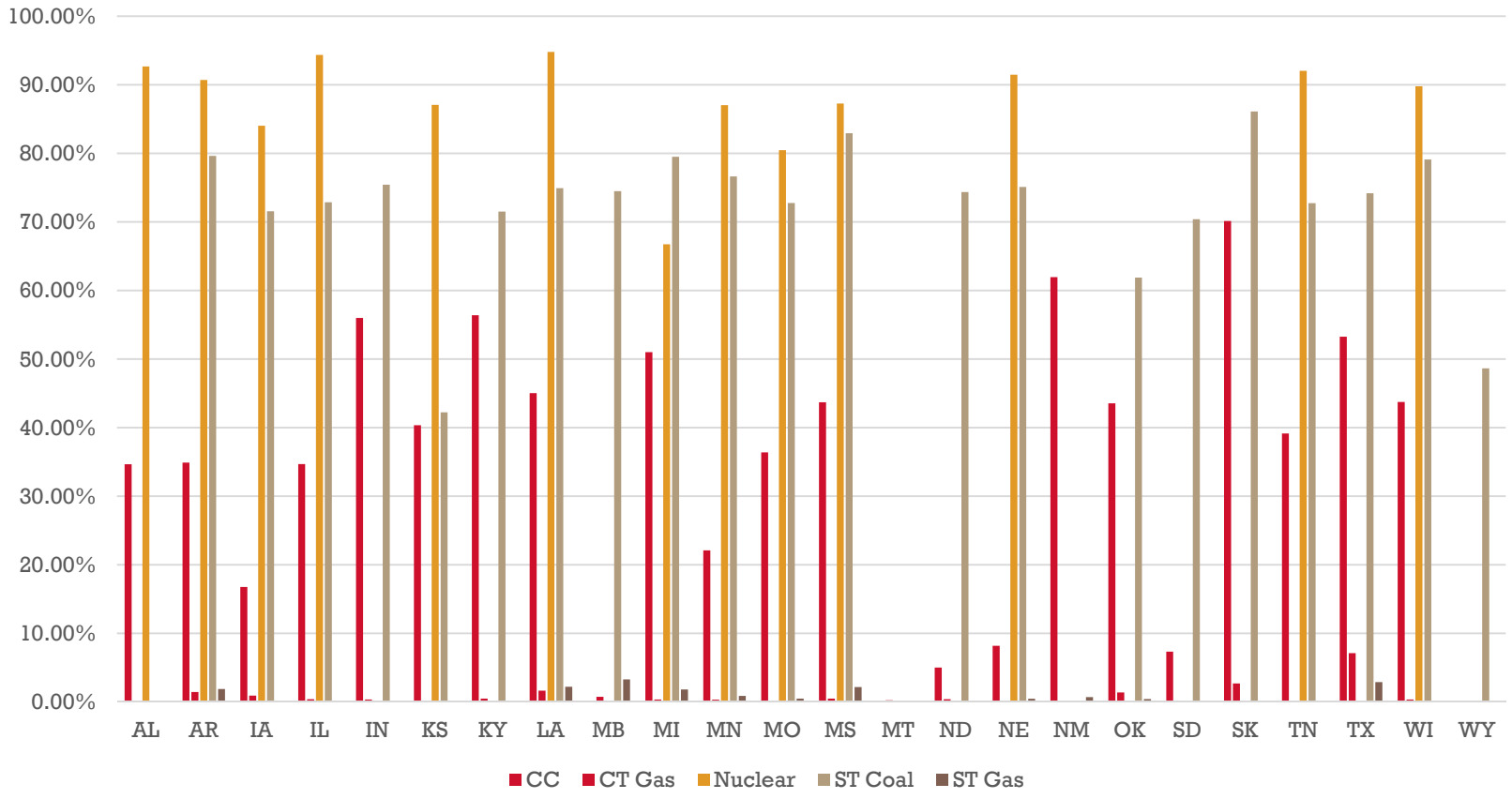
Unit Type	Future 1 2025	Future 2 2025	Future 3 2025
Nuclear	92.6%	92.6%	92.6%
Combined Cycle	42.9%	47.7%	35.1%
CT Gas	2.0%	2.4%	2.5%
Coal	66.5%	69.8%	86.1%
ST Gas	0.5%	0.8%	1.1%
Solar	22.7%	22.7%	20.5%
Wind	46.3%	46.3%	46.2%

