Southwest Power Pool

Economic Studies Working Group

March 15, 2018

41st Floor AEP Offices, Suite 4103 – Dallas, TX

• SUMMARY OF ACTIONS TAKEN •

1. Approved RR 276 with the current language and an $8/MWH VOM
2. Approved a motion that sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone
3. Approved a motion to keep the assumption that future proxy wind will not have transmission service, based on current trends, and will not be included in a load serving entity's rates
4. Approved a motion to apply the implementation of the following assumptions to all existing resources:
    a. Sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone
    b. All generation without firm transmission service to load should be subject to generator LMP price
5. Approved a motion to assume that proxy conventional and solar generation will obtain transmission service and through those arrangements will be included in a load serving entity's rates
6. Approved implementation of the curtailment price methodology for the 2019 ITP Assessment
7. Approved a recommendation for no additional ITP manual changes to renewable pricing for the 2019 ITP Assessment due to the potential risks to the schedule
8. Approved the policy additions for Phase 1 of the resource plan as posted with the discussed changes: Zero shortfalls for MRES and Zero shortfalls for KEPCO
9. Approved a motion to close out action item 173

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

March 15, 2018

41st Floor AEP Offices, Suite 4103 – Dallas, TX

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

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

There were 21 in-person participants and 46 web conference participants, representing 16 of 17 ESWG members. (Attachment 1 – March 15, 2018 Attendance List)

Agenda Item 1b – Receipt of Proxies

Alan Myers (ITC) asked for any proxy statements; four proxies were identified.

- Leon Howell (OGE) named Zac Hager (OGE) as his proxy.
- Natasha Henderson (GSEC) named Evan Racine-Johnson (GSEC) as her proxy.
- Jody Holland (SCMCN) named Eric Burkey (SCMCN) as his proxy.
- Al Tamimi (SUNC) named Ryan Yokley (SUNC) as his proxy.

(Attachment 1a – Proxy Statements)

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. (Attachment 2 – March 15, 2018 ESWG Agenda).

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

Agenda Item 2 – Review of Past Action Items

Amber Greb (SPP) reviewed the list of past action items and asked for any comments or questions. (Attachment 3 – Past Action Items)

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

a. Meeting Minutes – February 22nd, 2018

The Consent Agenda was approved unanimously.

Agenda Item 4 – ITP Items

Agenda Item 4a – Renewable Pricing Revision Request

Chris Jamieson (SPP) discussed the Renewable Pricing Revision Request to finalize VOM price. He informed the group of additional comments that were received outside of comment period. Chris provided the group with an overview of all comments received. The members discussed their preference for zero or eight dollars with stakeholders speaking up for both values. The conversation continued until the group made a motion. (Attachment 4a – RR 276 Renewable Pricing VO&M)

John Olsen (Westar) made a motion; seconded by Anita Sharma (AEP) to approve RR 276 with the current language and a $0/MWH VOM recommendation. The motion failed, 9 to 7.

Evan Racine-Johnson (GSEC) made a motion; seconded by Jon Iverson (OPPD) to approve RR 276 with the current language and an $8/MWH VOM recommendation. The motion was approved, with two abstention, Bethany King (EMDE) and Jon Olsen (Westar).

John Olsen (Westar) - "I abstained on the $8/VOM vote for the $0/VOM is the appropriate value for wind generation. It is consistent with current market rules concerning short-run marginal costs and how other units are modeled in the economic dispatch model. I did not vote against the $8/VOM value because if it too failed, the current process in the ITP manual would be the approach used, which is less desirable than the $8/VOM."

Action Item: Staff to write Recommendation Report for MOPC

Agenda Item 4b – Rate-Payer Benefits and the APC Calculation

Chris Jamieson reviewed a presentation on Rate-Payer Benefits and APC Calculation. The words "rate base" were replaced by "rates" throughout the posted presentation, as it is a more precise phrase. Chris went over the assumptions and recommendations with stakeholders. (Attachment 4b – Rate-Payer Benefits and the APC Calculation)

Anita Sharma (AEP) made a motion; seconded by John Olsen (Westar) to approve assumption 1, sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone. The motion was approved, with one "No" vote, Evan Racine-Johnson (GSEC).

"GSEC voted No for the following reasons: GSEC should not pay for transmission built for energy-only resources of other IOUs. Those with energy-only resources that want transmission built, should request firm transmission and pay for the transmission accordingly, rather than requiring it to be subsidized by those that do not benefit."

Tim Owens (NPPD) made a motion; seconded by Bennie Weeks (Xcel/SPS) to keep the assumption that future proxy wind will not have transmission service, based on current trends, and will not be included in a load serving entity's rates. The motion was approved unanimously. *This motion is confirming a previously approved motion.*

Tim Owens (NPPD) made a motion; seconded by Bennie Weeks (Xcel/SPS) to apply the implementation of the following assumptions to all existing resources:

- **Sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone**
- **All generation without firm transmission service to load should be subject to generator LMP price**

The motion was approved, with one "No" vote, Evan Racine-Johnson (GSEC) and two abstentions, Anita Sharma (AEP) and John Olsen (Westar).

John Olsen (Westar) "Abstained on the vote for Assumption #2. The exact approach for how this will be implemented was not clear. I agree with the concept, but would like to see how it will be implemented before approving. There may be multiple ways to meet the words, which may not be consistent with my expectation of the intent."

"GSEC voted No, since this motion is predicated on the previous motion to which GSEC objects."

Bennie Weeks (Xcel/SPS) made a motion; seconded by Gayle Nansel (WAPA) to assume that proxy conventional and solar generation will obtain transmission service and through those arrangements will be included in a load serving entity's rates. The motion was approved with two abstentions, Evan Racine-Johnson (GSEC) and Tim Owens (NPPD).

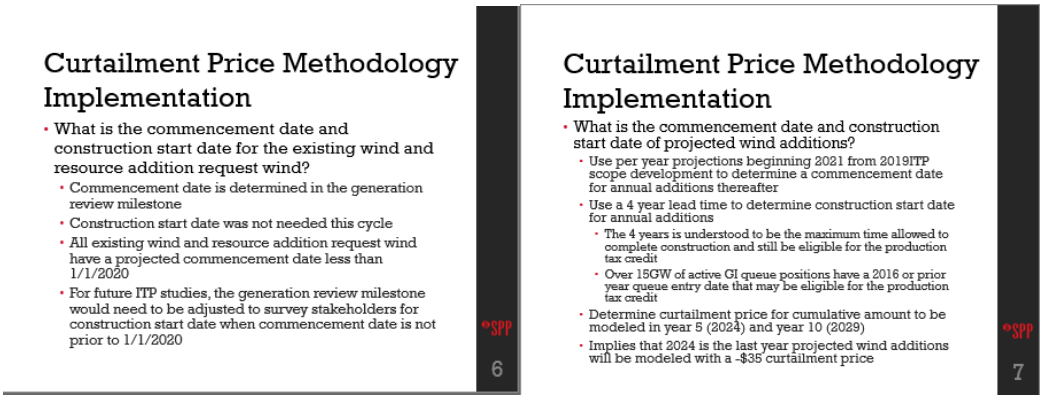
"NPPD abstained from this vote, based on our earlier objection to the way in which proxy renewable resources, including wind & solar, are being allocated to load zones as part of the resource plan

development. We do not object to the recommended assumption regarding conventional proxy resources." Tim Owens (NPPD)

Agenda Item 4c – Renewable Curtailment Price

Agenda Item 4ci – Implementation

Chris Jamieson (SPP) reviewed presentation on the 2019 ITP Renewable Curtailment Price implementation. Chris reviewed the curtailment price methodology implementation; see slides (6-7) below. Chris discussed using the commencement date and construction start date as implementation decision points for determining whether the production tax credit is a factor in operation of a wind resource. (Attachment 4ci -Renewable Curtailment Price Implementation)



Jon Iverson (OPPD) made a motion; seconded by Kurt Stradley (LES) to approve the implementation of the curtailment price methodology (as show above) for the 2019 ITP. The motion was approved, with one abstention, Evan Racine-Johnson (GSEC).

"GSEC Abstained for the following reason. We understand that the ITP process had some unique challenges due to its being in a state of transition. GSEC concurs that the ITP process should not be delayed, but in that case implementation time should be factored in accordingly in case (inevitable) revisions are desired by Members. In the next iteration, the Oklahoma PTC should be considered at a minimum."

Agenda Item 4cii – Renewable Curtailment Price Action Item

Chris Jamieson (SPP) reviewed a presentation on the Renewable Curtailment Price Action Item. The group discuss adjusting the manual to incorporate this topic in the scope. It was suggested that the ITP manual should describe a calculation methodology and the assumptions of the calculation would be set in the scope document. (Attachment 4cii - Renewable Curtailment Price Action Item)

Kurt Stradley (LES) made a motion; seconded by Gayle Nansel (WAPA) to approve staff's recommendation for no additional ITP manual changes to renewable pricing for the 2019 ITP due to the potential risks to the schedule. The motion was approved, with one abstention, Evan Racine-Johnson (GSEC).

Any GSEC Abstention votes that were made subsequent to item 4cii, on related ad-hoc approval items, were for a similar reason to above; i.e. we understand the time constraints and possible impacts to the ITP Schedule.

