Southwest Power Pool

Economic Studies/Transmission Working Group

August 13-14th, 2019

ITC Offices - Novi, MI

• SUMMARY OF ACTIONS TAKEN •

2019 ITP:

1. Endorsed the technical work performed by SPP staff to develop a portfolio of recommended projects for consideration by the SPP MOPC and Board

2020 ITP:

1. August 7 email vote approved the 2020 ITP Market Economic Model (MEM) Benchmarking

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

August 13-14th, 2019

ITC Offices - Novi, MI

• MINUTES •

Agenda Item 1 – Administrative Items

Agenda Item 1a - Call to Order, Introductions

TWG: Vice-Chair Nathan McNeil, called the meeting of the Transmission Working Group (TWG) to order at 8:05 am.

There were 19 in-person participants and 106 web conference participants, representing 21 of 26 TWG members. (Attachment 1 – August 13, 2019 ESWG Attendance)

ESWG: Chair Alan Myers (ITC) called the meeting of the Economic Studies Working Group (ESWG) to order at 8:05 a.m., welcomed those in attendance, and asked for introductions.

There were 19 in-person participants and 106 web conference participants, representing 17 of 17 ESWG members. (Attachment 1 – August 13, 2019 ESWG Attendance)

Agenda Item 1b – Receipt of Proxies

Amber Greb (SPP) asked for any proxy statements; five proxies were identified. (Attachment 2 – Proxy Statements)

TWG:

- Travis Hyde (OGE) identified Steve Hardebeck (OGE) as his proxy
- Josh Verzal (OPPD) identified Steve Hohman (OPPD) as his proxy for the first 45 minutes of the meeting

ESWG:

- Warren Whitson identified Tim Hall as his proxy
- Jeremy Severson identified Phil Westby as his proxy
- Natasha Henderson identified Kyle McKinney as her proxy for the second day

Agenda Item 1c – Review of Agenda

Chair Alan Myers (ITC) presented the agenda for review and asked for any additions or corrections. (Attachment 3 - June 12-13, 2019 ESWG Agenda)

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

TWG: Derek Brown, KCP&L and Westar, Evergy Companies made a motion to approve the agenda. Jason Shook (GDS Associates, Inc.) seconded the motion. The motion was approved unanimously.

Agenda Item 1d – Antitrust Reminder

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

Agenda Item 1e – Webex Tips

Amber Greb (SPP) provided some tips on using Webex, including requesting that users select the “Call me” feature in order to save on cost of call.

Agenda Item 2 – 2019 ITP Items

Agenda Item 2a – 2019 ITP Schedule

Juliano Freitas (SPP) reviewed a presentation on 2019 ITP Assessment schedule. He reviewed on-going and up-coming milestones. (Attachment 4 – 2019 ITP Schedule)

Agenda Item 2b – Final Portfolio

Liz Gephardt (SPP) and Kelsey Allen (SPP) presented the final portfolio. They reviewed the reliability and economic needs, target area analysis, reliability and economic projects, initial and final economic groupings of projects, and the benefit-cost comparison of final groupings. (Attachment 5 – 2019 ITP Portfolio)

Final Portfolio approval by ESWG:

> **Motion: John Olsen (Evergy) made a motion, seconded by Anita Sharma (AEP) to endorse the technical work performed by SPP staff to develop a portfolio of recommended projects for consideration by the SPP MOPC and Board. The motion was approved with one opposing vote: Zac Hager (OGE).**
>
> **“OG&E votes against the endorsement of the technical work performed for the selection of the final portfolio of the 2019 ITP due to concerns that the scoring methodology and process may have inadvertently favored a future that creates more congestion and therefore favoring more expensive projects that would be required to solve the higher congestion future.”**

Final Portfolio approval by TWG:

> **Motion: Michael Wegner, ITC Holdings made a motion to approve SPP Staff recommends the ESWG and TWG endorse the technical work performed by SPP staff to develop a portfolio of recommended projects for consideration by the SPP MOPC and Board. Matt McGee, American Electric Power seconded the motion. The motion was approved with one opposition from Steve Hardebeck (Oklahoma Gas & Electric) and abstention from Josh Verzal (OPPD).**

Agenda Item 2c – CSP Update

Adam Bell (SPP) informed the group of the progress for the coordinated system plan. He reviewed the list of projects that showed potential based on the initial benefit results for both SPP and MISO. No projects are being recommended at this time. (Attachment 6 – August 2019 CSP Results Update 2)

Agenda Item 2d – Voltage Stability Update

Chris Jamieson (SPP) presented on the governing language and objectives for the voltage stability assessment milestone. Staff will bring results to the September TWG and ESWG meetings.

Agenda Item 3 – 2020 ITP Items

Agenda Item 3a – Schedule

Juliano Freitas (SPP) reviewed the schedule for the 2020 ITP Assessment. He reviewed on-going and up-coming milestones. (Attachment 7 – 2020 ITP Schedule)

Agenda Item 3b – Powerflow Model

David Duhart (SPP) reviewed updates to the powerflow model since the model review posting April 5, 2019. Final approval will be in November 2019. (Attachment 8 – Powerflow Model)

Agenda Item 3c – Market Powerflow Model

Michael Odom (SPP) reviewed the market powerflow model build, including the governing language and an overview of the process. (Attachment 9 – 2020 ITP Market Powerflow Build)

End of Joint Meeting

Agenda Item 4 – Review of Past Action Items

Amber Greb (SPP) reviewed the list of past action items and asked for any comments or questions. The group discussed that Action Item 198 should have a goal of implementing in the 2021 ITP Assessment and that the inflation rate should probably match the government rate. (Attachment 10 – Past Action Items)

Agenda Item 5 – Consent Agenda

The consent agenda included the following items:

a. Meeting Minutes – July 17-18, 2019 (Attachment 11 – 20190717 ESWG Minutes)

b. Meeting Minutes – July 30, 2019 (Attachment 12 – 20190730 ESWG Minutes)

The consent agenda was approved unanimously.

Agenda Item 6 – 2020 ITP Items

Agenda Item 6a – Constraint Assessment

Kirk Hall (SPP) gave an overview of the upcoming constraint assessment milestone. He provided a detailed review of the process to create an event file and the upcoming tasks. (Attachment 13 – 2020 ITP Constraint Assessment)

Agenda Item 7 – 2021 ITP Items

Agenda Item 7a – Schedule

Juliano Freitas (SPP) reviewed the schedule for the 2021 ITP Assessment. He reviewed on-going and up-coming milestones. (Attachment 14 – 2021 ITP Schedule)

Agenda Item 7b – Scope

Agenda Item 7i – SPP MMU Recommendations

Keith Collins (SPP) presented the MMU recommendation that there be three futures considered in the ITP and that the third future be in the middle of the first and second future in regards to assumptions. (Attachment 15 – 2021 Scope and Futures Introduction)

Agenda Item 7bii – Futures

Jason Speer (SPP) presented charts on renewable generation development and reviewed assumptions for futures, including a third future that would consider increased carbon reduction. Alan Myers (ITC) requested feedback on the future assumptions and specifically how to set the retirement criteria in each future. Amber Greb (SPP) followed up on his request by sending out an email with the assumptions spreadsheet. (Attachment 16 – 2021 ITP Futures) (Attachment 17 – 2021 ITP Future Drivers (August ESWG))

Agenda Item 8 – RR-Separate Load Forecasts for Resource Planning

Antonio Barber (SPP) gave an update on the revision request for separate load forecasts for resource planning in the ITP assessments. This revision request will be brought to the September working groups for approval.

Agenda Item 9 – Software Tool Update/Retreat Plan

Juliano Freitas (SPP) gave an update on the software retreat plan.

Agenda Item 10 – 2020 Meeting Locations

Amber Greb (SPP) discussed 2020 ESWG meeting locations. (Attachment 18 – 2020 Meeting Schedule)

Agenda Item 11 – ESWG Scope (Charter)

Amber Greb (SPP) discussed the ESWG Charter. Staff will add language for the 20 year assessment and bring back for approval in September. (Attachment 19 – ESWG Scope (Charter))

Closing Items

Stakeholders requested the SPP staff conduct a lessons learned session with the ESWG to review the 2019 ITP assessment.

The meeting was adjourned at 10:57 AM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Name	Company/Email	Attendance
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Tim Owens	NPPD	In Person
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Member	Proxy	Note
Travis Hyde	Steve Hardebeck	TWG
Josh Verzal	Steve Hohman	TWG; first 45 min
Warren Whitson	Tim Hall	ESWG
Jeremy Severson	Phil Westby	ESWG
Natasha Henderson	Kyle McKinney	ESWG; Day 2

Southwest Power Pool

ECONOMIC STUDIES/TRANSMISSION WORKING GROUP JOINT MEETING

August 13th, 2019

ITC Offices - Novi, MI

• A G E N D A •

Tuesday, 9:00a.m. - 4:00p.m. (Eastern Time)

Wednesday, 9:00a.m. - 12:00p.m. (Eastern Time)

1. Administrative Items
    a. Call to Order, Introductions..Alan Myers/Travis Hyde (8 minutes)
    b. Receipt of Proxies .... Amber Greb (1 minute)
    c. Review of Agenda[1] .... Alan Myers/Travis Hyde (1 minute)
    d. Antitrust Reminder .... Amber Greb (1 minute)
    e. Webex Tips... Amber Greb (5 minutes)
2. 2019 ITP Items .... SPP Staff (190 minutes)
    a. Schedule[1] .... Juliano Freitas (10 minutes)
    b. Final Portfolio[1] (Approval Item) .... Liz Gephardt/Kelsey Allen (120 minutes)
    c. CSP Update..Adam Bell (30 minutes)
    d. Voltage Stability Update .... Chris Jamieson (30 minutes)
3. 2020 ITP Items .... SPP Staff (50 minutes)
    a. Schedule[1] .... Juliano Freitas (10 minutes)
    b. Powerflow Model[1] .... David Duhart (20 minutes)
    c. Market Powerflow Model[1] ....Michael Odom (20 minutes)

End of Joint Meeting

[1] Background Material Included

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP MEETING

August 13-14th, 2019

4. Review of Past Action Items[1] .... Amber Greb (15 minutes)
5. Consent Agenda
    a. Meeting Minutes – July 17-18th, 2019
    b. Meeting Minutes – July 30th, 2019
6. 2020 ITP Items .... SPP Staff (20 minutes)
    a. Constraint Assessment[1] ....Kirk Hall (20 minutes)
7. 2021 ITP Items ....(180 minutes)
    a. Schedule... Juliano Freitas (30 minutes)
    b. Scope[1] ....Jason Speer (150 minutes)
        i. SPP MMU Recommendations
        ii. Futures
8. RR-Separate Load Forecasts for Resource Planning ....Antonio Barber (20 minutes)
9. Software Tool Update/Retreat Plan... Juliano Freitas (10 minutes)
10. 2020 Meeting Locations[1] .... Amber Greb (15 minutes)
11. ESWG Scope (Charter) [1] .... Amber Greb (20 minutes)
12. Closing Items .... All (10 minutes)
    a. Summary of Action Items (Amber Greb)
    b. September ESWG Agenda Items
    c. Future Meetings
        i. September 5-6, 2019: 41st floor AEP Office, Dallas Texas
        ii. September Conference Call (TBD)
        iii. October 9-10, 2019: SPP Offices, Little Rock, AR
        iv. November 6-7, 2019: 41st floor AEP Office, Dallas Texas
        v. December 11-12, 2019: 41st floor AEP Office, Dallas Texas


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TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE.

Southwest Power Pool

2019 ITP Schedule

Juliano Freitas

August 13, 2019

Portfolio Consolidation (Complete)

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

Project Staging

- Start: 8/5/2019
- End: 8/15/2019
- Staff Leader: Joshua Pilgrim (jpilgrim@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: Amber Greb (agreb@spp.org)

Final Reliability Assessment (on Consolidated Portfolio)

- 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 Cook (ecook@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 – Dee Edmondson (dedmondson@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 Portfolio

ESWG/TWG

August 13, 2019

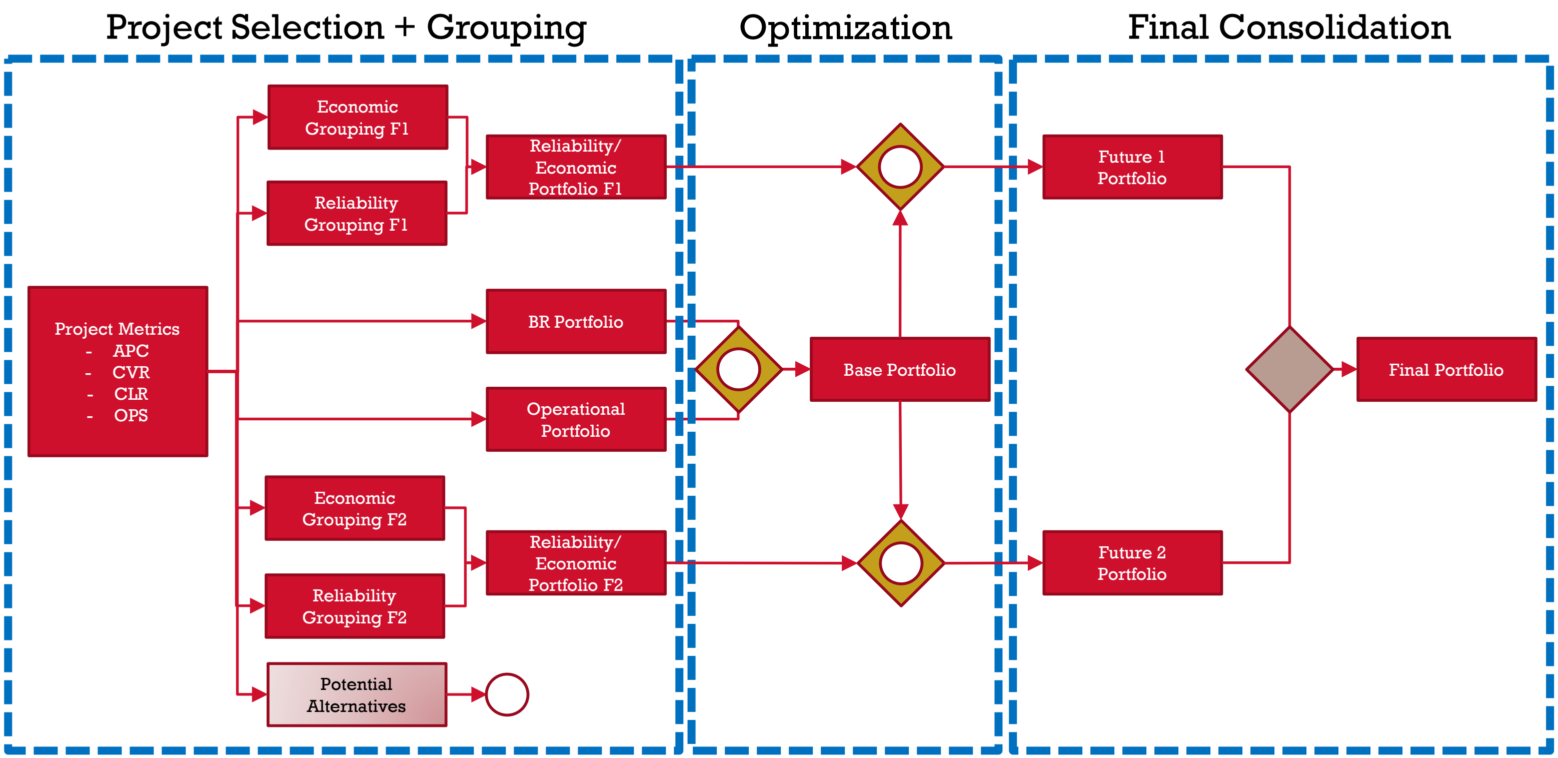
SouthwestPowerPool SPPorg southwest-power-pool

Objective

Goal of the Final Portfolio:

- Develop a regional plan that provides reliable and economic delivery of energy and facilitates achievement of public policy objectives, while maximizing benefits to the end-use customer

Portfolio Development Summary



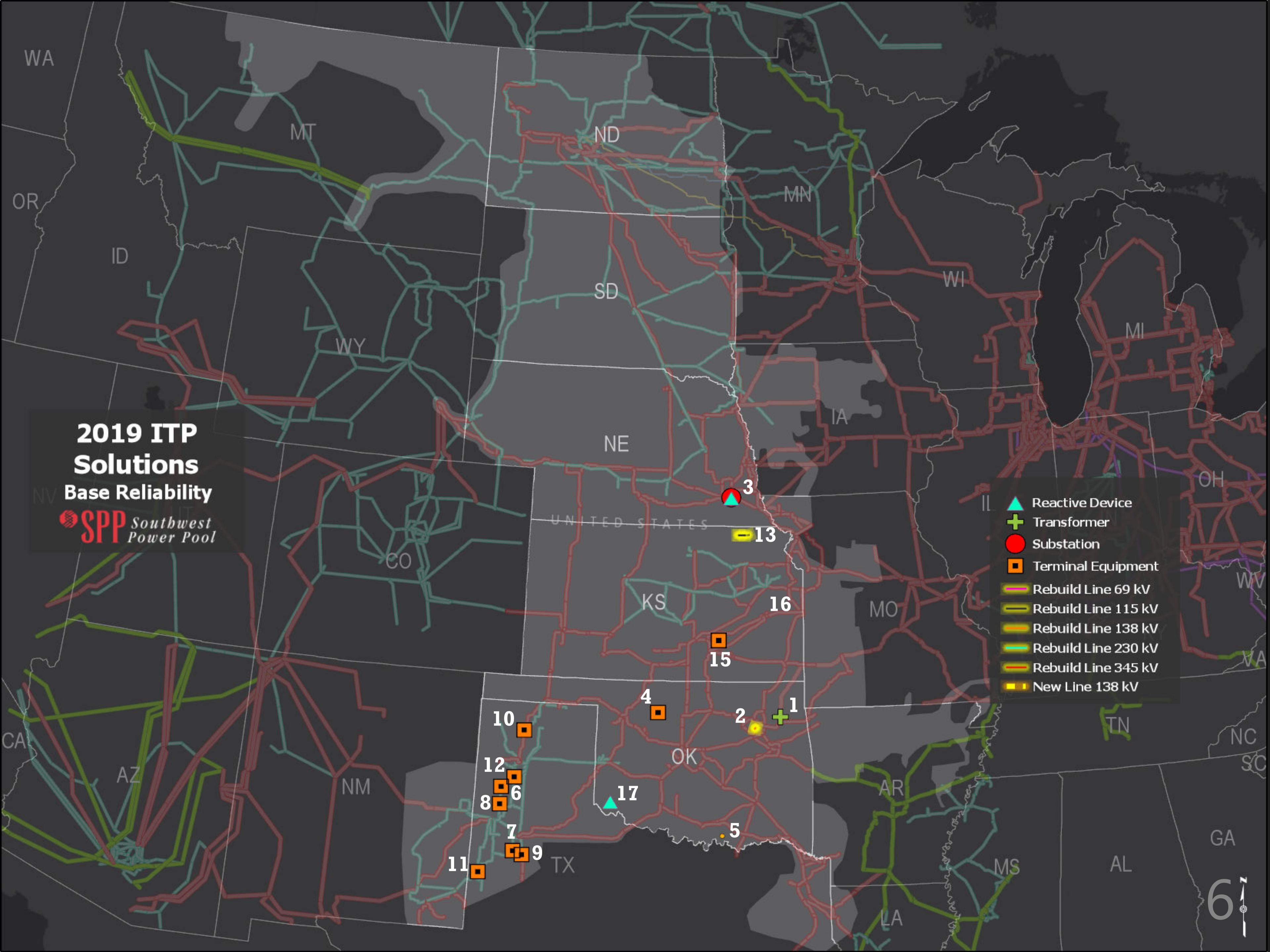
Optimization with consideration of potential alternatives

