

**Southwest Power Pool, Inc.  
Model Development Working Group  
Net Conference  
April 11: 9:00 A.M. – 12:00 P.M.**

**• M I N U T E S •**

**Agenda Item 1 - Administrative**

The meeting was called to order at 9:06 a.m. The following MDWG members were in attendance:

**MDWG Members present:**

MDWG Member	Proxy	Company	Present
Nate Morris		Empire District Electric Company	Yes
Derek Brown		Westar Energy	Yes
Jason Bentz		American Electric Power	Yes
Dustin Betz		Nebraska Public Power District	Yes
John Boshears		City Utilities of Springfield	Yes
Jerad Ethridge		Oklahoma Gas & Electric	Yes
Joe Fultz		Grand River Dam Authority	No
Wayne Haidle		Basin Electric Power Cooperative	Yes
Holli Krizek		Western Area Power Administration	Yes
Reené Miranda		Southwestern Public Service	Yes
Scott Schichtl		Arkansas Electric Cooperative Company	Yes
Jason Shook		GDS Associates	Yes
Brian Wilson		Kansas City Power & Light	No
Liam Stringham		Sunflower Electric Power Corporation	Yes
Anthony Cook		Southwest Power Pool, Inc	Yes

**The following guests were also in attendance:**

- Alan Burbach – Lincoln Electric System
- Aravind Chellappa – Southwestern Public Service
- Daniel Benedict – Independence Power & Light
- David Spargo, Joshua Verzal, Steve Hohman – Omaha Public Power District
- Dona Parks – Grand River Dam Authority
- Edgardo Manansala – Midwest Energy
- Ellis Lutz – Associated Electric Cooperative
- Gimod Olapurayil – ITC Great Plains
- Jeremy Severson – Basin Electric Power Cooperative
- Joe Williams, Shaun Golden – Western Farmers Electric Cooperative
- John Weber – Missouri River Energy
- Mark Reinart – Golden Spread Electric Cooperative
- Ryan Baysinger, Tien Le – Kansas City Power & Light
- Samuel Zewdie – MRO

Scott Mijin – Southwestern Power Administration  
Chris Colson – Western Area Power Administration  
Robert Jones – Monterey SW  
Michael Odom, Moe Shahriar, Theva Chanthaseny, English Cook, Zack Bearden –  
Southwest Power Pool

### **Proxies**

Ryan Baysinger held Brian Wilson's proxy. Dona Parks held Joe Fultz's proxy.

### **Meeting Agenda**

The group was asked if anyone had any issues or needed more time to review the posted materials. There were no concerns from anyone for this meeting.

The agenda was reviewed by the group. A motion to approve the agenda was made and seconded. The motion passed unopposed.

**(Attachment 1 - MDWG Meeting Agenda 20170411.docx)**

### **Meeting Minutes**

The January 17, 2017, February 6, 2017, and March 17, 2017 minutes were open for review. A motion to approve the three sets of minutes was made and seconded. The motion passed unopposed.

**(Attachment 2 - Update 2017 Series MDWG Schedule Email Vote 20170117.doc,**

**Attachment 3 - MDWG Minutes February 6, 2017.docx,**

**Attachment 4 - Approve 2017 Series Powerflow Models Vote 20170317.doc)**

### **Agenda Item 2 – Transmission Planning Improvement Effort:**

English Cook provided the TPITF Whitepaper and presented on the Accountability document.

**(Attachment 5 - TPITF Recommendations White Paper Final MOPC Approved 7-12-**

**2016.docx, Attachment 6 - TPITF SPP Staff and Stakeholder Accountability.docx,**

**Attachment 7 - TPITF Staff Stakeholder Accountability.pptx)**

Michael Odom presented on renewable dispatch for the light load in the new base reliability models. Comments were made in favor of using a 5 year average of real data for dispatching; however, the idea of only including units with firm service does not make sense. Will the Tariff language change for the protection of firm service? If the model isn't based on actual data, there will be a hard time defending the model in TPL-001-4. The question was asked how the models will be dispatched in the CBR models. Question as to whether the MDWG and ITP models should match. Anthony stated that the MMWG doesn't want models that have high wind dispatch; however, the manual states that renewable generation should be dispatched at seasonally expected values corresponding to the appropriate model. Michael stated that the TWG will be discussing the light load renewable dispatch language at their May meeting.

**(Attachment 8 - Modeling Firm Service in the Light Load Season.pptx)**

Michael told the group that he needs help understanding how Phase Shifting Transformers should be modeled so that language can be drafted language for the ITP manual. Several expressed interest in being part of the conversation. Michael stated that he would set up a call.

**\*\*Action Item\*\*:** Find out about units without firm service in the CBR models. Will the Tariff language change for the protection of firm service?

**\*\*Action Item\*\*:** Find out what the dispatch order will be in the CBR model, i.e. block or ECDI.

**\*\*Action Item\*\*:** Michael to set up a small group call for modeling PSTs.

**Agenda Item 3 – 2017 Series MDWG Powerflow, Short Circuit, Dynamic Status Update:**

Anthony stated that the powerflow models were posted on March 17, 2017.

Zack Bearden stated that pass 7 of the Short Circuit models was posted. He asked the group if the models were ready to be voted on or if additional time was needed for review. The group decided to allow for another pass with data to be submitted to SPP by April 28, 2017.

Moe stated that him and Michael are still working on updates to the master dyre file and wind farm topology. There were requests for SPP to post the Dyre file information periodically so that individuals can ensure their data is modeled accurately. One of the members asked how SPP calculates/utilizes single line to ground values. Moe stated that this is taken care of in another group but would get back with everyone interested.

**\*\*Action Item\*\*:** Data Submitting Entities submit sequence data updates by April 28, 2017 for the Short Circuit model build.

**\*\*Action Item\*\*:** Moe to post the dyre file.

**\*\*Action Item\*\*:** Moe to address SLG.

**Agenda Item 4 – 2018 Series Model Build:**

Anthony stated that a draft model selection and draft schedule were posted for the members to review. He stated that SPP Staff is still working to finalize the model needs that will cover the needs for all models. He added that the members should review the list for any additional needs not already captured by SPP Staff. He also stated that the dates in the schedule are rough dates at the moment to give a sense of timing of the model build. He asked the members to review both files and be ready to discuss at the May meeting.

**(Attachment 9 - 2018 Series MDWG-ITP Model Selection.xlsx, Attachment 10 - 2019 ITP & 2018 Series MDWG Powerflow, Short Circuit, and Dynamics Model Build\_DRAFT.pdf)**

**Agenda Item 5 – TPL-007-1 GMD Vulnerability Assessment:**

Chris Colson gave a quick update on TPL-007-1. He stated that the TPLTF is working on automation files to add transformers to the models that are applicable to the standard. A data request will be sent out soon to start gathering the data in order to meet the dates specified by the standard.

**Agenda Item 6 – Keystone XL Pumping Station Load:**

Derek Brown quickly asked if anyone was re-examining the inclusion of the loads to be included in the models. He asked if SPP has communicated with TransCanada lately. Michael stated that he would reach out to SPP management to find out if there have been any discussions and how that process should be initiated.

**\*\*Action Item\*\*:** Michael to reach out to SPP Management to find out if TransCanada has communicated with SPP on the Keystone XL project.

**Agenda Item 7 – MDWG Manual TF Members:**

Anthony announced the individuals that expressed interest in being part of the taskforce to update the MDWG procedure manual. He will get in contact with those individuals to schedule time to begin working on the manual.

**Agenda Item 8 – 2016 Organizational Effectiveness Survey Analysis:**

This item was postponed to a later meeting.

**Agenda Item 9 – SPP Engineering Hub Training/Testing:**

This item was postponed to a later meeting.

**Agenda Item 10 – Frequency of MDWG Meetings:**

This item was postponed to a later meeting.

**Agenda Item 10 – Administrative Items:**

**Summary of Action Items**

- Find out about units without firm service in the CBR models. Will the Tariff language change for the protection of firm service?
- Find out what the dispatch order will be in the CBR model, i.e. block or ECDI.
- Michael to set up a small group call for modeling PSTs.
- Data Submitting Entities submit sequence data updates by April 28, 2017 for the Short Circuit model build.
- Moe to post the dyre file.
- Moe to address SLG.
- Michael to reach out to SPP Management to find out if TransCanada has communicated with SPP on the Keystone XL project and how that process should be initiated.

**Future Meetings**

- TBD

**Adjourn Meeting**

With no further business to discuss, Nate asked for a motion to adjourn. Reené Miranda motioned to adjourn the meeting, Scott Schichtl seconded the motion. The motion passed unopposed. The meeting adjourned at 12:16 p.m.

Respectfully submitted,  
Anthony Cook  
SPP Staff Secretary

**Southwest Power Pool, Inc.**  
**MODEL DEVELOPMENT WORKING GROUP**

**April 11, 2017**

**Net Conference**

**• A G E N D A •**

9:00 a.m. – 12:00 p.m.

1. Administrative Items ..... Nate Morris (15 min)
  - a. Call to Order
  - b. Introductions
  - c. Proxies
  - d. Agenda Review (**Action Item**)
    - i. Meeting Materials
  - e. Previous Meeting Minutes (Action Item)
    - i. January 17, 2017 (Email Vote)
    - ii. February 6, 2017
    - iii. March 17, 2017 (Call Vote)
  
2. Transmission Planning Improvement Effort
  - a. TPITF Whitepaper Overview ..... English Cook/Anthony Cook
  - b. Stakeholder Accountability ..... English Cook
  - c. Standard Scope Items
    - i. Renewable Resource Modeling ..... Michael Odom
      1. Common Base Model Set
      2. Impact to MDWG Model Set
    - ii. Modeling of Phase Shifting Transformers..... Michael Odom
  
3. 2017 Series MDWG Powerflow, Short Circuit, Dynamic Status Update .....Moses, Zack, Moe
  
4. 2018 Series Model Build..... SPP Staff
  - a. DRAFT Model Selection
  - b. DRAFT Schedule
  
5. TPL-007-1 GMD Vulnerability Assessment ..... Chris Colson
 

Transformer modeling data/improvements:

  - a. Obtaining post processing automation files to add transformers to the models that are applicable under TPL-007.
  - b. Updating short circuit data of transformers to include PSS/E version 33 data fields filled out.
  - c. Temperature assumptions utilized in the line impedance modeling for the AC & DC models.
  
6. Keystone XL Pumping Station Loads ..... Derek Brown
  - a. Discuss modeling of the loads and next steps in light of the new administration.

*Relationship-Based • Member-Driven • Independence Through Diversity*

*Evolutionary vs. Revolutionary • Reliability & Economics Inseparable*

- 7. MDWG Manual TF Members ..... All
  - a. Primary: Reené Miranda, Edgardo Manansala, John Turner
  - b. Alternate: Wayne Haidle
- 8. 2016 Organizational Effectiveness Survey Analysis ..... Anthony Cook
- 9. SPP Engineering Hub Training/Testing ..... Mitch Jackson
- 10. Frequency of MDWG Meetings ..... All
- 11. Administrative Items ..... Nate Morris
  - a. Summary of Action Items
  - b. Future Meeting
  - c. Adjourn

**Southwest Power Pool  
MODEL DEVELOPMENT WORKING GROUP  
January 17, 2017  
Email Vote**

**• M I N U T E S •**

The 2017 Series MDWG Schedule was updated to reflect the delay in the Power Flow, Short Circuit, and Dynamic schedules.

**Power Flow:**

- The Pass 5 Member review dates were shifted by 1 day. The members will still get 5 days for review.
- The Pass 5 SPP review period was reduced by 1 day.

**Short Circuit:**

- The Pass 1 dates were updated to match the Power Flow Pass 4 dates

**Dynamics:**

- The Initial Data Update posting dates were updated
- The Member submission dates for the Initial Data Updates were shifted. The members will have until March 10, 2017.
- The rest of the schedule was unchanged.

The updated schedule was sent to the MDWG on January 16, 2017. Nate Morris solicited for a motion. Joe Fultz motioned to approve the schedule updates as presented. Jason Bentz seconded the motion. Nate then requested the group cast their votes. There were 13 votes casted to approve the schedule updates, and 1 abstention.

Wayne Haidle provided the following response for his abstention:

*"I'll abstain in light of cursory review of the posting manifesting a surprising number of issues, some of which fixes were previously provided. A review could perhaps be accomplished in a week to fully ascertain what remedies are required, but not sure submittals with certifiable quality could be fully accomplished in that timeframe."*

The schedule updates were approved on January 17, 2017.

Respectfully submitted,

Anthony Cook  
SPP Staff Secretary

**Southwest Power Pool, Inc.  
Model Development Working Group  
Net Conference  
February 6: 8:30 A.M. – 12:00 P.M.**

**• M I N U T E S •**

**Agenda Item 1 - Administrative**

The meeting was called to order at 8:35 a.m. The following MDWG members were in attendance:

**MDWG Members present:**

MDWG Member	Proxy	Company	Present
Nate Morris		Empire District Electric Company	Yes
Derek Brown		Westar Energy	Yes
Jason Bentz		American Electric Power	Yes
Dustin Betz		Nebraska Public Power District	Yes
John Boshears		City Utilities of Springfield	Yes
Jerad Ethridge		Oklahoma Gas & Electric	Yes
Joe Fultz		Grand River Dam Authority	Yes
Wayne Haidle		Basin Electric Power Cooperative	Yes
Holli Krizek		Western Area Power Administration	Yes
Reené Miranda		Southwestern Public Service	Yes
Scott Schichtl		Arkansas Electric Cooperative Company	Yes
Jason Shook		GDS Associates	Yes
Brian Wilson		Kansas City Power & Light	Yes
Liam Stringham		Sunflower Electric Power Corporation	Yes
Anthony Cook		Southwest Power Pool, Inc	Yes

**The following guests were also in attendance:**

- James Nail, City of Independence, Missouri
- Kevin Foflygen, City Utilities of Springfield
- Alan Burbach, Lincoln Electric System
- Aravind Chellappa, Southwestern Public Service
- Chris Colson, Western Area Power Administration
- Bruce Doll, Municipal Energy Agency of Nebraska
- Steve Hohman, Omaha Public Power District
- Edgardo Manansala, Midwest Energy
- Gimod Olapurayil, ITC Great Plains
- Jeremy Severson, Basin Electric Power Cooperative
- Dona Parks, Grand River Dam Authority
- Jarrod Wolford, Northeast Texas Electric Cooperative
- John Turner, Board of Public Utilities
- John Payne, Kansas Electric Power Coop



Mark Reinart, Golden Spread Electric Cooperative  
John Weber, Missouri River Energy  
David Sargent, Scott Mijin – Southwestern Power Administration  
Syed Ahmad, FERC  
Andrew Berg, Minnkota Power Cooperative  
Michael Odom, Moses Rotich, Moe Shahriar, Mitch Jackson, Theva Chanthaseny,  
Southwest Power Pool

### **Meeting Agenda**

The group was asked if anyone had any issues or needed more time to review the posted materials. There were no concerns from anyone for this meeting.