Action Item: Staff to begin working on an RR for the next cycle (2020)

Agenda Item 5 – 2019 ITP Items

Agenda Item 5a – Schedule

Juliano Freitas (SPP) informed the group of the 2019 ITP schedule status and projected hours. Juliano reviewed the schedule up to the Benchmarking milestone. (Attachment 5a – 2019 ITP Schedule)

Agenda Item 5b – Resource Plan for Policy Requirements

Amber Greb (SPP) presented the Resource Plan for Policy Requirements. Amber reviewed the results and discussed stakeholder's changes. MRES stated that resources in MISO were meeting their renewable requirements. Westar stated that the KEPCO requirements were being covered by Westar resources (This was verified by KEPCO after the meeting) (Attachment 5b – 2019 ITP Resource Plan Phase I)

> **Jeremy Severson (Basin) made a motion; seconded by Evan Racine-Johnson (GSEC) to approve the policy additions for Phase 1 of the resource plan as posted with the discussed changes: Zero shortfalls for MRES and Zero shortfalls for KEPCO. The motion passed unanimously.**

Agenda Item 5c – 2019 ITP External Resource Planning

Nikki Roberts (SPP) reviewed the 2019 ITP External Resource Plan and provided high-level details of MTEP18 evaluation process and findings. Due to our non-disclosure agreement with MISO, some details were not included in the presentation and will be posted to GlobalScape after the meeting. An email vote will be requested seven days after posting. (Attachment 5c - 2019 ITP External Resource Planning)

Agenda Item 5c – Siting

Liz Gephardt (SPP) provided an update on sitting plan. Liz provided a high-level schedule for future touch points with the group. (Attachment 4g – 2019 ITP Siting Plan)

Agenda Item 5d – AI 173 Economic Model using vendor data

Clayton Mayfield (SPP) spoke about ESWG Action Item 173. The action item states "Staff to develop a process for annual update of the economic model with vendor data." Clayton updated the ESWG implementation of action item. (Attachment 5d - AI 173 Economic Model using vendor data)

> **Jeremy Severson (Basin) made a motion; seconded by John Olsen (Westar) to close Action Item 173. The motion was approved unanimously.**

Agenda Item 5e – Resource Planning Phase 2

Amber Greb (SPP) reviewed presentation Resource Planning Phase II. Amber provided an overview of the milestone and reviewed resource-planning decision Tree. She reminded the group of upcoming review dates. (Attachment 5e - Resource Planning Phase 2)

Agenda Item 5f – Economic Model Build

Clayton Mayfield (SPP) provided an update on Economic Model Build and informed the group of schedule and expectations. (Attachment 5e - Resource Planning Phase 2)

Closing Items

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

List of action items from the meeting:

1. Write Recommendation Report for MOPC
2. Staff to begin working on an RR for the next cycle (2020) - (Renewable Curtailment Price Action Item)

The meeting was adjourned at 2:28 PM

Respectfully Submitted,

Amber Greb

ESWG Secretary

Participant Name	Email	Participatio
Alan Myers	ITC	In Person
Amber Greb	SPP	In Person
Anita Sharma	AEP	In Person
Bennie Weeks	Xcel/SPS	In Person
Calvin Daniels	WFEC	In Person
Chris Jamieson	SPP	In Person
Don Frerking (KCP&L)	KCPL	In Person
Eric Burkey	SCMCN	In Person
Evan Racine-Johnson	GSEC	In Person
Gayle Nansel	WAPA	In Person
Jarrod Wolford	NTEC	In Person
Jason Davis	SPP	In Person
Jeremy Severson	BEPC	In Person
John Olsen	Westar	In Person
Jon Iverson	OPPD	In Person
Juliano Freitas	SPP	In Person
Kurt Stradley	LES	In Person
Ryan Yokley	SUNC	In Person
Tim Hall	Southern Power	In Person
Tim Owens	NPPD	In Person
Wayne Penrod	SUNC	In Person

on

From: Howell, Leon
Sent: Monday, March 12, 2018 2:38 PM
To: Alan Myers (amyers@itcgreatplains.com) <amyers@itcgreatplains.com>; Amber Greb <agreb@spp.org>
Cc: Hager, Zac <HagerZC@oge.com>
Subject: **External Email** 3/15 ESWG proxy

Alan and Amber,
I designate Zac Hager as my proxy for the March 15, ESWG meeting.
Leon

From: Evan Racine-Johnson <ERacine-Johnson@gsec.coop>
Sent: Thursday, March 15, 2018 7:36 AM
To: Myers, Alan <amyers@itctransco.com>; Amber Greb <agreb@spp.org>
Cc: Henderson, Natasha <nhenderson@gsec.coop>
Subject: **External Email** Fwd: Evan Racine-Johnson has my proxy for today

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Hi Alan/Amber

Please find Natasha's proxy for me below!

Get Outlook for iOS

From: Natasha Henderson
Sent: Thursday, March 15, 2018 6:53:02 AM
To: Amber Greb
Cc: Evan Racine-Johnson
Subject: Evan Racine-Johnson has my proxy for today

Evan can you forward to Alan? My new phone does not have his contact information.

Thanks!
Natasha Henderson
Sent from my iPhone

From: Holland, Jody
Sent: Friday, March 09, 2018 4:20 PM

To: Alan Myers (amyers@itcgreatplains.com) <amyers@itcgreatplains.com>; Amber Greb <agreb@spp.org>
Cc: Burkey Eric <eburkey@gridliance.com>
Subject: **External Email** proxy for 3/15 ESWG meeting

Alan and Amber,

Eric will carry my proxy for the 3/15 ESWG meeting while I'm on Spring Break…well my daughter is on Spring Break. J

Jody Holland

Vice President, Planning & Engineering

South Central MCN, LLC

Midcontinent MCN, LLC

MidAtlantic MCN, LLC

Gridliance West Transco, LLC

Cell: 501-681-5950

Office: 972-476-0111

jholland@gridliance.com

From: Tamimi, Al
Sent: Wednesday, March 14, 2018 2:04 PM
To: Myers, Alan <amyers@itctransco.com>
Cc: Amber Greb <agreb@spp.org>
Subject: **External Email** Proxy

Ryan Yokley has my proxy for tomorrow's ESWG meeting.

Al Tamimi, Ph.D., P.E.

Sunflower Electric Power Corporation

V.P. Transmission Planning & Policy

Hays, KS 67601

Hays Office:785-623-3336

Cell:785-656-0435

atamimi@sunflower.net

ECONOMIC STUDIES WORKING GROUP MEETING

March 15th, 2018

41st Floor AEP Offices, Suite 4103 – Dallas, TX

• A G E N D A •

1. Administrative Items
    a. Call to Order, Introductions ..... Alan Myers (5 minutes)
    b. Receipt of Proxies ..... Amber Greb (1 minute)
    c. Review of Agenda[1] ..... Alan Myers (1 minute)
2. Review of Past Action Items[1] ..... Amber Greb (10 minutes)
3. Consent Agenda[1] ..... Alan Myers (1 minute)
    a. Meeting Minutes – February 22nd, 2018
4. ITP Items ..... SPP Staff (140 minutes)
    a. Renewable Pricing Revision Request[1] (Approval Item) ..... Chris Jamieson (20 minutes)
    b. Rate-Payer Benefits and the APC Calculation[1,2] (Approval Item) ..... SPP Staff (60 minutes)
    c. Renewable Curtailment Price[1](Approval Item) ..... Chris Jamieson (60 minutes)
        i. Implementation
        ii. Action Item 194
5. 2019 ITP Items ..... SPP Staff (135 minutes)
    a. Schedule ..... Juliano Freitas (15 minutes)
    b. Resource Plan for Policy Requirements[1] (Approval Item) ..... Amber Greb (30 minutes)
    c. Siting[1] ..... Liz Gephardt (15 minutes)
    d. AI 173: Economic Model using vendor data[1] ..... Clayton Mayfield (25 minutes)
    e. Resource Planning Phase 2[1] ..... Amber Greb (20 minutes)
    f. Economic Model Build[1] ..... Clayton Mayfield (10 minutes)
6. April ESWG Agenda Items ..... Amber Greb (10 minutes)
7. Closing Items ..... All (5 minutes)
    a. Summary of Action Items (Amber Greb)

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[1] Background Material Included
[2] Continuation of Renewable Expansion Mitigation

b. Future Meetings

i. April 25th, 2018: KCP&L in the One Kansas City Place building, Kansas City, MO

ii. May 16th-17th, 2018: Xcel Energy, 3rd Floor, 3C Conference Room, Denver, CO

iii. June 14, 2018: 41st floor AEP Office, Dallas Texas

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

March 15, 2017

	Action Item	Date Originated	Status	Comments
151	SPP staff to look into optional software tools for use in ITP studies.	May 20th, 2015	In Progress SPP Staff	February, 2017: Presentation on EGEAS. Hold on investigation of alternatives until EGEAS and ABB's new Capacity Expansion tool are able to be fully tested and compared.
173	SPP staff to develop a process for annual update of the economic model with vendor data.	June 16th, 2016	~~In Progress SPP Staff~~Complete	Update provided during March meeting
183	SPP staff to perform transmission outage analysis in the first part of 2017 to determine the appropriate APC benefit percentage to utilize for the mitigation of transmission outages benefit metric.	September 15th, 2016	In Progress SPP Staff	ESWG Approved the methodology and staff to begin analysis
185	ESWG to continue working on and finalize the Resource Siting Manual	June 29th, 2017	In Progress ESWG	Staff intends to finalize in September 2018
186	Formalize the economic model data guidelines and submission process	July 20th, 2017	In Progress SPP staff	~~Replaces action item 160~~Include the load updates for resource planning
187	Address the objections raised to the approved renewable VOM modeling detailed in the ITP manual	July 20th, 2017	In Progress SPP staff/ESWG	
189	Discuss mitigation options for concerns with who pays for and who benefits from transmission coming from the ITP process and how it may circumvent the GI and Aggregate study processes	October 4th, 2017	In Progress SPP staff/ESWG	
190	SPP staff to perform a full transmission outage analysis before the next RCAR	October 12th, 2017	SPP Staff	

192	SPP Staff to draft a Revision Request to update the ITP Manual language to reflect a $0 or $8/MWH solar and wind VOM price.	December 14th, 2017	In Progress, SPP Staff	RR in Progress, approved with an $8/MWH VOM
193	Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process	January 22nd, 2018	SPP Staff	
194	Research curtailment price methodology for renewables	February 22nd, 2018	~~SPP Staff~~Complete	Discussed in March meeting

Revision Request Form

SPP STAFF TO COMPLETE THIS SECTION	
RR #: 276	**Date: 02/15/2018**
RR Title: ITP Manual Renewable Pricing VOM	
System Changes ☒ No ☐ Yes **Process Changes?** ☒ No ☐ Yes **Impact Analysis Required?** ☒ No ☐ Yes	

SUBMITTER INFORMATION	
Name: Chris Jamieson on behalf of the ESWG	**Company:** Southwest Power Pool
Email: cjamieson@spp.org	**Phone:** 501-614-3231

Only Qualified Entities may submit Revision Requests.
Please select at least one applicable option below, as it applies to the named submitter(s).