Individual project review including assessment of unmet needs, while ensuring must-fix needs are addressed

Final Reliability Portfolio
Thermal/Voltage

Map #	Reliability Project	Area	Cost	Scenario*
1	Pryor Junction 138/115 kV Transformer	AEPW	$9,155,167	21S / BR,F1,F2
2	Tulsa SE - 21 St Tap 138kV Ckt 1 Rebuild	AEPW	$1,307,802	21S / BR
2	Tulsa SE - S Hudson 138kV Ckt 1 Rebuild	AEPW	$6,724,237	21S / BR
3	Firth 15MVAR Cap Bank 115kV	NPPD	$3,370,000	21S,W,L / BR,F1,F2
4	Cleo Corner - Cleo Junction 69kV Ckt 1 Terminal Upgrades	OKGE	$16,602	24S / BR
5	Caney Creek - Texoma Junction 138kV Ckt 2	OKGE/ WFEC	$6,803,000	21W / BR
6	Bushland - Deaf Smith 230kV Ckt 1 Terminal Upgrades	SPS	$1,185,094	29L / BR
7	Carlisle - LP Doud Tap 115kV Ckt 1 Terminal Upgrades	SPS	$88,924	29S / BR
8	Deaf Smith - Plant X 230kV Ckt 1 Terminal Upgrades	SPS	$1,185,094	29L / BR
9	Lubbock South - Jones 230kV Ckt 1 Terminal Upgrades	SPS	$88,924	29S / BR
9	Lubbock South - Jones 230kV Ckt 2 Terminal Upgrades	SPS	$88,924	29S / BR
10	Moore - RB-S&S 115kV Ckt 1 Terminal Upgrades	SPS	$158,742	29S / BR,F1
11	Plains Int - Yoakum 115kV Ckt 1 Terminal Upgrades	SPS	$158,742	29S / BR
12	Potter Co - Newhart 230kV Ckt 1 Terminal Upgrades	SPS	$1,185,094	29L / BR
13	Marshall County - Smittyville - Baileyville - South Seneca 115kV Ckt 1 Rebuild	WERE	$17,636,022	21L / BR
15	Getty East - Skelly 69kV Ckt 1 Terminal Upgrades	WERE	$114,821	21S,W,L / BR
17	Gypsum 12MVAR Cap Bank 69kV	WFEC	$490,093	21S / BR
		Total	**$49,757,282**	

*Earliest model year and season/driving scenario(s)

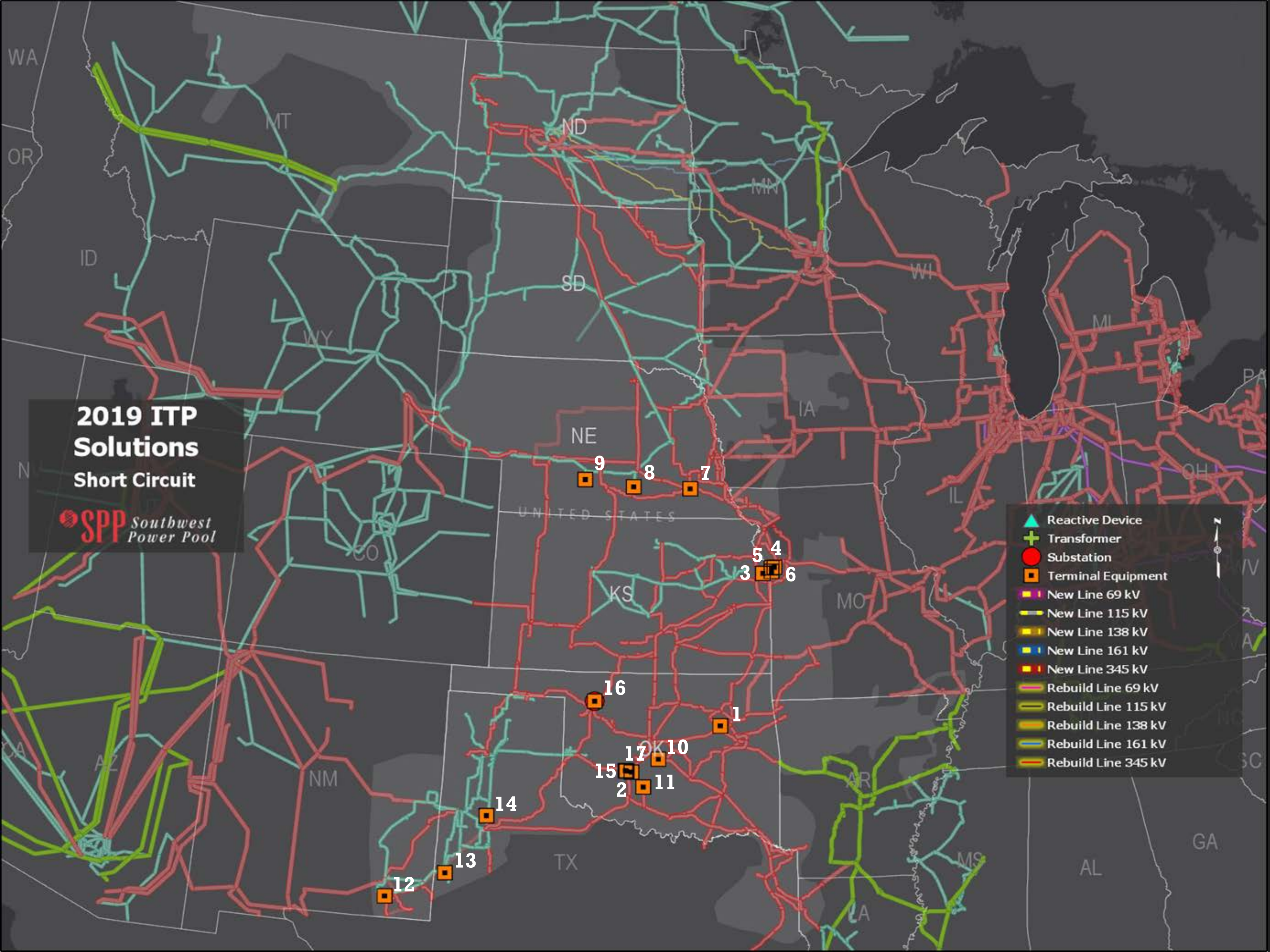


2019 ITP Solutions
Base Reliability
SPP Southwest Power Pool
WA
OR
ID
MT
WY
NV
CA
AZ
NM
CO
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MI
OH
WV
VA
TN
NC
SC
MS
AL
GA
UNITED STATES
1
2
3
4
5
6
7
8
9
10
11
12
13
15
16
17
Reactive Device
Transformer
Substation
Terminal Equipment
Rebuild Line 69 kV
Rebuild Line 115 kV
Rebuild Line 138 kV
Rebuild Line 230 kV
Rebuild Line 345 kV
New Line 138 kV

Final Reliability Portfolio
Short Circuit

Map #	Reliability Project	Area	Cost	Scenario*
1	Replace 21 breakers at Riverside Station 138kV	AEPW	$16,288,000	21S / BR
2	Replace 8 breakers at Southwestern Station 138kV	AEPW	$4,421,345	21S / BR
3	Replace 1 breaker at Craig 161kV	KCPL	$254,000	21S / BR
4	Replace 2 breakers at Leeds 161kV	KCPL	$440,000	21S / BR
5	Replace 2 breakers at Midtown 161kV	KCPL	$440,000	21S / BR
6	Replace 4 breakers at Southtown 161kV	KCPL	$880,000	21S / BR
7	Replace 1 breaker at Moore 13.8kV	NPPD	$510,000	21S / BR
8	Replace 2 breakers at Hastings 115kV	NPPD	$550,000	21S / BR
9	Replace 5 breakers at Canaday 115kV	NPPD	$2,600,000	21S / BR
10	Replace 2 breakers at Westmoore 138kV	OKGE	$271,289	21S / BR
11	Replace 3 breakers at Santa Fe 138kV	OKGE	$406,935	21S / BR
12	Replace 1 breaker at Carlsbad Interchange 115kV	SPS	$552,668	21S / BR
13	Replace 3 breakers at Denver City North and South 115kV	SPS	$5,526,680	21S / BR
14	Replace 3 breakers at Hale County Interchange 115kV	SPS	$1,658,004	21S / BR
15	Replace 1 breaker at Washita 69kV	WFEC	$52,400	21S / BR
16	Replace 12 breakers at Mooreland 138/69kV	WFEC	$835,850	21S / BR
17	Replace 3 breakers at Anadarko 138kV	WFEC	$228,500	21S / BR
		Total	**$35,915,671**	

*Earliest model year and season/driving scenario(s)



2019 ITP
Solutions
Short Circuit
SPP Southwest Power Pool
Reactive Device
Transformer
Substation
Terminal Equipment
New Line 69 kV
New Line 115 kV
New Line 138 kV
New Line 161 kV
New Line 345 kV
Rebuild Line 69 kV
Rebuild Line 115 kV
Rebuild Line 138 kV
Rebuild Line 161 kV
Rebuild Line 345 kV
WA
OR
ID
MT
ND
SD
MN
WI
MI
WY
NE
IA
IL
OH
CO
KS
MO
AZ
NM
OK
AR
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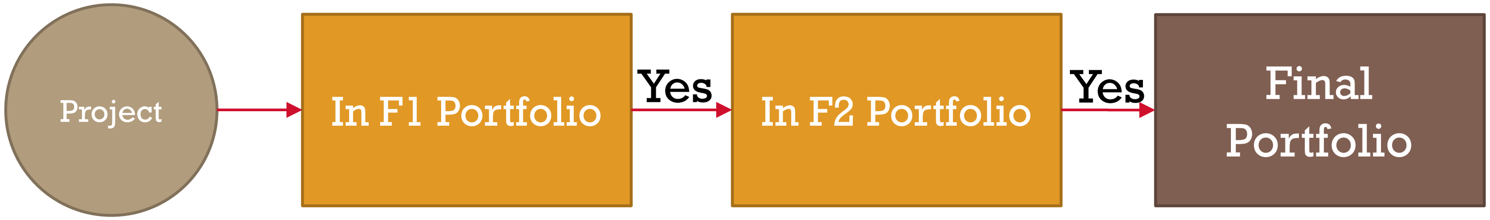
Portfolio Consolidation
Scenarios

Scenario #	Scenario Description	F1	F2	Should we recommend?	What should we recommend?
1	Same project in each future	Project A	Project A	✓	✓
2	Competing projects	Project B	Project C	✓	?
3	Projects in one future	N/A	Project D	?	✓

SPP

Portfolio Consolidation

Scenario 1: Same project in both portfolios



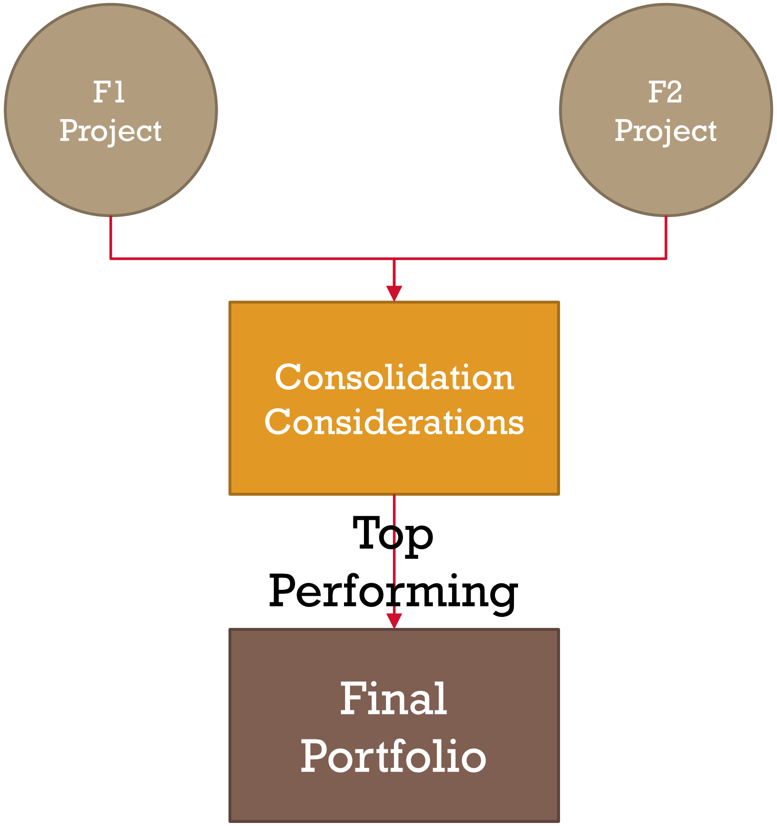
Scenario 1 Projects

Economic Project	Cost
Gracemont – Anadarko 138 kV Rebuild	$2,850,000
Kingfisher Jct. – East Kingfisher Tap 138 kV Rebuild	$1,000,000
Spearman – Hansford 115 kV Rebuild	$828,359
Lawrence EC – Midland 115 kV Terminal Upgrades	$30,939

Consolidation Considerations

<table>
<tr><th>No.</th><th>Considerations</th><th>Points Possible</th><th>Threshold</th></tr>
<tr><td rowspan="4">1</td><td>40-year (1-year) APC B/C in Selected Future</td><td rowspan="4">50</td><td>1.0 (0.9)</td></tr>
<tr><td>40-year (1-year) APC B/C in Opposite Future</td><td>0.8 (0.7)</td></tr>
<tr><td>40-year (1-year) APC Net Benefit in Selected Future ($M)</td><td>N/A</td></tr>
<tr><td>40-year (1-year) APC Net Benefit in Opposite Future ($M)</td><td>N/A</td></tr>
<tr><td rowspan="2">2</td><td>Congestion Relieved in Selected Future (by need(s), all years)</td><td>10</td><td>N/A</td></tr>
<tr><td>Congestion Relieved in Opposite Future (by need(s), all years)</td><td>10</td><td>N/A</td></tr>
<tr><td>3</td><td>Operational Congestion Costs or Reconfiguration ($M/year or hours/year)</td><td>10</td><td>>0</td></tr>
<tr><td>4</td><td>New EHV</td><td>7.5</td><td>Y/N</td></tr>
<tr><td>5</td><td>Mitigate Non-Thermal Issues</td><td>7.5</td><td>Y/N</td></tr>
<tr><td>6</td><td>Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility</td><td>5</td><td>Y/N</td></tr>
<tr><td colspan="2">Total Points Possible</td><td>100</td><td></td></tr>
</table>

Portfolio Consolidation
Scenario 2: Competing projects



Scenario 2 Project Set 1

- Competing Projects
  - F1: Upgrade Wolf Creek 345/69 kV Transformer & New Butler 138 kV Phase-Shifting Transformer ($20,349,161)
  - F2: New Wolf Creek - Blackberry 345 kV Line & New Butler 138 kV Phase-Shifting Transformer ($162,649,008)

No.	Consideration	Possible Points	F1 Project Score	F2 Project Score
1	APC Net Benefit and B/C in Selected Future	50	39.6	50
	APC Net Benefit and B/C in Opposite Future			
2	Congestion Relieved in Selected Future (by need(s), all years)	10	19.3	19.9
	Congestion Relieved in Opposite Future (by need(s), all years)	10		
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	8	8
4	New EHV	7.5	0	7.5
5	Mitigate Non-Thermal Issues	7.5	0	7.5
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	5	5
		Total Score	**71.9**	**97.9**

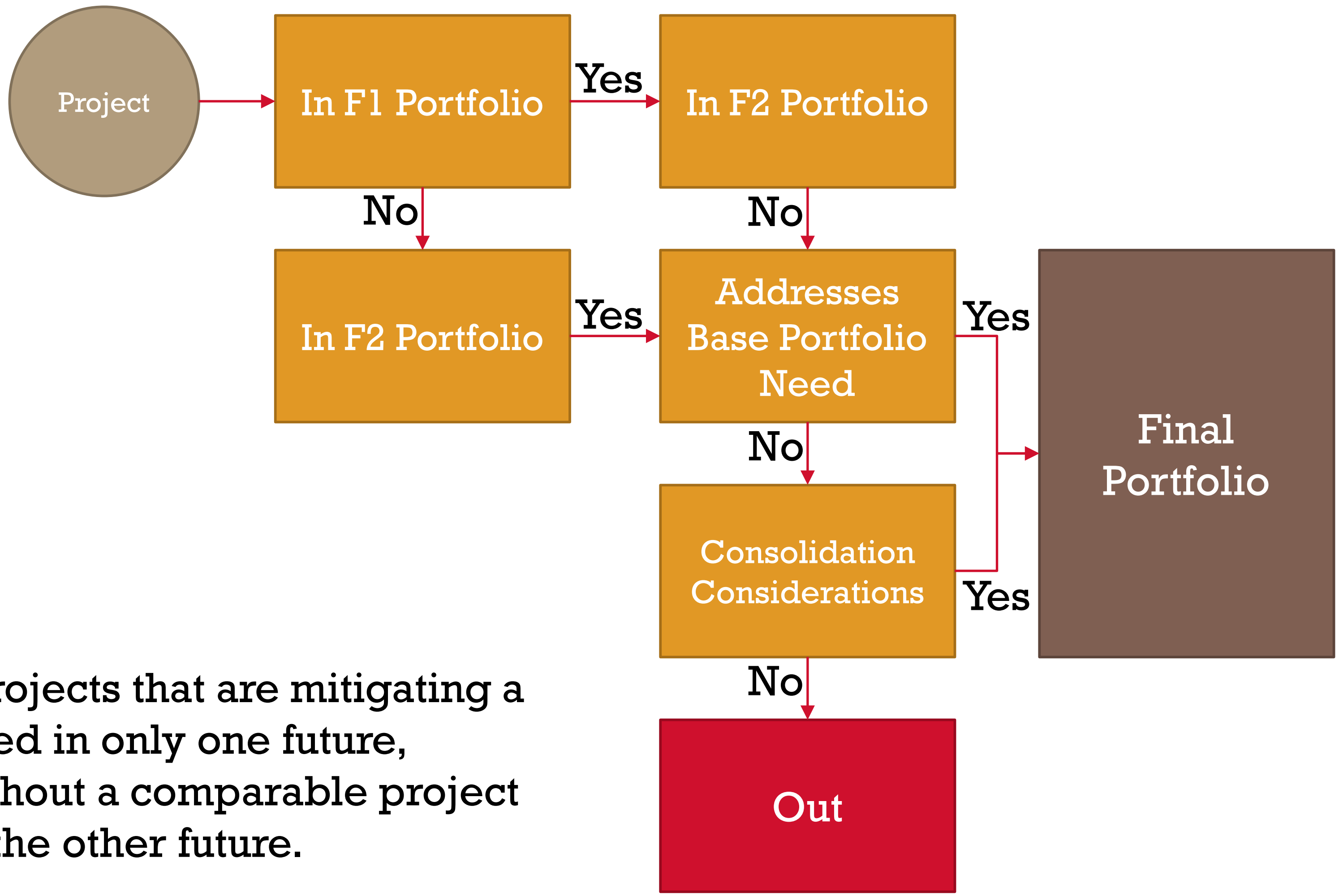
Scenario 2 Project Set 2

- Competing Projects
  - F1: Cleveland 138 kV Bus Tie Terminal Upgrades ($2,450,000)
  - F2: New Sooner – Wekiwa 345 kV Line and Sand Springs – Sheffield Steel 138 kV Terminal Upgrades ($85,948,123)

No.	Consideration	Possible Points	F1 Project Score	F2 Project Score
1	APC Net Benefit and B/C in Selected Future	50	48.6	50
	APC Net Benefit and B/C in Opposite Future			
2	Congestion Relieved in Selected Future (by need(s), all years)	10	1.3	18
	Congestion Relieved in Opposite Future (by need(s), all years)	10		
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	10	10
4	New EHV	7.5	0	7.5
5	Mitigate Non-Thermal Issues	7.5	0	7.5
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0	0
	Total Score		**59.9**	**93**

Portfolio Consolidation

Scenario 3: Projects in one future's portfolio



*Projects that are mitigating a need in only one future, without a comparable project in the other future.