The agenda was reviewed by the group. Anthony Cook stated additions for Annual Engineering Data Request Schedule, MOD Anomalies, and 2017 MDWG Powerflow model build status. Chris Colson requested to add an update for TPLTF efforts. Jerad Ethridge motioned to approve the agenda as amended; Derek Brown seconded the motion. The motion passed unopposed.

**(Attachment 1 - MDWG Meeting Agenda 20170206.docx)**

### **Meeting Minutes**

The September 20, 2016 and January 17, 2017 minutes were open for review. Nate postponed approving the January 17, 2017 minutes to allow Wayne Haidle to submit a written reason for his abstention to the vote. Derek Brown motioned to approve the minutes from the September 20, 2016 meeting; Brian Wilson seconded the motion. The motion passed unopposed.

**(Attachment 2 - MDWG Minutes September 20, 2016.docx)**

### **Agenda Item 2 – Transmission Planning Improvement Task Force (TPITF) Initiative:**

Michael Odom presented language on renewable dispatch for the new common models. He stated that the language for the summer renewable dispatch had already been approved by the TPITF and TWG by proxy. The TWG will be discussing the winter and light load renewable dispatch language at their next meeting. Derek expressed concern with 100% dispatch in the light load models especially when running compliance studies. Alternatives that were provided were to do the same as for the summer or winter, or use a flat value for the SPP region. There was also concern of not getting a complete picture if minimum and maximum scenarios (similar to S0 and S5) were not provided. Michael stated that more discussion would be had at the next TWG meeting. Many on the group did agree that the Base Reliability and the MDWG Models should be kept separate.

**(Attachment 3 - Modeling of Firm Transmission Service\_MO.docx)**

Anthony Cook stated that per the TPITF whitepaper, the MDWG and Base Reliability powerflow models are to be built in parallel. He gave a brief presentation on a proposal to build the MDWG models after the Base Reliability models to prevent having two model sets being built and reviewed at the same time. Reené Miranda asked for a slide that illustrates the different data being requested (i.e. loads, generation, etc.) and which models each will be applied to. There was concern about having two model sets being built/reviewed simultaneously and staying on schedule since history has proven it to be difficult to keep one model set build on schedule. Derek Brown asked if the Base Reliability models will be used for Generation Interconnection and Transmission Service processes. Anthony confirmed that the Base Reliability models will be the starting point for those processes as well as used for compliance. Anthony asked the members to consider the proposal for further discussion at future meetings.

Michael Odom announced that SPP would be sending out an Annual Engineering Data Request Schedule next week. He stated that this is to give the members tentative dates when specific data would be requested throughout the year. Reené Miranda stated that some processes ask for the same data that is already being provided with the model data submission and asked if those data requests could just utilize that which is already provided. Michael stated that Staff would work try and minimize the duplicate requests where possible. The example given was related to MW-Mile transmission line ownership, which could be extracted from model data. Chris Colson did state that this method wouldn't work for all companies since the owner column is not always the actual transmission owner.

**\*\*Action Item\*\*:** SPP Staff to create and provide a slide to illustrate which models will utilize the different data requests.

**Agenda Item 3 – TPLTF Efforts Update:**

Chris Colson gave a quick presentation on TPL-007-1. Reené asked if it would be included in the annual data request schedule discussed earlier. Staff stated that it would be included as part of the annual data request schedule. Chris stated that the request would be for 200 kV and above. He stated it would be appreciated for anyone to review the TPL-007-1 Guidance document by March 1<sup>st</sup> and provide any feedback.

**Agenda Item 4 – Data Submittal Workbook:**

This item was postponed to a later meeting.

**Agenda Item 5 – Model On Demand Talks:**

Anthony Cook demonstrated that individual MOD users can now export the MOD project table into an excel file for viewing.

Anthony Cook and Moses Rotich stated that an anomaly was recently discovered in MOD version 8.1.0.1 dealing with bus assignments in the raw data. The anomaly is that MOD will sort the From/To buses in numerical order upon uploading into the database but doesn't honor bus references for other data. For example, if a branch has 234561 as the From bus and 123456 as the To bus and assigns the To bus as the metered end, MOD will switch the configuration so that 123456 is now the From bus and 234561 is the To bus leaving the metered end still referencing the To bus. Anthony stated that the only way to fix this issue in the current version was to delete the affected elements from MOD and re-upload them in numerical order with the corrected referencing. Siemens has confirmed the anomaly and stated that it was corrected in version 9.1. Anthony stated that Staff will check with SPP IT to see what the possibility of moving to the latest version of 9 before the next series of models are to be built. Anthony also stated that corrections for this issue could be submitted in the form of idevs until the model build is complete; however, all other corrections need to be submitted through MOD.

**\*\*Action Item\*\*:** SPP Staff to discuss the possible timeframe of moving to MOD version 9.

**Agenda Item 6 – 2017 MDWG Powerflow Model Build Status:**

Anthony Cook stated that the latest pass was posted on Friday, February 3, 2017; however, the posted email did not specify a deadline for data submissions. This is because this is the last pass of the model build according to the schedule and SPP Staff prefers the MDWG decide how to proceed. The group discussed the issues reported in the latest docucode report and decided to allow for updates to be submitted until 8:00 A.M Monday, February 13, 2017. SPP Staff will have until 8:00 A.M. Monday, February 20, 2017 to post the next pass. Subsequent pass will

follow the same two week structure until the models are clean for finalization. Moses requested that entities notify SPP if they don't have any changes.

**Agenda Item 7 – Procedure Manual Task Force Participation:**

This item was postponed to a later meeting.

**Agenda Item 8 – Frequency of MDWG Meetings:**

This item was postponed to a later meeting.

**Agenda Item 10 – Administrative Items:**

**Summary of Action Items**

- SPP Staff to create and provide a slide to illustrate which models will utilize the different data requests.
- SPP Staff to discuss the possible timeframe of moving to MOD version 9.

**Future Meetings**

- TBD

**Adjourn Meeting**

With no further business to discuss, Nate asked for a motion to adjourn. Reené Miranda motioned to adjourn the meeting, Jerad Ethridge seconded the motion. The motion passed unopposed. The meeting adjourned at 12:35 p.m.

Respectfully submitted,  
Anthony Cook  
SPP Staff Secretary



**Southwest Power Pool, Inc.  
Model Development Working Group  
March 17, 2017: 9:00 A.M. – 10:00 A.M.  
Call Vote**

**• M I N U T E S •**

MDWG Member	Proxy	Company	Present
Nate Morris		Empire District Electric Company	Yes
Derek Brown		Westar Energy	Yes
Jason Bentz		American Electric Power	No
Dustin Betz		Nebraska Public Power District	Yes
John Boshears		City Utilities of Springfield	Yes
Jerad Ethridge		Oklahoma Gas & Electric	Yes
Joe Fultz		Grand River Dam Authority	Yes
Wayne Haidle		Basin Electric Power Cooperative	Yes
Holli Krizek		Western Area Power Administration	Yes
Reené Miranda		Southwestern Public Service	No
Scott Schichtl		Arkansas Electric Cooperative Company	No
Jason Shook		GDS Associates	Yes
Brian Wilson		Kansas City Power & Light	Yes
Liam Stringham		Sunflower Electric Power Corporation	Yes
Anthony Cook		Southwest Power Pool, Inc	Yes

The 2017 Series MDWG Power Flow models were presented for finalization.

- The Pass 8 Models were posted March 18, 2017 and asked for MDWG approval
- Additional updates were submitted

The MDWG discussed the additional updates that were submitted after the Pass 8 models were posted. SPS and Basin presented further updates at this time. The updates presented by SPS are due to the voltage schedule of an exploratory type generator. The updates presented by Basin are due to a Cornbelt load discrepancy.

Nate Morris solicited for a motion. Derek Brown motioned to approve the finalization of the 2017 Series MDWG Powerflow Pass 8 models with the caveat of adding the updates submitted since the models were posted as well as the SPS and Cornbelt updates mentioned during the call as long as they are provided in a reasonable time today and don't cause additional issues to other member's facilities and area balance. Brian Wilson seconded the motion. The motion passed unopposed.

Respectfully submitted,

Anthony Cook  
SPP Staff Secretary



# **TRANSMISSION PLANNING IMPROVEMENT TASK FORCE (TPITF)**

SPP Planning Process Improvement  
Recommendations

Published on April 5, 2016

## Revision History

Revision Date	Author	Change Description	Comments
4/5/2016	TPITF	Initial Draft	
6/17/2016	TPITF	Updated the transition schedule and modified Operational Needs Assessment language	
6/23/2016	TPITF	Incorporated proposed edits	
7/5/2016	TPITF	Finalize Document for July 2016 meetings	
7/12/2016	MOPC	Approved Recommendations	

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# Transmission Planning Improvement Task Force (TPITF) Recommendations Whitepaper

## Purpose

Since the adoption of the Integrated Transmission Planning process, there has been an improvement in the planning of needed transmission. The ITP process has helped to determine the transmission needs for the SPP region and facilitated investment in over \$5.5 Billion of cost effective transmission. SPP has now completed two cycles of the ITP and is now in the midst of the 2017 ITP10. The experience of stakeholders and the SPP has shed light on the strengths of the ITP process as well as potential improvements that could be made.

The Transmission Planning Improvement Task Force (TPITF) was assembled by the SPP Strategic Planning Committee (SPC) and the Market and Operations Policy Committee (MOPC) and given the responsibility for developing recommendations that will improve the regional planning processes. The objective was to make the SPP transmission planning process more responsive to the effects of the continued growth of SPP's transmission system, changes in the SPP markets, as well as the challenges and opportunities presented by changing federal and state energy and environmental regulations, and NERC compliance requirements. The TPITF recommendations are intended to represent a consolidated, coordinated approach in planning, managing, and maintaining the SPP transmission system, and improve the existing processes, with a particular emphasis on any progress that may be made to increase the availability of transmission service to SPP's customers without unduly compromising system reliability. The recommendations in this report are intended to enable the cost-effective use of capital-intensive generating resources for the benefit of all end-use customers in the SPP footprint and to further develop and enhance policies, tools, and practices to optimize the use of the transmission system. The TPITF was tasked with reviewing, evaluating, and proposing recommendations on the following:

1. The methodologies and modeling practices used in the Generator Interconnection Studies; Aggregate Transmission Service Studies; Integrated Transmission Planning (Near Term, 10, and 20), SPP TPL Compliance Assessments and the MDWG model development process to ensure effectiveness, consistency, and to determine if any gaps exist between the various processes. Where appropriate, the TPITF will collaborate with the SPP committees and working groups involved in the development and approval process for SPP planning.
2. Utilization of data, including data collected by operations that will benchmark, to the best ability, the real-time and planning horizon assessments to ensure consistency in the planning process.
3. The appropriateness of the planning cycle and assessments, including but not limited to, the effectiveness of using production cost modeling in more assessments; development, use, and weighting of futures, scenarios and sensitivities; the metrics used to evaluate proposed projects, in particular those that evaluate the impact on rate payers, and planning the transmission system beyond the traditional planning criteria of first contingency ("N-1") in accordance with the approved NERC Standard TPL-001-4<sup>1</sup>.

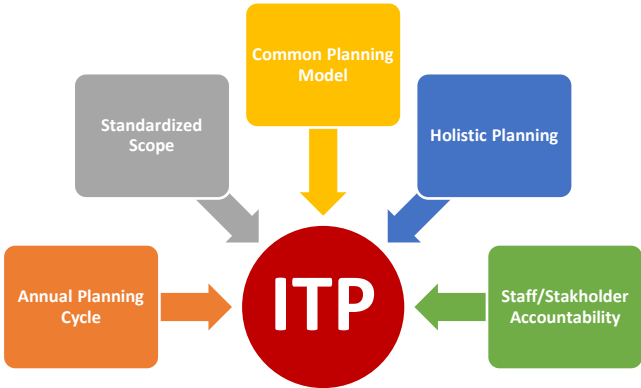
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<sup>1</sup> A copy of NERC Standard TPL-001-4 can be found at the following location:  
<http://www.nerc.com/ layouts/PrintStandard.aspx?standardnumber=TPL-001-4&title=Transmission System Planning Performance Requirements&jurisdiction=United States>



The TPITF has developed a set of five recommendations to accomplish this scope of work that will be discussed in detail throughout this whitepaper. These five recommendations are as follows.

- 1. Replace the current ITP schedules to produce an annual transmission expansion plan
- 2. Create a standardized scope
- 3. Establish a common planning model for use across the various SPP planning process
- 4. Utilize a holistic approach to planning
- 5. Create a Staff/Stakeholder accountability program



## Annual ITP Planning Cycle

### Purpose

The current ITP planning cycle consists of the ITPNT, ITP10, and ITP20 assessments performed over the course of three years. The TPITF sees value in performing a single ITP planning study that incorporates near- and long-term views with the study producing a planning report and transmission project recommendations on an annual basis. The efficiencies gained through the combination of the ITPNT and ITP10 assessment processes and the increased frequency of the completion of a forward-looking, annually published planning study will help address members’ requests for additional synergy and flexibility within SPP’s planning process.

### Current State

#### *Planning Cycle*

Section III of Attachment O of SPP’s Open Access Transmission Tariff (Tariff) describes the Integrated Transmission Planning (ITP) process as “...an iterative three-year process that includes the 20-Year, 10-Year, and Near Term Assessment.” The 20-Year (ITP20) and 10-Year Assessments (ITP10) are each performed once every three years as part of the three-year planning cycle with the ITP20 generally performed in the first half of each planning cycle. The Near Term Assessment (ITPNT) is performed on an annual basis to maintain system reliability in the short-term. In aggregate, these assessments evaluate the cost-effectiveness of proposed solutions needed in Years 2, 5, 10, and 20 over a 40-year horizon. The cycle is shown below and iterated every three years.

Year 1	Year 2	Year 3
ITPNT	ITPNT	ITPNT
ITP20		ITP10

The ITP20 is performed in the first half of the 3-year planning cycle to guide the development of plans for the ITP10 and ITPNT assessments. The ITP20 is primarily a strategic economic study designed to identify a transmission expansion portfolio containing Extra High Voltage (EHV) projects that would provide the flexibility to address reliability needs, support policy initiatives, and enable economic opportunities in the SPP transmission system under a wide range of future system scenarios within the studied 20-year horizon. The ITP20 portfolio is not likely to result in the issuance of Notifications to Construct (NTCs) for specific projects, but rather is a longer-term strategic vision expected to better inform planning decisions in the 5-10 year horizon including the “right-sizing” of projects in support of potential system needs observed in the 20-year horizon.