☐ **SPP Staff** ☐ **SPP Market Participant** ☐ **SPP Member** ☒ **An entity designated by a Qualified Entity to submit a Revision Request "on their behalf"**	☐ **SPP Market Monitor** ☐ **Staff of government authority with jurisdiction over SPP/SPP member** ☐ **Rostered individual of SPP Committee, Task Force or Working Group** ☐ **Transmission Customers or other entities that are parties to transactions under the Tariff**

REVISION REQUEST DETAILS

Requested Resolution Timing: ☒ **Normal** ☐ **Expedited** ☐ **Urgent Action**

Reason for Expedited/Urgent Resolution:

Type of Revision (select all that apply):

☒ Correction

☐ Clarification

☐ Design Enhancement

☐ New Protocol, Business Practice, Criteria, Tariff

☐ NERC Standard Impact *(Specifically state if revision relates to/or impacts NERC Standards, list standard(s))*

☐ FERC Mandate *(List order number(s))*

REVISION REQUEST RISK DRIVERS

Are there existing risks to one or more SPP Members or the BES driving the need for this RR? ☐ Yes ☒ No

If yes, provided details to explain the risk and timelines associated:

☐ Compliance (Tariff, NERC, Other)

☐ Reliability/Operations

☐ Financial

SPP Documents Requiring Revision:
Please select your primary intended document(s) as well as all others known that could be impacted by the requested revision (e.g. a change to a protocol that would necessitate a criteria or business practice revision).

☐ **Market Protocols**	**Section(s):**	**Protocol Version:**
☐ **Operating Criteria**	**Section(s):**	**Criteria Date:**
☐ **Planning Criteria**	**Section(s):**	**Criteria Date:**
☐ **Tariff (OATT)**	**Section(s):**	
☐ **Business Practice**	**Business Practice Number:**	

☒ **Integrated Transmission Planning (ITP) Manual**	**Section(s):** 2.2.1.10 Renewable Pricing
☐ **Revision Request Process**	**Section(s):**
☐ **Minimum Transmission Design Standards for Competitive Upgrades (MTDS)**	**Section(s):**
☐ **Reliability Coordinator and Balancing Authority Data Specifications (RDS)**	**Section(s):**
☐ **SPP Communications Protocols**	**Section(s):**

OBJECTIVE OF REVISION

Objectives of Revision Request:
Describe the problem/issue this revision request will resolve.

The revision request is proposed as part of ESWG action item 187, which was to address objections raised to the approved renewable variable operations and maintenance cost (VOM) modeling detailed in the ITP manual.

The following objections were raised by SPP stakeholders concerning the approved renewable VOM modeling methodology detailed in the ITP manual:

- May cause data gathering issues and inconsistencies
- May not be representative of renewable operating cost by definition
- May not be representative of real-time operations and power purchase agreement settlements
- May result in unequal treatment between transmission customer owned renewable generation resources and transmission customer purchases from merchant owned renewable generation resources
- May result in unequal treatment between transmission customer purchases from merchant owned renewable generation resources and transmission customer purchases from merchant owned conventional resources

The following observations were discussed with the ESWG when determining whether to move forward with a revision request.

- The approved VOM modeling methodology will impact the Adjusted Production Cost (APC) benefit of incremental transmission investment identified by the ITP study that is intended to provide for reliable and economic delivery of energy that maximizes benefits to the end-use customers
- The approved VOM modeling methodology may not adequately represent "take or pay" power purchase agreements and result in increasing costs to end-use customers by limiting the identification of incremental transmission investments needed to reduce economic curtailment or congestion costs associated with transmission customer purchased renewable generation resources
- The approved VOM modeling methodology may adequately represent power purchase agreements that are not "take or pay"
- The proposed $0/MWhr VOM is consistent with current industry practices

Describe the benefits that will be realized from this revision.

The revision request is intended as an interim measure to address the objections until such time as the ESWG may thoroughly vet a modeling methodology that more appropriately captures purchase power agreement (PPA) pricing in the Adjusted Production Cost benefit metric. The revision request removes the power purchase agreement pricing from the VOM methodology language in the ITP Manual and replaces it with a VOM cost of $0/MWhr for all wind and solar units, which is intended to reflect the low operating cost of these resources. The $0/MWhr VOM for wind and solar renewable resources is supported by the 2017 Lazard-Levelized Cost of Energy Analysis and the Energy Information Administration's Annual Energy Outlook 2017 assumptions, which are used by SPP staff in developing generator prototypes for the ITP Resource Plan. Additionally, removing the power purchase agreement pricing from the VOM methodology and using a VOM of $0/MWhr may better capture benefits of incremental transmission investment when reducing economic curtailment or congestion costs associated with transmission customer purchases from renewable generation resources under "take or pay" power purchase agreements.

REVISIONS TO SPP DOCUMENTS

In the appropriate sections below, please provide the language from the current document(s) for which you are requesting revision(s), with all edits redlined.

Integrated Transmission Planning (ITP) Manual

2.2.1.10 Renewable Pricing

The economic modeling of wind and solar resources include two primary parameters that impact pricing: curtailment price and VOM.

Wind and solar resources include an hourly profile. The curtailment price for wind and solar is the price at which the resource will curtail. If the LMP at the generation bus is greater than or equal to the curtailment price, the unit will generate energy in accordance with the hourly profile. If the locational marginal price (LMP) at the generation bus is less than the curtailment price, the unit generation will be curtailed. As a result, the curtailment prices impact the dispatch of wind and solar units in the economic models but do not impact the operating cost of the units.

To model a curtailment price for wind units that will reflect market operation, including projected production tax credit (PTC) impacts, the following criteria will be used for wind curtailment price modeling:

- Wind units will have $0/MWh curtailment price if any of the following are true[1]:
  - The unit is placed in service over 10 years prior to the study year.
  - Construction on the unit has not started prior to January 1, 2020.
  - An entity associated with the unit has provided feedback that the investment tax credit (ITC), rather than PTC, is applicable.
- Otherwise, wind units will have a negative $35/MWh curtailment price to reflect the "grossed-up" value of a PTC[2].

To model a curtailment price for solar units that will reflect market operation, the curtailment price will be set at $0/MWh.

The VOM for wind and solar resources defines the unit operating cost per MWh of energy generated. This operating cost is included in production cost calculations. The VOM parameter does not impact dispatch, curtailment, or LMPs in the economic model simulations.

~~To reflect PPA pricing as part of the VOM, the following criteria will be used for VOM modeling:~~

- ~~The SPP annual data request process for generation shall include reporting of the wind and solar units which have fixed-contract prices, such as PPAs. SPP will request appropriate documentation of units reported. If documentation is provided, the VOM shall be based on approximate wind and solar fixed-contract pricing, derived from publicly available data. A weighted average of the most recent five- to 10-year period shall be used.~~

For all wind and solar units ~~in which appropriate documentation is not provided to SPP~~, the VOM shall be $~~8~~0/MWh to reflect the low operating cost of renewable resources.

[1] Reflecting that the PTC is not a factor in its operation
[2] Reflecting income tax compensation

~~For wind or solar units identified through the resource expansion plan, the VOM of the new unit shall be equal to the VOM of the majority of existing wind or solar units in the model. Example: If 80 percent of existing wind units have the fixed-contract price for VOM, new wind units would use the fixed-contract price for VOM.~~


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

Rate-Payer Benefits and the APC Calculation

SPP Staff

March 15, 2018

Today's Discussion

- Background
  - The original ESWG action item 189 is reflective of stakeholder concerns regarding who benefits from and who pays for transmission through the ITP
  - SPP staff has contended that in the ITP process, only those APC benefits that flow back to the rate-paying customers should be evaluated against the transmission costs that may be allocated to those customers
- Objectives
  - Continue comprehensive discussion on the 1/11/18 ESWG motion regarding renewable mitigation to cover all generation types
  - Separate discussion into two concepts
    - Consideration of generator sales that impact rate-payers
    - Consideration of firm transmission service
  - Discuss these concepts as related to the APC calculation

Generator Sales

- Generator Sales in APC
  - Sales from generators included in a load serving entity's rates flow back to the rate-payer
  - Sales from merchant generators do not flow back to the rate-payer
    - To the extent merchant generators lower market energy costs and LMPs, this will lower the market purchase price that the load pays
- Assumption #1: Sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone
  - Sales from generators not included in the rates of a load serving entity should be excluded from the regional APC calculation

Transmission Service

- Transmission service in APC
  - APC calculation considers transmission service through calculation of net purchase/sale amounts by zone per hour
  - Net Purchase/Sale (MW) = ∑ zonal demand - ∑ zonal generation
  - Only excess generation or load is subject to the zonal LMP price to calculate a generator sale or load cost as a purchase to the zone for each hour
- Assumption #2: All generation without firm transmission service to load should be subject to generator LMP price

Implementation

- Considering assumptions 1 and 2:
- Implementation
  - Generators included in the rates of a load serving entity will be "assigned" to the appropriate load serving entity for the purpose of the APC calculation regardless of transmission service
  - Only those generators with firm transmission service will be used in the net purchase or sale calculation for each zone
  - Generators included in a load serving entity's rates without firm transmission service will be subject to the generator LMP and sales of a zone
  - Sales from generators not included a load serving entity's rates will be excluded from the APC calculation
- Additionally, there needs to be an assumption for future generators that may be included in the rates of a load serving entity or obtain transmission service

Recommendation

Motion to approve assumption 1, sales from generators that are included in the rates of a load serving entity should be included in the APC calculation of each zone.

Motion to accept staffs recommendation for the following:

- **Keep the assumption that future proxy wind will not have transmission service, based on current trends**
- **Keep the assumption that future proxy wind will not be included in a load serving entity's rates**

Motion to apply the implementation of assumptions 1 and 2 to all existing resources

Motion to assume that proxy conventional and solar generation will obtain transmission service and through those arrangements will be included in a load serving entity's rates

- Assumption #2: All generation without firm transmission service to load should be subject to generator LMP price

Implementation Examples

$175 Million Transmission Project Evaluation Example for Discussion Purposes

	Year	SPP Zonal Benefit ($M)	KACY and SWPA Benefit ($M)	Merchant/ proxy wind benefit ($M)	1-Year B/C (excluding proxy/ merchant wind benefit)	1-Year B/C (including merchant/ proxy wind benefit)
Approved Methodology	2025	26	0	6	0.8	1.0
Proposed Methodology	2025	28	0	6	0.8	1.0

- Approved methodology: Example to show the impact of removing sales of non-firm merchant/proxy wind from B/C ratio
- Proposed methodology: Example to show the incremental impact of including sales of non-firm resources of load serving entities by modeling 10% of owned and purchased resources of load serving entities as non-firm and 90% modeled as firm
- 1-Year Project Cost is $34M in 2025 dollars
- 2017 ITP10 Future 3 Economic Model
  - SPP zones, KACY, and SWPA zones include ~17 GW wind
  - Proxy/merchant generation includes ~9 GW wind similar to 2019 ITP F1 2024 projections


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2019 ITP Renewable Curtailment Price

ESWG

March 15, 2018

Overview

- Implementation of existing ITP Manual renewable curtailment price methodology
- Today's Goals
  - Discuss ITP Manual renewable curtailment price methodology
  - Discuss implementation of the existing ITP Manual curtailment price methodology
  - Approve SPP recommendation

Implementing Existing Language

SPP

Curtailment Price Methodology Implementation

- ITP manual criteria used to determine whether the production tax credit is a factor in the operation of a wind resource
  - Wind units will have $0/MWh curtailment price if any of the following are true
    - Wind resource age is more than 10 years old prior to the study year
    - Wind resource construction start date is not prior to 1/1/2020
    - Investment tax credit applies to wind resource versus production tax credit
  - Otherwise, wind units will have a negative $35/MWh curtailment price
- Implementation Decision Points:
  - What is the commencement date and construction start date for the existing wind and resource addition request wind?
  - What is the commencement date and construction start date of projected wind additions?