Capacity Factors by Unit Type

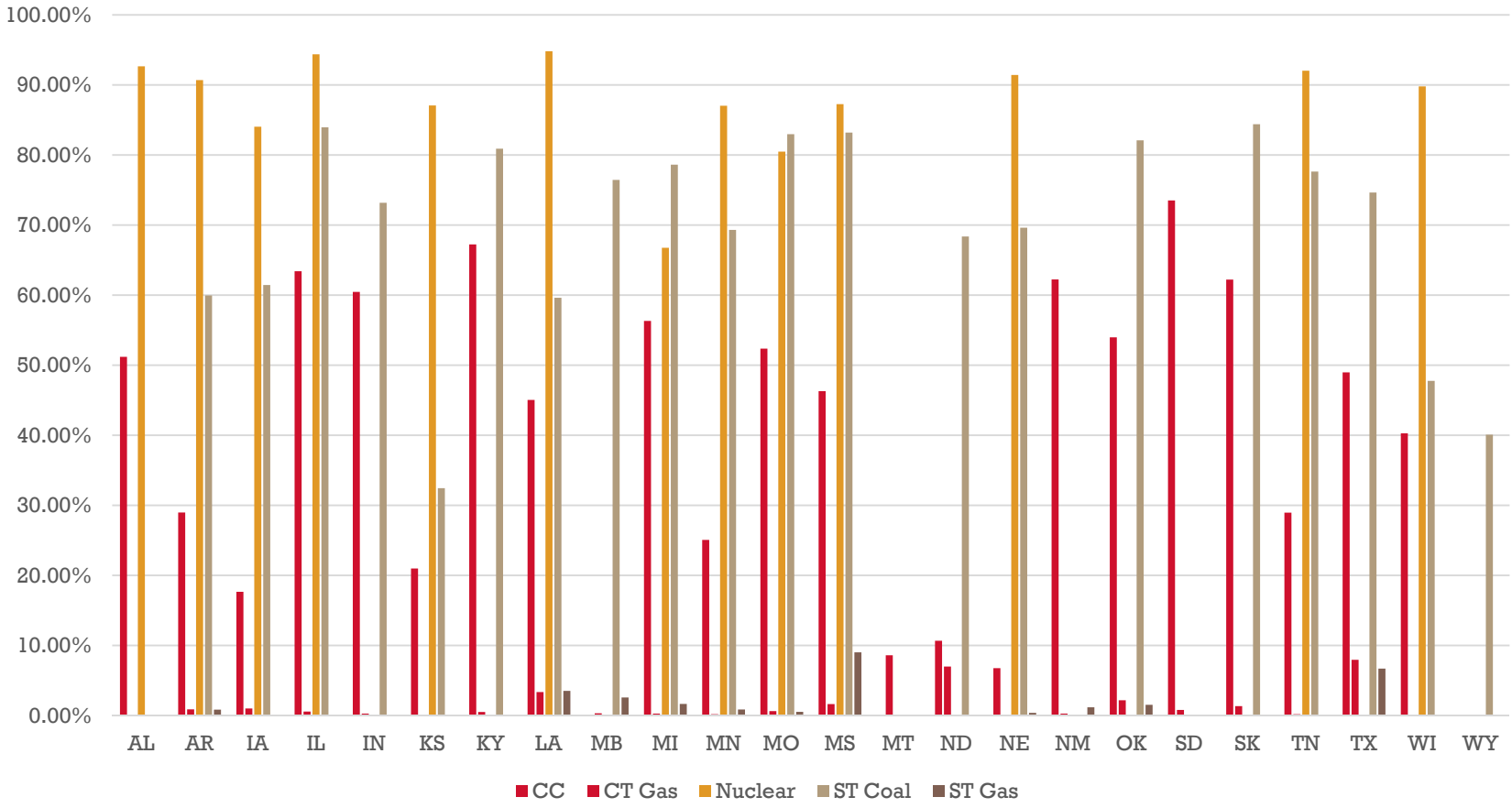
Annual Cost and Energy by Future

Unit Type	F1 2025 Avg $/MW	F1 2025 Annual Energy (GWh)	F2 2025 Avg $/MW	F2 2025 Annual Energy (GWh)	F3 2025 Avg $/MW	F3 2025 Annual Energy (GWh)
Nuclear	16.04	21764	16.04	21759	16.07	21760
CC	65.04	73302	60.60	83777	56.09	51483
CT Gas	105.29	1917	97.71	2358	87.37	2938
Coal	58.06	127646	53.67	129797	31.79	171913
ST Gas	114.60	425	101.40	761	88.42	1022