Scenario 3 Project 1

- Future 2 Project: Neosho – Riverton 161 kV Rebuild ($32,456,162)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	0
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	10
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	5
	Total Score (minimum 70 threshold)		**35**

- Recommendation to not include in final portfolio

Scenario 3 Project 2

- Future 2 Project: Neosho – Caney River 345 kV Terminal Upgrades ($2,026,940)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	42.6
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	2
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**64.6**

- Recommendation to not include in final portfolio

Scenario 3 Project 3

- Future 2 Project: Cimarron – Northwest – Matthewson 345 kV Terminal Upgrades ($369,869)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	45.5
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	8
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**73.5**

- Recommendation to include in final portfolio

Scenario 3 Project 4

- Future 2 Project: South Brown – Russett 138 kV Rebuild ($7,479,900)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future APC Net Benefit and B/C in Opposite Future	50	0
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	2
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**22**

- Recommendation to not include in final portfolio

Scenario 3 Project 5

- Future 1 Project: Sundown – Amoco Tap 115 kV Terminal Upgrades ($358,281)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	49.4
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	0
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**69.4**

- Recommendation to include in final portfolio
  - Wind in the area is coming into service and load continues to grow (increase in north to south flows)
  - Historically congested area with NTCs being issued for immediate upstream issues in previous ITP studies
  - Economic needs in Future 1 and Future 2

Scenario 3 Project 6

- Future 2 Project: Arnold – Ransom 115 kV Terminal Upgrades and Pile – Scott City – Setab 115 kV Terminal Upgrades ($3,652,000)

No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	50
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	9
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**79**

- Recommendation to include in final portfolio

Scenario 3 Project 7

- Future 2 Project: Upgrade Fort Thompson 345/230 kV Transformer Ckt 1 & 2 ($14,750,000)

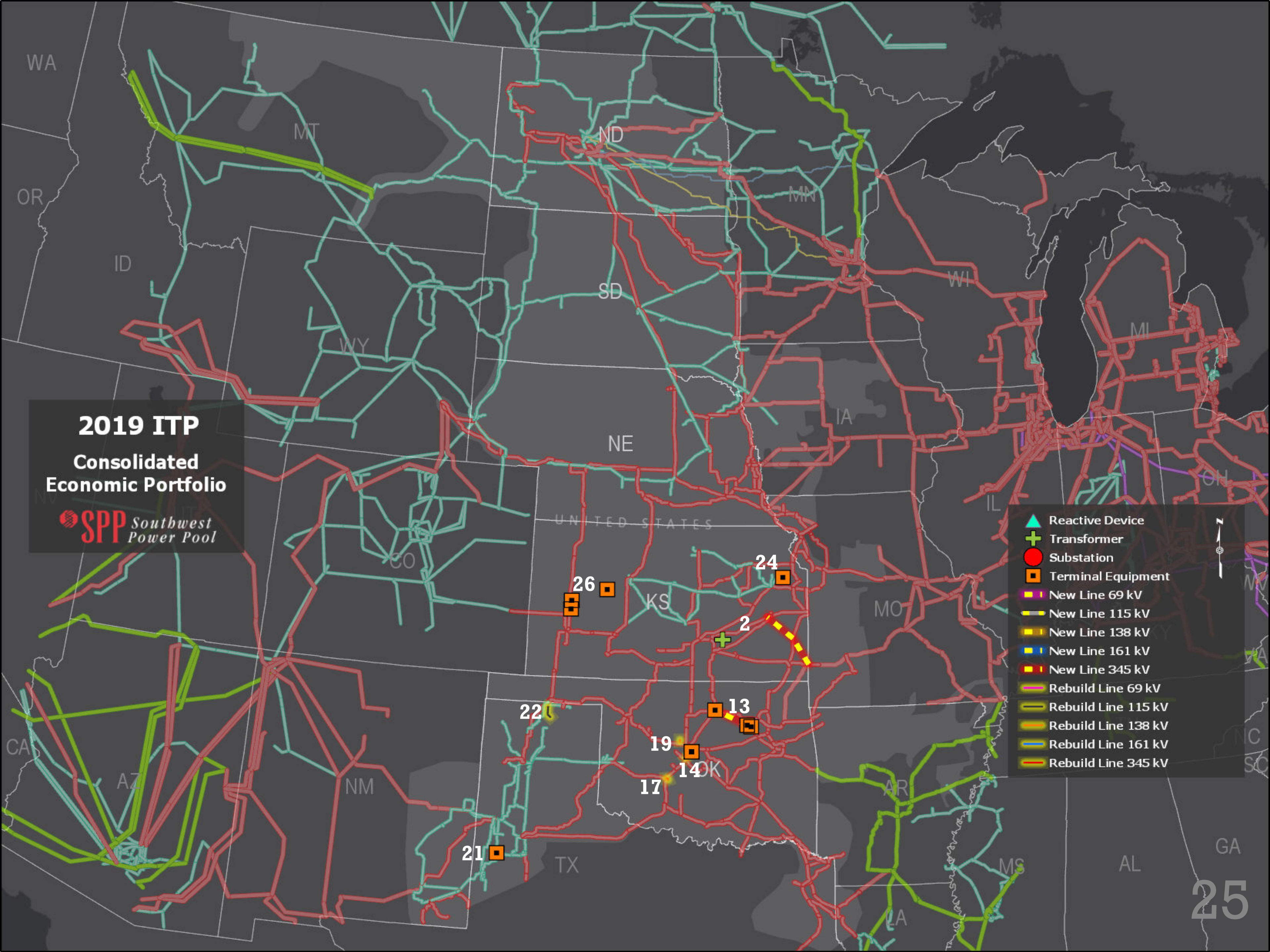
No.	Consideration	Possible Points	Project Score
1	APC Net Benefit and B/C in Selected Future	50	0
	APC Net Benefit and B/C in Opposite Future		
2	Congestion Relieved in Selected Future (by need(s), all years)	10	20
	Congestion Relieved in Opposite Future (by need(s), all years)	10	
3	Operational Congestion Costs or Reconfiguration ($M/yr or hrs/yr)	10	2
4	New EHV	7.5	0
5	Mitigate Non-Thermal Issues	7.5	0
6	Long Term Viability (e.g. 2013 ITP20) or Improved Auction Revenue Right (ARR) Feasibility	5	0
	Total Score (minimum 70 threshold)		**22**

- Recommendation to not include in final portfolio

SPP

Final Economic Portfolio

Map #	Economic Project	Project Cost
2	New Wolf Creek – Blackberry 345 kV Line and New Butler 138 kV Phase-Shifting Transformer	$162,649,008
13	New Sooner – Wekiwa 345 kV Line and Sand Springs – Sheffield Steel 138 kV Terminal Upgrades	$85,948,123
14	Cimarron – Northwest – Matthewson 345 kV Terminal Upgrades	$369,869
17	Gracemont – Anadarko 138 kV Rebuild	$2,850,000
19	Kingfisher Jct. – East Kingfisher Tap 138 kV Rebuild	$1,000,000
21	Sundown – Amoco Tap 115 kV Terminal Upgrades	$358,281
22	Spearman – Hansford 115 kV Rebuild	$828,359
24	Lawrence EC – Midland 115 kV Terminal Upgrades	$30,939
26	Arnold – Ransom 115 kV Terminal Upgrades and Pile – Scott City – Setab 115 kV Terminal Upgrades	$3,652,000
	Total	**$257,686,579**


2019 ITP
Consolidated Economic Portfolio
SPP Southwest Power Pool
Reactive Device
Transformer
Substation
Terminal Equipment
New Line 69 kV
New Line 115 kV
New Line 138 kV
New Line 161 kV
New Line 345 kV
Rebuild Line 69 kV
Rebuild Line 115 kV
Rebuild Line 138 kV
Rebuild Line 161 kV
Rebuild Line 345 kV
WA
OR
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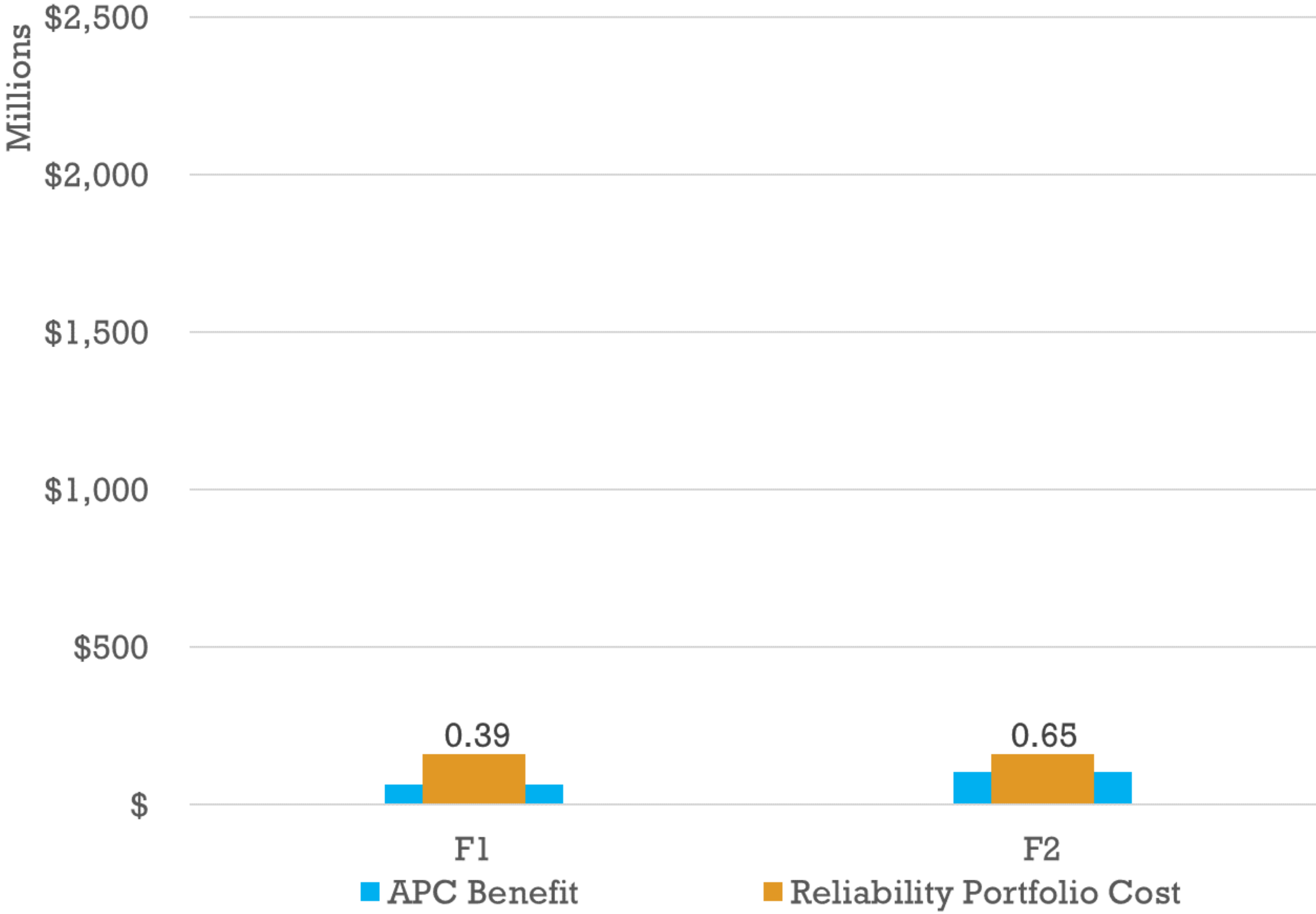
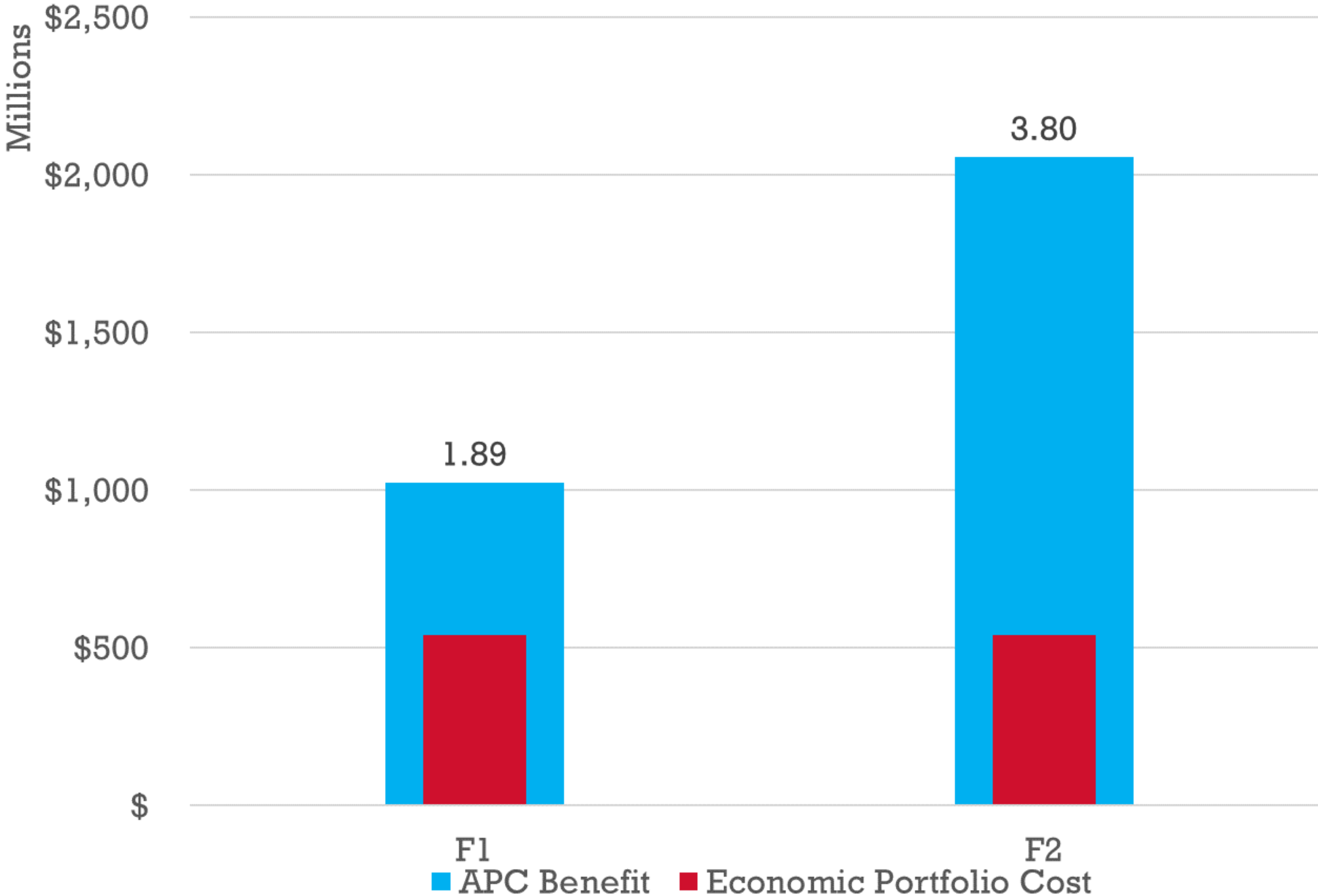
2019 ITP Reliability Portfolio APC Benefits & Costs



*Values are in 40-year NPV

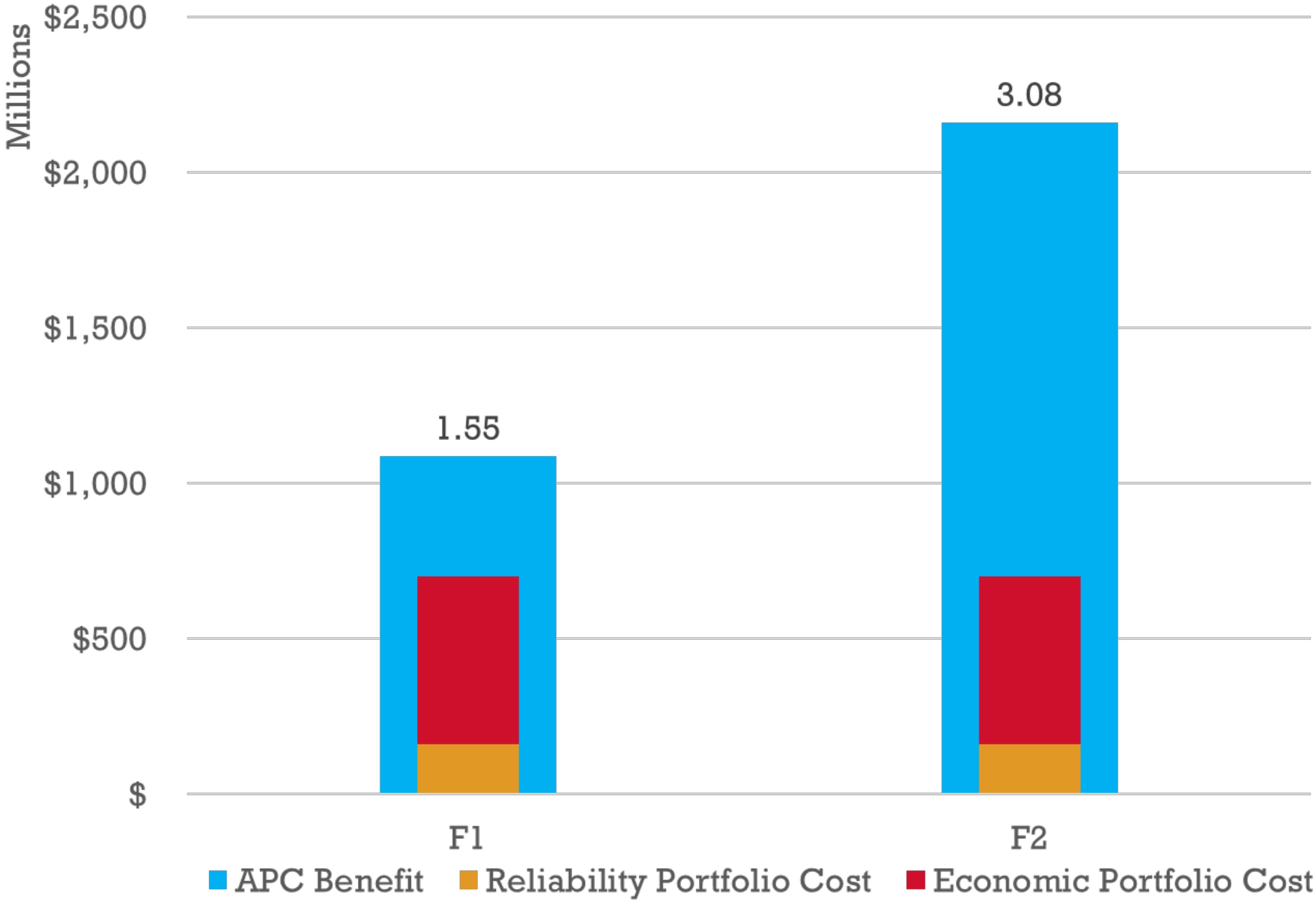
2019 ITP Economic Portfolio APC Benefits & Costs



*Values are in 40-year NPV

SPP

2019 ITP Final Portfolio APC Benefits & Costs



*Values are in 40-year NPV

SPP

Recommendation

- SPP Staff recommends the ESWG and TWG endorse the technical work performed by SPP staff to develop a portfolio of recommended projects for consideration by the SPP MOPC and Board.