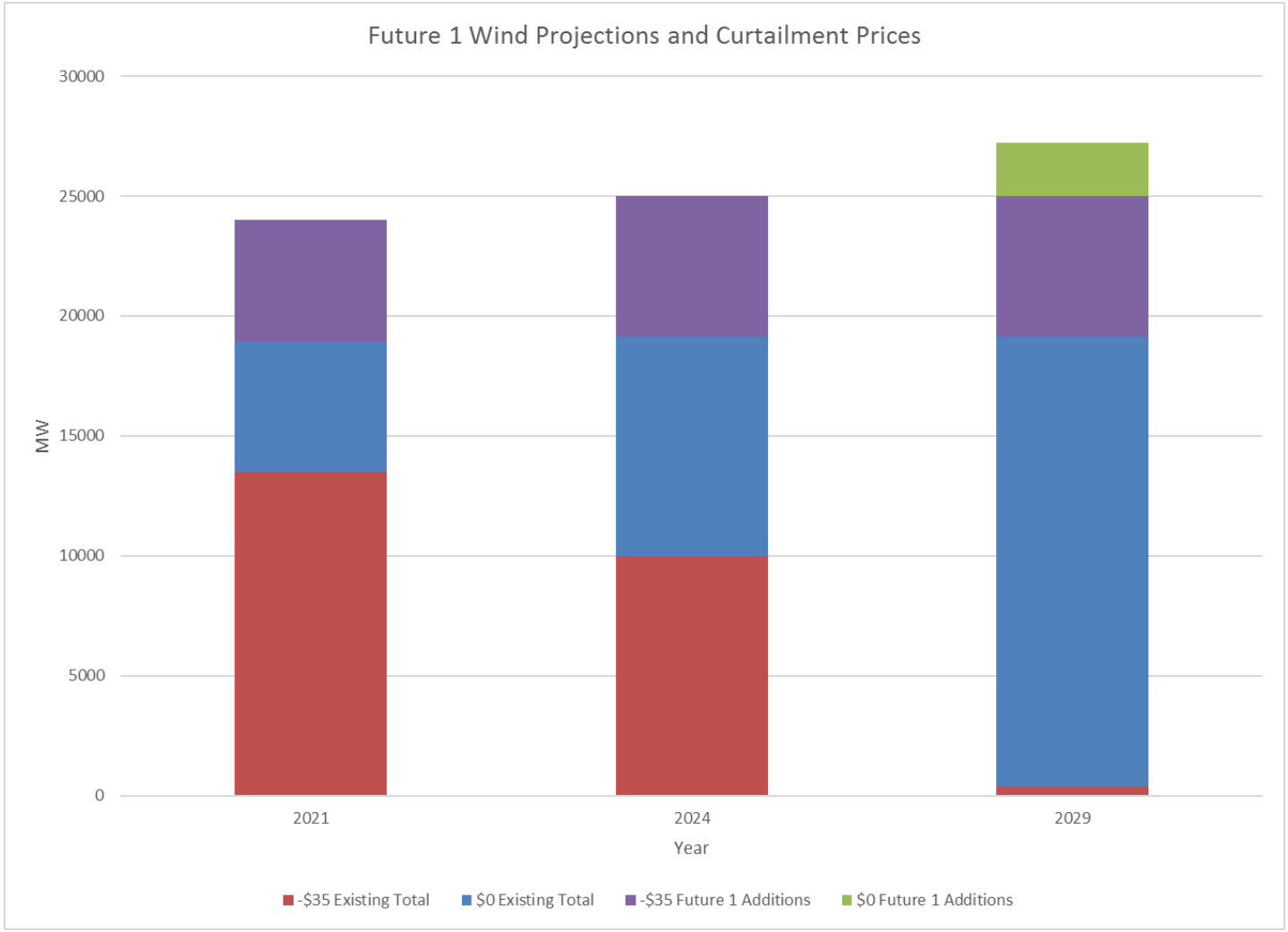
Curtailment Price Methodology Implementation

- What is the commencement date and construction start date for the existing wind and resource addition request wind?
  - Commencement date is determined in the generation review milestone
  - Construction start date was not needed this cycle
  - All existing wind and resource addition request wind have a projected commencement date less than 1/1/2020
  - For future ITP studies, the generation review milestone would need to be adjusted to survey stakeholders for construction start date when commencement date is not prior to 1/1/2020

Curtailment Price Methodology Implementation

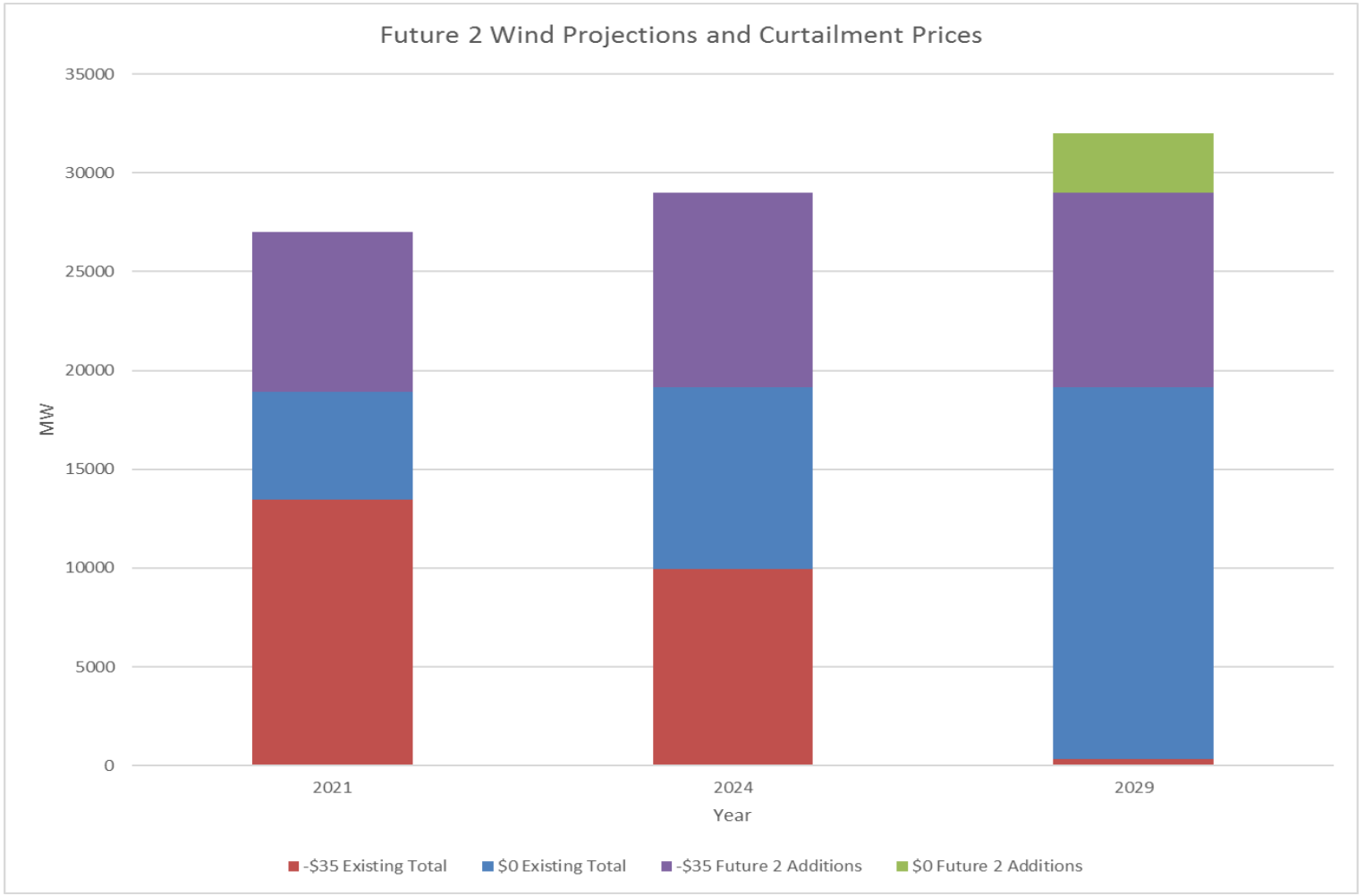
- What is the commencement date and construction start date of projected wind additions?
  - Use per year projections beginning 2021 from 2019ITP scope development to determine a commencement date for annual additions thereafter
  - Use a 4 year lead time to determine construction start date for annual additions
    - The 4 years is understood to be the maximum time allowed to complete construction and still be eligible for the production tax credit
    - Over 15GW of active GI queue positions have a 2016 or prior year queue entry date that may be eligible for the production tax credit
  - Determine curtailment price for cumulative amount to be modeled in year 5 (2024) and year 10 (2029)
  - Implies that 2024 is the last year projected wind additions will be modeled with a -$35 curtailment price

Future 1 Implementation



Study Year 2 2021 Projection = 24,000 MW and Study Year 2 2021 per ITP Scope = 18,932 MW
Study Year 5 2024 Projection and per ITP Scope = 25,000 MW and Study Year 10 2029 Projection and per ITP Scope = 26,000 MW
Implementation assumes a 4 year lead time for each annual addition to determine if construction start date is prior to 1/1/2020

Future 2 Implementation



Study Year 2 2021 Projection = 27,000 MW and Study Year 2 2021 per ITP Scope = 18,932 MW
Study Year 5 2024 Projection and per ITP Scope = 29,000 MW and Study Year 10 2029 Projection and per ITP Scope = 32,000 MW
Implementation assumes a 4 year lead time for each annual addition to determine if construction start date is prior to 1/1/2020