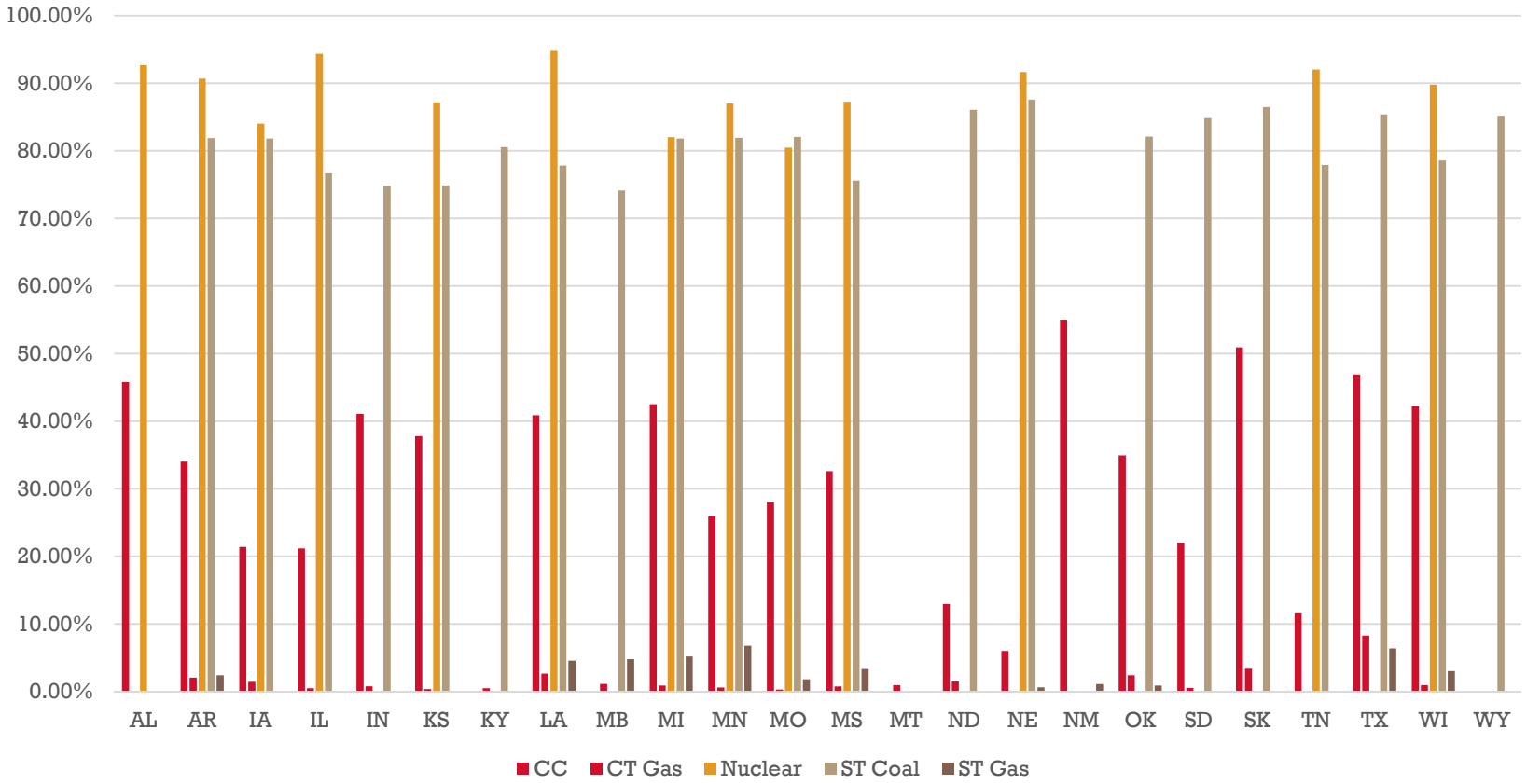
Capacity Factors by State – Future 1



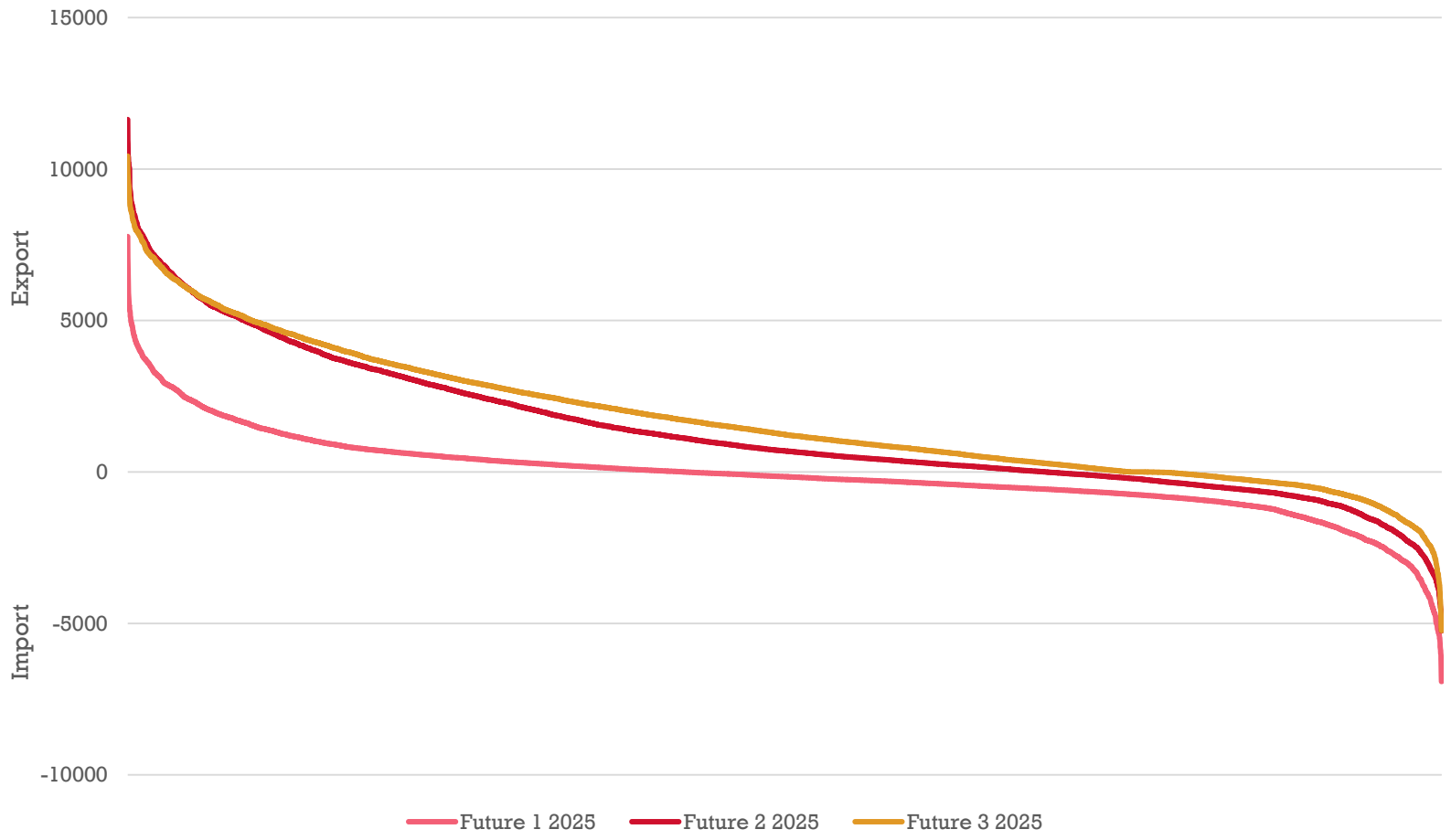
Capacity Factors by State – Future 2



Capacity Factors by State – Future 3