The ITP10 is performed in the second half of the 3-year planning cycle. The ITP10 is intended to study in further detail a subset of future scenarios studied in the ITP20. The ITP10 is designed to develop a transmission expansion portfolio containing primarily 100 kV and above projects needed to address reliability needs, support policy initiatives, and enable economic opportunities in the SPP transmission system within the studied 10-year horizon. This portfolio of projects is likely to be recommended for NTCs.

The ITPNT is performed annually over the 3-year planning cycle. Unlike the ITP20 and ITP10, the ITPNT does not assess economic or public policy needs, but instead focuses exclusively on the reliability needs of the system associated with forecasted load growth and maintenance of long-term firm transmission service within the studied 5-year horizon.

### TPITF Issues Related to Current Planning Cycle

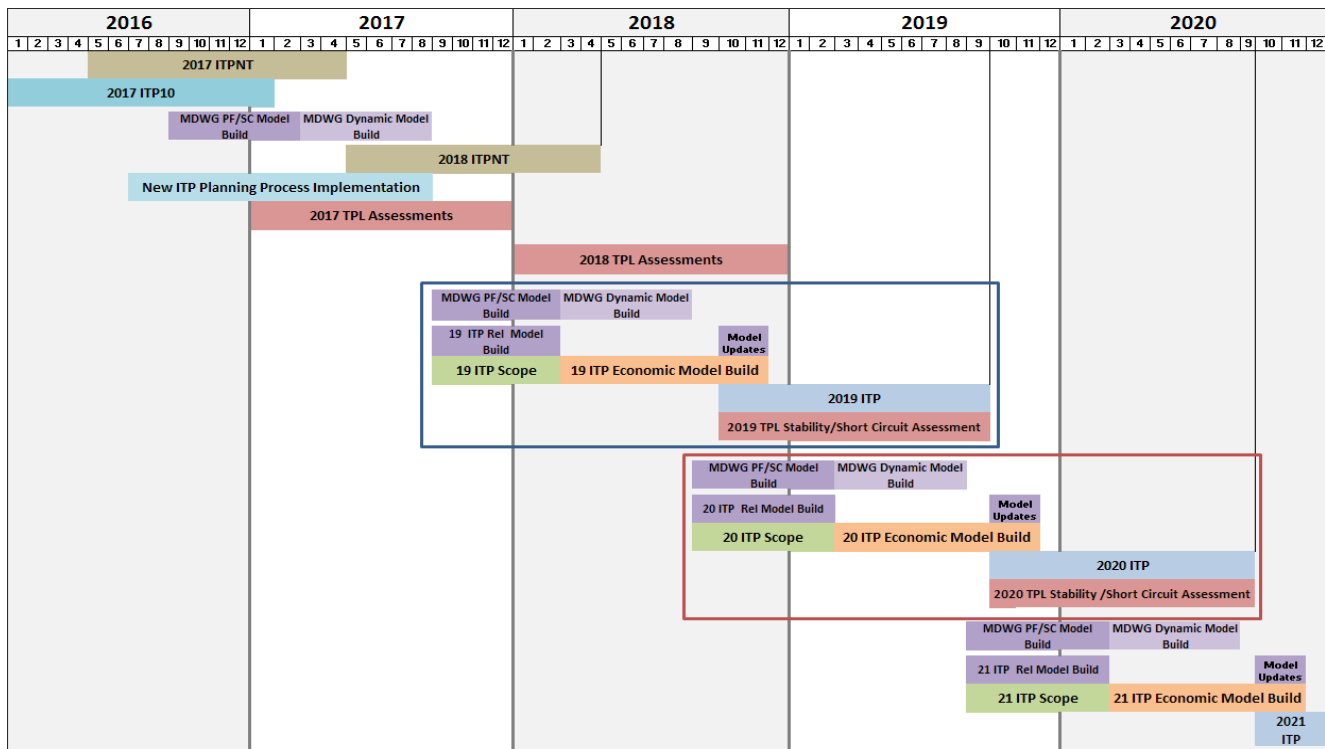
The TPITF identified a number of issues related to the current planning cycle that inhibit the flexibility, quality, and timeliness of the SPP planning process. While the complete issues list can be found in [Appendix C](#), issues related to the planning study cycle are summarized as follows:

- The 3-year planning cycle is too long and is inflexible in addressing changing system needs.
- The frequency of the 10-year planning assessment (once every 3 years) is inadequate.
- The ITP20 is performed too frequently based on practical value compared with the time and cost to perform the assessment.
- Performing the planning assessments separately reduces the opportunities for synergy in addressing the reliability, public policy, compliance, and economic needs of the SPP system with NTCs.

### Desired State

#### Proposed Planning Cycle

The TPITF proposes an ITP 10-year assessment process that produces an annual report and transmission expansion plan. The proposed planning cycle, as illustrated below, will consist of scope development and reliability and economic model builds prior to the planning assessment. Planning models for succeeding studies will be built concurrently with the in-process study to allow the annual performance of the 10-year assessment. The cycle will iterate in this fashion producing an annual report in perpetuity. Further details can be found in the [Transition and Implementation](#) section.



The annual assessment cycle addresses Stakeholder concerns that the current planning process takes too long by reducing the ITP planning cycle from 36 months to 12. This is achieved primarily by three changes to the existing process. First, the TPITF proposes removing the ITP20 from the standard ITP

planning cycle. While the TPITF recognizes the ITP20 provides significant strategic value, the deliverable of the study is informational and may not need to be refreshed with triennial frequency. Due to the intense resource usage and the desire to reduce the duration of the planning cycle, but yet maintain the value of the ITP20, the TPITF recommends removing the ITP20 from the planning cycle and performing it separately no less than once every five years unless as directed by the SPP Board with input from the Strategic Planning Committee (SPC). Second, the remaining 18-month cycle will become an annual 10-year assessment cycle that produces an annual report and transmission expansion plan. With each cycle, a 10-year assessment will be performed that combines the ITPNT, ITP10, TPL-001-4 Short Circuit, and portions of the TPL-001-4 Steady State assessments into one assessment, which is discussed in further detail in the [Holistic Planning Process](#) section. This change is intended to increase synergy by performing the multiple planning assessments in unison. Lastly, the assessment and model build cycles will overlap by 12 months producing three 10-year assessments over a three-year period as opposed to just one 10-year assessment in that same timeframe with the current ITP process. This approach addresses the goal of increasing the frequency of the 10-year assessments for reliability, public policy, and economic needs.

# Standardized ITP Assessment Scope

## Purpose

A large concern for SPP Staff and TPITF members is the amount of SPP Stakeholder and Staff time spent during each study process reviewing and approving scope items that tend to remain the same from study to study. The TPITF recommends the review and standardization of study scope items that remain relatively unchanged throughout each study iteration. This standardization will provide specific details around each scope item and eliminate the need for repetitive reviews and approvals. Stakeholders will retain the ability to modify standardized scope items by using the SPP Revision Request process as discussed in more detail below.

An additional benefit of standardization will be an increase in the consistency of how the studies are performed year over year which will help facilitate more detailed project analysis.

## Current State

### *Integrated Transmission Planning Manual<sup>2</sup>*

The Integrated Transmission Planning Manual (ITP Manual) is a comprehensive document describing the model building and assessment processes of the ITPNT, ITP20, and ITP10 studies. It also includes language describing futures development, the Order 1000 process, and the deliverables for each of the assessments. While the ITP Manual goes to great length to describe the numerous aspects of the assessments, it is written in a fashion that leaves several scope items open for a range of interpretation. This results in the need for working group review and approval with each ITP cycle. As a result, specific detail is drafted in study scopes that are then circulated through the corresponding working groups, including MOPC, for approval.

### *Study Scope Development and Approval*

The scope development processes between the ITPNT and ITP10 are similar in the way the scope documents are created but differ in how they are approved. For both processes, the scope documents are developed during the initial planning phases of the studies. These documents are developed by SPP Staff and reviewed and approved by the appropriate working groups before moving on to MOPC and the SPP BOD for final approvals. Where the processes differ is in the level of detail incorporated for each scope item. The scope for the ITPNT is constructed to include the final process details for each item so that the final approval of the scope solidifies the scope for the remainder of the study. The ITP10's approach differs in that the scope is constructed at a high-level with specific criteria surrounding each scope item formulated during the study process at a time before the corresponding actions occur. While a high-level scope is approved on the front-end of the ITP10 study process, specifics are not always reviewed and approved until after the study process has commenced and those scope-specific processes are ready to commence.

### *TPITF Issues Related to Study Scopes*

The TPITF identified a number of issues related to study scopes that inhibit the flexibility, quality, and timeliness of the SPP planning process. While the complete issues list can be found in [Appendix C](#), issues related to the planning study cycle are summarized as follows:

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<sup>2</sup> Integrated Transmission Planning Manual: [http://www.spp.org/documents/28615/2015\\_itp\\_manual\\_append\\_1.pdf](http://www.spp.org/documents/28615/2015_itp_manual_append_1.pdf)

- There is inconsistency from study to study in how some scope items are implemented. The scope can change mid-process due to a change in the expectations of members or conflicting expectations among members. This can cause difficulty with building consensus toward the approval of resultant transmission plans.
- Scope review and approval by working groups can take a long time and cause delays in the process. Scope approval, including individual scope items, can take several working group meetings before approval is granted creating a bottleneck in the study schedule.
- The lack of standardization in the study scope makes it difficult to estimate the amount of SPP and member resources needed to complete the study.

## Desired State

### *Standardized Scope*

The review and approval of methodologies and criteria that guide study processes will be included in the ITP Manual as standard study scope items. These are processes that will remain the same under typical/normal circumstances from study to study. Outside of minor modifications, these items will not require the same level of scrutiny and vetting other scope items like the definition of study futures may require. Standardizing these planning principles will simplify the scope development process, eliminate the need to review and approve these items annually, and help to provide the consistency members seek for the planning studies.

The TPITF recommends the following scope items relating to data inputs and analysis be reviewed for standardization in the ITP Manual. SPP Staff will work with the appropriate working groups to set the standard for each item.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Economic model development</li> <li>• Economic model generation parameters</li> <li>• Market structure</li> <li>• Load forecasts</li> <li>• System topology</li> <li>• Transmission service</li> <li>• CBA model</li> <li>• Resource plans</li> <li>• Renewable modeling</li> <li>• Siting plan</li> <li>• DC ties and lines</li> <li>• Fuel prices</li> <li>• Renewable survey</li> <li>• Hurdle rates</li> <li>• Benchmarking</li> <li>• Generation resources</li> <li>• Exports/imports - first tier</li> <li>• Consolidation</li> </ul> | <ul style="list-style-type: none"> <li>• Define constraints</li> <li>• Needs assessments – economic/policy/reliability</li> <li>• DPP window</li> <li>• Cost estimates</li> <li>• Solution development – economic/policy/reliability</li> <li>• Interregional considerations</li> <li>• 40-year financial analysis</li> <li>• Benefit metrics</li> <li>• Sensitivities</li> <li>• Staging</li> <li>• Reactive needs</li> <li>• Stability assessment</li> <li>• NERC TPL-001-4</li> <li>• Supplemental data for non-compliance to submittal deadlines</li> </ul> |
|--|---|

### *Assumptions Document*

An assumptions document will be developed to fully outline and describe those study scope items that will require Stakeholder review and approval with each new study. These items will be approved by the appropriate working groups during the scope development phase of the planning cycle.

Scope items such as the definitions of futures or scenarios and sensitivities may change with each study iteration in order to provide the appropriate context under which to assess the future performance of the existing transmission system and any needed improvements. For the 2017 ITP10 Assessment, the futures were modified to reflect the EPA's Clean Power Plan. Maintaining the ability to change these assumptions from study to study will provide the flexibility needed for the long-term transmission planning process.

The TPITF considers the following scope items assumption items and recommends their inclusion in the assumptions document. Items like Fuel Prices which were listed as standardized items above may contain assumption elements like Gas Prices listed below. While the standard process or definition may remain unchanged, data outputs/inputs from those items may change from study to study and may require review and approval.

- Futures selection
- Gas prices
- Renewable levels
- Final portfolio selection

The TWG and ESWG should review and approve the scope items that will be standardized and the scope items that will be a part of the assumptions document and update the ITP Manual accordingly. The TPITF recommends moving the revised ITP Manual under SPP's Revision Request process.

#### *Revision Request (RR) Process for Scope Changes*

Once the standardized scope is approved, modifications to the standardized scope document will be submitted through the SPP Revision Request (RR). The RR process is a key component of SPP's Stakeholder processes and allows Stakeholder input into decision making. It will place guidelines around the approval and implementation of study scope changes. The Revision Requests will be made via SPP's Request Management System (RMS) which will allow for the tracking and reporting of scope revision submissions.

This process will give Stakeholders the ability to submit scope revisions for review by other Stakeholders without interrupting the study process which will decrease the mid-process disruptions that have been experienced in past studies. Approved revisions will be incorporated into the scope of the subsequent study.

The TPITF believes the leveraging of the RR process will appropriately address member concerns while reducing the considerable amount of time it has taken in past studies to finalize the study scope due to numerous revisions submitted by Stakeholders.

The TPITF envisions the use of the RR process to address improvements to the foundational scope items standardized within the ITP Manual. The TPITF recognizes the importance of Stakeholder input into the scope development process; however, it is the Task Force's desire to see that substantive changes receive proper Stakeholder vetting and approval before implementation.

Standardized scope items will retain flexibility by granting the appropriate working group the ability to provide guidance on items as prescribed by the ITP Manual. An example of this flexibility may be with the standardizing of the scope item Fuel Prices. Standardized language may include the mechanism for setting fuel prices. Per the scope, the selected index would always be used for pricing information, however, the actual price of natural gas may change year-over-year. As the natural gas fuel prices change, the recommended prices would become a part of the assumptions while the standardized scope item would remain unchanged. If a Stakeholder recommends the use of another source for pricing

information, that recommendation would be submitted through the RR process for proper Stakeholder vetting and approval.