Next Steps

- Staging
- Benefit Metrics
- Rate Impacts
- Sensitivity Analysis
- Final Reliability Assessment
- Voltage Stability Assessment
- Report

Appendix

Consolidation Calculations
Consideration 1

Scenario 2 (Competing Projects)

1. Test B/C Thresholds in Opposite Future
   - If project has less than 0.8 40-year B/C in opposite future, zero points will be awarded
   - If project meets 0.8 40-year B/C threshold in opposite future, continue calculations
2. Calculate Net APC Benefits
   - $Net\ APC\ Benefit_{P1,AVE} = \frac{Net\ APC\ Benefit_{P1,F1} + Net\ APC\ Benefit_{P1,F2}}{2}$
   - $Net\ APC\ Benefit_{P2,AVE} = \frac{Net\ APC\ Benefit_{P2,F1} + Net\ APC\ Benefit_{P2,F2}}{2}$
   - $Net\ APC\ Benefit_{Max} = Maximum(Net\ APC\ Benefit_{P1,AVE}, Net\ APC\ Benefit_{P2,AVE})$
3. Calculate Points Awarded
   - $Points\ Awarded_{P1} = 50 \times \frac{Net\ APC\ Benefit_{P1,AVE}}{Net\ APC\ Benefit_{Max}}$
   - $Points\ Awarded_{P2} = 50 \times \frac{Net\ APC\ Benefit_{P2,AVE}}{Net\ APC\ Benefit_{Max}}$

Consolidation Calculations

Consideration 1 Example

Scenario 2 (Competing Projects)

	Project 1	Project 2
Total Project Cost ($M)	**10.3**	**75.0**
40-yr APC B/C in Selected Future	1.6	1.9
40-yr APC B/C in Opposite Future	1.4	0.9
40-yr APC Net Benefit in Selected Future ($M)	6.2	67.5
40-yr APC Net Benefit in Opposite Future ($M)	4.1	-7.5

1. Test B/C Thresholds in Opposite Future
2. Calculate Net APC Benefits
   - $Net\ APC\ Benefit_{P1,AVE} = \frac{\$6.2M+\$4.1M}{2} = \$5.2M$
   - $Net\ APC\ Benefit_{P2,AVE} = \frac{\$67.5M-\$7.5M}{2} = \$30.0M$
   - $Net\ APC\ Benefit_{Max} = Maximum(5.2{,}30) = 30.0$
3. Calculate Points Awarded
   - $Points\ Awarded_{P1} = 50 \times \frac{5.2}{30.0} = \mathbf{8.6}$
   - $Points\ Awarded_{P2} = 50 \times \frac{30.0}{30.0} = \mathbf{50}$

SPP

Consolidation Calculations
Consideration 1

Scenario 3 (Projects in one future's portfolio)

1. Test B/C Threshold in Opposing Future
   - If project has less than 0.8 40-year B/C in opposing future, zero points will be awarded
   - If project has at least 1.0 40-year B/C in opposing future, 50 points will be awarded
   - If project meets 0.8 40-year B/C threshold in opposing future, but is less than 1.0, continue calculations
2. Calculate Net APC Benefits
   - $Net\ APC\ Benefit_{P1,AVE}$
   - $Net\ APC\ Benefit_{P1',AVE} = Net\ APC\ Benefit_{P1,AVE}$ $with 1.0\ B/C\ in\ opposing\ future$
3. Calculate Points Awarded
   - $Points\ Awarded_{P1,\%} = 50 \times \frac{Net\ APC\ Benefit_{P1,AVE}}{Net\ APC\ Benefit_{P1',AVE}}$

SPP

Consolidation Calculations

Consideration 1

Scenario 3 (Projects in one future's portfolio)

	Project 1	Project 1'
Total Project Cost ($M)	**10.3**	**10.3**
40-yr APC B/C in Selected Future	1.9	1.9
40-yr APC B/C in Opposite Future	0.9	1.0
40-yr APC Net Benefit in Selected Future ($M)	9.3	9.3
40-yr APC Net Benefit in Opposite Future ($M)	-1.0	0.0

1. Test B/C Threshold in Opposing Future
2. Calculate Net APC Benefits
   - $Net\ APC\ Benefit_{P1',AVE} = \frac{\$9.3M - \$1.0M}{2} = \$4.1M$
   - $Net\ APC\ Benefit_{P1',AVE} = \frac{\$9.3M + \$0.0M}{2} = \$4.6M$
3. Calculate Points Awarded
   - $Points\ Awarded_{P1,\%} = 50 \times \frac{\$4.1M}{\$4.6M} = \mathbf{44.4}$

Consolidation Calculations

- Consideration 2
  - Percent of congestion relieved on targeted needs multiplied by the number of possible points
- Consideration 3
  - Points awarded based on any associated operational issues' percentage of the operational needs criteria ($10M in congestion cost over last 24 months or system reconfiguration at 25% of year), capped at points possible
- Consideration 4*
  - All possible points awarded if new EHV
- Consideration 5*
  - All possible points awarded if expected to mitigate non-thermal issues
- Consideration 6*
  - All possible points awarded if in SPP long-term study

*No points awarded if criteria not met

Project Performance Details
Consideration 1

Project	Future	F1 Y5 B/C	F1 Y10 B/C	F1 40-year B/C	F1 Net Benefit	F2 Y5 B/C	F2 Y10 B/C	F2 40-year B/C	F2 Net Benefit
Upgrade Wolf Creek 345/69 kV Transformer & New Butler 138 kV Phase-Shifting Transformer	F1	2.23	3.39	6.67	$215,061,015	4.61	6.80	13.30	$466,809,450
New Wolf Creek - Blackberry 345 kV Line & New Butler 138 kV Phase-Shifting Transformer	F2	0.54	0.76	1.48	$146,030,835	1.06	1.70	3.36	$715,609,897
Cleveland 138 kV Bus Tie Terminal Upgrades	F1	10.99	22.86	46.73	$209,002,128	33.51	63.65	128.78	$584,032,505
New Sooner – Wekiwa 345 kV Line and Sand Springs – Sheffield Steel 138 kV Terminal Upgrades	F2	(0.11)	0.65	1.52	$82,871,072	0.93	2.65	5.57	$732,971,999
Neosho – Riverton 161 kV Rebuild	F2	0.53	0.01	(0.22)	-$73,823,392	0.96	0.87	1.53	$31,963,269
Neosho – Caney River 345 kV Terminal Upgrades	F2	2.92	(1.47)	(4.64)	-$21,321,987	13.48	19.92	38.95	$143,484,736
Cimarron – Northwest – Matthewson 345 kV Terminal Upgrades	F2	5.81	(6.25)	(16.75)	-$12,248,830	69.46	101.67	198.52	$136,292,623
South Brown – Russett 138 kV Rebuild	F2	0.33	(0.18)	(0.56)	-$21,736,543	0.27	1.32	2.86	$26,000,299
Sundown – Amoco Tap 115 kV Terminal Upgrades	F1	30.84	52.77	105.40	$69,779,833	25.67	5.03	(0.23)	-$818,829
Arnold – Ransom 115 kV Terminal Upgrades and Pile – Scott City – Setab 115 kV Terminal Upgrades	F2	1.02	1.39	2.69	$11,524,320	2.64	1.97	3.26	$15,382,077
Upgrade Fort Thompson 345/230 kV Transformer Ckt 1 & 2	F2	0.26	0.03	(0.06)	-$29,107,737	0.29	2.36	5.21	$115,918,002

SPP-MISO 2019 Coordinated System Plan Study (CSP)

ESWG/TWG

August 2019

2019 CSP Results

Key Takeaways

- Both parties have shared and coordinated potential interregional solutions to resolve the joint needs
  - Full project list available in the appendix
- No projects recommended
  - No projects met the JOA criteria that a minimum of 5% of the total project benefit must be received by each RTO
- 7 projects showed potential based of initial results as showing benefits to both RTOs

Shortlisted SPP-MISO CSP Projects

- Projects (initially) showed potential to benefit both SPP and MISO
  - Hugo to Valiant Terminal Upgrades
  - Raun to Tekamah 161 kV Rebuild
  - Raun to Tekamah to S1226 161 kV Rebuild
  - New Hope REA to Hope East 115kV Line; Hope REA and Emmet station upgrade
  - New Hope REA to Emmet 115kV Line; Hope REA and Emmet station upgrade
  - Granite Falls - Marshall 115kV dynamic line rating
  - Blackberry to Wolf Creek 345 kV

Hugo to Valiant Terminal Upgrades

- Project Description
  - Upgrade any necessary terminal equipment at Valiant and/or Hugo to increase the rating of the 138kV line between the two substations
- Potential Benefit
  - Project was shortlisted due to the benefit to MISO and SPP's anticipation the project would be needed once SPP's ITP portfolio was assumed
- Final Determination
  - Anticipated benefit to SPP was not realized within the consolidated ITP portfolio
  - Project provided SPP negative APC benefit

SPP Southwest Power Pool

MISO

Raun Area Projects

- Project Description
  - Raun to Tekamah 161 kV Rebuild
  - Raun to Tekamah to S1226 161 kV Rebuild
- Potential Benefit
  - Projects were short listed due to the initial benefit shown to both SPP and MISO
- Final Determination
  - Both projects failed B/C and JOA 5% benefit thresholds

	Cost (M$)	MISO 20yr (M$)	SPP 20yr (M$)	% Split (MISO/SPP)	B/C
Raun to Tekamah 161 kV Rebuild	58*	40.04	1.55	96.3% / 3.7%	0.72
Raun to Tekamah to S1226 161 kV Rebuild	79*	38.97	0.85	97.9% / 2.1%	0.50

SPP Southwest Power Pool

MISO

Hope Area Projects

- Project Description
  - New Hope REA to Hope East 115kV Line; Hope REA and Emmet station upgrade
  - New Hope REA to Emmet 115kV Line; Hope REA and Emmet station upgrade
- Potential Benefit
  - Projects were shortlisted due to the benefit shown to both SPP and MISO

Hope Area Projects Cont.

- Final Determination
  - Both projects failed MISO 1.25 B/C threshold
  - Projects failed to stand up to SPP robustness testing
    - Calculated benefits to SPP varied greatly when testing within SPP groupings
    - Both projects yielded negative benefit in Future 1
    - Projects were addressing overall model congestion and did not address specific ITP constraints
    - Additional congestion was identified on the SPP system with this project in the models

	Cost (M$)	MISO 20yr (M$)	SPP 20yr (M$)	% Split (MISO/SPP)	B/C
New Hope REA to Hope East	35	14.70	21.02	41.16% / 58.84%	1.02
New Hope REA to Emmet	37	15.20	24.36	38.42% / 61.58%	1.07

SPP Southwest Power Pool

MISO

Granite Falls to Marshall Dynamic Line Rating

- Project Description
  - Extend existing 115kV line from Erie Road to Marshall ER by one (1) mile to re-terminate into the existing Marshall 115kV substation
  - Install any necessary terminal equipment at the Marshall 115kV station to accommodate an additional line from Erie Road 115kV
  - Install any necessary equipment to dynamically rate the Granite Falls to Marshall 115 kV line
- Potential Benefit
  - Project was shortlisted due to the initial benefit shown to both SPP and MISO
- Final Determination
  - MISO determined that economic analysis is unable to conclusively ascertain the benefits due to the uncertainty associated with a dynamic line rating
  - SPP determined the project did not pass the "grouping" phase of the ITP study and was not included in either F1 or F2 consolidated portfolio

Blackberry to Wolf Creek

- Project Description
  - Build a new 345kV line from Blackberry to Wolf Creek
- Potential Benefit
  - Project was shortlisted due to the initial benefit shown to both SPP and MISO
    - While both RTO's benefited, initial results showed SPP to receive over 98% of the overall project benefit but the project was shortlisted to ensure those numbers didn't change to the point MISO would receive at least 5%
- Final Determination
  - Project failed JOA 5% benefit threshold
  - Final runs still indicated SPP to benefit be in excess of 97% falling short of the JOA criteria

Blackberry to Wolf Creek

- SPP and MISO looked into the results of this specific project to investigate the differing results between the ITP and MTEP
- Difference Drivers (likely applicable to all projects)
  - SPP and MISO's APC calculation
  - Aggregation methodology to 20-year present value benefits
  - Model years used between the ITP and MTEP
  - Future assumptions and modeling differences
- Market to Market (M2M) payments and APC are two different metrics
  - M2M payments captures the impact of market flows compared to FFEs; APC captures the impacts of pool-wide dispatch
  - Even though Neosho-Riverton shows high historical M2M payments, this does not necessarily translate to APC savings

SPP Southwest Power Pool

MISO

CSP Needs addressed due to a model correction

- South Shreveport to Wallace Lake
- Sioux City to Sioux City
- Hankinson to Wahpeton

Review of Results - Joint Needs

- Neosho to Riverton
  - Project to address this need discussed earlier in presentation
- Kerr to Maid
  - Projects addressing the flowgate did not provide MISO economic benefit
  - Need is still being evaluated regionally in SPP’s 2019 ITP
- Hugo to Valiant
  - Project to address this need discussed earlier in presentation
- Marshall to Smittyville
  - Neither SPP or MISO saw economic benefit from projects relieving this flowgate
  - The need is still being considered as a part of the ITP’s base reliability portfolio

Review of Results - Seams Needs

- Raun to Tekamah
  - Projects to address this need discussed earlier in presentation
- Patmos to Fulton
  - Project to address this need discussed earlier in presentation
- Bull Shoals to Midway Jordan
  - Projects addressing this flowgate did not provide SPP economic benefit
- South Brown to Russet
  - Projects addressing the flowgate did not provide MISO economic benefit
- Granite Falls to Marshall Tap
  - Project to address this need discussed earlier in presentation
- Grand Forks to Falconer
  - Neither SPP or MISO saw economic benefit from projects relieving this flowgate
  - Reliability issue in the area is addressed by an op guide

IPSAC Meeting August 19

- SPP-MISO Interregional Planning Stakeholder Advisory Committee
  - August 19, 2019
  - 9:00am to 12:00pm
  - Net Conference
- Registration Link
- Agenda
  - FERC Approval JOA Revisions
  - CSP Process & Needs Review
  - CSP Results
  - Lessons Learned & Next Steps

SPP Southwest Power Pool

MISO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2020 ITP Schedule

Juliano Freitas

August 13, 2019

Powerflow Model

- Start: 7/09/2018
- End: 2/22/2019 (Final Approval) – *See Model Updates milestone for further information on model finalization*
- Member Review Time:
  - *Pass 0 – Trial 1: 7/13/2018 – 7/20/2018 (5 days)*
  - *Pass 0 – Trial 2: 8/03/2018 – 8/24/2018 (15 days)*
  - *Pass 1: 9/14/2018 – 9/21/2018 (5 days)*
  - Pass 2: 10/05/2018 – 10/26/2018 (15 days)
  - Pass 3: 11/16/2018 – 12/07/2018 (15 days)
  - Pass 4: 12/21/2018 – 1/11/2019 (15 days)
  - **Final Data Submission Deadline: 1/11/2019**
  - Final Initial ITP: 2/11/2019 – 2/15/2019 (5 days)
  - **Final Initial ITP Approval: 2/22/2019**
  - **Final ITP Approval with Oct. 2019 Board approved projects in Nov. 2019**
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

Short Circuit Model

- Start: 11/14/2018
- End: 2/28/2019
- Member Review Time:
  - Pass 1: 12/14/2018 – 1/11/2018 (6 days)
  - Pass 2: 2/08/2019 – 2/15/2019 (6 days)
  - Pass 3: 2/21/2019 – 2/28/2019 (6 days) (MDWG Approval) Complete
  - **Final ITP Approval with Oct. 2019 Board approved projects in Nov. 2019**
- Staff Leader: TBD
- Working Group Approval: TWG

Market Economic Model Build

- Start: 2/01/2019
- End: 9/05/2019 (Member's Final Approval)
- Member Review Time:
  - Post 1: 6/13/2019 – 6/28/2019 (12 days)
  - Post 2: 8/19/2019 – 8/23/2019 (5 days)
  - Post for Final Approval: 8/29/2019 – 9/05/2019 (5 days)
  - Final ESWG Member Approval: 9/05/2019
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

Market Economic Benchmarking

- Start: 5/13/2019
- End: 8/07/2019 (Member's Final Approval)
- Member Review Time:
  - Post for Review: 6/24/2019 – 6/28/2019 (5 days)
  - Post for Final Approval: 7/10/2019 – 7/17/2019 (6 days)
  - Post for Final Approval: 8/02/2019
  - Final ESWG Member Approval via email: 8/07/2019
- Staff Leader: Chris Jamieson (cjamieson@spp.org)
- Working Group Approval: ESWG

Constraint Assessment

- Start: 8/02/2019
- End: TBD
- Member Review Time:
  - Final TWG Member Approval via email: TBD

Staff Leader: Kirk Hall (khall@spp.org)

- Working Group Approval: TWG

Market Powerflow Models (BA Reliability)

- Start: 9/02/2019
- End: 1/15/2020 (Member's Final Approval)

- Staff Leader: Michael Odom (modom@spp.org)
- Working Group Approval: TWG

Base Reliability Needs Assessment

- Start: 11/15/2019
- End: 3/14/2020

- Staff Leader: Joshua Pilgrim (jpilgrim@spp.org)

Market Powerflow Reliability Needs Assessment

- Start: 1/02/2020
- End: 3/14/2020

- Staff Leader: Dee Edmondson (dedmondson@spp.org)

Economic Needs Assessment

- Start: 1/02/2020
- End: 3/14/2020

- Staff Leader: Liz Gephardt (lgephardt@spp.org)

Public Policy Needs Assessment

- Start: 1/02/2020
- End: 3/14/2020

- Staff Leader: Liz Gephardt (lgephardt@spp.org)

Operational Needs Assessment

- Start: 1/02/2020
- End: 3/14/2020

- Staff Leader: Will Tootle (wtootle@spp.org)

Short Circuit Needs Assessment

- Start: 1/02/2020
- End: 3/14/2020

- Staff Leader: Jason Terhune (jterhune@spp.org)

DPP Window

- Start: 3/15/2020 12:00 a.m.
- End: 4/13/2020 11:59 p.m.
- Member Review Time:
  - Transmission-planning response window (30 calendar days)
- Staff Leader: Ellen Cook (ecook@spp.org)