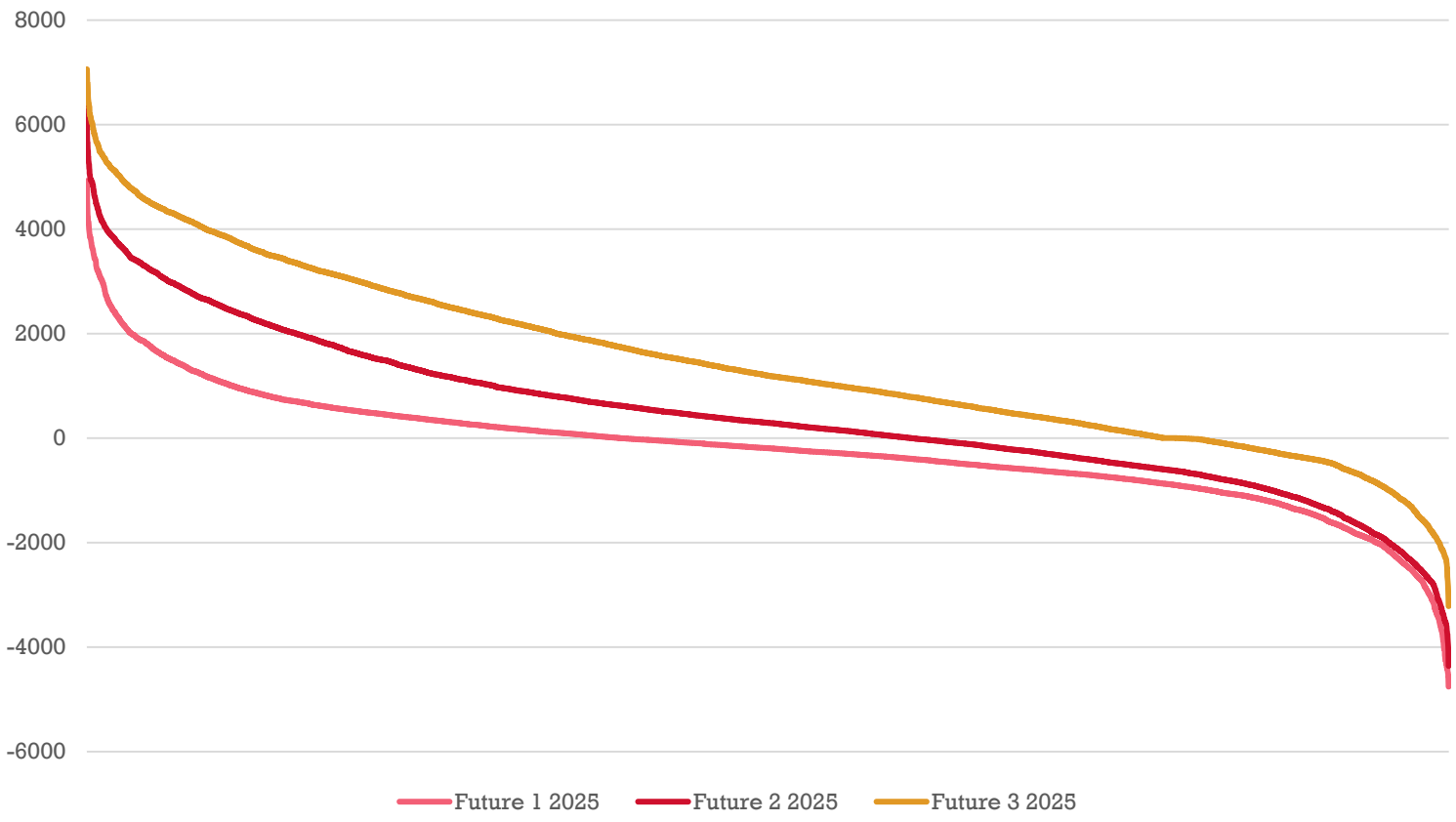


Interchange per Future



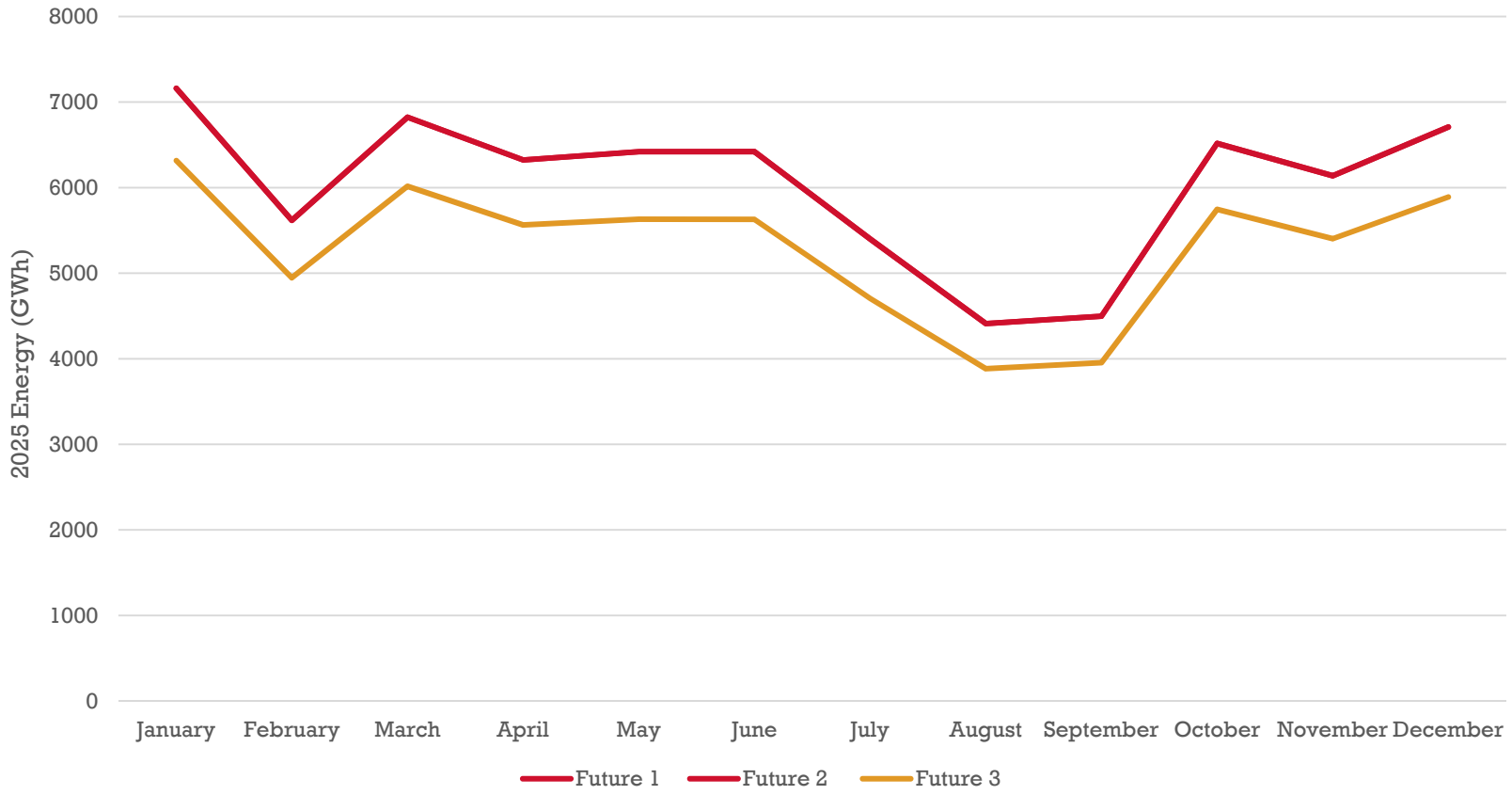
Unconstrained model

Interchange per Future

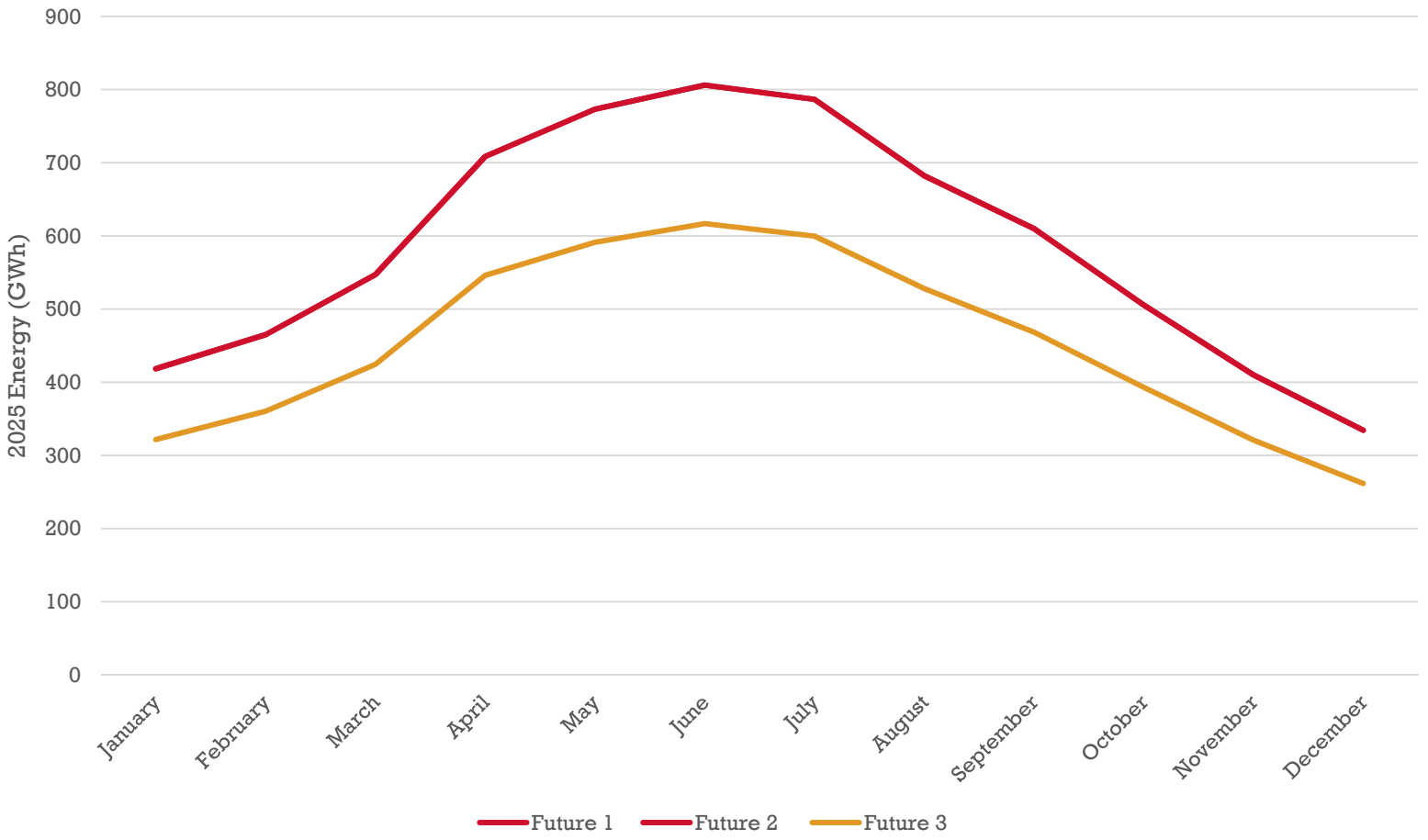


Book of Flowgates Event File model