# Common Planning Model

## Purpose

The SPP Modeling department in conjunction with the Model Development Working Group (MDWG) is responsible for developing the SPP Steady-State, Short Circuit, and Dynamics models. These model sets serve as the basis for further refinement into the base models for ITP and TPL Steady State assessments. The Economic Planning department is responsible for constructing the Economic model that is used during performance of the ITP10 study. The TPITF Scope document lists as one of its three objectives the “Utilization of data, including data collected by operations that will benchmark, to the best ability, the real-time and planning horizon assessments to ensure consistency in the planning process.” To meet the goal of consistency in the planning process, the TPITF recommends the building of a common base reliability model that will be used for all SPP planning processes including Transmission Service and Generation Interconnection as well as the ITP. This base reliability model will also serve as the base model for the TPL Steady State assessment. The TPITF also recommends the TWG select the TPL sensitivity case from the CBA Reliability model set.

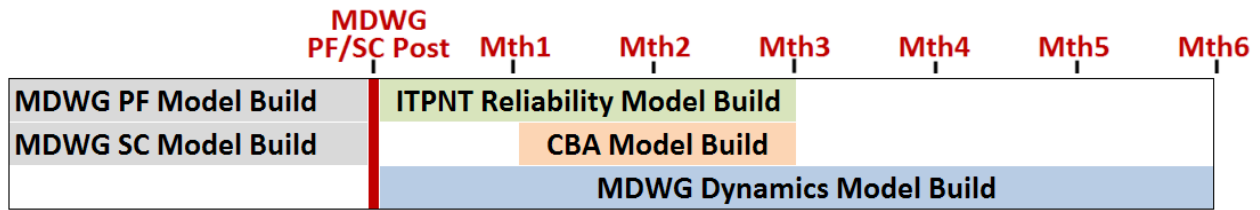
## Current State

The set of models currently used in the SPP planning processes are listed below. The ITPNT Reliability and the TPL Steady State models use the MDWG Powerflow model as their base model.

Description <sup>3</sup>	Year 1	Year 2	Year 5	Year 10	Total
ITPNT Reliability	----	Scenario 0: ITPNT SP & WP Scenario 5: ITPNT SP & WP CBA: ITPNT SP & WP	Scenario 0: ITPNT SP & WP Scenario 5: ITPNT SP & WP CBA: ITPNT SP & WP Scenario 0, 5, & CBA (off-peak): ITPNT L	----	15
ITP10 Economic	----	----	Futures (1/2/3): 8760 hrs	Futures (1/2/3): 8760 hrs	6
ITP10 Reliability	----	----	DC/AC Future (1/2/3): S & L	DC/AC Future (1/2/3): S & L	12
TPL - Steady State Assessment	R2.1.1 Y-1 Peak: MDWG S (base) & ITPNT SP5 (sensitivity) R2.1.2 Y-1 Off-Peak: MDWG L (base) & ITPNT L5 (sensitivity)	----	R2.1.1 Y-5 Peak: MDWG (base) & ITPNT SP5 (sensitivity)	R2.2.1 Y-10 Peak: MDWG S (base)	4
TPL - Series Short Circuit	S Max Fault				1

<sup>3</sup> Cases are defined as: SP (summer peak), WP (winter peak), L (light load), and S (summer)

The current model build schedule can be summarized as shown below.



*MDWG Models*

The final MDWG Powerflow and Short Circuit models are typically scheduled to post simultaneously. This posting is usually scheduled for the 1<sup>st</sup> quarter of each new calendar year in the February timeframe.

Work on the MDWG Dynamics model is performed prior to the posting of the MDWG Powerflow model. The effort consists of building the DYRE files, incorporating topology updates submitted by members, and mitigating errors found in the model. Following the posting of the MDWG Powerflow model, the Dynamics model build continues, lasting approximately six months in duration.

*ITP Models*

The ITPNT Reliability models are built using the same database (MOD) as the MDWG Powerflow models. As with the Dynamics model build, work on the ITPNT Reliability model is performed prior to the posting of the final MDWG Powerflow models. This consists of modeling topology updates to reflect only existing and approved facilities, transactions, and updates to generation dispatch. Following the posting of the MDWG Powerflow models, the ITPNT Reliability model build will continue for approximately three months in duration.

The CBA Reliability model uses the initial pass of the ITPNT Scenario 0 Reliability model as its topology base. ITP10 economic data is utilized to provide seasonal generation economics, wind profiles, and hydro profiles. Each pass of the CBA Reliability model is dispatched based on a security constrained economic dispatch (SCED) and provided for member review.

The ITP10 models are based on the 10-year ITPNT Scenario 0, summer peak model. It incorporates the Scenario’s topology for base load and generation. This topology is the base of the PROMOD economic model. The next steps in the economic model build process are the load and generation reviews where members can confirm or adjust their load, add economic data to the existing generation, and confirm or adjust the resource name plate values used to create the 10-year ITPNT model. In order to meet the renewable capacity and/or energy requirements, SPP Staff will evaluate if all the requirements are met and if they are not met, add additional renewable resources to the model. It is also necessary to meet the required capacity margin for each zone. To achieve that, it is necessary to develop a resource plan where conventional and renewable prototypes are considered to determine needed and more economically viable additions. Resources added to the economic model are then sited throughout the SPP system. The last step in the model build process is to perform a constraint assessment to verify how the models behave when the system is constrained and to identify any new flowgates that should be monitored. The number of models is dependent on the amount of Futures included in the ITP10 study scope. Members are responsible for the review and approval the model sets, and provide vital feedback during each of the model build steps mentioned above.

### TPITF Issues Related to Current Modeling Practices

The TPITF identified a number of issues related to the planning models and their corresponding builds that inhibit the efficiency, consistency, and accuracy of the currently constructed model sets. While the complete issues list can be found in [Appendix C](#), issues related to the models are summarized as follows:

- Models are not constructed in a consistent manner across the planning processes. Models are fundamentally different between the processes.
- Separate model builds for the different planning processes place additional burdens on members to submit and review data several times throughout the year.
- The models are not indicative of what is happening in real-time under the new Integrated Marketplace. Market and Operations feedback should be reflected in the model development process.

### Desired State

The table below lists the proposed model sets for the TPITF recommended ITP planning cycle. These models differ significantly from the planning model sets currently built and are described in further detail below. The base reliability model listed and described below will become the base model for all of SPP’s planning processes including Transmission Service, Generation Interconnection, and the TPL Steady State compliance study. This will address concerns Stakeholders have expressed over model consistency between the planning processes.

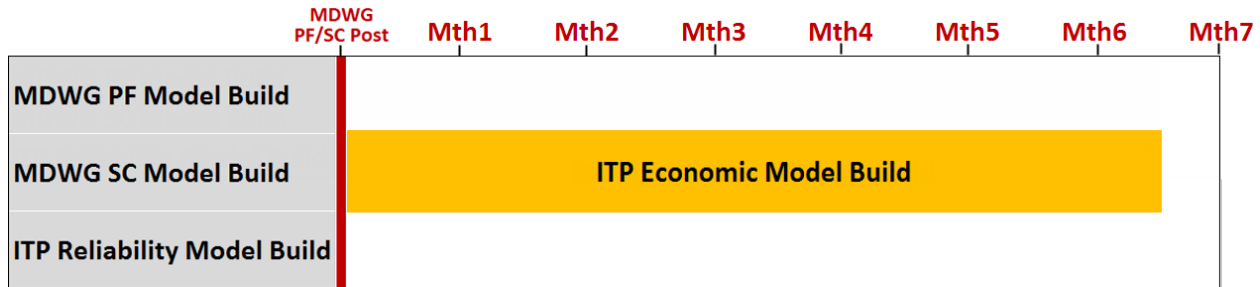
Description	Year 2	Year 5	Year 10	Total
Reliability: CBA (TPL Sensitivity Case)	One Future Coincident Peak 4On/Off-Peak (2)	Up to Three Futures Coincident Peak On/Off-Peak (6)	Up to Three Futures Coincident Peak On/Off-Peak (6)	14
Reliability: Base Scenario TPL: Powerflow	Summer Winter Light Load Non-coincident Peak (3)	Summer Winter Light Load Non-coincident Peak (3)	Summer Winter Light Load Non-coincident Peak (3)	9
Economic	One Future Coincident Peak 8760 (1)	Up to Three Futures Coincident Peak 8760 (3)	Up to Three Futures Coincident Peak 8760 (3)	7
TPL - Series Short Circuit	S Max Fault			1

The proposed model build schedule is listed below. In order to meet the model build timeline necessary to facilitate the 12-month ITP assessment window, the ITP Reliability model will be built in parallel with the MDWG Powerflow and Short Circuit models. With this change, the TPITF recognizes the need to collect the data required to build the ITP Reliability model earlier in the process than it is requested today. The current MDWG model build schedule will be leveraged to govern the collection of required

<sup>4</sup> NERC defines On-Peak as “...periods of higher electrical demand.” and Off-Peak as “...periods of lower electrical demand.”

data. Leveraging the MDWG model build schedule will address member concerns with multiple data review and submittal windows found across the separate model builds in the planning processes. Required data will be requested, submitted, and reviewed on the front-end of the model build process, thereby eliminating the multi-process burdens currently experienced by members.

Efficiencies implemented in the Economic model build process will also help facilitate the 12-month ITP assessment window by reducing the build time to a little over six months.



The TPITF recommends the structure of the ITP model sets to consist of the following:

- Base Reliability Model
- Economic Model
- CBA Reliability Model

*Base Reliability Model*

At least one scenario powerflow model will be required in order to meet the reliability planning requirements for the SPP region. This base reliability model will be developed as an indicative representation of how entities within SPP responsible for serving network load would serve network load utilizing network resources only. This model would consist of non-coincident peak load forecasts, assumed long-term firm transmission service usage levels, and expected conventional and renewable resource output levels. The TPITF recommends the modeling of renewable facilities with firm service at each facility’s highest summer output (months July and August; hours 15:00-19:00) for the last three years per facility and off-peak and light load at 100% of firm service. For new renewable resources, the average of facility peaks within the new resources’ areas will be used to model the resources’ outputs.

The Year 2, 5, and 10 base reliability model set utilized for regional and sub-regional reliability planning will also be utilized as the base model for long-term firm transmission service request studies. However, this base model will be adjusted as necessary to appropriately analyze and integrate transmission service requests consistent with the SPP Tariff provisions and business practices that govern the process.

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

The Year 2, 5, and 10 base reliability model sets utilized for regional and sub-regional reliability planning will also be utilized as the base model sets for generator interconnection request studies. However, the

base model set will be adjusted as necessary to execute the study of generator interconnection service requests consistent with the tariff provisions and business practices that govern the process.

#### *Economic Model*

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

The current economic and policy study processes for the ITP10 require needs assessments for Year 10 only. The proposal above will add additional economic and policy needs assessments for Years 2 and 5.

#### *CBA Reliability Model*

The CBA powerflow models will be developed as an indicative representation of how load would be served in the SPP Integrated Marketplace. This CBA model will be built from PROMOD output and will consist of coincident peak load forecasts for the SPP region and the security constrained commitment and dispatch of both firm and non-firm generating resources derived from economic planning models. Interchange between SPP and Tier 1 will be determined based on price differentials that may include hurdle rates as developed with the existing economic process. The TPITF recommends the TWG select the TPL sensitivity case from the CBA Reliability model set.

#### *TPL Assessment Models*

The Year 2, 5, and 10 base reliability model sets utilized for regional and sub-regional reliability planning will be utilized as the base model sets for the TPL Steady State assessment. As noted above, the CBA powerflow model set will be used for the selection of the sensitivity case required in addition to the base case model for TPL compliance. Not all of the reliability or CBA models will be used, only the models necessary to meet compliance with TPL-001-4.

The MDWG short circuit model with all planned generation and transmission facilities in service is represented with the following additional requirements:

- Place all available facilities in-service:
  - Generation
  - Transmission lines (Out for maintenance)
  - Transformers
  - Buses
- Flat – classical fault analysis conditions

This model set establishes category P0 as the normal System condition and defines the models that will be used for the short circuit analyses to comply with requirement TPL-001-4 R2.3 as the Maximum Fault Year 2 Summer.

## Holistic Planning Process

### Purpose

The TPITF envisions an efficient and effective planning process in which all SPP regional Planning assessments are coordinated to produce transmission expansion plans that will optimize the use of the SPP transmission system while maintaining reliability.

Creating efficiencies in the planning process by synchronizing processes and coordinating study findings will be the building blocks by which a planning process will be constructed that will address reliability, economics, public policy, and regulatory compliance needs over the 10-year planning cycle.

Aligning planning processes along with SPP Operations will facilitate the sharing of the most accurate information and data between studies and will allow the ITP process the opportunity to address issues that may have not been identified in the Generation Interconnection and Transmission Service Study processes but that are observed within the real-time environment.

### Current State

#### *TPITF Issues with Parallel Planning Processes*

The TPITF identified a number of issues related to the various aspects of the planning process. While the complete issues list can be found in [Appendix C](#), issues related to the planning process are summarized as follows

- Chronic operational issues not being addressed in the long-term planning process.
- Project evaluation and selection does not consider all factors necessary for comprehensive engineering economic analysis. Planning horizon assessments do not appropriately account for the impacts of real-time markets.
- Planning process has no regional funding mechanism for projects necessary to mitigate higher depth contingency planning required for NERC compliance.
- Planning processes are disconnected and do not inform one another.

### Desired State

The TPITF proposes a regional planning process built to leverage knowledge of the transmission system's reliability, public policy, compliance, and economic needs, as well as generation interconnection and transmission service request impacts in order to develop a more cost-effective transmission portfolio for a 10-year planning horizon. The TPITF believes this will be enabled by utilizing a common set of foundational modeling assumptions as the starting point for all planning studies within the planning cycle as discussed in the [Common Planning Model](#) section of this whitepaper. The staging of the model builds for all reliability, public policy, compliance, and economic studies will be determined to produce a single needs assessment for the 10-year planning horizon. System needs resulting from generation interconnection and transmission service requests will be identified within the currently established timelines for those processes. However, the evaluation of transmission service needs and associated projects will be coordinated with those identified in the 10-year horizon regional planning process to facilitate continuity in the overall transmission expansion plan.

### *Reliability and Compliance Assessments*

Reliability and compliance needs will be determined based on NERC Standards, SPP Planning Criteria, and Sub-Regional Planning Criteria of individual SPP members. The reliability needs will be produced from the base reliability and CBA reliability models for Years 2, 5, and 10 as described in further detail in the [Common Planning Model](#) section of this whitepaper. The base reliability needs will represent potential criteria violations based on a model set that utilizes only firm resources and firm transactions to serve non-coincident network load on an individual Balancing Authority (BA) by individual BA basis. The CBA reliability needs will represent potential criteria violations based on a model set that utilizes both firm and non-firm resources with a market dispatch to serve SPP coincident network load.