Other Considerations

- What do we do with the curtailment price for external wind resources for modeling consistency?
  - Recommendation is to apply the same curtailment price methodology implementation to external regions

Recommendation

- SPP staff recommends ESWG to approve implementation of the curtailment price methodology (as presented in slides 6 and 7) for the 2019 ITP
  - Commencement date and construction start date of projected wind additions
    - Use per year projections beginning 2021 from 2019ITP scope development to determine a commencement date for annual additions thereafter
    - Use a 4 year lead time to determine construction start date for annual additions
    - Determine curtailment price for cumulative amount to be modeled in year 5 (2024) and year 10 (2029)

Appendix

Background

- Curtailment price
  - Defines LMP price at which a renewable resource will be curtailed
  - Impacts LMPs, curtailment, and dispatch of production cost simulations
- ITP Manual curtailment price methodology
  - Intended to improve market operation modeling
  - Simplified modeling approach to account for Production Tax Credit impacts

ITP Manual Language

2.2.1.10 Renewable Pricing

- To model a curtailment price for wind units that will reflect market operation, including projected production tax credit (PTC) impacts, the following criteria will be used for wind curtailment price modeling:
  - Wind units will have $0/MWh curtailment price if any of the following are true[17]:
    - The unit is placed in service over 10 years prior to the study year.
    - Construction on the unit has not started prior to January 1, 2020.
    - An entity associated with the unit has provided feedback that the investment tax credit (ITC), rather than PTC, is applicable.
  - Otherwise, wind units will have a negative $35/MWh curtailment price to reflect the "grossed-up" value of a PTC[18].

[17] Reflecting that the PTC is not a factor in its operation

[18] Reflecting income tax compensation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ITP Manual - Renewable Curtailment Price

ESWG

March 15, 2018

Overview

- Action Item 194: Research curtailment price methodology for renewables
- Today's Goals
  - ITP Manual Discussion
  - Schedule Discussion
  - Review examples
  - Approve SPP recommendation

ITP Manual Discussion

- Transmission Planning Improvement Task Force (TPITF) Recommendations to standardize renewable modeling
  - Renewable curtailment price methodology approved by ESWG January 30th, 2017
  - ITP Manual approved July 2017 MOPC and BOD cycle
- ITP Manual curtailment price methodology
  - Intended to improve market operation modeling
  - Simplified modeling approach to account for production tax credit impacts

ITP Manual Discussion

- -$35/MWh curtailment price is an approximation of the "grossed-up" PTC value using a $23/MWh (2016$) PTC and a corporate tax rate of 35%
  - PTC = $/MWh
  - "grossed-up" PTC value = PTC/(1-tax rate)
  - Curtailment price = -("grossed-up" PTC value)
  - Note: This curtailment price was observed upon reviewing historic wind offer pricing in the SPP Integrated Market with some additional variability in negative offers (See appendix)
- The corporate tax rate was changed in early 2018 from 35% to 21% which may result in a "grossed-up" PTC value of $30/MWh
- ITP Manual curtailment price methodology was intentionally simplified to not account for PTC phase out where wind projects may only receive 80%, 60%, and 40% of the PTC depending on "construction start date" being after 2016 with the construction end date being no longer than 4 years (See appendix)

Schedule Discussion

- Milestones needing the curtailment price
  - Benchmarking: April-June 2018
  - Economic Model: April-September 2018
  - Constraint Assessment: August-September 2018
- Additional revisions to the renewable pricing methodology at this time may introduce more risk to the 2019ITP schedule than added accuracy to study deliverables
  - Need to identify a revision request sponsor
  - If revision request sponsored by ESWG, time is needed to determine scope of revision and draft ITP manual language
  - Time is needed to draft revision request and administer for July MOPC and BOD approval
  - Time is needed for implementation and depending on scope of revision may impact Siting milestone

Recommendation

- SPP staff recommends no additional ITP manual changes to renewable pricing for the 2019 ITP due the potential risks to the project schedule.

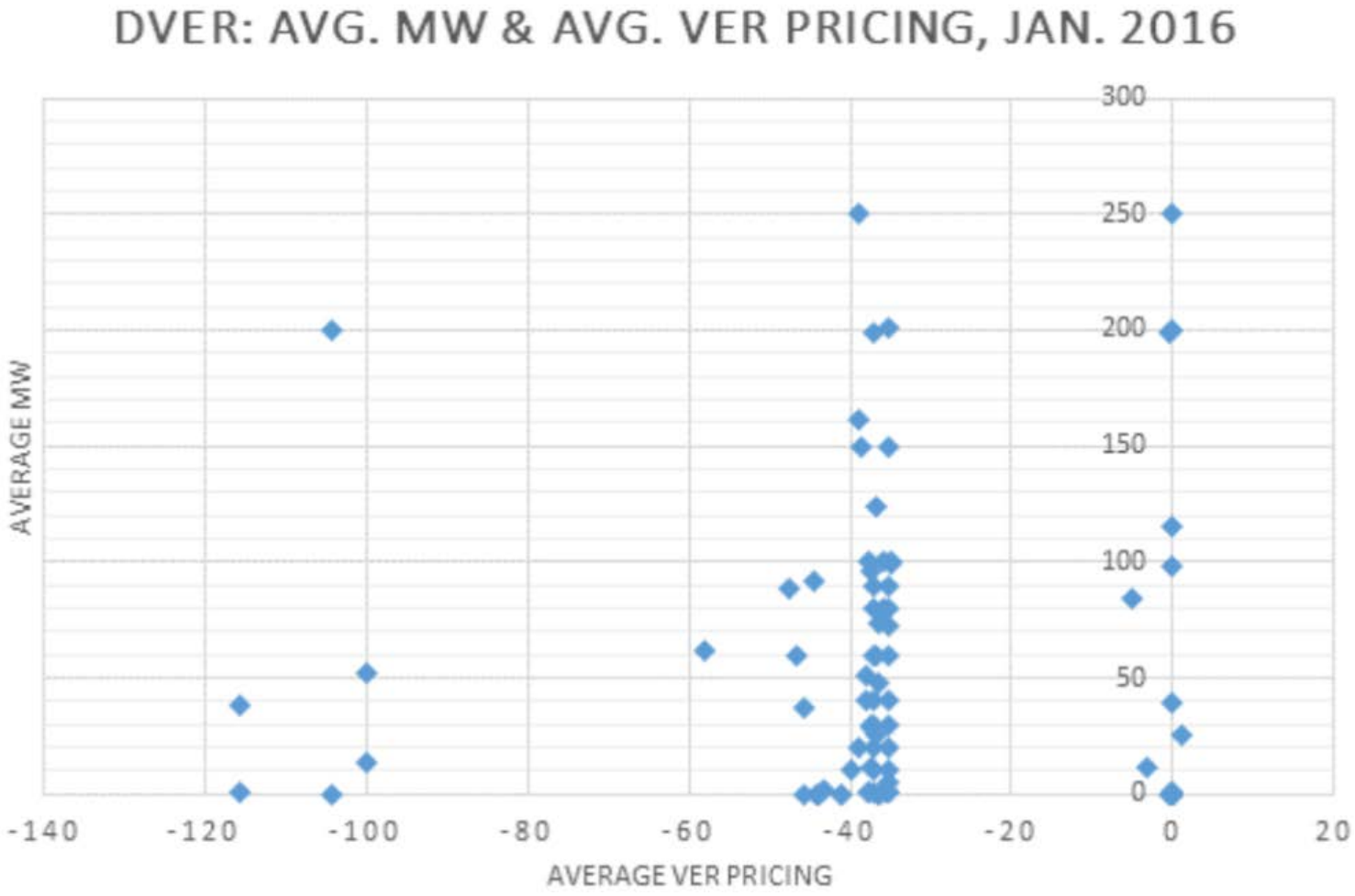
Appendix

PTC ($/MWh)

Current Year	PTC %	ITC %	Wind Farm Construction (In-Service Year)													
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan. 1, 2020
2006	100%		$ 23														
2007	100%		$ 23	$ 23													
2008	100%		$ 23	$ 23	$ 23												
2009	100%		$ 23	$ 23	$ 23	$ 23											
2010	100%		$ 23	$ 23	$ 23	$ 23	$ 23										
2011	100%		$ 23	$ 23	$ 23	$ 23	$ 23	$ 23									
2012	100%		$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23								
2013	100%		$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23							
2014	100%		$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23						
2015	100%	30%	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23					
2016	100%	30%		$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23				
2017	80%	24%			$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 18			
2018	60%	18%				$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 18	$ 14		
2019	40%	12%					$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 18	$ 14	$ 9	
2020	0%	10%						$ 23	$ 23	$ 23	$ 23	$ 23	$ 23	$ 18	$ 14	$ 9	-
2021	0%								$ 23	$ 23	$ 23	$ 23	$ 23	$ 18	$ 14	$ 9	-
2022	0%									$ 23	$ 23	$ 23	$ 23	$ 18	$ 14	$ 9	-
2023	0%										$ 23	$ 23	$ 23	$ 18	$ 14	$ 9	-
2024	0%											$ 23	$ 23	$ 18	$ 14	$ 9	-
2025	0%												$ 23	$ 18	$ 14	$ 9	-
2026	0%													$ 18	$ 14	$ 9	-
2027	0%														$ 14	$ 9	-
2028	0%															$ 9	-
2029	0%																-

NOTE: After construction begins the tax payer has 4 years to complete construction, e.g. a wind facility starting construction in 2019 could begin operation in 2023, and the PTC would expire in 2033.
https://www.irs.gov/irb/2016-23_IRB/ar07.html

Historical Wind Offer Pricing, Jan 2016



Source: Strategic Planning Committee background materials, 12/1/16

Potential ITP manual curtailment price methodology revisions for future ITP studies

- Specify how the curtailment price for projected wind additions is determined
- Account for changes in corporate tax rate
- Account for PTC phase out
- Adjust language to be more generic in regard to current PTC rules in effect at the beginning of the study and specify additional assumptions needed to reasonably model expected renewable resource market offers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2019 ITP Schedule

Juliano Freitas

March 15, 2018

General Information

- Projected Amount of Hours: 28,000
- Number of Milestones: 53
- Working Groups Involved: ESWG, TWG and MDWG
- Finishing Date: October 2019