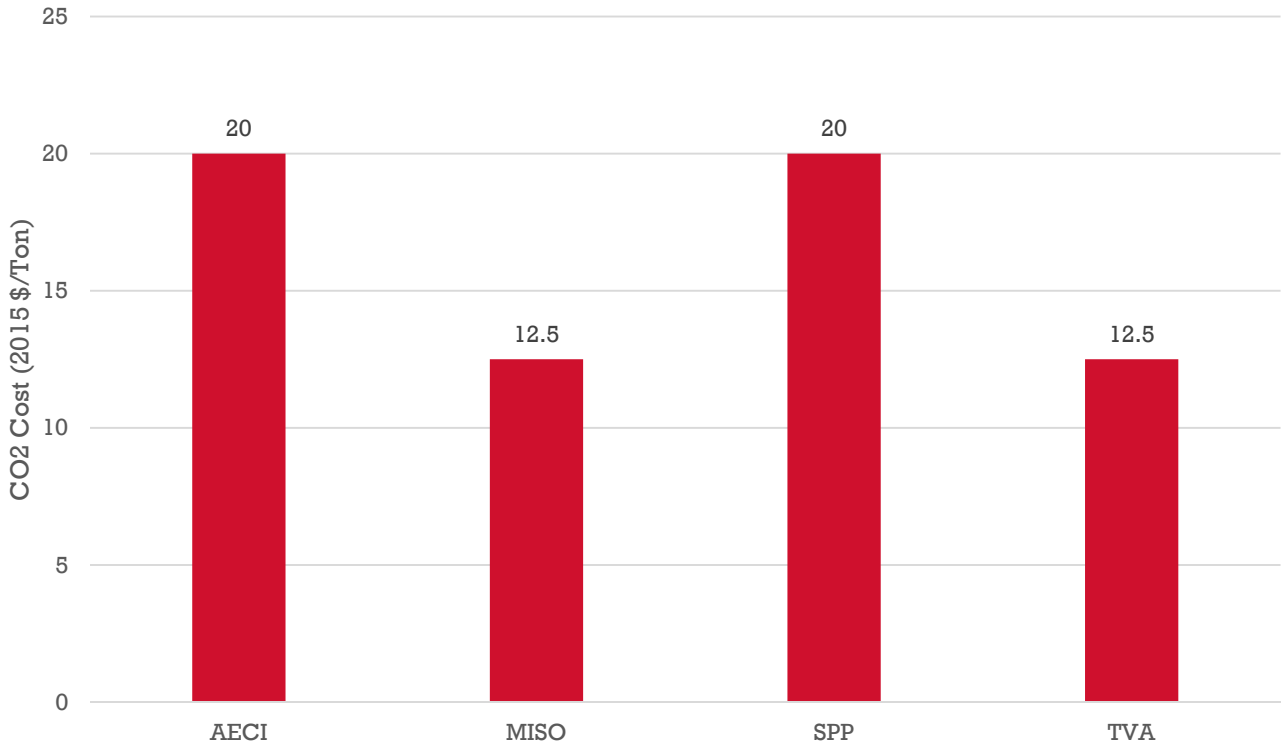
SPP Wind Output per Future



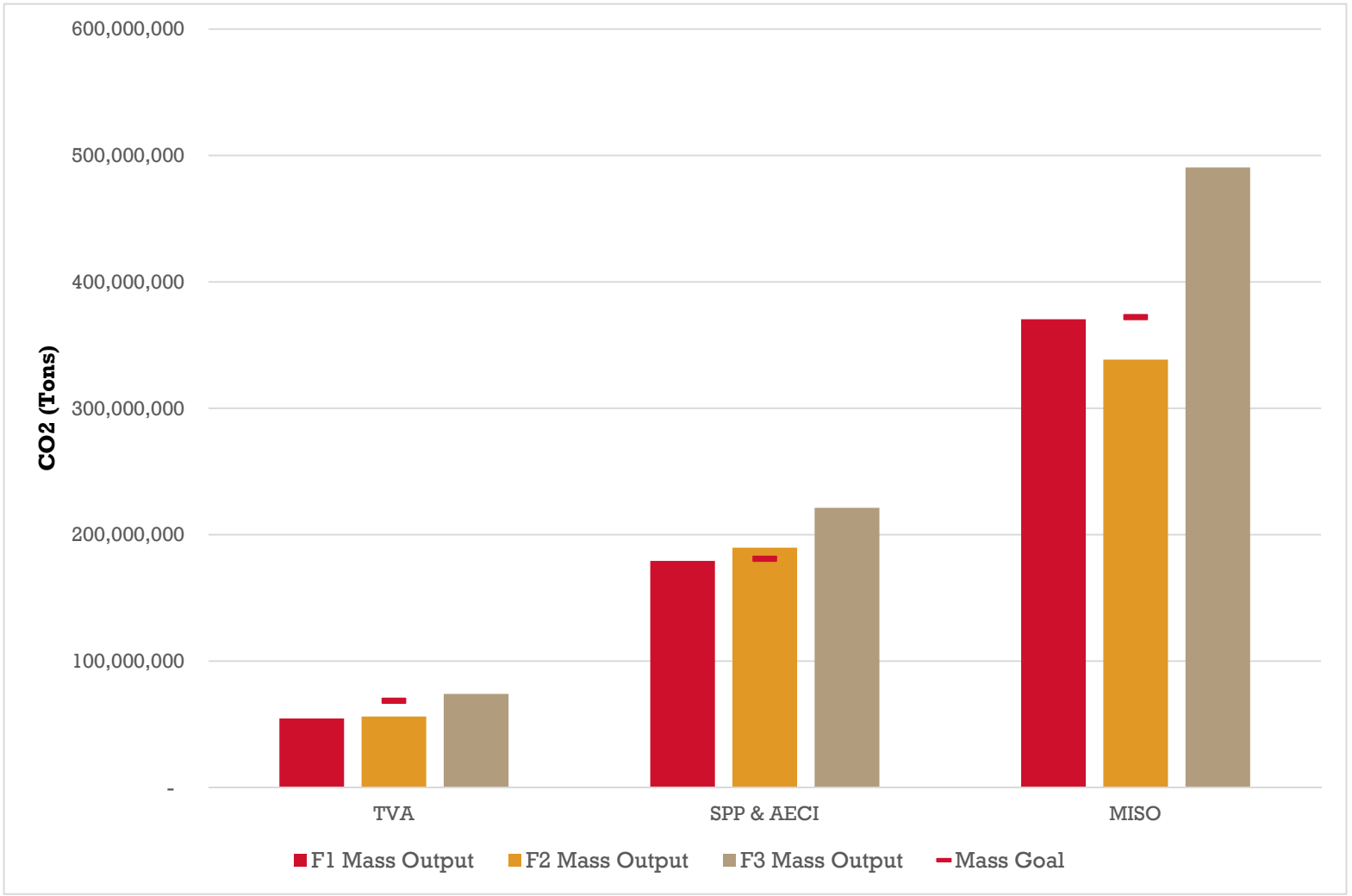
SPP Solar Output per Future



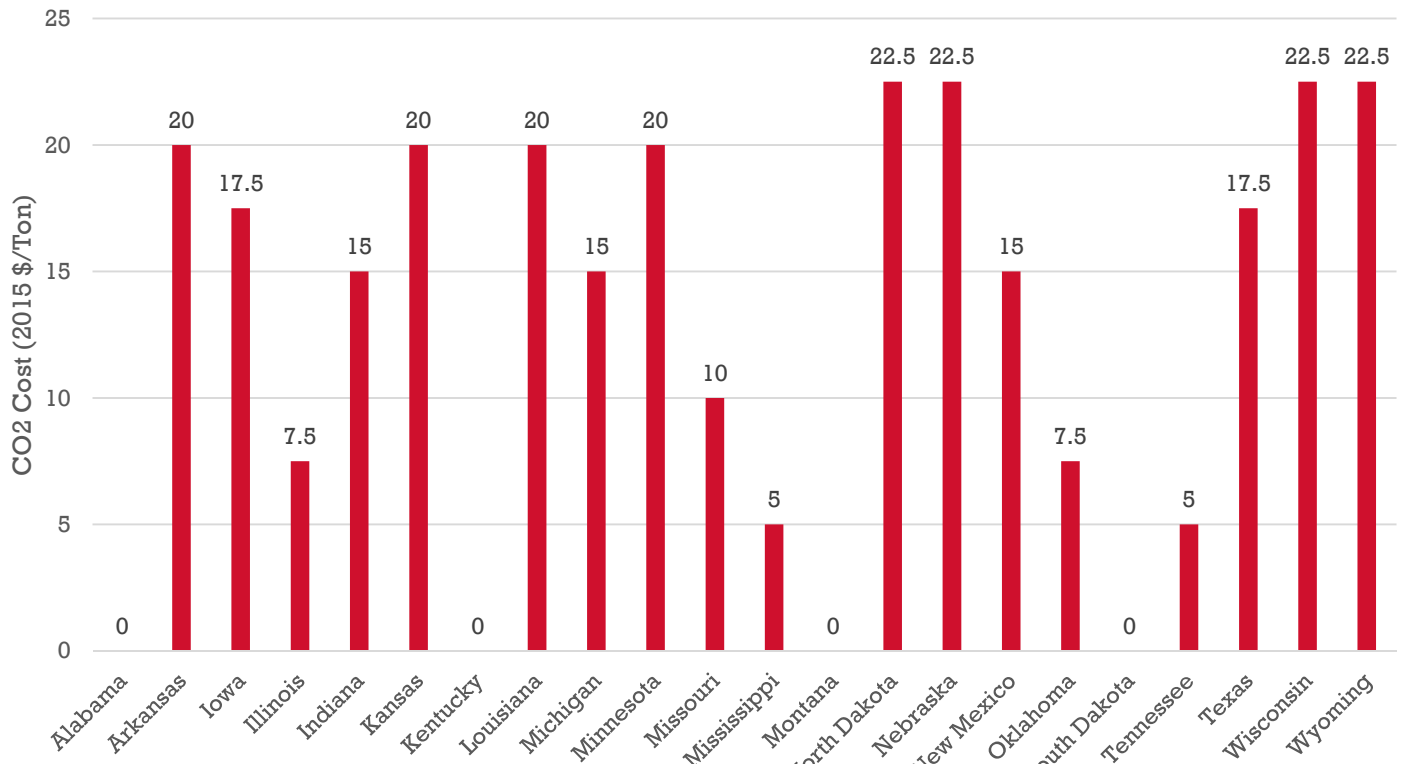
Regional Carbon Prices