Compliance needs will be produced from the TPL base reliability and Short Circuit models for Years 2, 5, and 10 as described in further detail in the [Common Planning Model](#) section. Compliance needs that may be considered for NTCs will represent TPL-001-4 contingencies that do not allow for non-consequential load loss or interruption of firm transmission service (P0-P3). Mitigations, at a minimum, will be developed by SPP Staff or the applicable TP for TPL-001-4 contingencies that do allow for non-consequential load loss or interruption of firm transmission service (P4-P7). Planning Event descriptions are listed in [Appendix A](#).

After reviewing the TPL stability study process, the TPITF chose not to include the study in the ITP planning process. Factors considered were the historical lack of issues identified in the process that would require transmission projects, the use of the proposed ITP models, Order 1000 implications, and the general consensus within the TPITF that inclusion of the assessment does not provide any tangible benefit to the study that would justify the potential resource, cost, and schedule impacts its inclusion would have on the ITP planning process. The remaining TPL Steady State events will be handled along with the stability process outside of the ITP process.

### *Public Policy Assessments*

Public policy needs are considered to be any system deficiency that prohibits attaining renewable energy mandates or goals in the economic model runs for each Future in Years 2, 5, and 10 due to renewable energy curtailments caused by transmission congestion.

### *Economic Assessments*

Economic needs will be determined based on the adverse impact of congestion on the cost of energy production, energy purchases, and sales for the SPP region. This will be achieved by monitoring key system constraints with thermal limitations. SPP Staff will conduct transfer analysis as needed to identify any voltage stability limitations that may precede the system's thermal limitations and also include these voltage stability limitations in the system constraints list. Economic needs will be produced from the economic models for Years 2, 5, and 10 described in further detail in the [Common Planning Model](#) section. Economic needs will represent a list of the most congested flowgates in the economic model runs for each Future in Years 2, 5, and 10.

### *Generation Interconnection Request Assessments*

Generation interconnection needs will be determined based on NERC Criteria, SPP Planning Criteria, and Sub-Regional Planning Criteria of individual SPP members. The reliability needs will be produced from the models that begin with the base reliability models for Years 2, 5, and 10 as described in further detail in the [Common Planning Model](#) section. All generation interconnection requests will be added to the models. The reliability needs identified will represent potential criteria violations due to the interconnection of the generation determined from the powerflow, dynamic stability, and short circuit

assessments. For the powerflow assessment, transmission reinforcement is required for violations that meet the generator interconnection criteria for impacts to the constraints for the contingencies specified in the ITP process. For the stability analysis, unstable conditions will be addressed for transmission reinforcement for contingencies specified in the dynamic stability assessment for TPL-001-4 contingencies equivalent to P0, P1, P2.1-2.3, P4, and P5 as identified by SPP and the Transmission Owners. Higher depth contingencies (P6-P7) will be evaluated as necessary for the location of the generation for mitigations. For the short circuit assessment, transmission reinforcement will be required for a scenario with all generation and all transmission elements in service (P0).

#### *Transmission Service Request Assessments*

Transmission service needs will be determined based on NERC Criteria and SPP Planning Criteria and will be produced from the base reliability models for Years 2, 5, and 10 described in further detail in the [Common Planning Model](#) section. Transmission service needs will represent transmission system overloads caused or impacted by the requested transfer(s).

Network Integration Transmission Service (NITS) requests are modeled as generation to load transfers in addition to generation to generation transfers. This is done because NITS is a request to serve network load with the new designated network resource, and the impacts on the transmission system are determined accordingly. Point-To-Point transmission service requests are modeled as generation to generation transfers. Generation to generation transfers are accomplished by developing a post-transfer case for comparison by dispatching the requested source and redispatching the requested sink.

#### *Operational Assessments*

The determination of operational needs will be based on chronic operational issues with a significant financial or reliability impact identified in the operation of the integrated marketplace. SPP Operations observes a more diverse range of system operating scenarios that may not be feasible to effectively simulate in the planning environment. As a result, certain reliability and economic needs that are seen with relative frequency in the real time operations may not be identified in the long term planning process. Further, the long term planning process currently does not have a mechanism to address these issues with NTCs for new projects. The TPITF recommends the following process for incorporating operational issues into the planning process.

SPP Operations Staff will work with the TWG, ESWG, and ORWG to develop criteria around the definition and designation of chronic operational issues that should be evaluated in the planning process. Once the criteria for identifying operational issues has been established, SPP Operations will provide SPP Planning with a list of economic and reliability operational needs along with the historical context for each issue. For reliability operational needs, historical context may consist of data such as the frequency and duration of occurrences of the reliability events as well as related outage information along with other types of supporting information. For economic operational needs, historical context may consist of data such as congestion or uplifted costs associated with the issue. These issues will be included in the planning assessment needs list so that DPPs can be submitted for chronic operational issues.

Upon establishment of the ITP portfolio of proposed transmission projects, these projects will be tested as solutions to the reliability and economic operational needs using operational models that captured actual occurrences of the needs. These operational models will be approved by the applicable SPP stakeholder working groups to ensure consistency with the criteria established to designate the operational needs as chronic, rather than infrequent system needs. For those operational needs that are not mitigated by the proposed set of projects, or other DPPs, SPP Staff will develop candidate



projects to address the needs. The candidate projects and associated justification will be presented to the TWG, ESWG, and ORWG for their review and endorsement. The list of endorsed projects will be included in the ITP project portfolio that is submitted to the MOPC and the SPP BOD for approval.

### *Seams*

In order to ensure a robust and effective regional planning process, the evaluation of transmission system reliability, economic, and public policy needs must also account for the opportunity to jointly develop beneficial projects with SPP's neighbors. Interregional planning processes alone may not be sufficient to adequately address these needs along SPP's seams. SPP's regional planning processes should help to facilitate interregional planning where possible. SPP engages in interregional planning activities pursuant to FERC Order 1000 with MISO and the Southeastern Regional Transmission Planning (SERTP) group. Additionally, SPP has Joint Operating Agreements (JOAs) with various other utilities that govern periodic or ad-hoc joint planning processes.

Because many of the same Staff and Stakeholder resources are involved in both SPP regional and interregional planning activities, coordination between the various processes is vital to ensure consistency and efficiency. Each of the process changes envisioned in this recommendations whitepaper should be evaluated for opportunities to align or leverage similar activities occurring in interregional processes. Additional recommendations could also be made for SPP Staff to propose appropriate changes to applicable agreements with neighboring entities.

As described in the [Common Planning Model](#) section, SPP's regional model development attempts to model neighboring regions consistent with how those neighboring regions model themselves in their respective regional planning processes. During the construction of each regional planning model, efforts will be made to acquire the necessary modeling information from neighboring entities. This coordination process is best facilitated where SPP and neighboring modeling schedules are closely aligned. Where appropriate, information from recent interregional planning processes will be leveraged.

SPP's regional planning processes should also facilitate the identification and resolution of reliability, economic, and public policy needs along the seams. This consideration of needs along SPP's seams will include coordination with SPP markets and operations to evaluate issues impacting neighboring utilities. The development of a process to consider the impact of Market-to-Market transactions may provide valuable input into the identification of seams issues and potential mitigations

### *Solution Development*

All reliability, compliance, public policy, and economic needs, as described above, that could result in NTCs will be aggregated and posted publicly to initiate a single Detailed Project Proposal (DPP) window. Compliance needs such as TPL-001-4 P4-P7 events as well as generation interconnection and transmission service request needs will be addressed outside of the DPP window in compliance with the timelines specified under the existing processes. SPP Staff will evaluate DPPs as well as Staff solutions to develop the most cost-effective solutions to all reliability, public policy, compliance, and economic needs. This will be accomplished by evaluating the patterns and drivers of system needs over the full 10-year planning horizon. Also, synergies of candidate solutions will be analyzed and leveraged as appropriate. For instance, the viability of deferring or displacing reliability, compliance, or public policy solutions with projects that preserve those attributes but also produce economic benefits will be evaluated for the full 10-year planning horizon.

Transmission system needs that are consistent across the full planning horizon will be addressed with cost-effective long-term solutions. When required, short-term mitigations will be sought, selected, and

implemented while maintaining system reliability. Reliability, compliance, public policy, and economic needs that are identified in the early portion of the 10-year planning horizon, but not identified in the later portion will be evaluated in detail to determine the anticipated changes in system conditions or topology that are mitigating the need in the long-term. The system changes that mitigate transmission system needs in the long-term will be documented and the short-term need will be evaluated with the use of short-term mitigations or least-cost solutions until the need is permanently displaced with the longer-term solution. Reliability, compliance, public policy, and economic needs that are identified in the latter portion of the 10-year planning horizon, but are not identified in the early portion will be addressed with the use of cost-effective long-term transmission solutions.

Solutions that are evaluated in the 10-year regional planning process will also be evaluated as possible candidate solutions to needs identified in the generation interconnection and transmission service request evaluation processes. Identical needs occurring during identical time periods that are identified in both the 10-year regional planning process and the applicable service process will be evaluated using the 10-year regional planning process solution(s). Identical needs that occur in an earlier time period in the 10-year regional planning process than in the applicable service process will be evaluated using the 10-year regional planning process solution. Identical needs that occur in the 10-year regional planning process after they occur in the applicable service process will be evaluated using acceleration of the 10-year regional planning process solution, and costs will be allocated consistent with existing cost allocation methodologies under the SPP Tariff. For all other needs that are identified in the generation interconnection and transmission service request processes, the least-cost solution necessary to accommodate the service request will be selected.

Solutions for compliance needs such as TPL-001-4 P4-P7 events will be developed through coordination between SPP Staff and SPP Transmission Owners. These solutions will be considered corrective action plans that may or may not include transmission expansion.

## Staff/Stakeholder Accountability

### Current State

The ITP process requires a significant amount of collaboration between SPP Staff and SPP Stakeholders in order to produce the required deliverables of the study. SPP Stakeholders are responsible for establishing the scope of the studies and also providing guidance for the methodologies to be used in the studies. Further, SPP Stakeholders are responsible for providing the data necessary to implement the scope and methodologies and to also review study data and results to certify quality.

SPP Staff is responsible for the facilitation of the Stakeholder process and implementation of the study scope. These efforts include notifying SPP Stakeholders of tariff and other governing document requirements to support study scope development, identification and solicitation of data necessary to implement the scope, recommendations for methodologies to efficiently execute the scope, and any other general support necessary to implement the study scope. Staff is also responsible for developing project schedules that determine the time allotted to accomplish each aspect of the study scope and also the responsible party for those aspects of the scope.

The data exchange and data review deadlines in these schedules are often breached in the current ITP process. This has led to project schedule mitigations actions that have proven to be inefficient and costly. These project schedule mitigations may reduce time for Staff to perform study work and also reduce Stakeholder review time and threatens Stakeholder satisfaction and the overall quality of the study.

### Desired State

The TPITF recommendations for reforms to the planning process, specifically the inclusion of TPL analysis in the study and the annual planning cycle, will increase the criticality of coordination between SPP Stakeholders and Staff. SPP Stakeholders are responsible for establishing the scope of the studies and also providing guidance for the methodologies to be used in the studies. Further, Stakeholders are responsible for providing the data necessary to implement the scope and methodologies and to also review study data and results to certify quality. SPP Stakeholders and Staff will implement an accountability assurance program that consists of mechanisms designed to promote timely data exchanges, reviews, and approvals within the transmission planning process. The program will identify all entities responsible for providing data to the process and also include the identification of actions that will be taken in the absence of timely data exchanges, reviews, and approvals. The program will also describe options available to any entities that would like to submit study data after the data exchange deadlines or request changes to data after the data review deadlines.

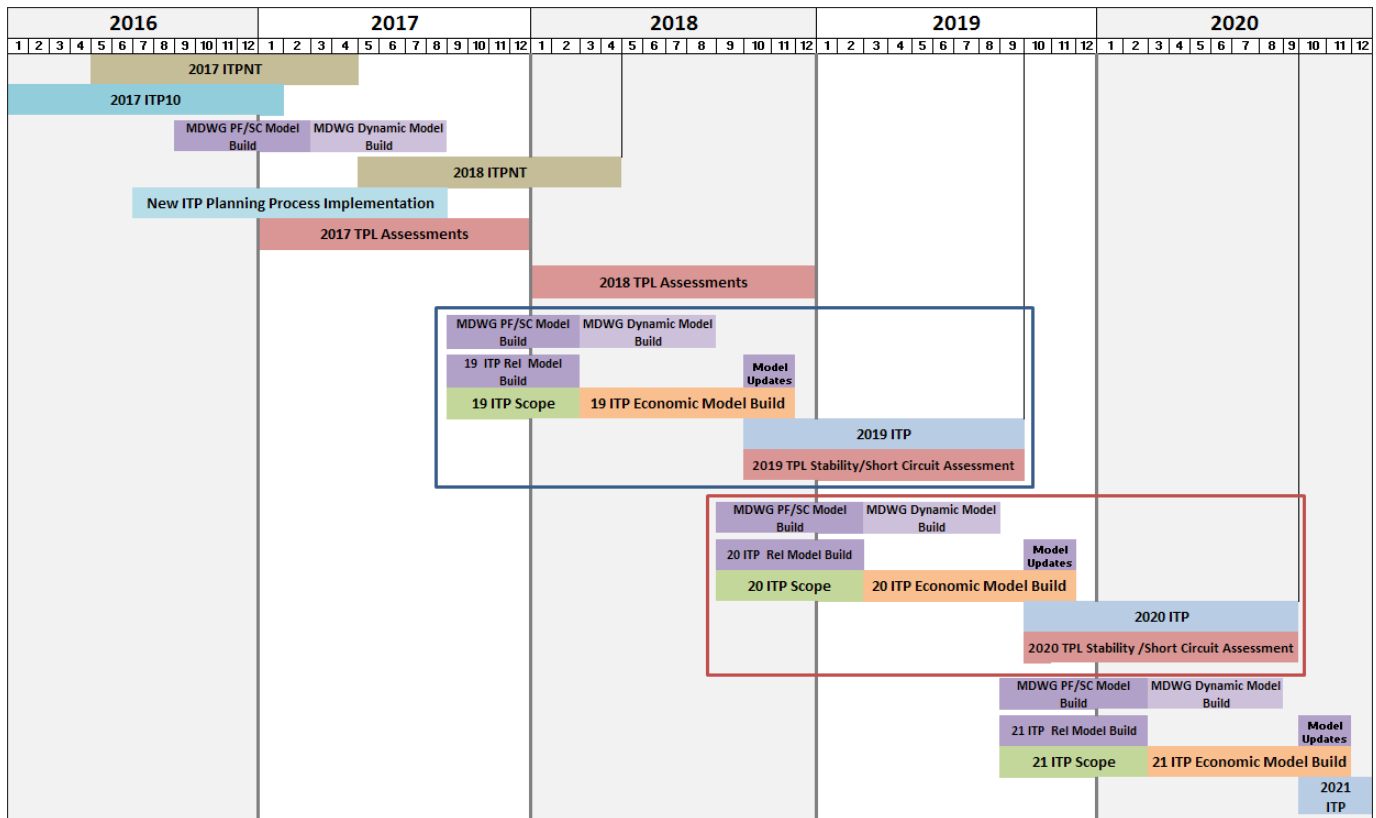
SPP Staff will develop a project schedule in parallel with the development of the scope of each study. This schedule will identify the timing, duration, and responsible parties for all data exchanges, data reviews, and approvals required to complete the ITP study. SPP Staff will coordinate with Stakeholders in the development of this schedule and formally vet the final schedule with Stakeholders within one month of the completion of the study scope and assumptions document. Each member company will identify a single point of contact for their company that will be responsible for addressing all data required to support the modeling process. For each data exchange identified in the study schedule, applicable SPP working groups and Staff will agree upon the data that will be used as a proxy for Stakeholder supplied data to keep the process moving forward in the event the data is not supplied by the data exchange deadline. If data reviews are not conducted by the associated schedule deadlines, the data will be assumed to be appropriate and the study will move forward as scheduled. At the

conclusion of each data exchange window, but no less than each quarter, SPP Staff will provide a report card to the MOPC listing any deadlines breached by SPP Stakeholders or Staff.