Powerflow Model

- Start: 7/17/2017
- End: 3/1/2018 (Final Approval)
- Member Review Time:
  - Pass 0 – Trial 1: 7/21/2017 – 8/4/2017 (10 days)
  - Pass 0 – Trial 2: 8/11/2017 – 8/25/2017 (10 days)
  - Pass 0 – Trial 3: 9/1/2017 – 9/15/2017 (10 days)
  - Pass 1 – Trial 1: 9/22/2017 – 10/6/2017 (10 days)
  - Pass 1 – Trial 2: 10/13/2017 – 10/20/2017 (5 days)
  - Pass 2: 11/7/2017 – 11/20/2017 (9 days)
  - Pass 3: 12/5/2017 – 12/22/2017 (13 days)
  - Pass 4: 1/19/2018 – 2/1/2018 (10 days)
  - Pass 5: 2/23/2018 – 3/1/2018 (5 days)
- Staff Leader: Moses Rotich (mrotich@spp.org)
- Working Group Approval: TWG

Short Circuit Model

- Start: 11/20/2017
- End: 3/9/2018
- Member Review Time:
  - Pass 1: 12/8/2017 – 12/29/2017 (15 days)
  - Pass 2: 1/25/2018 – 2/1/2018 (5 days)
  - Pass 3: 3/1/2018 – 3/9/2018 for Approval
- Staff Leader: Zack Bearden (zbearden@spp.org)
- Working Group Approval: TWG

Policy Renewable Resource Plan – Phase I

- Start: 1/22/2018
- End: 3/15/2018 (Member's Final Approval)
- Member Review Time:
  - 3/8/2018 – 3/15/2018 (6 days)
- Staff Leader: Amber Greb (agreb@spp.org)
- Working Group Approval: ESWG

Renewable & Conventional Resource Plan – Phase II

- Start: 2/6/2018
- End: 5/23/2018 (Member's Final Approval)
- Member Review Time:
  - 5/15/2018 – 5/23/2018 (7 days)
- Staff Leader: Amber Greb (agreb@spp.org)
- Working Group Approval: ESWG

Siting Plan

- Start: 12/1/2017
- End: 7/2/2018 (Member's Final Approval)
- Member Review Time:
  - Site Prioritization: 2/22/2018 – 3/8/2018 (5 days)
  - Site Prioritization: 4/9/2018 – 4/13/2018 (5 days)
  - Site Prioritization: 4/20/2018 – 4/27/2018 (6 days)
  - Site Assignment Renewable: 5/18/2018 – 5/24/2018 (5 days)
  - Site Assignment Renewable: 5/31/2018 – 6/7/2018 (6 days)
  - Site Assignment Conventional: 6/12/2018 – 6/18/2018 (5 days)
  - Site Assignment Conventional: 6/25/2018 – 7/2/2018 (6 days)
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

Generator Outlet Facilities

- Start: 4/30/2018
- End: 7/25/2018 (Member's Final Approval)
- Member Review Time:
  - 7/18/2018 – 7/25/2018 (6 days)
- Staff Leader: Kirk Hall (khall@spp.org)
- Working Group Approval: TWG

Economic Model Building

- Start: 7/3/2017
- End: 9/28/2018 (Member's Final Approval)
- Member Review Time:
  - Post 1: 2/12/2018 – 2/23/2018 (10 days)
  - Post 2: 8/8/2018 – 8/14/2018 (5 days)
  - Post 3: 9/17/2018 – 9/21/2018 (5 days)
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)
- Working Group Approval: ESWG

Benchmarking

- Start: 4/4/2018
- End: 6/14/2018 (Member's Final Approval)
- Member Review Time:
  - Pass 1: 5/9/2018 – 5/16/2018 (5 days)
  - Pass 2: 6/7/2018 – 6/14/2018 (6 days)
- Staff Leader: Clayton Mayfield (cmayfield@spp.org)
- Working Group Approval: ESWG

Model Topology Updates

- Start: Pass 1 Powerflow Model
- End: 3/1/2018 (General topology changes)
- End: 8/6/2018 (New NTC's and withdrawals approved by the Board and NTC re-evaluations)
- Member Review Time:
  - Topology Lockdown: 3/1/2018
  - NTC/Re-Evals: 8/6/2018
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

Constraint Assessment

- Start: 8/2/2018
- End: 9/27/2018 (Member's Final Approval)
- Member Review Time:
  - 8/31/2018 – 9/6/2018 (5 days)
  - 9/17/2018 – 9/21/2018 (5 days)
- Staff Leader: Chris Jamieson (cjamieson@spp.org)
- Working Group Approval: TWG

Economic model conversion to powerflow

- Start: 8/2/2018
- End: 10/10/2018 (Member's Final Approval)
- Member Review Time:
  - 10/3/2018 – 10/9/2018 (5 days)
- Staff Leader: Zack Bearden (zbearden@spp.org)
- Working Group Approval: TWG

Base Reliability Needs Assessment

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

BA Reliability Needs Assessment

- Start: 9/27/2018
- End: 1/7/2019
- Staff Leader: Jason Speer (jspeer@spp.org)

Economic Needs Assessment

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

Policy Needs Assessment

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

Operational Needs Assessment

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

Short Circuit Needs Assessment

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

DPP Window

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

Staff Solutions Development

- Start: 1/8/2019
- End: 3/20/2019
- Staff Leaders:
  - Reliability: Kelsey Allen (kallen@spp.org)
  - Economic: Nikki Roberts (nroberts@spp.org)
  - Policy: Nikki Roberts (nroberts@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

DPP Evaluations

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

Initial Reliability Portfolio Development

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

Project Grouping – Phase 1
(Conceptual Cost Estimate)

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

Study Cost Estimates – Round 1

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

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

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

Planning Summit

- Start: 5/17/2019
- End: 6/4/2019
- Member Review Time:
  - Summit Materials (7 days prior to meeting)
- Staff Leader: Ellen Bailey (ebailey@spp.org)

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

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

Study Cost Estimates – Round 2

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

Final Reliability Portfolios Development

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

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

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

Project Grouping – Final Determination

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

Optimization

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

Portfolio Consolidation

- Start: 7/18/2019
- End: 8/2/2019
- Staff Leader: James Bailey (jbailey@spp.org)

Staging

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

Benefit Metrics Calculation

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

Stability Analysis

- Start: 8/5/2019
- End: 8/26/2019
- Staff Leader: Chris Jamieson (cjamieson@spp.org)

Sensitivity Analysis

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

Final Reliability Assessment

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

Rate Impacts/ATRR

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

Final Report

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

TWG/ESWG Final Approvals

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

MOPC and SPP Board

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


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2019 ITP Resource Plan Phase 1

Amber Greb

March 15, 2018

Objective

- Answer stakeholder questions or concerns with the process
- Approve Phase 1 of the Resource Plan
- Discuss next steps

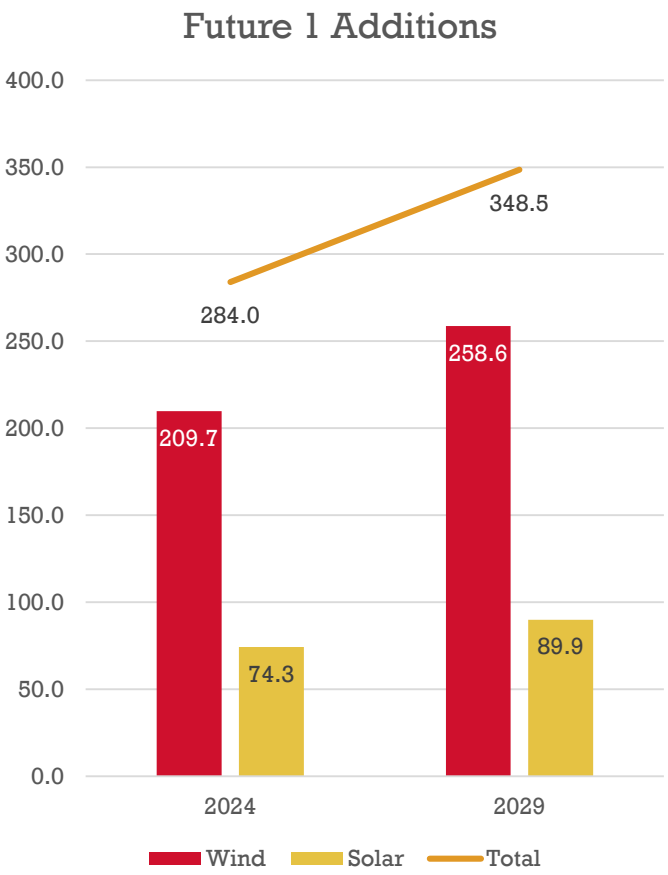
Process

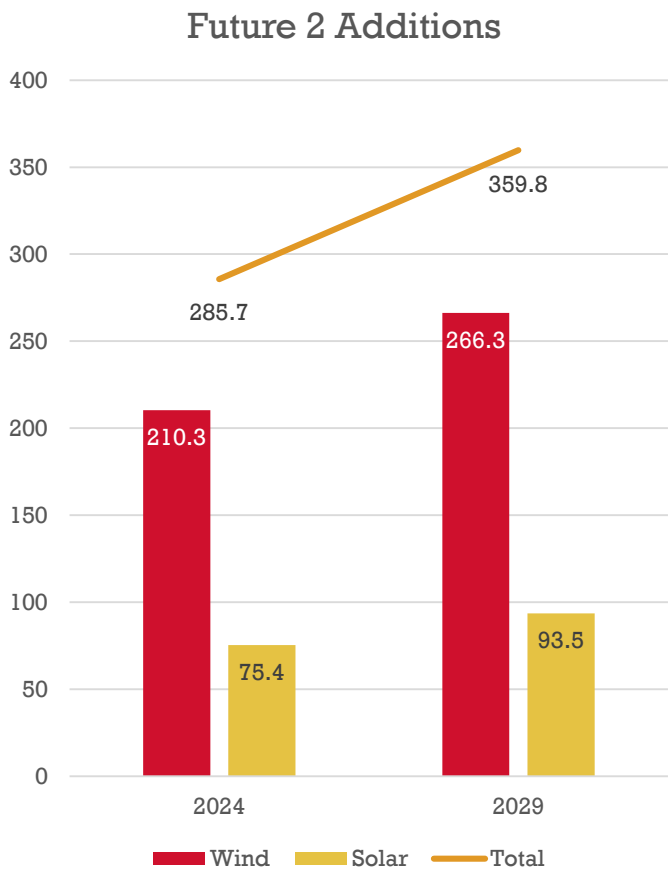
- After Renewable Policy Review is finalized, all utilities renewable requirements are known
- Utilities are assessed on ability to meet requirements given current resources
- Additions are recommended to meet shortfalls