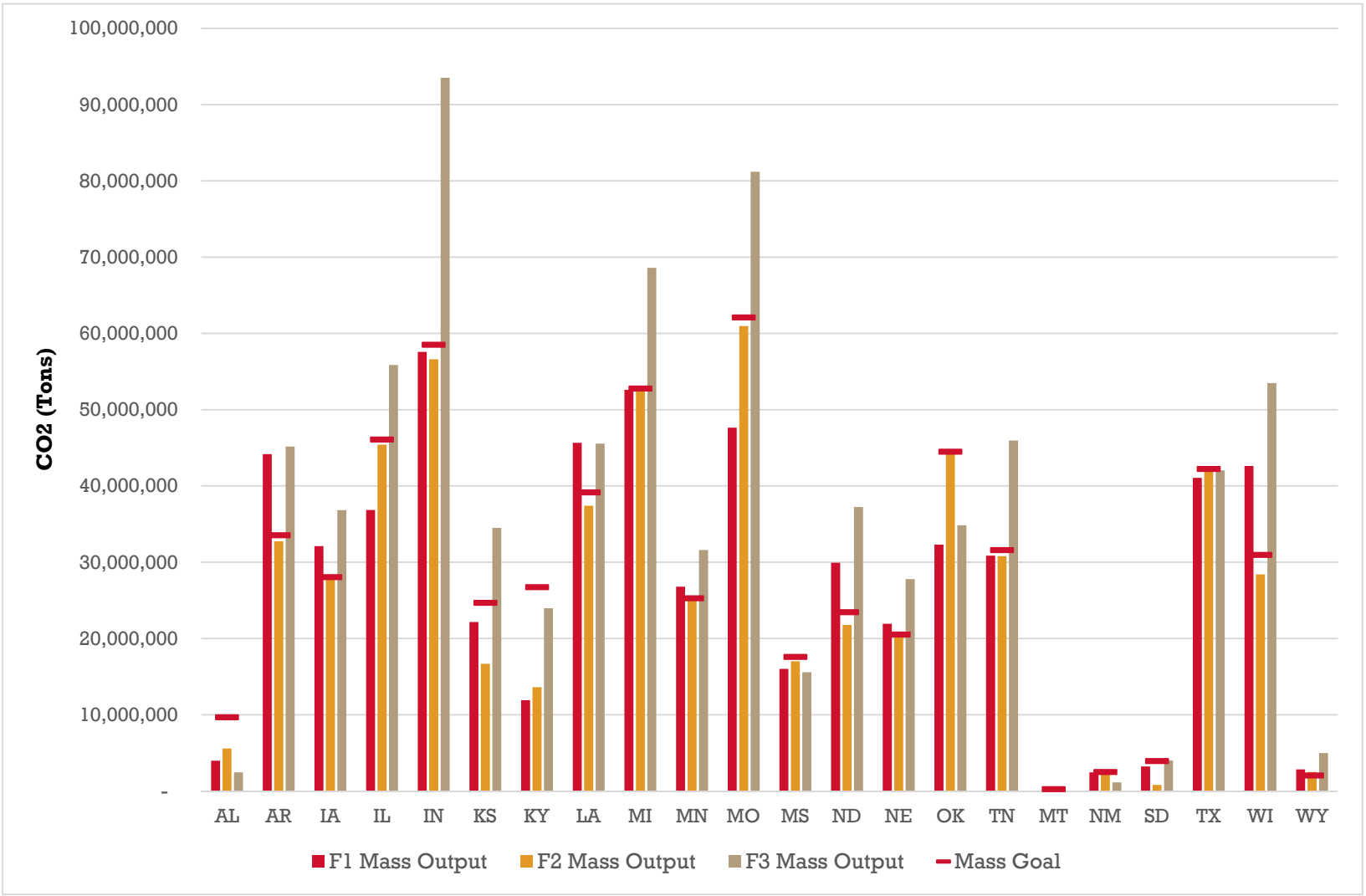
Regional Emissions by Future



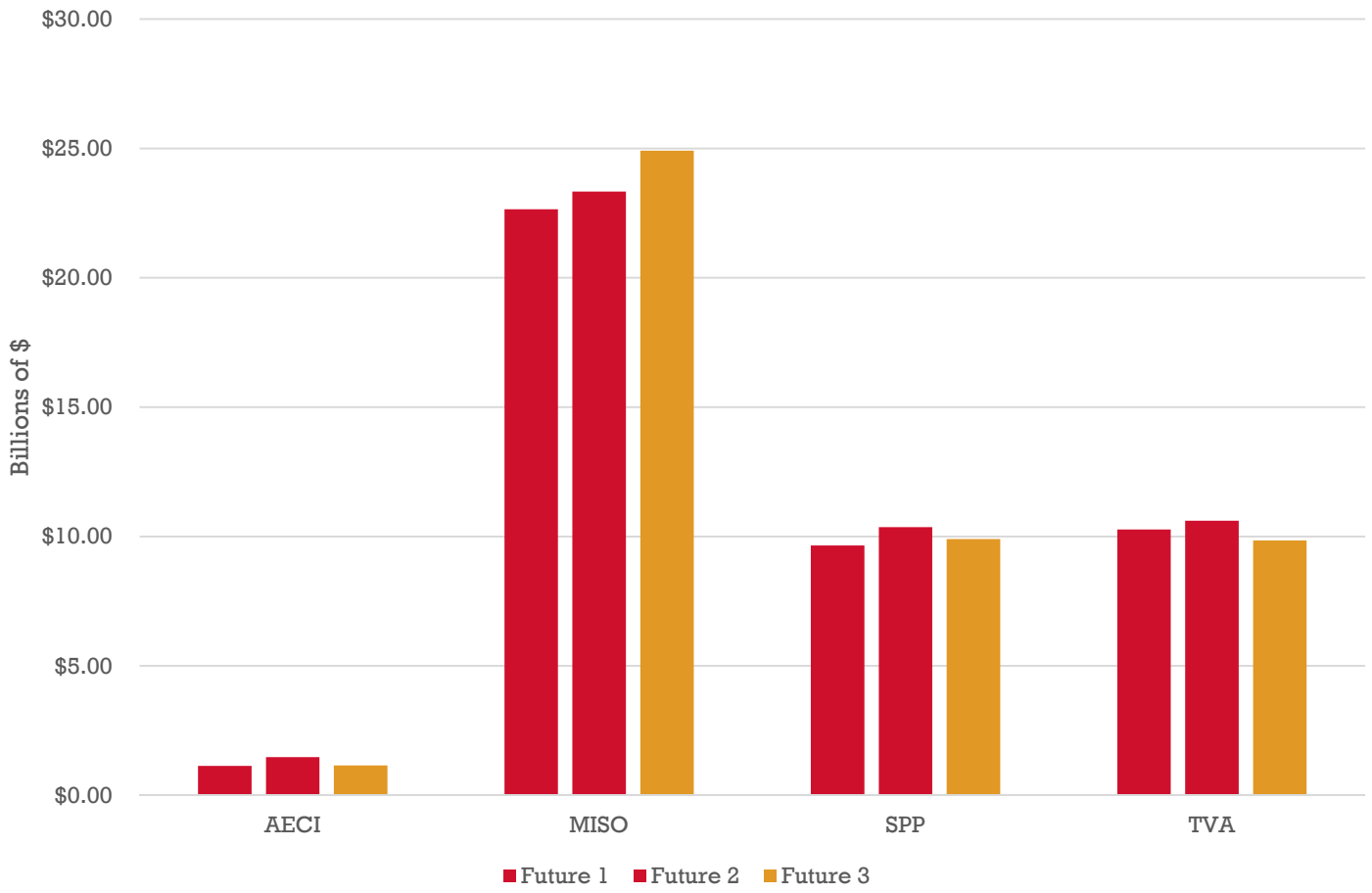
State by State Carbon Prices



State Emissions by Future



2025 Production Costs