Any entity that does not meet prescribed data exchange, review, or approval deadlines and wants to add or change data used in the study may make a request for a waiver of the deadline to the MOPC. SPP Staff will provide the MOPC with the project schedule impacts, schedule mitigation plans, and an estimate of any costs associated with accommodating the waiver to support the MOPC decision making process. Upon approval of the waiver and associated schedule mitigations and costs, SPP Staff will incorporate the Stakeholder data into the planning process. In the event the waiver is not approved, SPP Staff will make no changes to the study process and will continue moving forward with the current study schedule.

## Transition and Implementation

The TPITF recommends a transition to the new 2019 ITP planning process starting in September 2017 with the ITP model builds and scope development leading to the initial ITP planning assessment that will be completed in October of 2019. The transition to the new planning process will require two preliminary steps. First, the current planning cycle will need to be completed. Second, SPP Stakeholders and Staff will need to implement all changes necessary to allow the new process to move forward. These changes will include, but are not limited to modifications to the SPP tariff and other appropriate governing documents, establishment of the details of the new processes and procedures for the new planning study by the applicable SPP working groups, and the procurement of resources and tools necessary to implement the process. To help facilitate the move to the new planning process, the TPITF recommends the scoping of two study futures for the initial 2019 planning cycle. After the 2019 planning cycle has been completed, SPP staff and SPP Stakeholders will have the opportunity to perform a review and lessons-learned exercise for the study and determine where additional improvements may be needed to incorporate a third study future. The chart below illustrates the transition activities, projected durations, and the timing of the first two planning processes under the new ITP process and is discussed in further detail below.



### Current Planning Cycle Completion

The current ITP planning cycle has two remaining studies, the 2017 ITP10 and the 2017 ITPNT. The 2017 ITP10 is scheduled to be completed in January 2017. The 2017 ITPNT is scheduled to begin in April 2016 and be completed in April 2017. The next ITP planning cycle under the current process would begin with an ITP20 assessment that commences in 2017, as well as the 2018 ITPNT that would begin in April 2017 and end in April of 2018.

While the TPITF believes the 2018 ITPNT assessment is necessary for continued reliability planning during the transition, the TPITF does not believe an ITP20 study should begin in 2017. Instead, the TPITF believes SPP Stakeholder and Staff resources would be better utilized by focusing their efforts on initiatives necessary to facilitate the successful implementation of the new ITP Planning process. The TPITF recommends the suspension of the ITP20 for 2017. SPP will need to make a FERC filing to accomplish this recommended suspension. If the study is required by the SPP BOD, the TPITF recommends outsourcing the performance of the study to free up the resources necessary for implementation of the new planning process.

There will be three more TPL assessments performed under the current processes, prior to the inclusion of TPL power flow and short circuit assessments into the new ITP planning process. These assessments are the 2016, 2017, and 2018 TPL assessments and will be completed in December 2016, December 2017, and December 2018 respectively. The 2019 TPL stability assessment will commence in the latter half of 2018 rather than January of 2019 to align with the 2019 ITP assessment timeframe. In essence, the TPL assessments will be performed twice in 2018 in order to facilitate alignment with and inclusion in the 2019 ITP assessment and meet annual NERC posting requirements.

### **Implementation Preparation**

The TPITF will provide a final set of recommendations to the MOPC, SPC, and SPP BOD in July 2016 for approval. At that point, it is the Task Force's intent to forward the approved recommendations to the appropriate Stakeholder groups for process development and implementation. During the timeframe between the 2016 April and July MOPC/SPP Board cycle, the TPITF will work with impacted Stakeholder groups to develop timelines for the development, review, and implementation of the changes to the planning process. This information will be used to develop more detailed schedules for the transition to the new process. The TPITF will also work with SPP Staff and Stakeholders to determine potential resource and other budgetary impacts of the recommended process improvements. Workshops will be held to inform and educate Stakeholders on the proposed improvements in order to present a clear and vetted set of final recommendations in July 2016.

The TPITF will also present an implementation plan that will outline the deliverables and timelines required by Stakeholder groups to meet the start date of the new ITP planning process. The plan will also describe the changes to governing documents needed to facilitate the move to a holistic planning process. The TPITF foresees major involvement from SPP Staff, TWG, ESWG, ORWG, RCWG, and RTWG with the coordination of the transition to the new planning process along with the work necessary to update the ITP Manual, SPP Tariff, SPP business practices, and SPP Criteria.

## Recommendations

### Annual Planning Cycle

The TPITF recommends the reduction of the three-year Integrated Transmission Plan assessment cycle to an annual planning cycle that will produce a 10-year transmission expansion plan each year.

- Remove the ITP20 Assessment from the three-year ITP cycle. Place the performance of the 20-year study under the guidance of the SPC to be performed no less than once every five years unless as directed by the SPP Board.
- Combine the Near Term and 10-year Assessments into a single planning study.

### Standardized ITP Study Scope

The TPITF recommends standardizing ITP study scope items and the development of a streamlined assumptions document.

- Standardize scope items and incorporate into the ITP Manual.
- Place the ITP Manual under SPP's Revision Request process to facilitate changes submitted for standardized scope items.
- Assumptions document for approval items. Identify items that will require up-front approval (futures, gas prices, etc.).

### Common Planning Model

The TPITF recommends the development of a single, base reliability powerflow model that will be used for all SPP planning processes including Transmission Service and Generation Interconnection as well as the TPL Steady State assessment.

- One base reliability model for all planning processes including TPL Steady State assessment replacing the Scenario 0 and 5 models with an as-expected model.
- Model renewable facilities with firm service at each facility's highest summer output (months July and August; hours 15:00-19:00) for the last three years per facility and off-peak and light load at 100% of firm service. For new renewable resources, the average of facility peaks within the new resources' areas will be used to model the resources' outputs.

### Holistic Planning Process

The TPITF recommends combining the ITPNT, ITP10, and the TPL Steady State and Short Circuit assessments into a single, 10-year ITP study that will produce an integrated transmission expansion plan addressing reliability, economic, policy, and compliance needs in Years 2, 5, and 10.

- Issue NTCs for all projects required to address needs in Years 2, 5, and 10.
- Develop a process for identifying and incorporating chronic operational issues into the ITP process.

### SPP Staff/Stakeholder Accountability

The TPITF recommends development of an accountability assurance program that consists of mechanisms designed to promote timely data exchanges, reviews, and approvals within the transmission planning process.

- Formal MOPC/SPP BOD reporting structure for communicating staff/stakeholder non-compliance with deadlines.

### **Transition and Implementation**

The TPITF recommends a transition to the new 2019 ITP planning process that will begin in September 2017 with the ITP model builds and scope development leading to the initial ITP planning assessment that will be completed in October of 2019.

- Suspension of the ITP20 for 2017. If the study is required by the SPP BOD, the TPITF recommends outsourcing the performance of the study to free up the resources necessary for implementation.
- Scope two study futures for the initial 2019 planning cycle to help facilitate the move to the new planning process.



## Appendix A: Planning Events

### P0

- N-0, No Contingencies

### P1

- N-1, Single Contingency
- Must use footnote 12 to have Non-consequential load loss or curtailment of Firm Transmission service
- Steady State
  - Use auto N-1 to capture all possible combinations
- Stability
  - Use Fast Fault Scan to determine events for study

### P2

- N-1, Single Contingency
- Steady State
  - TP submitted 230 kV and above
  - Captured in auto N-1
  - Script written to capture opening line section without fault
- Stability
  - Use Fast Fault Scan to determine events for study
  - TP submitted 230 kV and above

### P3

- G-1, N-1, Multiple Contingency
- Must use footnote 12 to have Non-consequential load loss or curtailment of Firm Transmission service
- Steady State
  - First contingent element will be a generator
  - System Adjustments are made
  - Second contingent element will be in same area as first
- Stability
  - Use Fast Fault Scan to determine events for study
  - TP submitted 230 kV and above

### P4

- N-k + stuck breaker, Multiple Contingency
- Can use Non-consequential load loss and curtailment of Firm Transmission service for HV (<300kV)
- Steady State
  - TP submitted 230 kV and above
- Stability
  - TP submitted 230 kV and above

### P5

- N-k + non-redundant relay failure, Multiple Contingency
- Can use Non-consequential load loss and curtailment of Firm Transmission service for HV (<300kV)
- Steady State
  - TP submitted 230 kV and above
- Stability

- TP submitted 230 kV and above

**P6**

- N-1-1, Multiple Contingency
  - No Generator contingencies
- Can use Non-consequential load loss and curtailment of Firm Transmission service
- Steady State
  - First contingent element will not be a generator
  - System Adjustments are made
  - Second contingent element will be in same area as first
- Stability
  - Use Fast Fault Scan to determine events for study
  - TP submitted 230 kV and above

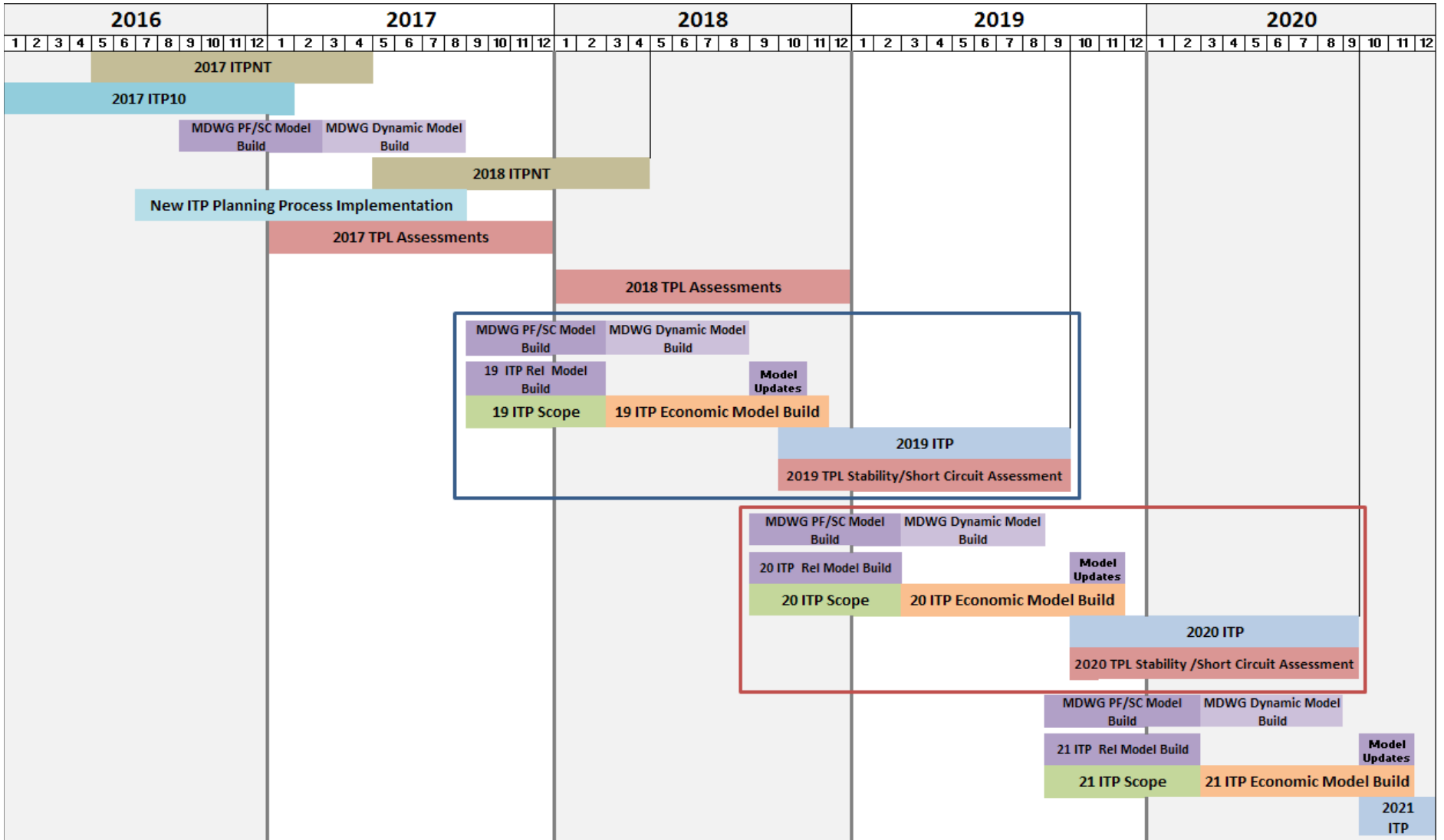
**P7**

- N-2, Multiple Contingency
  - Common Structure or loss of a bipolar DC line
- Can use Non-consequential load loss and curtailment of Firm Transmission service
- Steady State
  - TP will provide to PC
- Stability
  - TP will provide to PC

**Extreme Events**

- N-k +, Multiple Contingency
- Steady State
  - TP will provide to PC
- Stability
  - TP will provide to PC

## Appendix B: Proposed ITP Planning Process Timeline



## Appendix C: TPITF Issues List

TPITF Issue
Build time - A year to develop model is too long, and leaves only 30 days to use it
Build time - Need some models to last longer than a year to reduce burden on member staffs
Build time - Issues show up with little time to address (load/gen input issues, inconsistent assumptions between processes, etc.)
Data review - Schedule and process, especially for economic models, could use better documentation and structure
Bridge model - Need a 7-year-out model to bridge gaps between ITP-NT and ITP-10 (NT & 10 are fundamentally different models)
Seams - Study process and/or inputs hampered by lack of relationship between interregional and intraregional models
Seams - Planning models don't reflect needs on the seams
Load forecasting - Inconsistency across entities, combined with no verification mechanisms, leads to distrust
Load forecasting - Need a consistent methodology for including load forecasting in the SPP model
Load/generation - Minimize potential for gaming by having unit dispatch for models come from SPP under CBA model
Market realities - Market feedback should be reflected within model development (including generation dispatch, SCED)
Market realities - Inconsistency with how markets work, e.g., models rely on block dispatch vs. market dispatch
Market realities - Reflection of CBA dispatch needs to become more prevalent
Market realities - Inconsistencies in modeling delivery between evaluations, e.g., between studies like ITP-NT and GI
Is MOD the right tool? Other alternatives?