Solutions Development & Validation

- Start: 3/15/2020
- End: 6/10/2020

- Staff Leaders:
  - Reliability: Kelsey Allen (kallen@spp.org)
  - Economic: Liz Gephardt(lgephardt@spp.org)
  - Policy: Liz Gephardt(lgephardt@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

Solutions Evaluations

- Start: 3/15/2020
- End: 6/10/2020

- Staff Leaders:
  - Reliability: Kelsey Allen (kallen@spp.org)
  - Economic: Amber Greb (agreb@spp.org)
  - Policy: Amber Greb (agreb@spp.org)
  - Operational: Will Tootle (wtootle@spp.org)
  - Short Circuit: Jason Terhune (jterhune@spp.org)

Reliability Portfolio Development

- Start: 2/15/2020
- End: 6/10/2020

- Staff Leader: Kelsey Allen (kallen@spp.org)

Project Grouping & Ranking

- Start: 3/15/2020
- End: 8/14/2020

- Staff Leaders: TBD

Study Cost Estimates – Round 1

- Start: 6/10/2020
- End: 6/25/2020

- Staff Leader: John O'Dell (jodell@spp.org)

Planning Summit

- Start: 6/25/2020
- End: 7/10/2020
- Member Review Time:
  - Summit Materials (7 days prior to meeting)
- Staff Leader: Ellen Cook (ecook@spp.org)

Study Cost Estimates – Round 2

- Start: 7/10/2020
- End: 7/25/2020

- Staff Leader: John O'Dell (jodell@spp.org)

Final Reliability Portfolios Development

- Start: 7/26/2020
- End: 8/14/2020

- Staff Leader: Kelsey Allen (kallen@spp.org)

Optimization & Portfolio Consolidation

- Start: 8/16/2020
- End: 9/18/2020

- Staff Leaders:
  - Liz Gephardt (lgephardt@spp.org)
  - Amber Greb (agreb@spp.org)

Project Staging

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: Liz Gephardt (lgephardt@spp.org)

Benefit Metrics Calculation

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: Antonio Barber (abarber@spp.org)

Stability Analysis

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: Dee Edmondson (dedmondson@spp.org)

Sensitivity Analysis

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: James Bailey (jbailey@spp.org)

Final Reliability Assessment

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: TBD (TBD)

Rate Impacts/ATRR

- Start: 8/14/2020
- End: 9/18/2020

- Staff Leader: Antonio Barber (abarber@spp.org)

Final Report

- Start: 8/1/2020
- End: 9/18/2020

- Staff Leader: Ellen Cook (ecook@spp.org)

TWG/ESWG Final Approvals

- Start: 9/25/2020
- End: 10/2/2020

- Staff Leaders:
  - TWG – Dee Edmondson (dedmondson@spp.org)
  - ESWG – Amber Greb (agreb@spp.org)

MOPC and SPP Board

- Start: 9/6/2020
- End: 10/27/2020
- Member Review Time:
  - MOPC: 10/2/2020 – 10/13/2020 (7 days)
  - SPP Board: 10/20/2020 – 10/27/2020 (5 days)


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2020 ITP Powerflow Update

Engineering Modeling

Objective

- Communicate 2020 ITP Base Reliability (BR) powerflow model updates received since model review posting and associated next steps

Background

- The 2020 ITP BR powerflow models were posted for TWG review on February 15, 2019
- The 2020 ITP BR powerflow models were approved as by TWG on February 22, 2019
- The 2020 ITP BR Pass 5a powerflow models posted on April 5, 2019
- SPP has received 3 model updates. Only one is covered by the Section 10.3 evaluation process of the ITP manual

2020 ITP BR Model Updates

- The "2020 ITP Model Update Matrix.xlsx" file will be posted with the updated 2020 ITP BR models after the 2019 ITP portfolio is approved by the board.
- Summary of 2020 ITP BR model updates:
  - Removal of the Lamb County Project
  - Removal of the Heizer Transformer 4
  - Gridiliance Winfield LPP update

Next Steps

- Model updates identified after the Load Review update posting could have considerable impacts to the 2020 ITP Assessment
- Post updated 2020 ITP BR powerflow models with Model Updates Matrix document on November 2019
- Final vote for 2020 ITP BR powerflow models planned for November 2019


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2020 ITP Market Powerflow Model (MPM)

Michael Odom

August 13, 2019

Market Powerflow Model Background

- ITP Manual and ITP Scope contain governing language for the 2020 ITP Market Powerflow Model build
- MP models are assessed in the Deliverability, ITP, and TPL assessments
  - Year 1 for Deliverability Study
  - Year 2, 5, 10 for ITP
  - Year 2, 5 for TPL Sensitivity
- There are 11 MPM models planned to be built
  - Year 1, F1 On-Peak
  - Year 2, F1 On-Peak & Off-Peak
  - Year 5, F1 & F2 On-Peak & Off-Peak
  - Year 10, F1 & F2 On-Peak & Off-Peak

Governing Language

- ITP Manual and ITP Scope contain governing language for the 2020 ITP Market Powerflow Model build
- MP On-Peak represents the Summer On-Peak hour (Coincident to SPP) from the PROMOD 8760 simulation
- MP Off-Peak represents the Off-Peak hour (Between April and May) from the PROMOD 8760 simulation
- Generation is SCUC / SCED to match PROMOD, accounts for approximated losses
- Load is based on PROMOD demand groups, power factor from Base Reliability models
- Interchange is based on PROMOD
- Reactive Device Settings changes can be made via member request
- External data sourced from Base Reliability model or MTEP

Market Powerflow Model Build Overview

- Acquire PROMOD simulations
- Utilize PAT to export Operating Point data
- Incorporate Operating Point data into PSSE
- Solve models
- Run Powerflow Docucheck to identify errors
- Coordinate with members to correct errors and to review reactive device settings
- Make model updates as needed
- Finalize models
- Request TWG approval of models

Next Steps

- Coordinate the model build timing with the timing of Market Economic Model build and Constraint Assessment
- Perform preliminary checks on existing code and identify future code needs
- Develop new code to improve model build efficiency and accuracy

Southwest Power Pool, Inc.

ECONOMIC STUDIES WORKING GROUP

Pending Action Items Status Report

August 13-14, 2019

	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	Vendor Reports are due September 27th. The 2-day retreat will be November 18-19th.
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. Staff to bring an update by the December ESWG meeting
190	SPP staff to perform a full transmission outage analysis before the next RCAR	October 12th, 2017	SPP Staff	
193	Discuss separate load forecasts for resource planning purposes, and how to incorporate into the ITP process	January 22nd, 2018 November 15th, 2018	SPP Staff	Has been incorporated into the Load review for 2020. Bringing to September meeting Update the ITP Manual
196	From SSC: ESWG to look into including market to market payments/settlements in the ITP Planning Process	January 9th, 2019	In Progress SPP Staff	Staff presented an education session in February, bring additional information as available
197	Research data sources for Fuel Prices and determine methodology for averaging/removing bias	March 13, 2019	SPP Staff	Staff will bring a recommendation during 2021 Scope development
198	Research the appropriateness of the 2.5% inflation rate used in ITP Assessments	April 11, 2019	SPP Staff	Goal: Which ITP is our goal 2021 or 2022? Shooting for the 2021
199	How we inform our Siting Plan: Research the appropriateness of relying on the GI Queue for Siting of renewables and Battery Storage and looking into other available information	April 2019	SPP Staff	Goal: to complete and implement for the 2021 ITP Assessment
200	Address the Load shape issues provided by ABB	July 2019	SPP Staff	
201	Review the interchange methodology	July 2019	SPP Staff	Goal: To complete for the 2021 ITP Assessment

202	Re-Evaluate the existing wind 80/100 meter turbine height	July 2019	SPP Staff	Goal: 2021 ITP Scope

Southwest Power Pool

Economic Studies Working Group

July 17-18th, 2019

Hilton Des Moines - Downtown, IA

• SUMMARY OF ACTIONS TAKEN •

2020 ITP:

1. Approved updates to the AECI Resource Plan
2. Approved the inclusion of recommended updates in the Market Economic Model

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ECONOMIC STUDIES WORKING GROUP

July 17-18th, 2019

Hilton Des Moines - Downtown, IA

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

There were 23 in-person participants and 60 web conference participants, representing 16 of 17 ESWG members. (Attachment 1 – June 12-13, 2019 ESWG Attendance)

Agenda Item 1b – Receipt of Proxies

Amber Greb (SPP) asked for any proxy statements; one proxy was identified. (Attachment 2 – 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 3 - June 12-13, 2019 ESWG Agenda)

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

Agenda Item 1d – Antitrust Reminder

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

Agenda Item 2 – Review of Past Action Items

Amber Greb (SPP) reviewed the list of past action items and asked for any comments or questions The group decided to remove Action Item 194 to continue researching and discussing curtailment pricing for future studies due to the ESWG approving a revision request in June.

Agenda Item 3 – Consent Agenda

The consent agenda included the following items:

a. Meeting Minutes – June 12-13, 2019 (Attachment 4 – 20190613 ESWG Minutes)

b. Meeting Minutes – June 20, 2019 (Attachment 5 – 20190620 ESWG Minutes)

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

Agenda Item 4 – Webex Tips

Amber Greb (SPP) presented tips on using Webex and discussed the differences with the new carrier. (Attachment 6 – Webex Update)

Agenda Item 5 – 2019 ITP Items

Agenda Item 5a – 2019 ITP Schedule

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

Agenda Item 5b – Portfolio Development

Liz Gephardt (SPP) and Kelsey Allen (SPP) presented on portfolio development. They reviewed the reliability and economic needs, target area analysis, reliability and economic projects, initial and final economic groupings of projects, and the benefit-cost comparison of final groupings. (Attachment 8 – 2019 ITP Portfolio Development)

Agenda Item 5bi – CSP Update

Adam Bell (SPP) informed the group of the ongoing work for the coordinated system plan. (Attachment 9 – SPP-MISO CSP Update)

Agenda Item 5c – Portfolio Optimization

Kalen Coleman (SPP) reviewed the optimization milestone and presented the project overlap for expected optimization. (Attachment 10 – 2019 ITP Portfolio Optimization)

Agenda Item 5d – Portfolio Consolidation

Amber Greb (SPP) presented a summary of the consolidation milestone. She reviewed the scoring considerations and calculations as well as schedule. (Attachment 11 – 2019 ITP Portfolio Consolidation)

Agenda Item 5e – Project Staging

Joshua Pilgrim (SPP) gave an overview of the staging milestone. He discussed ITP manual language for both reliability and economic project staging. (Attachment 12 – Staging)

Agenda Item 5f – Benefit Metrics/Rate Impacts

Antonio Barber (SPP) gave an overview of the benefit metrics and rate impacts milestone. He reviewed the benefit metric impact analysis and details for each metric as well as how rate impacts are determined. (Attachment 13 – Benefit Metrics)

Agenda Item 5g – Voltage Stability Assessment

Chris Jamieson (SPP) presented on the governing language and objectives for the voltage stability assessment milestone. (Attachment 14 – 2019 ITP Voltage Stability Assessment)

Agenda Item 6 – 2020 ITP Items

Agenda Item 6a – Schedule

Juliano Freitas (SPP) reviewed the schedule for the 2020 ITP Assessment. He reviewed on-going and up-coming milestones. (Attachment 15 – 2020 ITP Schedule)

Agenda Item 6b – Market Economic Model Benchmarking

Clayton Mayfield (SPP) reviewed the benchmarking recommended updates and provided results of the benchmarking milestone. (Attachment 16 – 2020 ITP Benchmarking)

> **Anita Sharma (AEP) made a motion; seconded by Jeremy Severson (BEPC) to approve the inclusion of recommended model updates. The motion passed unanimously.**

Clayton Mayfield (SPP) recommended approval of the benchmarking milestone but the group decided to schedule a conference call to review and approve after more research is done on the load in the model.

Agenda Item 6c – External Resource Plan

Joshua Norton (SPP) reviewed the updated AECI resource plan. (Attachment 17 – AECI update EMB)

> **Jeremy Severson (BEPC) made a motion; seconded by Tim Owens (NPPD) to approve the updated AECI Resource Plan. The motion passed unanimously.**

Agenda Item 7 – 2021 ITP Items

Agenda Item 7a – Schedule

Juliano Freitas (SPP) reviewed the schedule for the 2021 ITP Assessment. He reviewed on-going and up-coming milestones. (Attachment 18 – 2021 ITP Schedule)

Agenda Item 7b – Scope

Jason Speer (SPP) reviewed previous ITP scopes and introduced the 2021 ITP Scope. He led a discussion on the development of futures as well as scope survey responses. (Attachment 19 – 2021 Scope and Futures Introduction)

Agenda Item 7c – Market Monitoring Unit recommendations

Keith Collins (SPP) gave remarks about MMU's input into the planning process and gave a case for a third future in the 2021 ITP Assessment. (Attachment 20 – MMU_2021_ITP_Scope Comments)

Agenda Item 7d – Generation & Load Review

Clayton Mayfield (SPP) reviewed the 2021 Generation and Load Review process, the Waiver and Resource Addition Request process, and the milestone schedule. (Attachment 21 – 2021 ITP Generation and Load Review)

Agenda Item 8 – Transmission Outages

Juliano Freitas (SPP) gave an update on transmission outage rate for the 2021 ITP Assessment.

Agenda Item 9 – Software Tool Update/Retreat Plan

Juliano Freitas (SPP) gave an update on the software retreat plan.

Agenda Item 10 – 2020 Meeting Locations

Amber Greb (SPP) discussed 2020 ESWG meeting locations. (Attachment 22 – 2020 Meeting Schedule)

Closing Items

There were no action items.

The meeting was adjourned at 1:55 PM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

Southwest Power Pool

Economic Studies Working Group

July 30th, 2019

Conference Call

• SUMMARY OF ACTIONS TAKEN •

2020 ITP:

1. Approved 2020 ITP Market Economic Model Benchmarking

Southwest Power Pool

Southwest Power Pool

ECONOMIC STUDIES WORKING GROUP

July 30th, 2019

Conference Call

• 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 9:00 a.m.

There were 53 web conference participants, representing 15 of 17 ESWG members. (Attachment 1 – July 30, 2019 ESWG Attendance)

Agenda Item 1b – Receipt of Proxies

Juliano Freitas (SPP) asked for any proxy statements; one proxy was identified. (Attachment 2 – 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 3 – July 30, 2019 ESWG Agenda)

> **Kurt Stradley (LES) made a motion; seconded by Zac Hager (OGE) to adopt the agenda. The motion was approved unanimously.**

Agenda Item 1d – Antitrust Reminder

Juliano Freitas (SPP) provided an antitrust reminder to the group.

Agenda Item 2 – Market Economic Model Benchmarking

Juliano Freitas (SPP) gave an updated presentation on benchmarking of the model. Two issues were discussed during this presentation. First, the peak load date, and second the wind capacity factors to be used during the 2020 ITP Assessment.

During the peak load discussion, ESWG members requested SPP Staff to use the 2019 load shapes to verify how it affects the peak load hour; members are not comfortable with the peak load staff presented using the 2020 load shapes.

Staff will re-run the numbers using the 2019 load shapes and post the results by Friday 8/2 and seek an email vote by Monday 8/5.

For the wind capacity factor discussion, staff showed the ESWG members that adjusting the tower height of existing wind to 80 meters would cause a minimum impact on annual energy production numbers (around 3%) (Attachment 4 – 2020 ITP Benchmarking_Updated)

> **Calvin Daniels (WFEC) made a motion; seconded by Tim Owens (NPPD) to approve the 2020 ITP Market Economic Model Benchmarking. The motion passed with one abstention: Zac Hager (OGE).**
>
> **"OG&E abstains on the vote on the 2020 ITP Benchmarking due to concerns that the wind energy capacity factor is much higher than historical records which may artificially increase congestion, the need for transmission projects and the APC calculations used to evaluate potential transmission projects." – Zac Hager**

Closing Items

The ESWG identified three action items during the meeting:

1. Address load shape issues provided by ABB
2. Review interchange methodology for ITP Assessment
3. Reevaluate existing wind hub heights for the 2021 ITP Scope

The meeting was adjourned at 11:35 AM.

Respectfully Submitted,

Amber Greb

ESWG Secretary

2020 ITP Economic Constraint Assessment

Kirk Hall

August 13, 2019

Economic Constraint Assessment Overview

- Method of determining elements that limit the incremental transfer of power throughout the system both under system intact and contingency situations
- SPP utilizes constraints to reliably manage the flow of energy arcos the physical bottlenecks of the transmission system in the least costly manner
- Developing study-specific constraints plays a critical part in determining Transmission Needs, as the constraint assessment identifies future bottlenecks as well as fine tunes the PROMOD models
- Due to PROMOD limitations it is not possible to monitor all combinations of transmission elements for issues, so the Constraint Assessment narrows constraint focus to most impactful as determined by ITP Future assumptions

Governing Documents

ITP Manual

2.2.3 CONSTRAINT ASSESSMENT

SPP maintains a list of flowgates to monitor based on reliability and economic issues seen in real-time. The constraint assessment is used to identify potential future constraints for each future and year of study.

To create these additional constraints, SPP will perform economic simulations to identify additional or breaching elements in the system that occur during the reliability peak and off-peak hours[22]. System flows under two levels of constraint will be analyzed:

- Copper Plate: No defined constraints.
- Initial constraint list based on NERC and SPP flowgates.

2.3 SPP BA POWERFLOW MODEL OVERVIEW

- Peak Hour: SPP coincident peak hour
- Off-Peak Hour: Hour with the highest wind penetration between April and May between the hours of 12 a.m. – 6 a.m.
- Highest wind output hour/top 1% of load hours

Governing Documents II

ITP Manual

2.2.3.1 Contingency Screening

Due to software and time limitations, large contingency lists are not feasible. The contingency lists will be created with the goal of including the most impactful contingencies for constraint identification.

After the initial economic simulation dispatch results have been created, the resulting contingencies will be limited to the following types of planning events identified in the NERC Standard TPL-001 for the 100 kV-and-above transmission system:

- P1.2 and P1.3 single-branch contingencies on the 100 kV and above system exceeding 50 percent loading in the peak and off-peak hours under system intact conditions for the translated areas.
- P1.2 and P1.3 single-branch contingencies on the 200 kV and above system exceeding 25 percent loading in the peak and off-peak hours under system intact conditions for the SPP footprint.
- Contingencies included in the SPP permanent and temporary flowgates, including P7 events.
- Other P1, P2, P4 and P5 events as potential contingencies.

Contingencies meeting these criteria that are inconsistent with operation of the SPP Integrated Marketplace or create simulation anomalies may be excluded from further evaluation.

SPP

Governing Documents III

2.2.3.2 Constraint Identification

Facilities exceeding their thermal limits under system intact and contingency conditions will be assessed for potential inclusion as constraints. Flow violations occurring in either of the reliability hours will be automatically included unless SPP and stakeholders deem otherwise during the constraint review. Flow violations occurring in the annual hourly simulations will be considered for inclusion based on the following information, at a minimum:

[22] Defined in the Base Reliability Model Overview section

- Number of violation hours and/or violation loading thresholds.
- The ability of the simulation to reach a valid[23] dispatch solution due to a given constraint[24].
- Preliminary economic model simulation results.
- Performance of constraints in prior SPP expansion plan studies.