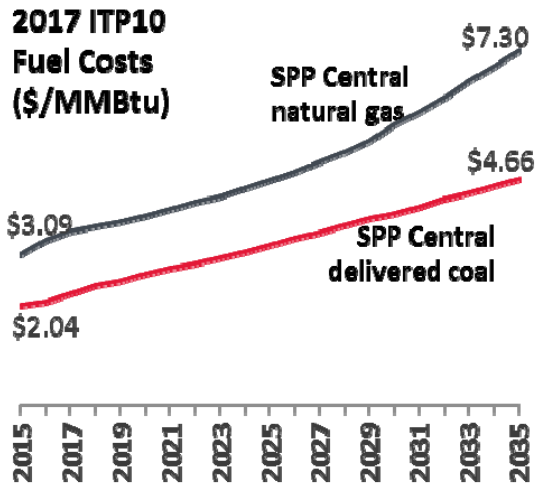


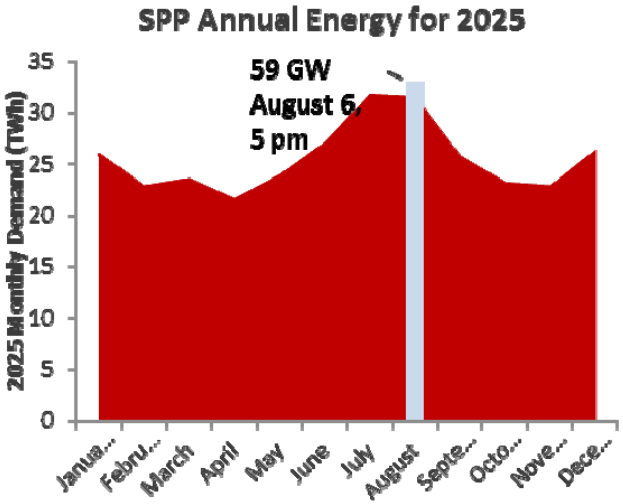
Next Steps

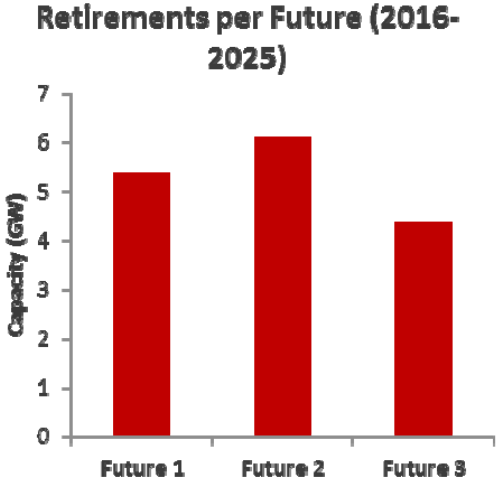
- Complete Benchmarking Analysis by March 3rd
- Post on March 10th for ESWG Approval on March 17th