## TPITF Issue

Data Submittal - SPP does not get enough accurate data on the first pass; should be close by second pass

Data Submittal - Need more enforceable deadlines for meeting set submission timelines

Data Submittal - Data is coming from planners; not operations or markets

Corrections - Sometimes make the same corrections over and over (lost productivity); affects confidence in models

Corrections - Known problems such as flowgate issues don't get fixed in between models

Corrections - Are we address flowgate and other issues identified in the state-of-the-market report?

Gaps - Disconnect between SPP planning and operations results in issues making it into model (MOD-33 may fix?)

Gaps - Models inconsistent among various processes (ITP, GI, Agg, TS) and between RTOs

Gaps - Experiencing operational issues that didn't show up in planning models

Gaps - No feedback loop from member IRPs to the transmission planning model

Gaps - Reliability models in ITP-10 may not be sufficient; may need to be more similar to ITP-NT model

Gaps - Stakeholders not consistently informed of material changes in models when request window is still open

Gaps - Validation issues result from ProMod tool automatically doing 6-month public data updates; can address by notifying vendor

Automation - Members need more automation to help with their data reviews

Automation - Improve MOD tool for consistency and reduced build time

Uncertainty of and lack of validation of data in the models

Experience delays in receiving model from members

Duplication of effort due to lack of standardization of data

TPITF Issue
People don't trust the data
Disconnect between submitters and users
Notices to Construct - Lack clarity around what qualifies for NTCs
Wind - Need to improve modeling of wind farms that have interconnection but no transmission service
RCAR - Which group should address RCAR model issues?
Cycle: 18-month cycle not long enough (Board wants shorter timeframe); find efficiencies in model build to enable shorter process
Planning Horizon: ITP-NT only looks out 5 years, creating gap with ITP-10 for years 6-9
Planning Horizon: Disconnect between ITP-NT and multi-year view of flowgates depending on viewpoint of the party looking at them
Planning Horizon: No long-term planning for real-time markets; may need policy change
Quantity: Don't do enough futures and the amount is limited by rate impact concerns
Type: No sensitivities around gas/wind prices (gen build); consider doing sensitivities when doing generation build
Type: No economic assessment in the ITP-NT; add economics to ITP-NT
Type: Supply and demand build (beyond # of futures) not robust; not enough time evaluating gen and supply issues (gas prices, etc.)
Approach: SPP methodology is inconsistent in how futures are treated; impacts final design
Quality: Lack of planning beyond N-1 (less robust system); consider new TPL requirements and regional funding mechanism for compliance
Quality: Don't consider infrastructure age and condition in planning studies
Quality: Inconsistency on how non-transmission alternatives are handled can lead to sub-optimal outcomes; more options needed; policy considerations

**TPITF Issue**

Methodology: Unclear whether TCRs are accounted for in ITP process. Resource cost (no congestion) versus LMPs. Resource cost captures the TCR

Methodology: 1-year benefits-to-cost ratio may not be adequate; is 0.9 the right cutoff level?

Methodology: Generation location modeling in ITP-10 is off-base; do we need to model generation where it's going in? Incorporate the GI queue.

Methodology: No transfer analysis for in-process construction, if not specifically called for in study scope (ties back to need for more information)

Methodology Could a deliverability study count toward the 12% capacity margin requirement for CDR (capacity and demand reserve) purposes? Consider this into this.

Methodology: More consistent use of benefit metrics through the process, both year-to-year and process to process

Equitability: Scenario 5 near-term models may not be sufficient to preserve rights of long-term firm transmission. Reflective of how the system is used to preserve the LT rights? Assumes wind at 100% on-peak (not accurate). Could cause over-build of the system due to unrealistic dispatch. High-wind shoulder or off-peak case. Service: Financial vs physical firm. Developed pre-market.

Value Creation: May be missing opportunities to develop solutions that could be leveraged through off-takers outside the SPP footprint

ITPNT and ITP10 built to address different needs.

ProMod: Tool uses generic data vs. replicating what's happening in the new market

ProMod: Tool has memory limitations; need to explore better use of hardware and software supporting our planning processes

Policy: Do we need ITP-20 given we already have option of special high-priority study if we end up needing that data set?

Policy: No long-term planning for real-time markets; seeing flowgates that aren't getting fixed. Economic and Reliability screens. may need policy

Timelines: Timelines don't align across SPP ITP, MISO MTEP, and IPSAC processes

Timelines: Study duration timelines (predetermined) often do not reflect scope of work required

Timelines: Timing of ITP-10 minimizes any positive impact that may result (no flexibility)

TPITF Issue
FERC: Unclear whether NTC re-evaluation process is still appropriate given Order 1000
FERC: Order 1000 had a large impact on the amount and scope of work for the planning processes
Cycle Impact: High regulatory bar conflicts with desire to go faster
Market-to-market: Unclear how market-to-market impacts should be addressed in the planning process
Too much transmission service protection; duplication leads to overbuilding
NTCs: No mechanism to administer NTCs from TPL studies; should we fold into ITP-NT process or revise tariff to give TPL authority to administer NTCs
Efficiency: Redundancy of model/contingency sets suggest need to combine all or parts of ITP-NT, TPL and/or ITP10
Efficiency: Having to run separate AQ process creates inefficiency vs. including in ITP-NT where possible or not having TOs perform the studies
Bifurcation of planning process and NERC planning standards
Accuracy: Difficult to accurately reflect external systems with each planning process (impacts accuracy of regional results)
Completeness: No mechanism to capture/fix all seams needs to ensure comprehensive planning (East not getting appropriate benefits?)
Timeliness: Interregional planning is a two-party process, which can cause timeline issues
Timeliness: Planning processes don't align with inter-regional processes
Resource: Not enough SPP resource to expand value of long-range planning; need honest cost assessment to align budget with study expectations
Responsiveness: Projects showing up at the last minute due to a lack of foresight
Collaboration: Need fundamental principles balanced with back-end direction
Time spent on studies not used/leveraged in other processes. What's the value of the studies? Are we utilizing the results? - ERAG, EIPC, JOA, ITP2



**TPITF Issue**

Lack of Engineering Economic Analysis. Consider costs, etc. when evaluating and selecting a project(s) as a fix. Bridge to operational planning.

Misalignment of stakeholder incentives; RCAR. Plan system regionally and look at cost allocation etc. via zone.

Inefficient staff resource usage. Time not spent on the development of regional plan due to work from WGs outside of planning studies scopes.

Lack of higher-level vision for studies; reactive planning vs pro-active planning. Tactical and short-term vs long-term strategic plan.

Lack of detailed project analysis. Higher-level vs detailed project analysis. Issues: study scope, delays in the schedule (time crunch)

Projects screened out or selected based on cost estimates that may not be accurate.

Too slow to accept new realities; CBA, TPL, CPP

Assignment of costs associated with siting generation due to the location of a flowgate (mkt). Have to work around the issue.

Direction: SPP staff feels we do not have enough guidance upfront; prefer fundamental principles with back-end discretion

Milestone Reviews: Requirement that working groups review each ITP-10 milestone creates elongated process; policy changes could speed updates

Consensus: Growing difficulty to build consensus toward approval of transmission plans

Changing of expectations; mid-process

Conflicting member expectations

Responsiveness: Too many planning processes at SPP - sheer number limits speed of member inputs

Organization: Planning processes at SPP too siloed (e.g., Aggregate Studies, Generator Interconnection) - should eliminate or consolidate

Resources: Limited member staff to participate in the process (results, models, etc.)

Resources: SPP introducing software that entities don't have; as a result, they lose the ability to validate the data

**TPITF Issue**

Lack of feedback loop due to Order 1000. All projects considered competitive until deemed otherwise. Limits discussion regarding the projects until they are determined to be non-competitive.

Incentive points awarded for DPP submission creates issues. DPPs submitted just to get bonus points. 1-step vs 2-step

Flowgates: Operations and Planning coordinate on annual flowgate assessment but don't create actual solutions; consider merging with ITP-NT process adding solutions (at least enable quarterly removal of flowgates)

Generation: Expectations for generation at odds with reality, as evidenced in gaps between GI/Agg Studies and ITP (are assumptions on delivery different should they be?)

Integration: Processes don't tend to "talk" to each other – can GI and Aggregate study results be better integrated into other studies?

Process Clarity: No distinction on what you get between ERIS and NRIS

Regulatory: Unclear of impact to LTRC outcomes based on upcoming Boston Energy FERC compliance ruling (is it an issue?)

Methodology: TSS assumes all firm service is rolled over; no mechanism to verify roll-over of service in planning processes. How addressed since all modeled in perpetuity. How to consider service in the out-years. No transactions in the ITP10 but captured in the ITPNT.

## Appendix D: Glossary

<b>ARR</b>	Auction Revenue Rights
<b>BPWG</b>	Business Practice Working Group
<b>CAWG</b>	Cost Allocation Working Group
<b>CBA</b>	Consolidated Balancing Authority
<b>DPP</b>	Detailed Project Proposal
<b>ESWG</b>	Economic Studies Working Group
<b>IROL</b>	Interconnection Reliability Operating Limits
<b>ITP</b>	Integrated Transmission Planning
<b>ITP10</b>	ITP 10-Year Assessment
<b>ITP20</b>	ITP 20-Year Assessment
<b>ITPNT</b>	ITP Near-term Assessment
<b>MDWG</b>	Model Development Working Group
<b>MOPC</b>	SPP Market and Operations Policy Committee
<b>NERC</b>	North American Electric Reliability Corporation
<b>NITS</b>	Network Integration Transmission Service
<b>NTC</b>	Notifications to Construct
<b>OATT</b>	Open Access Transmission Tariff
<b>RCWG</b>	Regional Compliance Working Group
<b>RMS</b>	SPP Request Management System
<b>RR</b>	Request Revision process
<b>RSC</b>	Regional State Committee
<b>RTWG</b>	Regional Tariff Working Group
<b>SPC</b>	SPP Strategic Planning Committee
<b>SSC</b>	Seams Steering Committee
<b>TCR</b>	Transmission Congestion Rights
<b>TWG</b>	Transmission Working Group

## Staff/Stakeholder Accountability

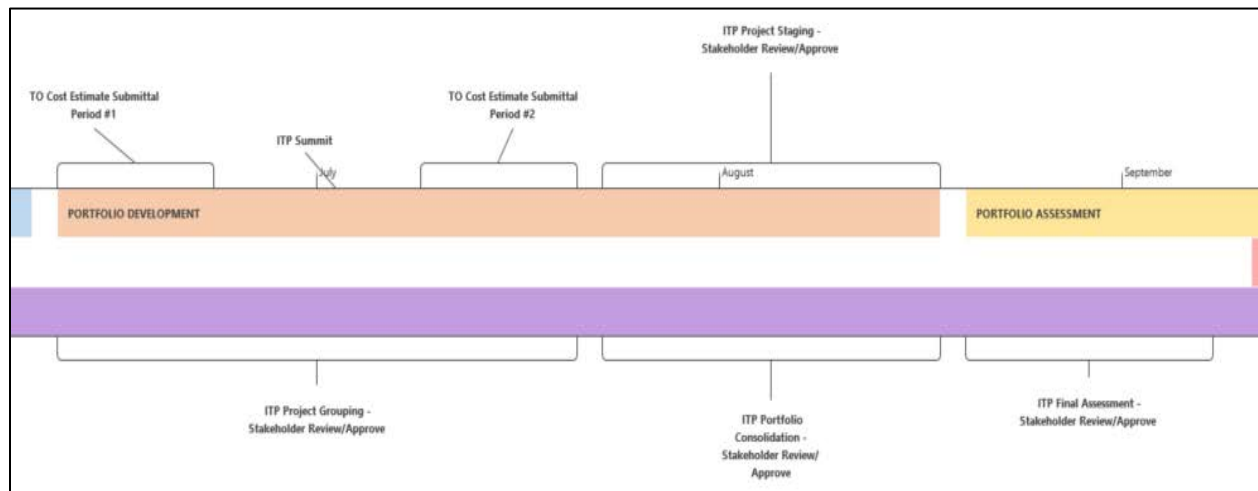
SPP Stakeholders and Staff will introduce steps to focus on accountability for timelines and milestones that consist of mechanisms designed to promote the timely exchanges of data, reviews, and approvals within the transmission planning process.

### Project Schedule

SPP Staff will develop a project schedule in parallel with the development of the scope of each successive study. This schedule will identify the timing, duration, and responsible parties for all data exchanges, reviews, and approvals required to complete the ITP study process. Staff will coordinate with Stakeholders in the development of this schedule and formally vet the final schedule with Stakeholders upon the completion of the study scope.

This schedule will be maintained by SPP Staff and regularly reviewed at appropriate stakeholder meetings to keep affected parties informed of upcoming milestones to assist with the timely completion of the planning process.