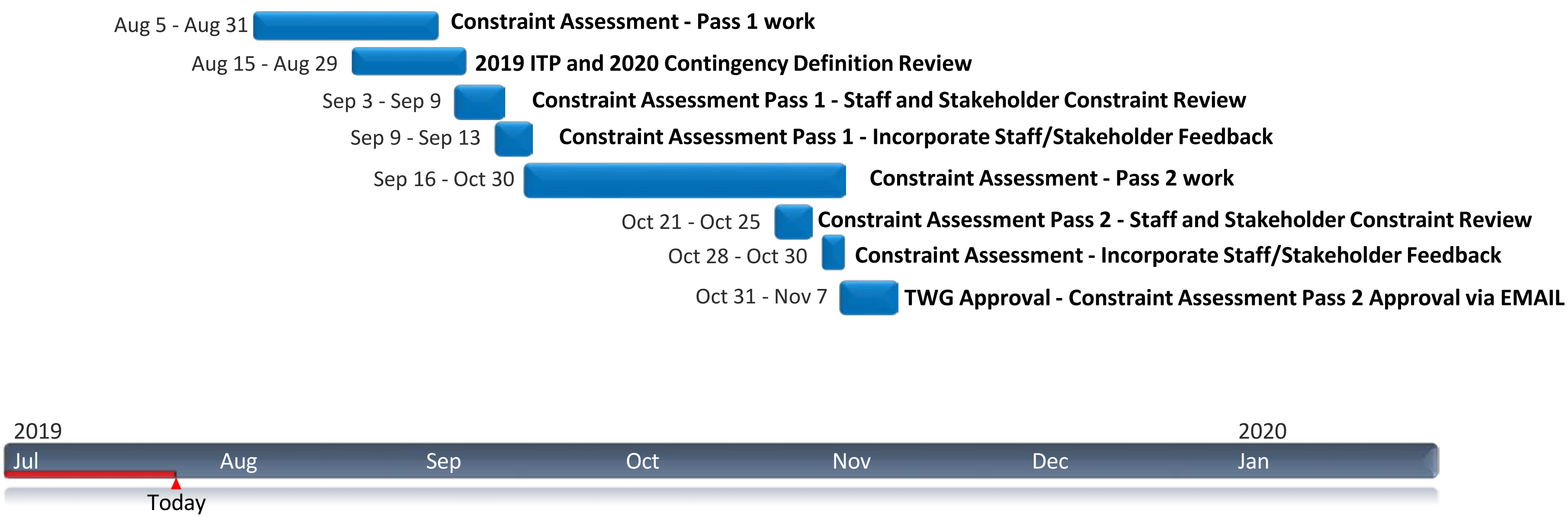
The ESWG and TWG will be given the opportunity to review the resulting constraints. After the review is completed, TWG approval will be requested before completion of the milestone.

In addition to the approved list of constraints, some 69 kV constraints may be included in the constraint list as needed to properly control the dispatch of resources on the 69 kV system and capture congestion in developing 100 kV and above solutions. These constraints will be suggested or provided by SPP stakeholders.

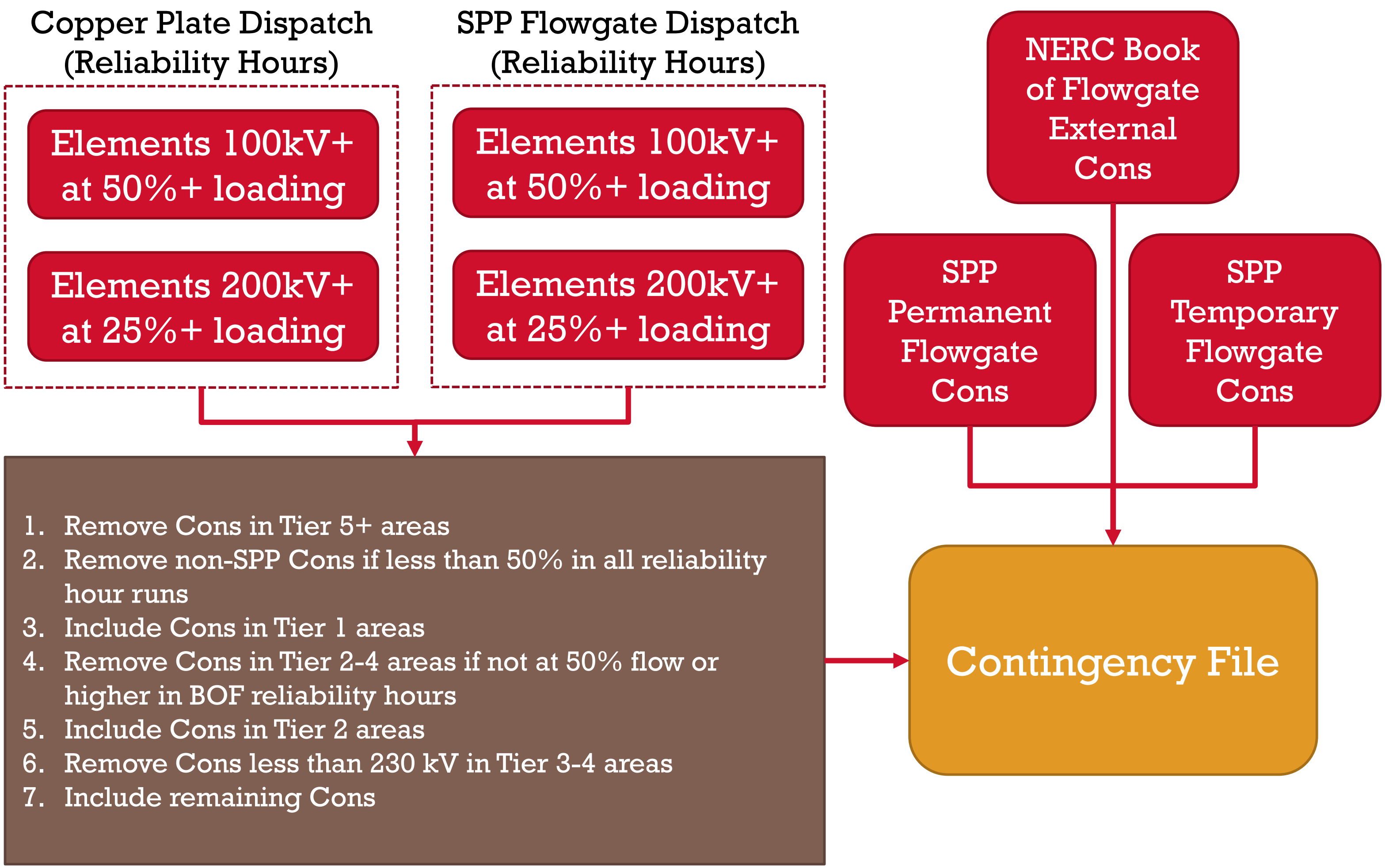
Schedule Notes

- Current ITP schedule calls for Needs Assessment posting around mid-March
  - Schedule crunch to finalize study by October 2020
- Pass 2 of the constraint assessment is accelerated to allow economic model completion earlier
- Staff plans to request a data review for members in mid-August
  - 2019 ITP solution idevs and associated contingency updates
- Goal accelerate the DPP window opening to allow more time in the schedule for assessments
- **Requires staff making some assumptions on 2019 ITP stakeholders approvals**

Constraint Assessment Schedule



Contingency Creation
By Scenario



Event Creation (By Scenario)

Contingency File

Overloaded elements under SPP flowgate dispatch in **peak hour**:
- 100kV+
- With 0% LODF threshold
- With 10%+ flow change

Overloaded elements under SPP flowgate dispatch in **off-peak hour**:
- 100kV+
- With 0% LODF threshold
- With 10%+ flow change

Overloaded elements under SPP flowgate dispatch in **annual run**:
- 100kV+
- With 1% LODF threshold
- With 10%+ flow change

1. Review events with 20%+ shift factor from existing and/or resource plan generation for potential exclusion (MUST - automation)
2. Review events associated with SPP Invalid contingency list for potential exclusion
3. Remove events with radial monitored lines under system intact and contingency conditions (TARA)
4. Remove events associated with external special protection schemes
5. Include MTEP19, NERC, SPP Temp Flowgate constraints (includes 69kV)
6. Include SPP and Tier 1 system intact events
7. Include SPP and Tier 1 events with first occurrence of monitored element under contingency (regardless of violated hour threshold).
8. Include SPP and Tier 1 Peak and Off-Peak constraints
9. Keep top 5 contingencies per monitored element
10. Include SPP events violating 800+ hours, non-SPP events violating 1200+ hours
    1. New monitored elements below set thresholds included
11. Review "null" events with no generation at least 1% shift factor for potential exclusion

SPP Permanent Flowgates → **Preliminary Scenario Event File**

Iterative process

Event Creation II
By Scenario

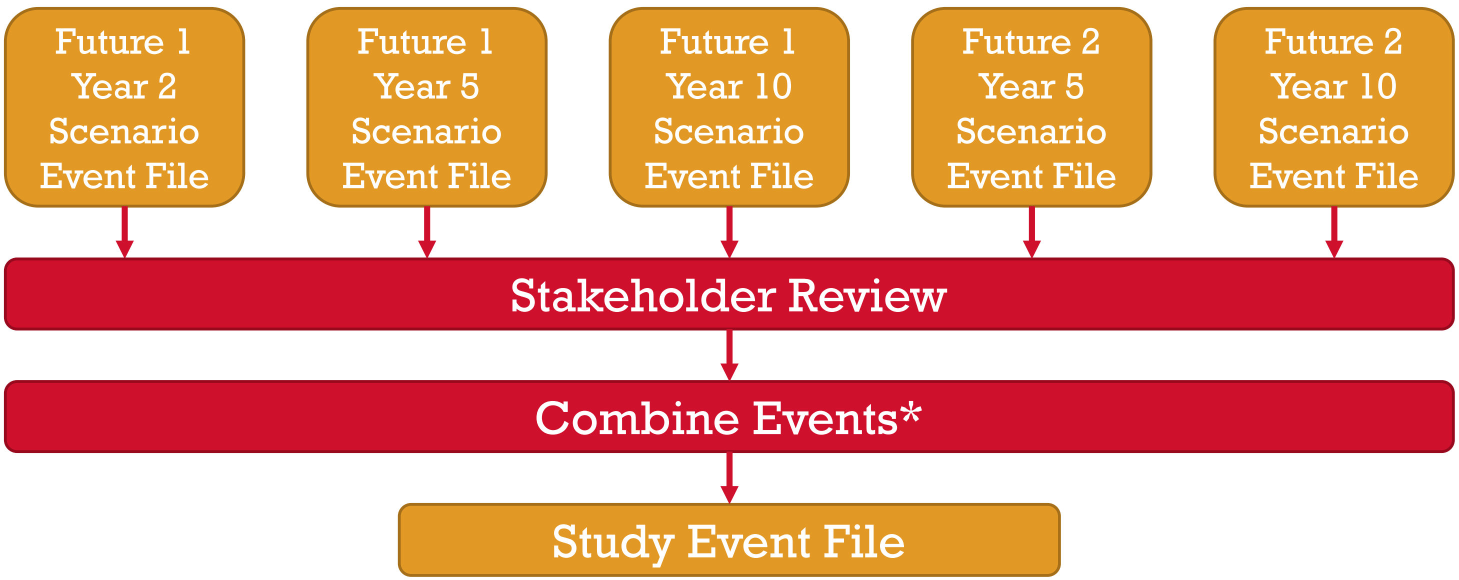
Preliminary Scenario Event File

Create
Economic Dispatch

1. Review events causing overloads, emergency energy, or dump energy
2. Review event congestion scores for potential exclusion in case of dimensioning issues
3. Removed Tier 2 constraints with contingencies less than 230kV not in MTEP19 event file and **NERC BOF**

Scenario Event File

Methodology Overview
Event Creation – Study-specific



*To the extent possible with topology changes amongst scenarios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2021 ITP Schedule

Juliano Freitas

August 14, 2019

Scope Development

- Start: 7/8/2019
- End: 1/14/2020 (Member's Final Approval)
  - MOPC Approval: 1/14/2020
- Member Review Time:
  - 12/04/2019 – 12/11/2019 (8 days)
  - Approved by ESWG: 12/11/2019
  - 12/11/2019 – 12/18/2019 (8 days)
  - Approved by TWG: 12/18/2019
- Staff Leader: Jason Speer (jspeer@spp.org)
- Working Group Approvals: ESWG and TWG

Powerflow & Short Circuit Models

- Start: 7/09/2019
- End: 3/06/2020 (Final Approval) – *See Model Updates milestone for further information on model finalization*
- Member Review Time:
  - *Pass 0 – Trial 1: 7/22/2019 – 7/26/2019 (5 days) (complete)*
  - Pass 0 – Trial 2: 8/12/2019 – 8/30/2019 (15 days)
  - Pass 1 – Trial 1: 9/30/2019 – 10/18/2019 (15 days)
  - Pass 1 – Trial 2: 11/18/2019 – 12/13/2019 (20 days)
  - **Last Chance Data Submission Deadline: 12/13/2019***
  - Pass 2: 1/20/2020 – 2/07/2020 (15 days)
  - **Final Chance Data Submission Deadline: 2/07/2020****
  - Final Initial ITP: 3/02/2020 – 3/06/2020 (5 days)
  - **Final Initial ITP Approval: 3/06/2020**
  - **Final ITP Approval with Oct. 2020 Board approved projects in Nov. 2020**
- Staff Leader: David Duhart (dduhart@spp.org)
- Working Group Approval: TWG

* **Last Chance** - Data Submitters provide final Transmission Service Inputs (AG1) Data, review Pass 2 models/data submission through MOD, update load and generation reports/reconcile transaction discrepancies.
** **Final Chance** - Data Submitters submit final generation dispatch, DocuCheck corrections and topology data updates through MOD and EDST.

SPP

Load Review

- Start: 7/19/2019
- End: 3/06/2020 (Member's Final Approval)
- Member Review Time:
  - Load Pass 0: 8/26/2019 – 8/30/2019 (5 days)
  - Load Pass 1 – Trial 1: 9/30/2019 – 10/18/2019 (13 days)
  - Load Pass 1 – Trial 2: 11/18/2019 – 11/22/2019 (5 days)
  - Load Pass 2: 1/20/2020 – 1/24/2020 (5 days)
  - Final Posting for Approval: 2/28/2020
  - **Final ESWG Approval: 3/06/2020**
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

Generation Review

- Start: 7/19/2019
- End: 3/06/2020 (Member's Final Approval)
- Member Review Time:
  - Generation Pass 0: 8/26/2019 – 8/30/2019 (5 days)
  - RAR & Waiver Request to Stakeholders: 8/26/2019 – 9/02/2019 (28 days)
  - Generation Pass 1 – Trial 1: 9/30/2019 – 10/18/2019 (13 days)
  - Generation Pass 1 – Trial 2: 11/18/2019 – 11/22/2019 (5 days)
  - Generation Pass 2: 1/20/2020 – 1/24/2020 (5 days)
  - Final Posting for Approval: 2/28/2020
  - **Final ESWG Approval: 3/06/2020**
- Staff Leader: Liz Gephardt (lgephardt@spp.org)
- Working Group Approval: ESWG

SPP Southwest Power Pool
MARKET MONITORING UNIT

Market Monitoring Unit Comments on 2021 ITP Scope Development

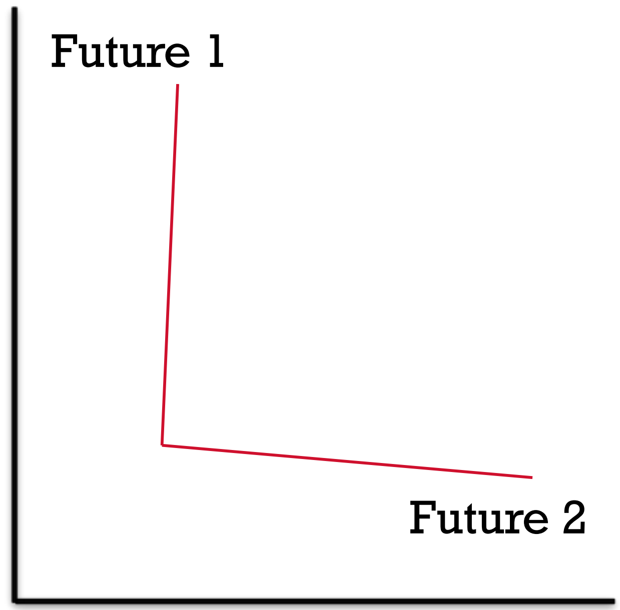
Keith Collins
Executive Director, Market Monitoring Unit, SPP
August 14, 2019

MMU recommendations on 2021 ITP scope development

- ESWG evaluating whether or not to do a two future or three future approach
  - MMU recommends the second future be a bookend
  - Should a third future be considered, the MMU recommends that it is the middle future
- MMU recommends updating retirement assumptions based on current information and trends

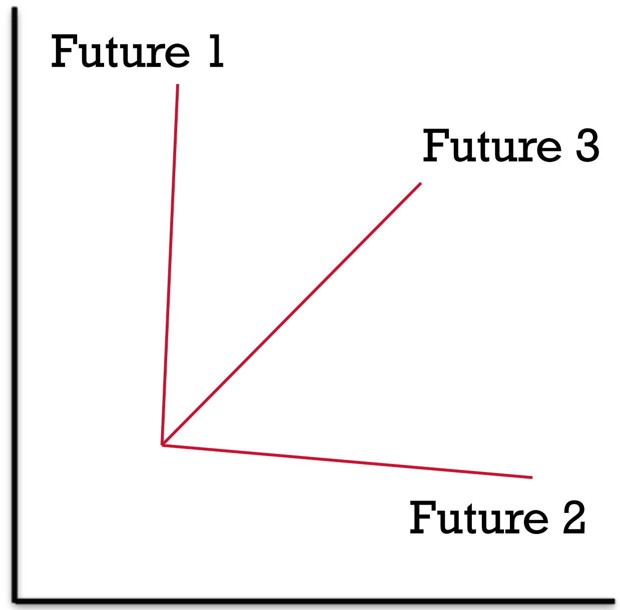
MMU recommends second future be a bookend

Two future approach



MMU recommends third future be the middle future

Three future approach



MMU recommends updating retirement assumptions

- Energy Information Administration data showed 2018 retirement results were:
  - 49 years for coal
  - 46 years for gas
- 2020 ITP retirement assumptions were
  - 56 years for coal
  - 50 years for gas
- Industry trends continue to show increased retirement of coal resources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2021 ITP Futures