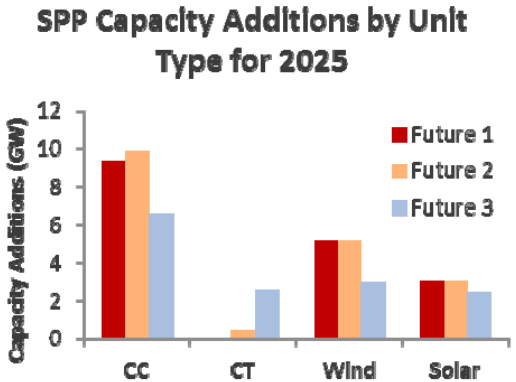
Appendix

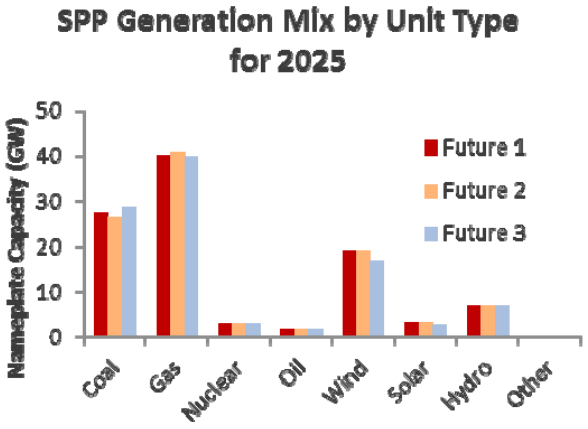
2017 ITP10 Input Assumptions

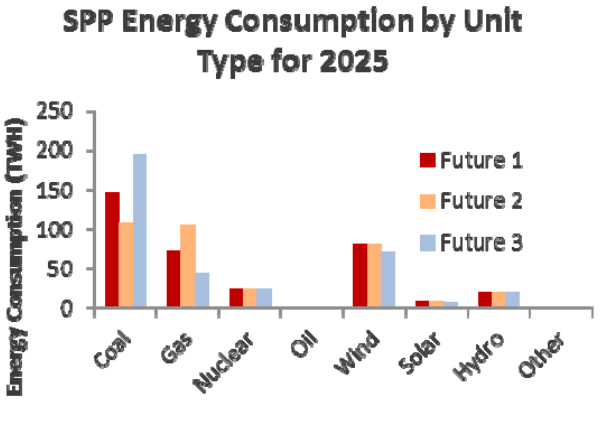




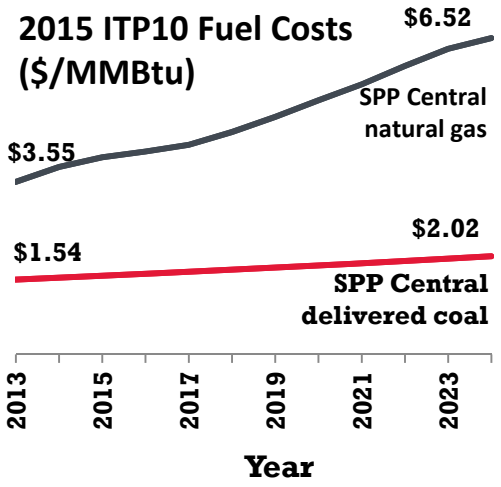


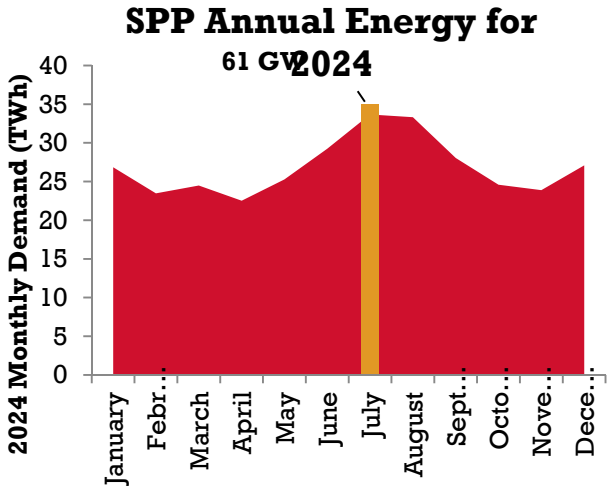


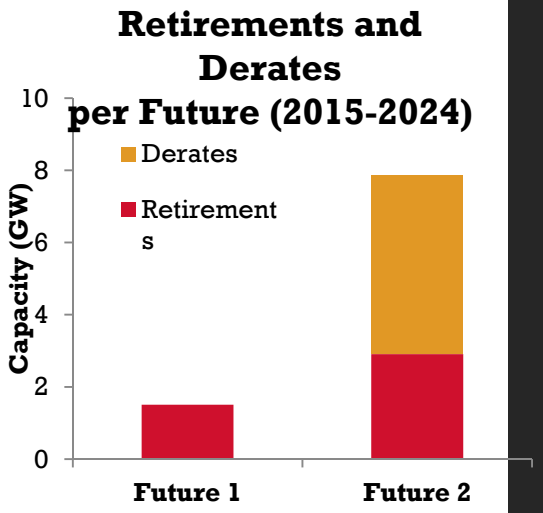


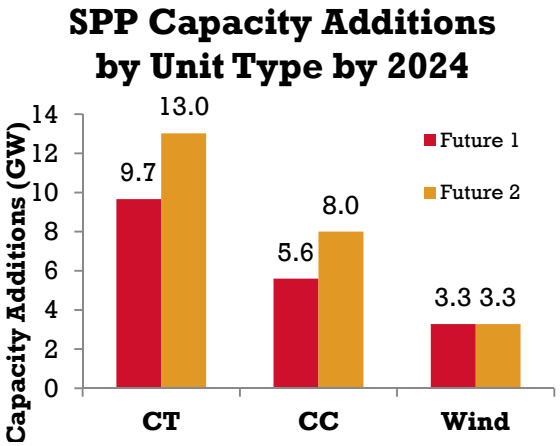


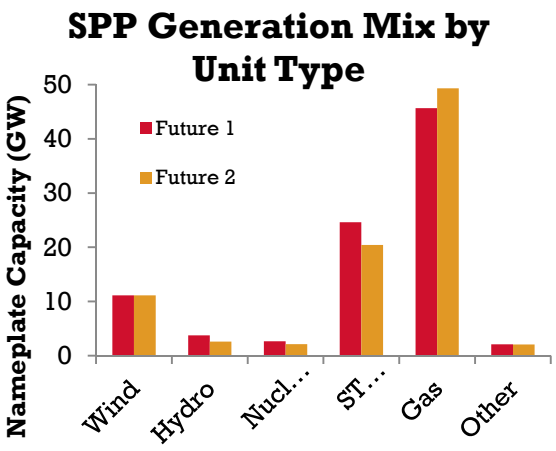
2015 ITP10 Input Assumptions

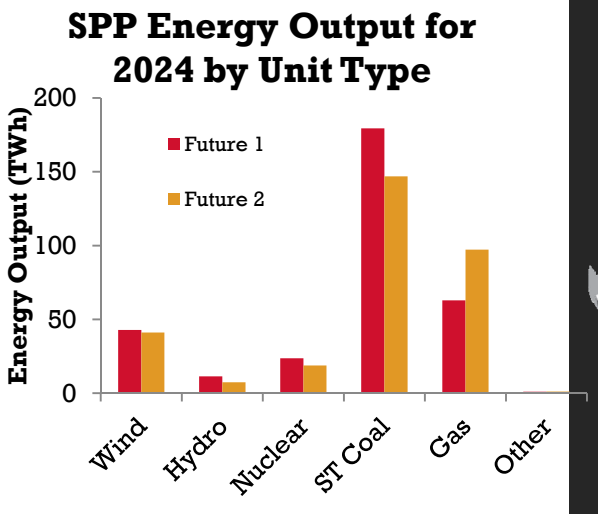













SPP
75th Anniversary
75
SEVENTY-FIVE YEARS OF
RELIABILITY THROUGH RELATIONSHIPS

Constraint Assessment

2017 ITP10

2015 ITP10 Methodology

Methodology Overview

- Create ITP base event file from SPP's Permanent Flowgate workbook
  - Contains PTDF's and OTDF's of interest to SPP
- Ran PROMOD 8760 with base event file
  - Feed results into PAT
- Use PROMOD dispatch in PAT to create contingency list utilizing Peak Hour for 8760 analysis
  - Create outages for elements exceeding 50% loading for 100kV+
  - Remove invalid contingencies

Methodology Overview

- Use PAT dispatch to create contingency list utilizing Peak Hour for Peak and Off-Peak analysis
  - Create outages for elements exceeding 50% loading for 100kV+
  - Remove invalid contingencies
- Use corresponding contingency list for monitored element creation
  - Monitor elements 100kV+
  - Threshold for binding hours:
    - SPP: 800
    - Non-SPP: 1200

2017 ITP10 Methodology

Contingency Creation

- Simulated two PROMOD 8760 runs
  - Copper Plate Event File
  - Event file containing SPP's Permanent Flowgate events
- Determine Peak and Off-Peak hours
  - High load (Peak): August 6th at 5 pm
  - High wind-to-load (Off-Peak): January 4th at 5 am
- Use PROMOD dispatch in PAT to create 8760 contingency list
  - Create outages for elements exceeding 50% loading for 100kV+ in Peak and Off-Peak hours
  - Create outages for elements exceeding 25% loading for 200kV+ in Peak and Off-Peak hours (SPP Only)

Contingency Creation (Con't)

- Use PAT to create Peak and Off-Peak contingency lists based on PAT dispatch in respective hour
  - Create outages for elements exceeding 50% loading for 100kV+
  - Create outages for elements exceeding 25% loading for 200kV+ (SPP Only)
- Remove invalid contingencies
  - 2016 Near Term invalid contingency list
  - 2015 ITP10 invalid contingency list
- Include contingencies identified in SPP's Permanent Flowgate workbook in all contingency lists
- Include contingencies identified in SPP's Temporary Flowgate list in all contingency lists

Event Creation

- Utilize respective validated contingency lists for 8760, Peak, and Off-Peak analyses
- Monitored element selection:
  - Include monitor elements 100kV+
  - Violated hour threshold:
    - SPP: 800 hours
    - Non-SPP: 1200 hours
    - New monitored elements below set thresholds included
  - PROMOD congestion score
  - PROMOD emergency generation
- Combine results and validate events
- Stakeholder feedback

Constraint Assessment Update

- Currently validating events
- Expecting to post March 3rd for March 10th Approval