Shortfalls by Utility by State

		Future 1		Future 2			
		Capacity Shortfall (MW)					
Utility	Renewable Type	2024	2029	2024	2029	Capacity Factor	Mandate/Goal Information
Empire District Electric Co.	Wind	0.0	35.2	0.0	41.7	49.2%	MO Mandate
Empire District Electric Co.	Solar	0.0	8.8	0.0	10.4	23.7%	MO Mandate
Kansas Electric Power Coop. Inc.	Wind	73.6	77.2	73.6	77.2	49.2%	KS Goal
Kansas Electric Power Coop. Inc.	Solar	18.4	19.3	18.4	19.3	23.7%	KS Goal
Kansas Municipal Energy Agency	Wind	64.4	66.2	64.4	66.2	49.2%	KS Goal
Kansas Municipal Energy Agency	Solar	16.1	16.6	16.1	16.6	23.7%	KS Goal
Missouri River Energy Services	Wind	9.4	13.1	9.7	13.6	49.2%	MN Mandate
Missouri River Energy Services	Solar	2.4	3.3	2.4	3.4	23.7%	MN Mandate
Missouri River Energy Services	Wind	1.2	1.3	1.2	1.4	49.2%	ND Goal
Missouri River Energy Services	Solar	0.3	0.3	0.3	0.3	23.7%	ND Goal
Missouri River Energy Services	Wind	16.1	17.3	16.4	18.0	49.2%	SD Goal
Missouri River Energy Services	Solar	4.0	4.3	4.1	4.5	23.7%	SD Goal
Southwind Energy Group	Wind	8.9	9.3	8.9	9.3	49.2%	KS Goal
Southwind Energy Group	Solar	2.2	2.3	2.2	2.3	23.7%	KS Goal
Sunflower Electric Power Corp.	Wind	36.1	38.9	36.1	38.9	49.2%	KS Goal
Sunflower Electric Power Corp.	Solar	9.0	9.7	9.0	9.7	23.7%	KS Goal
WFEC Coops in SPS	Solar	21.9	25.2	22.8	27.0	23.8%	NM Mandate, sited in NM
Subtotal	Wind	209.7	258.6	210.3	266.3		
Subtotal	Solar	74.3	89.9	75.4	93.5		
Total	**Both**	**284.0**	**348.5**	**285.7**	**359.8**		

Renewable Additions





Staff Recommendation

- SPP recommends the ESWG approve the Resource Plan – Phase 1 for the 2019 ITP as posted.
- With discussed changes
- Zero for MRES
- Zero for KEPCO (Upon Verification)

Next Steps

- Resource Plan Phase 2
- Siting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2019 ITP External Resource Planning

Nikki Roberts

March 15, 2018

Objective

- Provide high level details of MTEP18 evaluation process and findings
- Discuss next steps to seek approval of source(s) for the 2019 ITP External Resource Plan

MTEP18 Future Definitions

- Continued Fleet Change (CFC)
  - 50/50 demand and energy forecast
  - Natural Gas prices follow industry long-term forecasts
  - Oil and Gas generation retired at useful life limit age (55 years), and coal generation retired reflecting age and historical retirements (65 years)
  - Renewable additions reach about 15% of MISO energy by 2032
- Distributed and Emerging Technology (DET)
  - 50/50 demand and energy forecast with higher energy growth rate
  - Natural Gas prices follow industry long-term forecasts
  - Oil and Gas generation retired at useful life limit age (55 years), and coal generation retired reflecting age and historical retirements (65 years)
  - Nuclear generation retired if license expired
  - Renewable additions reach about 20% of MISO energy by 2032, primarily from solar.

MTEP18 Evaluation Process

- SPP Staff examined the following data in the MTEP18 for MISO, TVA, and AECI areas:
  - Generation Resource Retirement Assumptions including:
    - Baseline Retirements
    - Additional Age Based Retirements
  - Conventional Resource Plan Additions
  - Existing Renewables
  - Renewable Resource Plan Additions
  - Demand Peak and Energy Totals
- Sources:
  - MTEP18 2022, 2027, and 2032 PROMOD Databases as provided by MISO
  - MTEP18 data posted publically in the form of presentations and spreadsheets

Staff Findings

- MISO level of retirements in relation to peak load totals per year similar to SPP.
- AECI and TVA unit retirement assumptions in the MTEP similar when applying the approved ITP age based criteria to AECI and TVA units.
- Wind to Load ratios in MISO lower than SPP ratio, which is expected due to technical potential.
- Solar to Load ratios in MISO similar to SPP ratio.
- Minimal resource additions for AECI.

Confidentiality

- MISO's Legal Team has advised SPP that for any information from the MTEP18 to be used in the ITP database, SPP should continue the practice of requiring execution of the Joint SPP-MISO CEII NDA prior to release.
- For this reason, the details used for evaluation of the MTEP18 model cannot be posted in a public forum.

Next Steps

- Post Full Presentation with additional MTEP18 details on GlobalScape
  - Stakeholders must have a fully executed Joint SPP-MISO CEII NDA in order to access the presentation
- Solicit e-mail vote once Stakeholders have had a chance to review the full presentation

Recommendation

- SPP Staff recommends utilizing the MTEP18 retirement assumptions and resource plan additions for MISO areas and TVA.
- SPP Staff recommends developing a resource plan for AECI following the same assumptions as SPP.
  - AECI is a close neighbor and has been treated more like SPP in past studies.
  - Demand assumptions in the MTEP are lower for AECI than what is indicated in the PF models being used in the 2019ITP.
  - Minimal coordination between MISO and AECI.


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2019 ITP Siting Plan

Liz Gephardt

March 15, 2018

Objective

- Update group on the status of Siting Plan
- Inform upcoming stakeholder approvals

Overview and Current Status

- Repository development
  - Objective: Detail and organize list of all potential sites for wind, solar, and conventional units
  - Complete
- Load Pocket Analysis
  - Objective: Identify any necessary resource and siting plan changes for top load pocket(s) based on load density, historical congestion, and SPP Annual State of the Market Report
  - Nearing completion
- Pre-screening Sites
  - Objective: Identify transfer capability for all sites included in the site repository
  - In progress

High-level Schedule

December 2017-March 2018

- Load pocket analysis (SPP)
- Repository development (SPP)

February 2018

- Stakeholder review and feedback on repository

March 2018

- Stakeholder feedback on load pocket analysis
- Site pre-screening (SPP)

April 2018

- Site prioritization (ESWG review and approval)

May 2018

- Renewable siting plan (ESWG review and approval)

June 2018

- Conventional siting plan (ESWG review and approval)


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ESWG Action Item 173

Clayton Mayfield

March 15, 2018

Objective

- Inform ESWG that staff has completed ESWG Action Item 173
  - Staff to develop a process for annual update of the economic model with vendor data.
- Continue vendor data feedback loop discussion

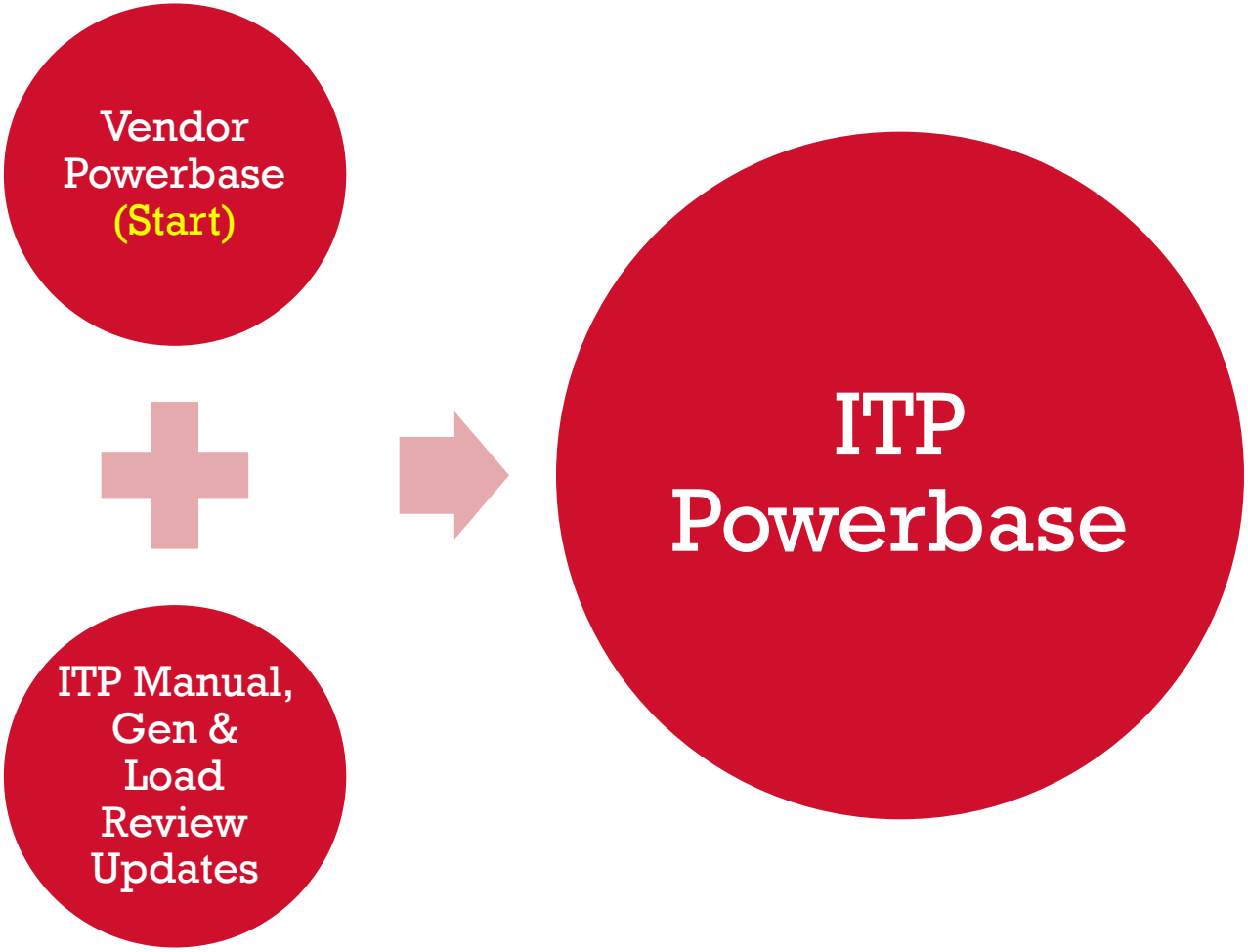
Implementation of ESWG Action Item 173

ITP Manual Defined Vendor Updates

- Implemented the action item by setting vendor data as the "base case" for majority of model parameters such as:

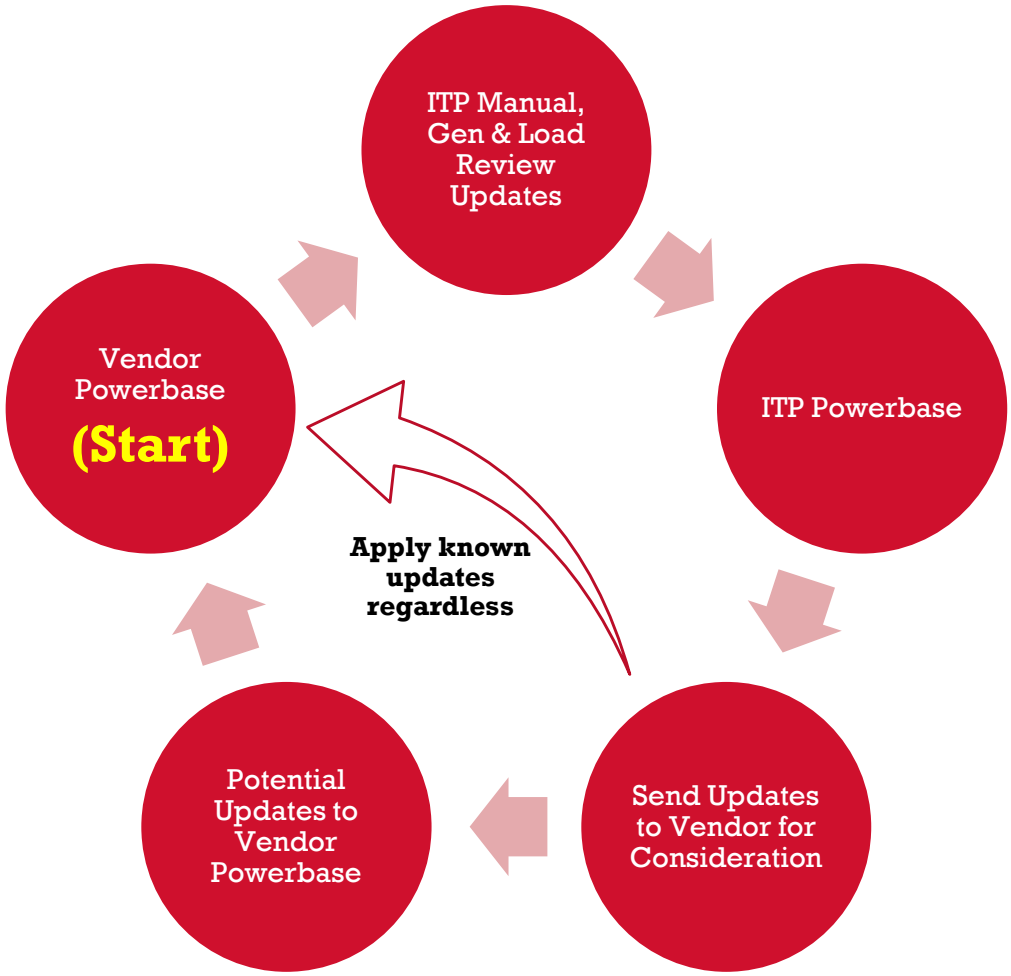
- Hourly Load Shapes
- Monthly Peak and Energy %
- Generator Names
- Category Type
- Conventional VOM
- Conventional FOM
- Heat Rate
- Heat Rate Profile
- Physical State Location
- Annual Maintenance Hours
- Forced Outage Rate
- Effluents (% Removed)
- Emission Rates
- Fuel Forecast
- Hydro Energy Limits
- Seasonal Max Cap by Year
- Retirement Date
- Commission Date
- Hurdle Rates

19 ITP Economic Model Process Overview



Annual Vendor Data Feedback Loop

Feedback Loop Overview



Feedback Goals

- SPP staff and stakeholders to determine what data in the generation and load review should be included in the feedback loop (confidential/non-confidential)
  - Example: Retirement Dates, VOM, FOM, etc.
- Help vendor incorporate stakeholder approved modeling techniques and data updates into vendor data set
  - Define vendor requirements to accept each update
- Allow other BAs and RTOs to model SPP as SPP does
  - Will also aid in joint studies such as the MISO-SPP CSP
- In time, reduce SPP staff and stakeholder PROMOD model review workload

Next Steps

- Poll stakeholders through email to list out desired vendor data parameter changes (PMAX, Retirement Dates, Commission Dates, etc.)
- Staff to compile stakeholder and staff desired changes
- Staff to work with vendor to incorporate changes
- Staff to bring results back to ESWG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ITP Resource Planning Phase II

Amber Greb

March 15th, 2018

Objective

- Provide an Overview of milestone
- Remind Stakeholders of accreditation
- Go over next steps

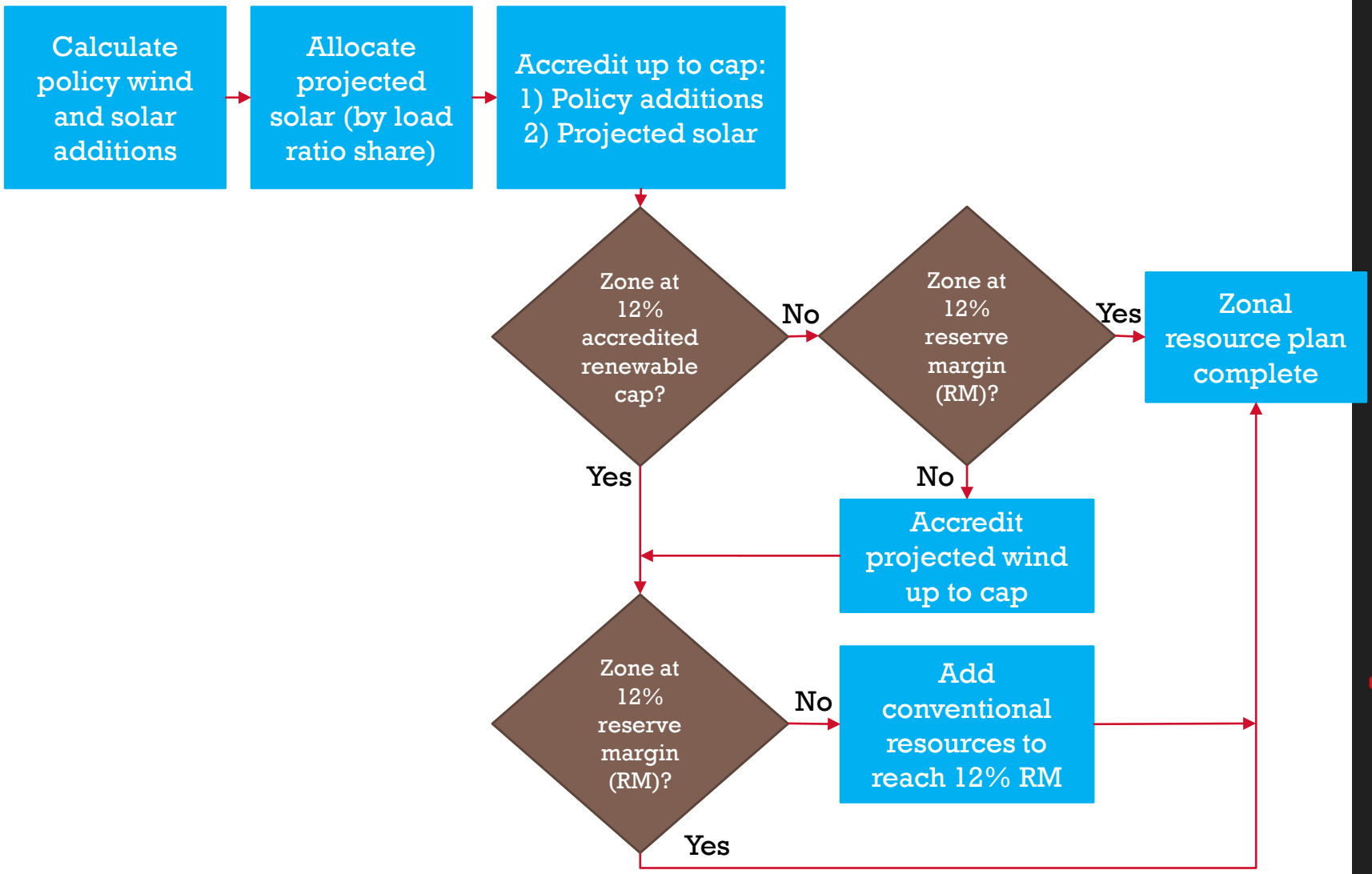
Overview

- Develop a resource plan for years 5 and 10 for each future
  - Resource additions are included to develop realistic future-year models by accounting for reserve margin requirements, historical trends, economics, etc
  - The resource-planning phase will identify new units and the associated parameters for these new units
- The final resource plan for each future will include:
  - Solar and wind (from RP1)
  - Projected solar and wind (pre-approved by the ESWG)
  - Combustion Turbines (CTs), Combined Cycle (CCs) and Reciprocating Engines from Strategist

Overview

- Each Zone must meet a 12% reserve margin from accredited resources
  - Each pricing zone shall be assessed for resource adequacy by accounting for load projections, existing generation, new wind and solar additions, capacity accreditation for all renewable units
- Accreditation:
  - Existing renewable units will follow SPP Planning Criteria 7.1.5.3.7
  - New wind resources will have a 20 percent capacity accreditation.
  - New utility scale solar will have a 70 percent capacity accreditation.
  - Accredited renewable capacity will be capped at 12 percent of a load serving entity's total load.
- The resource plan will be reviewed by the ESWG

Resource Planning Decision Tree



Next Steps

- Allocating the projected Wind and Solar
  - Update at the April 25th ESWG meeting
- Final Resource Plan Approval
  - May 2018
- Feeds into Siting Plan