Jason Speer

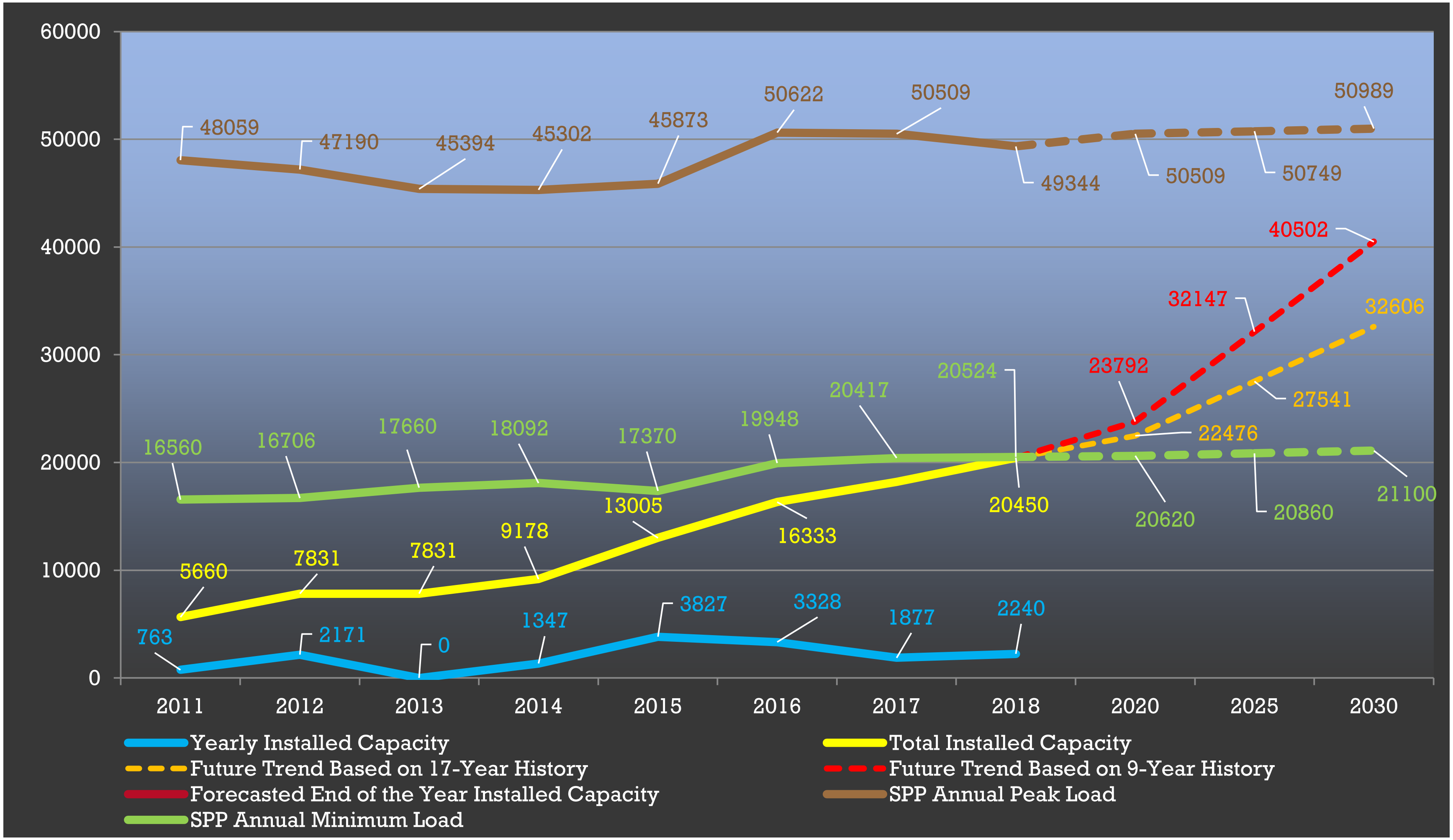
August 14, 2019

Overview

- Objective
  - Renewable Trends (Installed vs GI Queue)
  - Review 2021 ITP Futures framework

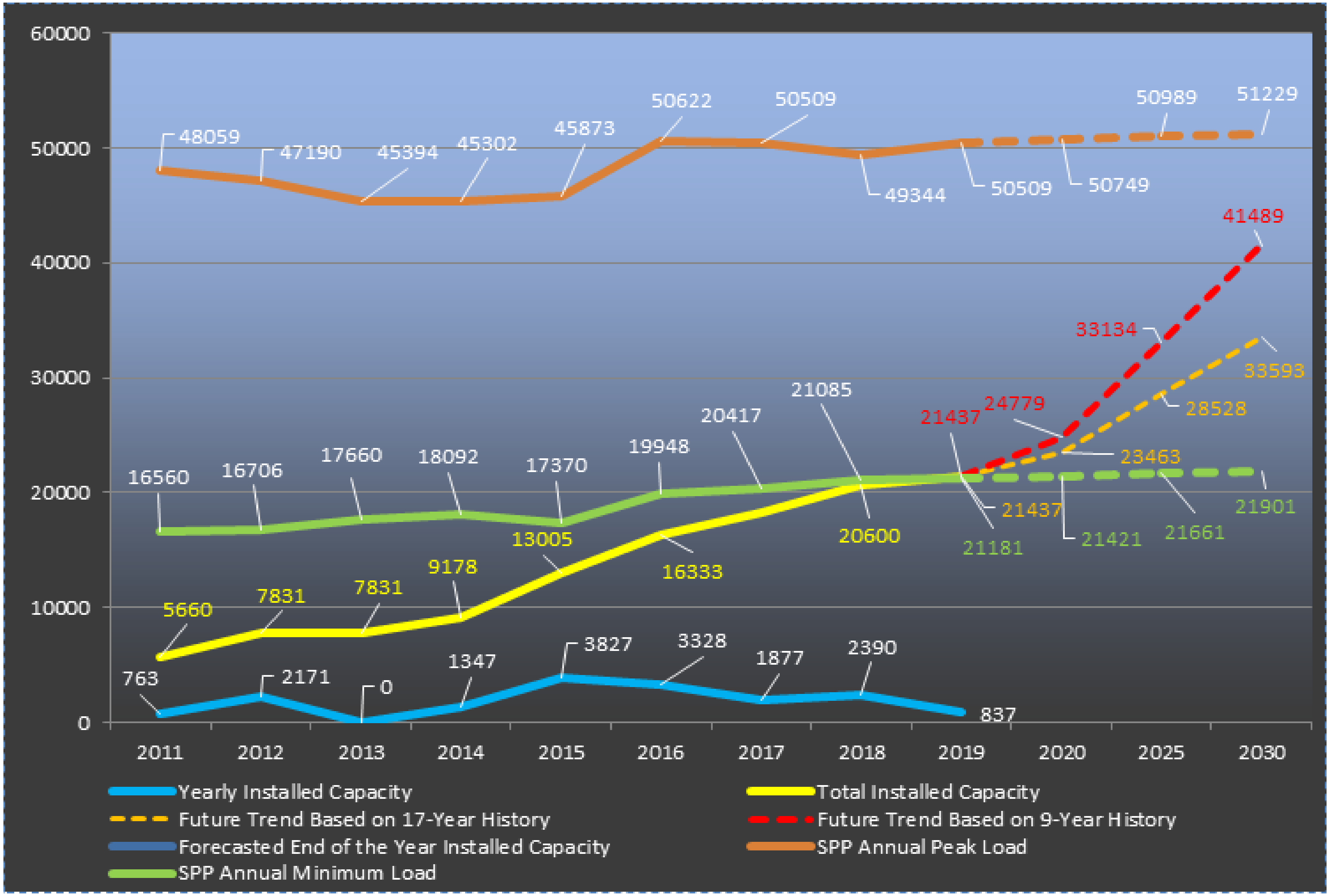
Renewable Generation

Wind Capacity Installed by Year (9/2/2018)



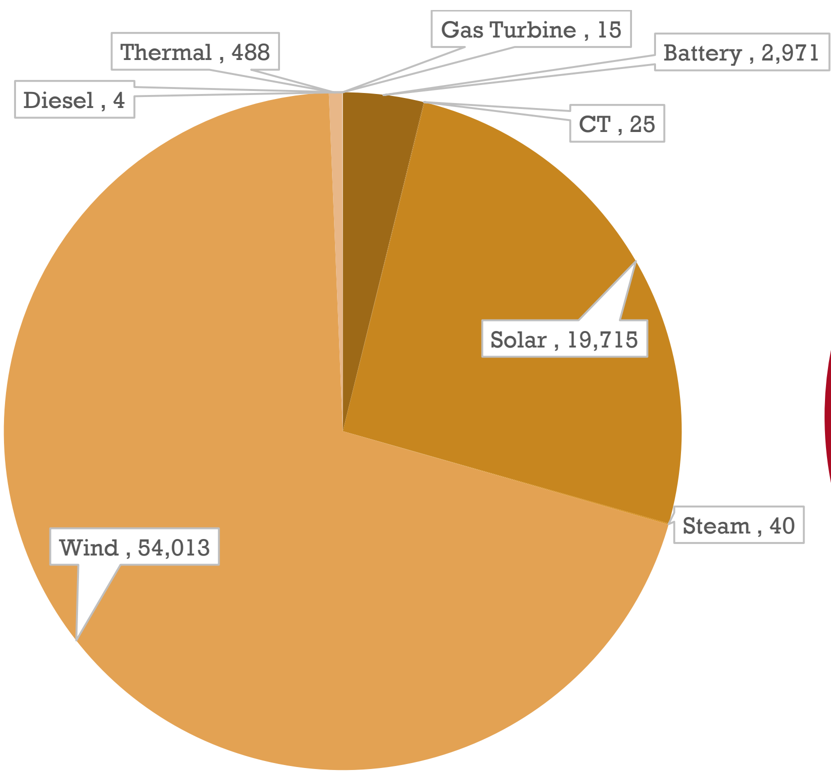
SPP

Wind Capacity Installed by Year (7/26/2019)

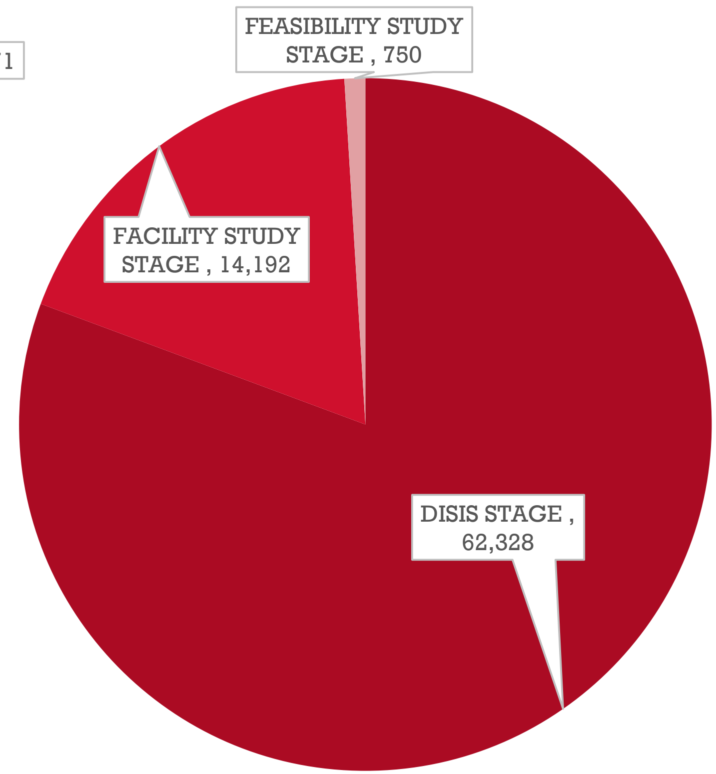


SPP

Pending GI Requests by Generator Type & Study Stage 07/2018



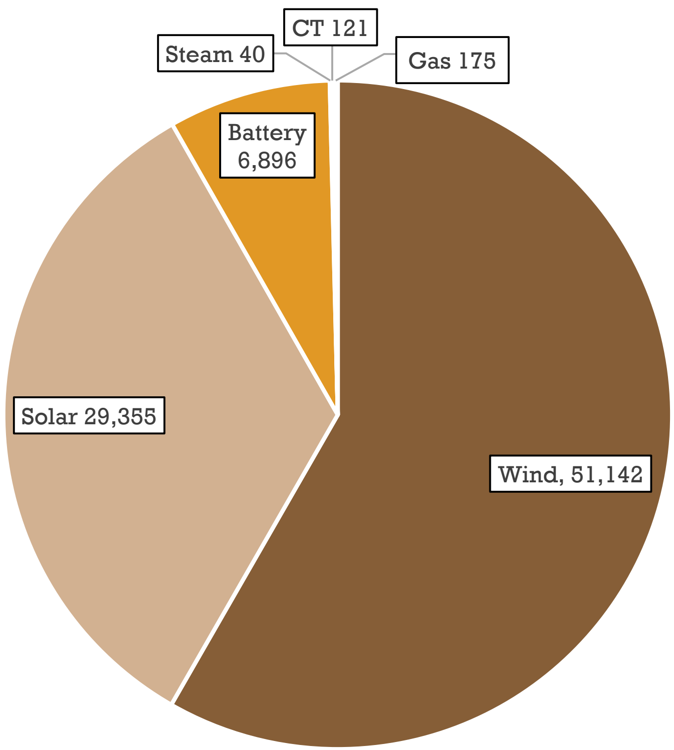
MW Requested by Generation Type



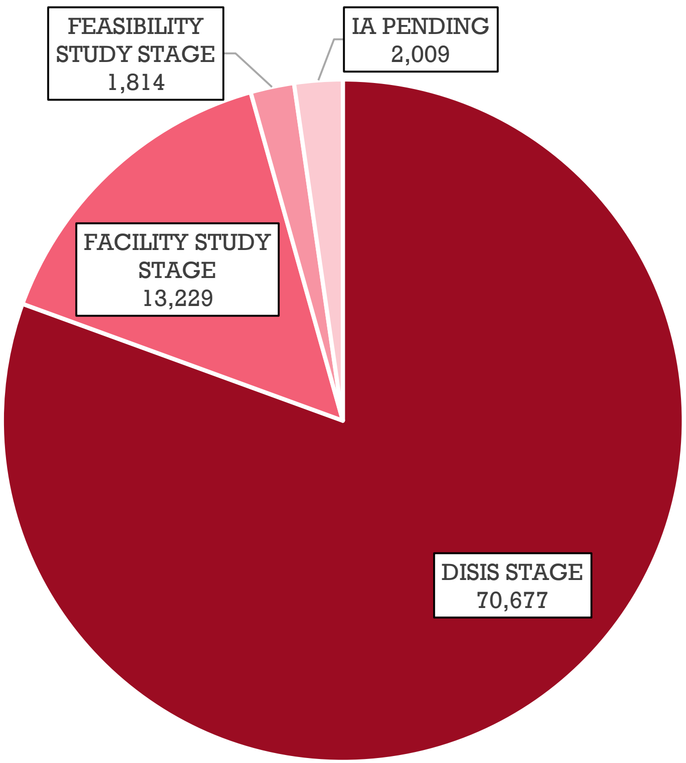
MW Requested by Study Stage

SPP

Pending GI Requests by Generator Type & Study Stage 07/2019

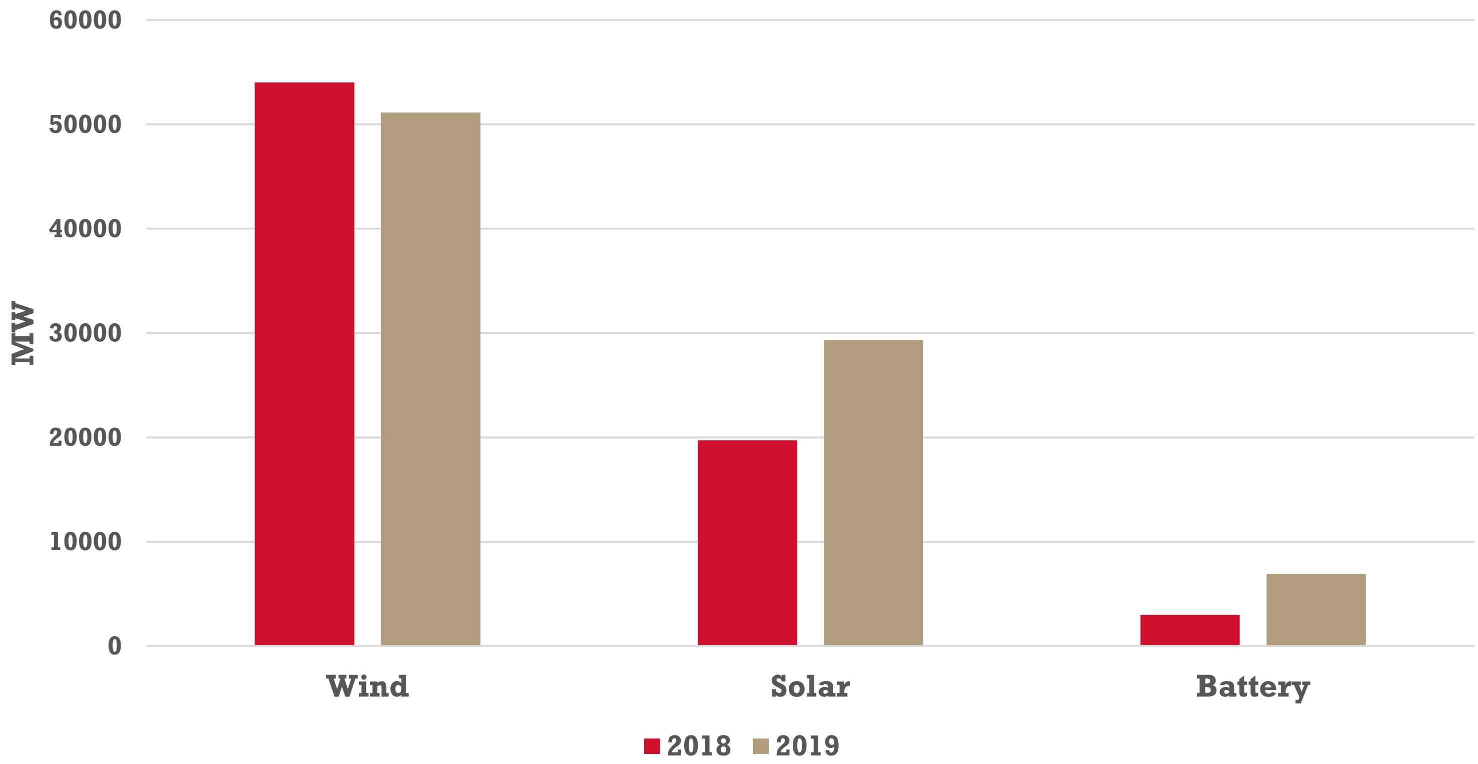


MW Requested by Generation Type



MW Requested by Study Stage

Pending GI Requests by Generator Type (2018 vs 2019)



SPP

GI Requests by Gen Type and Study Stage

July, 2018

Status	Wind	Solar	Comb. Turb.	Thermal	Battery	Steam	Diesel	Gas Turb.	Total
Feasibility Study		750							750
Preliminary Impact									
Definitive Impact	40,829	18,002		488	2,951	40	4	15	62,328
Facilities Study	13,184	963	25		20				14,192
TOTAL	**54,012 (69.9%)**	**19,715 (25.5%)**	**25 (.05%)**	**488 (.6%)**	**2,971 (3.8%)**	**40 (.05%)**	**4 (<.01%)**	**15 (.2%)**	**77,270**

July, 2019

Status	Wind	Solar	Comb. Turb.	Thermal	Battery	Steam	Diesel	Gas Turb.	Total
Feasibility Study		1524			290				1,814
Preliminary Impact									
Definitive Impact	36,429	27,368	96		6,586	40		158	70,677
Facilities Study	12,704	463	25		20			17	13,229
TOTAL	**49,133 (57.3%)**	**29,355 (34.3%)**	**121 (.1%)**	**0 (0%)**	**6,896 (8%)**	**40 (<.1%)**	**0 (0%)**	**175 (.2%)**	**85,720**

Wind Capacity Install Trends

- Current installed capacity ~21.4 GW
- GI Queue (IA Fully Executed/On Schedule)
  - 2019 – 2 GW
  - 2020 – 4.35 GW
  - 2021 – 2.2 GW

Futures

Reference Case

The reference case will reflect the current trends of the power system industry. Natural gas and coal prices follow current long term forecasts. In the reference case, new environmental regulations are not anticipated. Coal and gas retirements will be based on average lifespan. Renewable generation (Solar and Wind) additions will exceed current Renewable Portfolio Standard Requirements (RPS) due to economics, public appeal, and the potential for future policy changes, as reflected in historical renewable installations.

- Demand and energy growth rates as submitted
- Natural gas prices are consistent with industry long-term reference forecasts
- Renewable additions continue following current GI queue trends
- Renewable resources continue to be competitive
- Coal and gas units will be retired reflecting average lifespan
- No nuclear unit retirements

Emerging Technologies

The emerging technology future is driven primarily by the assumption that distributed generation, demand response, energy efficiency, and storage will have a major impact on load and energy growth rates. Distributed generation, demand response, and energy efficiency will decrease load and energy growth rates. A medium adoption rate of electric vehicles and rapid increase of deployment in electric storage resources in the SPP footprint will provide some offset for the decrease, but overall load and energy growth rates will see a decline. An increase in coal retirements will be based on the industry trends. New technologies will increase the capacity factor at new or re-built wind farms.

- Natural gas prices are consistent with industry long-term reference forecasts
- New technologies will increase the capacity factor at new or re-built wind farms
- A rapid increase in deployment of energy storage devices
- Accelerated coal unit retirements
- No nuclear unit retirements

Wind/Solar

- 2019 ITP

KEY ASSUMPTIONS	YEAR 2	REFERENCE CASE YEAR 5	REFERENCE CASE YEAR 10	EMERGING TECHNOLOGIES YEAR 5	EMERGING TECHNOLOGIES YEAR 10
Distributed Generation (Solar)	As submitted in load forecast	As submitted in load forecast		+300 MW	+500 MW
Solar (GW)	~0.25+	3	5	4	7
Wind (GW)	~18+	24.2	24.6	27	30

- 2020 ITP

KEY ASSUMPTIONS	YEAR 2	REFERENCE CASE YEAR 5	REFERENCE CASE YEAR 10	EMERGING TECHNOLOGIES YEAR 5	EMERGING TECHNOLOGIES YEAR 10
Distributed Generation (Solar)	As submitted in load forecast	As submitted in load forecast		+300 MW	+500 MW
Solar (GW)	Existing + RARs	4	7	5	9
Wind (GW)	Existing + RARs	26	28	30	33

- 2021 ITP

KEY ASSUMPTIONS	YEAR 2	REFERENCE CASE YEAR 5	REFERENCE CASE YEAR 10	EMERGING TECHNOLOGIES YEAR 5	EMERGING TECHNOLOGIES YEAR 10
Distributed Generation (Solar)	As submitted in load forecast	As submitted in load forecast		+300 MW	+500 MW
Solar (GW)	Existing + RARs	6	9	7	11
Wind (GW)	Existing + RARs	29	32	33	37

Coal/Gas Retirement

- 2019 ITP
  - Coal: Age-based 60+
  - Gas/Oil: Age-based 60+
- 2020 ITP
  - Coal: Age-based 56+
  - Gas/Oil: Age-based 50+
- 2021 ITP
  - Future 1 (Reference Case)
    - Coal: Age-based 56+
    - Gas/Oil: Age-based 50+
  - Future 2 (Emerging Technologies)
    - Coal: Age-based 52+
    - Gas/Oil: Age-based 48+

<u>Key Assumptions</u>	Drivers				
	Reference Case			Emerging Technologies	
	Year 2 (2023)	Year 5 (2026)	Year 10 (2031)	Year 5 (2026)	Year 10 (2031)
Peak Demand Growth Rates	As Submitted in Load Forecast			As Submitted in LF	
Energy Demand Growth Rates	As Submitted in LF			Increase	
Natural Gas Prices	Current Forecast			Current Forecast	
Coal Prices	Current Industry Forecast			Current Forecast	
Emissions Prices	Current Industry Forecast			Current Forecast	
Fossil Fuel Retirements	None	Age-Based-56 yr for coal, 50 yr for gas/oil, subject to GO review		Age-Based-52 yr for coal, 48 yr for gas/oil, subject to GO review	
Environmental Regulations	Current Regulations			Current Regulations	
Demand Response	As Submitted in LF			As Submitted in LF	
Distributed Generation (Solar)		Assumed in LF		+300 MW	+500 MW
Energy Efficiency	As Submitted in LF			As Submitted in LF	
Export Lines	No			No	
New/Re-powered Renewables	Increased capacity factor			Increased capacity factor	
Storage	Additions based on RAR	20% of projected solar		35% of projected solar	
Total Renewable Capacity					
Solar (GW)	Existing + RAR	6	9	7	11

Third Future (Carbon Reduction)

The third future is driven primarily by the assumption that environmental regulations will be implemented due to a shift in the current political climate. The main driver for this future will be the implementation of a carbon tax. Along with a carbon tax, production tax credits (PTCs) for wind generation will be re-instated, including consideration of solar generation as well. The combination of a carbon tax and re-instatement of PTCs will lead to an even greater increase in renewable generation. Additionally, an increase in coal retirements, energy storage, and distributed generation will be observed. Due to the coal retirements and available renewable energy, gas prices will increase. New technologies will increase the capacity factor at new or re-built wind farms.

- Carbon Tax adder*
- Distributed generation will decrease load and energy growth rates
- Natural gas prices increase slightly due to regulations on fracking
- Accelerated coal unit retirements due to the economics of the carbon tax
- Increased deployment of energy storage devices and distributed generation
- New technologies will increase the capacity factor at new or re-built wind farms

*$22 adder discussed in previous studies

Future 3 Drivers

Key Assumptions	Drivers Year 5 (2026)	Drivers Year 10 (2031)
Peak Demand Growth Rates	As Submitted in Load Forecast	
Energy Demand Growth Rates	As submitted in LF	
Natural Gas Prices	Increased	
Coal Prices	Current Industry Forecast	
Emissions Prices	Current Industry Forecast	
Fossil Fuel Retirements	Age-Based-49 yr for coal, 46 yr for gas/oil, subject to GO review	
Environmental Regulations	$22 Carbon Adder	
Demand Response	As Submitted in LF	
Distributed Generation (Solar)	Increased	
Energy Efficiency	As Submitted in LF	
Storage	Increased	
Total Renewable Capacity		
Solar (GW)	7	11
Wind (GW)	33	37

SPP

Key Assumptions	Drivers: Reference Case Year 2 (2023)	Reference Case Year 5 (2026)	Reference Case Year 10 (2031)	Emerging Technologies Year 5 (2026)	Emerging Technologies Year 10 (2031)
Peak Demand Growth Rates	As Submitted in Load Forecast			As Submitted in LF	
Energy Demand Growth Rates	As Submitted in LF			?% higher than reference due to EV	
Natural Gas Prices	Current Industry Forecast			Current Forecast	
Coal Prices	Current Industry Forecast			Current Forecast	
Emissions Prices	Current Industry Forecast			Current Forecast	
Fossil Fuel Retirements	Current Forecast	Coal: age-based 56+, Gas/Oil: age-based 50+ subject to GO review		Coal: age-based 52+, Gas/Oil: age-based 48+ subject to GO review and ESWG Approval	
Environmental Regulations	Current Regulations			Current Regulations	
Demand Response	As Submitted in LF			As Submitted in LF	
Distributed Generation (Solar)	As Submitted in LF			+300 MW	+500 MW
Energy Efficiency	As Submitted in LF			As Submitted in LF	
% of Load served by renewables	N/A	N/A	N/A	N/A	N/A
Impact of Electric Vehicles				increased energy	
Storage	RAR	20% of projected solar		35% of projected solar	
Total Renewable Capacity					
Solar (GW)	Existing + RAR	6	9	7	11
Wind (GW)	Existing + RAR	29	32	33	37

Carbon Reduction	
Year 5 (2026)	Year 10 (2031)
As Submitted in LF	
?% higher than emerging due to EV	
Current Forecast	
Current Forecast	
Current Forecast	
Based on CF	
Carbon Adder	
As Submitted in LF	
Increased	
As Submitted in LF	
greater increased energy	
Increased	
7-9+	11-14+
33-35+	37-41+

Strawpoll Approved Futures

Reference Case

The reference case will reflect the current trends of the power system industry. Natural gas and coal price
term forecasts. In the reference case, new environmental regulations are not anticipated. Coal and gas r
based on average lifespan. Renewable generation (Solar and Wind) additions will exceed current Renewal
Requirements (RPS) due to economics, public appeal, and the potential for future policy changes, as ref
renewable installations.

Middle

The emerging technology future is driven primarily by the assumption that distributed generation, demar
efficiency, and storage will have a major impact on load and energy growth rates. Distributed generation
and energy efficiency will decrease load and energy growth rates. A medium adoption rate of electric
increase of deployment in electric storage resources in the SPP footprint will provide some offset for the d
load and energy growth rates will see a decline. An increase in coal retirements will be based on the inc
technologies will increase the capacity factor at new or re-built wind farms.

Extreme Bookend-Carbon Reduction

The third future is driven primarily by the assumption that environmental regulations will be implemented
current political climate. The main driver for this future will be the implementation of a carbon tax. Alon
production tax credits (PTCs) for wind generation will be re-instated, including consideration of solar gen
combination of a carbon tax and re-instatement of PTCs will lead to an even greater increase in renew
Additionally, an increase in coal retirements, energy storage, and distributed generation will be observ
retirements and available renewable energy, gas prices will increase. New technologies will increase the
or re-built wind farms.

es follow current long retirements will be ble Portfolio Standard lected in historical
nd response, energy , demand response, vehicles and rapid lecrease, but overall lustry trends. New
d due to a shift in the g with a carbon tax, neration as well. The able generation. ed. Due to the coal capacity factor at new

	Votes
2 Futures	3
Reference Case	
Bookend Case	
3 Futures	15
Reference C ase	
Middle	
Extreme Bookend	
2 Futures	5
Reference Case	
Less Aggressive bookend	

Date	Meeting Name	Location
January		
01/07/20	CAWG	AEP
1/7-8/20	ORWG	Xcel Offices, Denver
01/13/20	HRC	El Dorado Hotel, Santa Fe, NM
1/14-15/20	MOPC	El Dorado Hotel, Santa Fe, NM
1/15-16/20	SPC	El Dorado Hotel, Santa Fe, NM
1/21-22/20	MWG	NextEra Offices, Juno Beach
01/23/20	RTWG	AEP
01/26/20	BOD Directors Dinner	
01/26/20	RSC Dinner	
01/27/20	FC	El Dorado Hotel, Santa Fe, NM
01/27/20	OC	El Dorado Hotel, Santa Fe, NM
01/27/20	HRC	El Dorado Hotel, Santa Fe, NM
01/27/20	RSC Development Session	El Dorado Hotel, Santa Fe, NM
01/27/20	RSC	El Dorado Hotel, Santa Fe, NM
01/27/20	BOD Dinner	
01/28/20	BOD	El Dorado Hotel, Santa Fe, NM
01/28/20	BOD Directors Dinner	
01/29/20	BOD Development Session	El Dorado Hotel, Santa Fe, NM
February		
02/13/20	CAWG	AEP
2/18-19/20	MWG	AEP
02/27/20	RTWG	AEP
March		
03/03/20	CAWG	AEP
03/17/20	Settlements User Conference Reception	Next Level Events
3/17-18/20	Settlements User Conference	SPP
3/17-18/20	MWG	AEP
03/19/20	RTWG	AEP
03/31/20	BAOC/EOP	Xcel Offices, Amarillo
April		
4/1-2/20	ORWG	Xcel Offices, Amarillo
04/09/20	CAWG	AEP
04/13/20	OC	SPP
4/14-15/20	MOPC	SPP
4/21-22/20	MWG	AEP
04/23/20	RTWG	AEP
04/26/20	BOD/Officers Dinner	
04/26/20	RSC Dinner	

04/27/20	FC	SPP
04/27/20	HRC	SPP
04/27/20	RSC Development Session	SPP
04/27/20	RSC	SPP
04/27/20	BOD Dinner	Clinton Library
04/28/20	BOD	SPP
04/28/20	BOD Directors Dinner	
04/29/20	BOD Development Session	SPP
May		
5/19-20/20	MWG	AEP
05/28/20	RTWG	AEP
June		
06/02/20	CAWG	AEP
6/16-17/20	MWG	AEP
06/23/20	SECWG	AEP
06/25/20	RTWG	AEP
6/30-7/1/20	ORWG	GRDA Offices, Tulsa
July		
07/13/20	FC	Holiday Inn Rushmore Plaza, Rapid City
7/14-15/20	MOPC	Holiday Inn Rushmore Plaza, Rapid City
7/15-16/20	SPC	Holiday Inn Rushmore Plaza, Rapid City
7/21-22/20	MWG	AEP
07/23/20	RTWG	AEP
07/26/20	BOD/MC Dinner	
07/26/20	RSC Dinner	
07/27/20	HRC	Holiday Inn Rushmore Plaza, Rapid City
07/27/20	OC	Holiday Inn Rushmore Plaza, Rapid City
07/27/20	RSC Development Session	Holiday Inn Rushmore Plaza, Rapid City
07/27/20	RSC	Holiday Inn Rushmore Plaza, Rapid City
07/27/20	BOD Dinner	
07/28/20	BOD	Holiday Inn Rushmore Plaza, Rapid City
07/28/20	BOD Directors Dinner	
07/29/20	BOD Development Session	Holiday Inn Rushmore Plaza, Rapid City
August		
08/11/20	CAWG	AEP
8/18-19/20	MWG	Tri State Offices, Denver
08/27/20	RTWG	AEP
September		
09/08/20	CAWG	AEP
9/15-16/20	MWG	AEP
09/24/20	RTWG	AEP
09/29/20	BAOC/EOP	SPP

9/30-10/1/20	ORWG	SPP
October		
10/06/20	CAWG	AEP
10/12/20	FC	SPP
10/13-14/20	MOPC	SPP
10/14-15/20	SPC	SPP
10/15-16/20	MWG	SPP
10/22/20	RTWG	AEP
10/25/20	BOD/RSC Dinner	
10/26/20	HRC	SPP
10/26/20	OC	SPP
10/26/20	RSC Development Session	SPP
10/26/20	RSC	SPP
10/26/20	BOD Dinner	
10/27/20	BOD	SPP
10/27/20	BOD Directors Dinner	
10/28/20	BOD Development Session	SPP
November		
11/10-11/20	MWG	AEP
11/12/20	CAWG	AEP
11/19/20	RTWG	AEP
December		
12/8-9/20	MWG	AEP
12/17/20	RTWG	AEP

Proposed ESWG Meetings 2020				
Month	TWG	ESWG	Location	Other Option
January	7th-8th	8th-9th	AEP no longer available on 7th	
February	4th	5th-6th		
March	3rd-4th	4th-5th	AEP no longer available on 3rd	
April	7th	8th-9th	AEP no longer available on 9th	
May	5th-6th	6th-7th		
June	2nd	3rd-4th	AEP no longer available on 2nd	
July	7th	8th-9th		
August	4th-5th	5th-6th		
September	1st	2nd-3rd		
October	6th-7th	7th-8th	AEP no longer available on 6th	
November	3rd	4th-5th		
December	1st -2nd	2nd-3rd		

	2020 Holidays
New Year's Day	Wednesday, 1/1/2020
Memorial Day	Monday, 5/25/2020
Independence Day	Friday, 7/3/2020
Labor Day	Monday, 9/7/2020
Thanksgiving & Day After	Thursday, 11/26/2020 & Friday 11/27/2020
Christmas Eve and Christmas Day	Thursday, 12/24/2020 & Friday, 12/25/2020

Joint Meeting			
Joint ESWG/TWG	Detroit	ITC	June-Sept
	Kansas City	Evergy	April
Joint ESWG/TWG	Amarillo	Golden	Summer Time
Joint ESWG/TWG			
Joint ESWG/TWG			
Joint ESWG/TWG			
Joint ESWG/TWG			

Southwest Power Pool
Economic Studies Working Group
Charter
April 25th, 2017

PURPOSE

The Economic Studies Working Group (ESWG) advises and assists Southwest Power Pool (SPP) Staff in the determination of the appropriate data, planning methods and processes to be used in the development and evaluation of economic transmission expansion options for the SPP region. The ESWG will be responsible for data, sources, models, economic planning methodology, timing and implementation, application, economic parameters and metrics to be used in the development and evaluation of economic expansion options in the SPP region. The ESWG will also review the economic planning processes used by SPP Staff and offer proposals for improvement of these processes. The ESWG will be responsible for all economic modeling parameters and data for the SPP region, and will conduct as needed updates to all data for the stakeholders on a regular basis as appropriate for regional planning needs. Additionally, the ESWG will have oversight on appropriate access of data to third party consultants.

SCOPE OF ACTIVITIES

In carrying out its purposes, the ESWG will:

1. Provide oversight, data inputs and review, as appropriate, of economic planning studies performed by the SPP, including but not limited to:
   - Integrated Transmission Planning (ITP) – provide input into the economic portions of the ITP process
   - Balanced Portfolio – Provide guidance to the CAWG on input assumptions and modeling techniques used in the Balanced Portfolio analysis
   - High Priority – support other high priority economic studies, as applicable
   - Coordinated System Planning – provide input into economic studies performed in coordination with neighboring regions or entities
   - Regional Cost Allocation Review (RCAR) – provide input into the RCAR analysis and provide guidance to the Regional Allocation Review Task Force (RARTF), as needed
   - 20 year assessment
   -

2. Provide oversight of the economic study process performed by the SPP, including but not limited to, economic transmission plan development, project interaction and the overall economic planning process

3. Provide input to the SPP in evaluation of the impact of market mechanisms on planning studies

4. Establish study standard assumptions for economic analysis; determine, update and vet the necessary data and inputs required to model, study, and evaluate economic alternatives

5. Define and update any terms used in the economic transmission planning process, including data, metrics and assumptions that provide clear understanding to conduct economic studies for SPP

6. Identify, review and modify the metrics for overall quantification and break-out of economic impacts beyond adjusted production cost savings

7. Review the solution techniques and provide recommendations for improvements and/or alternatives

8. Update and maintain the economic planning process documentation to provide controls for economic planning in SPP

9. Provide updates to the MOPC on the status and progress of economic studies and planning in the SPP

REPRESENTATION

The ESWG membership will consist of up to seventeen voting members (including the Chairman). The ESWG will have one non-voting Regulatory Liaison member.

Members of the ESWG shall have experience and knowledge in one or more of the following areas:

- Economic Analysis
- Economic Modeling
- Energy markets
- Transmission Planning
- Planning and Forecasting
- Generation

DURATION

Permanent.

REPORTING

The ESWG reports to the Market and Operations Policy Committee.

Other Notes:

In light of FERC Orders 888 and 889 and the group composure of transmission and generation parties, the ESWG will have to observe the Standards of Conduct outlined in FERC Order 889. As such, there may be topics discussed by the ESWG that are privileged and confidential. Under such an event, appropriate measures will be taken to

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ensure that no Standards of Conduct are violated, including but not limited to, closed meetings, closed sessions, etc. Members and participants will be required to adhere to SPP’s Nondisclosure Agreement.