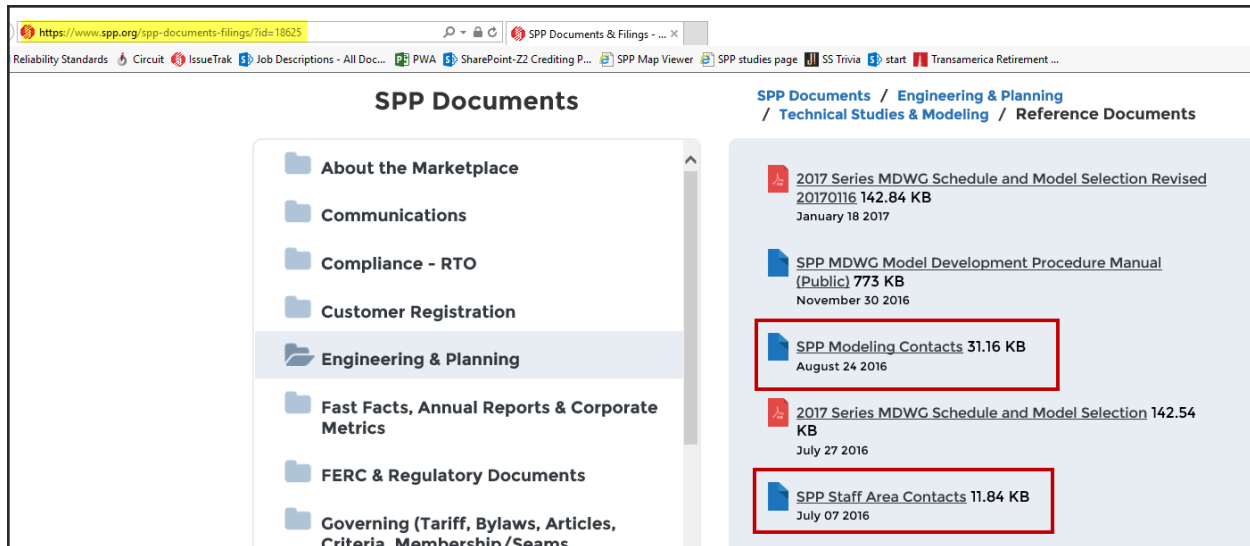
<b>PORTFOLIO DEVELOPMENT</b>	<b>50 days</b>	<b>Mon 6/11/18</b>	<b>Fri 8/17/18</b>
ITP Project Cost Estimates	30 days	Mon 6/11/18	Fri 7/20/18
ITP Project Grouping - Stakeholder Review/Approve	30 days	Mon 6/11/18	Fri 7/20/18
ITP Portfolio Consolidation - Stakeholder Review/Approve	20 days	Mon 7/23/18	Fri 8/17/18
ITP Project Staging - Stakeholder Review/Approve	20 days	Mon 7/23/18	Fri 8/17/18
<b>PORTFOLIO ASSESSMENT</b>	<b>25 days</b>	<b>Mon 7/16/18</b>	<b>Fri 8/17/18</b>



### Point of Contact

Each member company will identify a central point of contact (CPOC) for their company who will be responsible for coordinating the submission of all data required to support the modeling and planning processes. TPITF discussions centered on the use of a CPOC to help increase the coordination and timely delivery of required information necessary to meet scheduled milestones.

The SPP Modeling department currently lists Modeling and Staff Area contacts on SPP's corporate website (below). SPP Staff CPOCs for the ITP study process will be determined during the development of the study scope and published on the *Transmission Planning* page of the website. The list of Stakeholder CPOCs will be maintained internally by Staff.



## Data Submission, Reviews/Approvals, and Mitigation

Applicable SPP working groups and Staff will agree upon proxy data to be used in the absence of newly submitted data to meet schedule deadlines and avoid process delays. Along with the timely submittal of data, it is a process expectation that data reviews and required approvals will be conducted by the associated schedule deadlines. The failure of a Stakeholder to properly and timely perform the required review should not cause a delay in the corresponding process. In the event that review deadlines are missed, the items requiring review or approval will be assumed to be appropriate and the process will move forward without delay.

Any entity that does not meet the prescribed data exchange, review, or approval deadlines and/or wants to add or change data used in the study process may make a request for a waiver of the deadline to the MOPC. SPP Staff will provide the MOPC with the project schedule impacts, schedule mitigation plans, and an estimate of any costs associated with accommodating the waiver to support the MOPC decision making process. The approval of the MOPC will be required to make any adjustments to the process schedule or incur additional financial costs associated with process mitigation.

*There has been discussion about Staff performing their own impact assessment to determine if the lack of data or action would be material to the process. Using engineering judgement, Staff would make this determine and share it with the stakeholder and/or appropriate working group. For data, Staff may look to set parameters around what might be considered material. For instance +/- 1.5% on load growth. If a stakeholder has a late load growth submission of 1%, it would automatically be disqualified and passed into the next model build. If the load growth comes in at 2% (outside of bandwidth), staff would use judgement to determine the impact. For example, if it's in northwest North Dakota, there may not be an impact like it would be if it was the OK city area.*

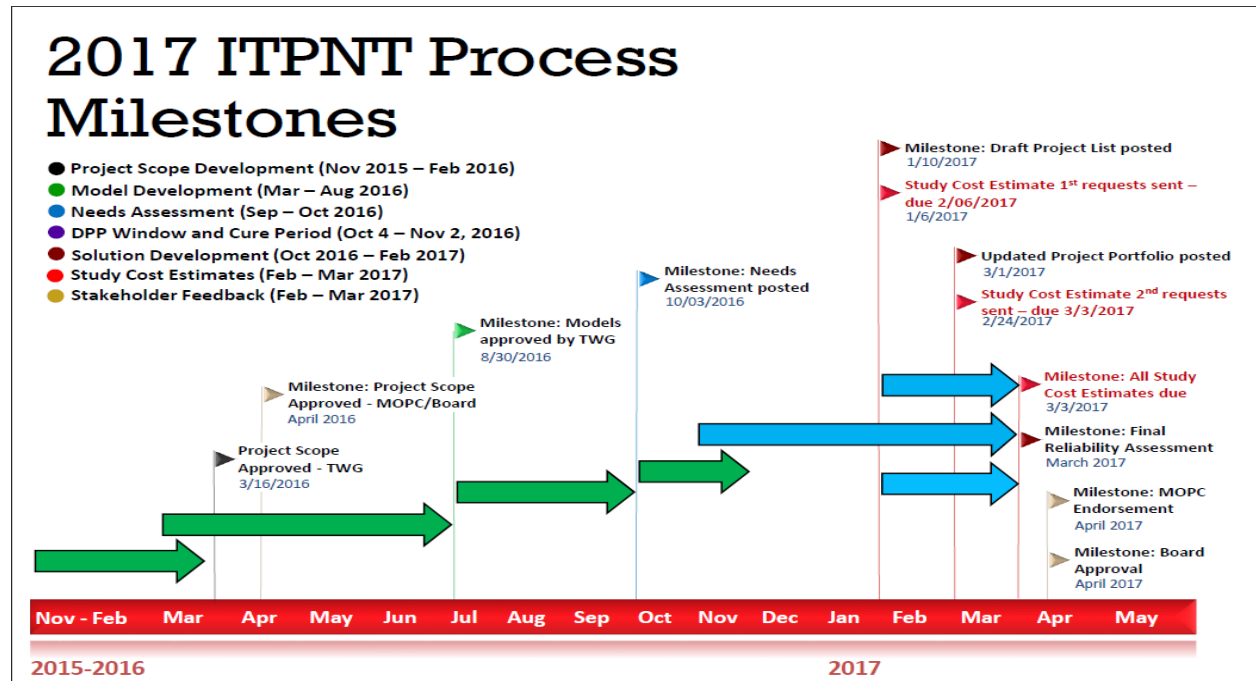
*This level of detail would not be included in the document, rather under the corresponding item in the Standardized Scope.*

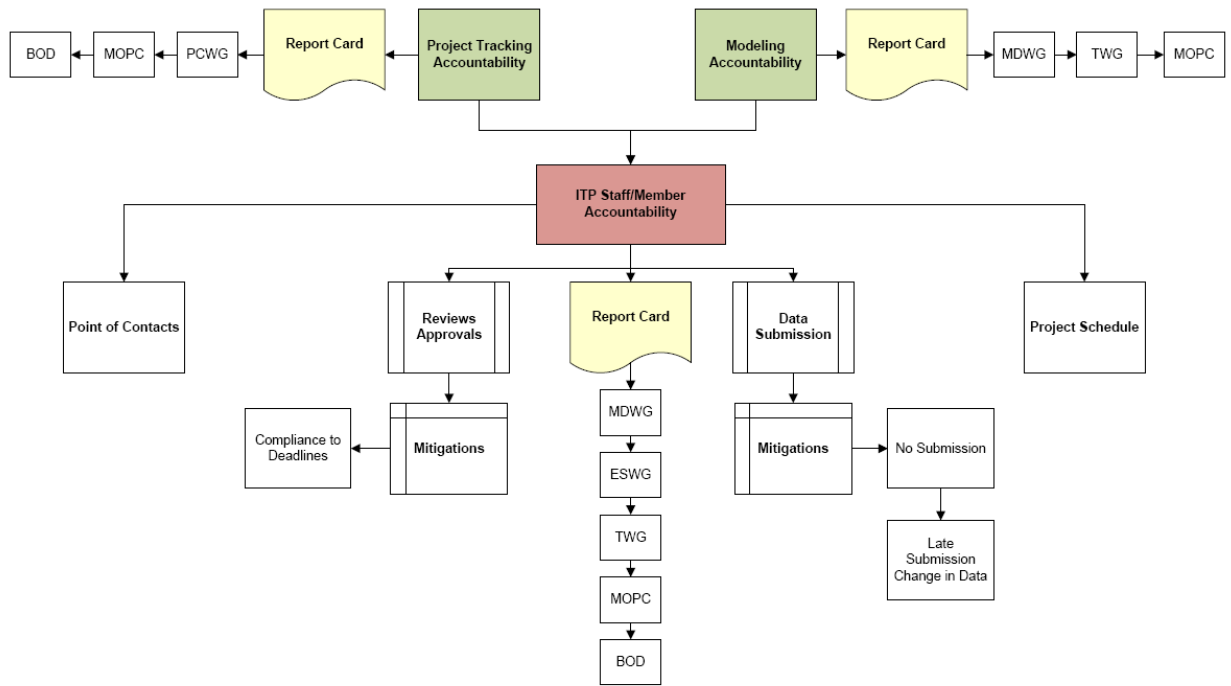
## MOPC Report

SPP Staff will provide a quarterly report to the MOPC highlighting the process milestones from the preceding quarter. Updates will be given on adherence to milestone timelines in regards to data review and submittal, scheduled reviews and approvals, and on issues that may have required mitigation for the process to remain on schedule.

A summary of the participation of Stakeholders and Staff will inform MOPC of the attention and importance placed on the successful completion of milestones and adherence to deadlines critical to

producing a complete, high-quality, and timely report and portfolio. Issues requiring mitigation, as mentioned above, whether through the actions of Staff or Stakeholders will be presented in sufficient detail to give the MOPC a clear picture of the issue and remedies put in place to avoid potential impacts to the process schedule.





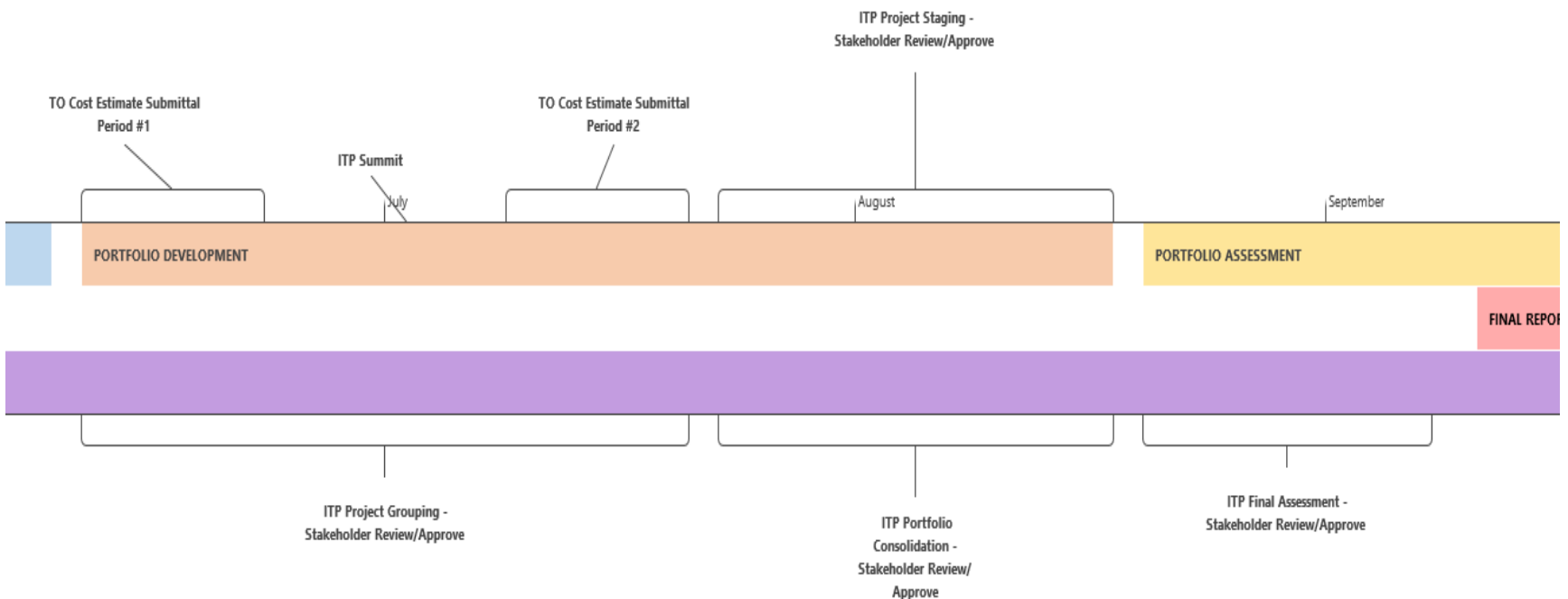
# Staff/Stakeholder Accountability

English Cook – SPP Engineering Support Services



# Project Schedule

- Vetted and approved study schedule
- Regular review with stakeholders
- Break out milestones requiring stakeholder review and approval



# Single Point of Contact

- SPP Staff contacts per group/project
- Stakeholder
  - Coordination and timely delivery of required information
  - Liaison for company

The screenshot shows a web browser window with the URL <https://www.spp.org/spp-documents-filings/?id=18625>. The page title is "SPP Documents" and the breadcrumb navigation is "SPP Documents / Engineering & Planning / Technical Studies & Modeling / Reference Documents".

The left sidebar contains a navigation menu with the following items:

- About the Marketplace
- Communications
- Compliance - RTO
- Customer Registration
- Engineering & Planning**
- Fast Facts, Annual Reports & Corporate Metrics
- FERC & Regulatory Documents
- Governing (Tariff, Bylaws, Articles, Criteria, Membership/Seams)

The main content area displays a list of documents:

- [2017 Series MDWG Schedule and Model Selection Revised 20170116](#) 142.84 KB  
January 18 2017
- [SPP MDWG Model Development Procedure Manual \(Public\)](#) 773 KB  
November 30 2016
- [SPP Modeling Contacts](#) 31.16 KB  
August 24 2016
- [2017 Series MDWG Schedule and Model Selection](#) 142.54 KB  
July 27 2016
- [SPP Staff Area Contacts](#) 11.84 KB  
July 07 2016

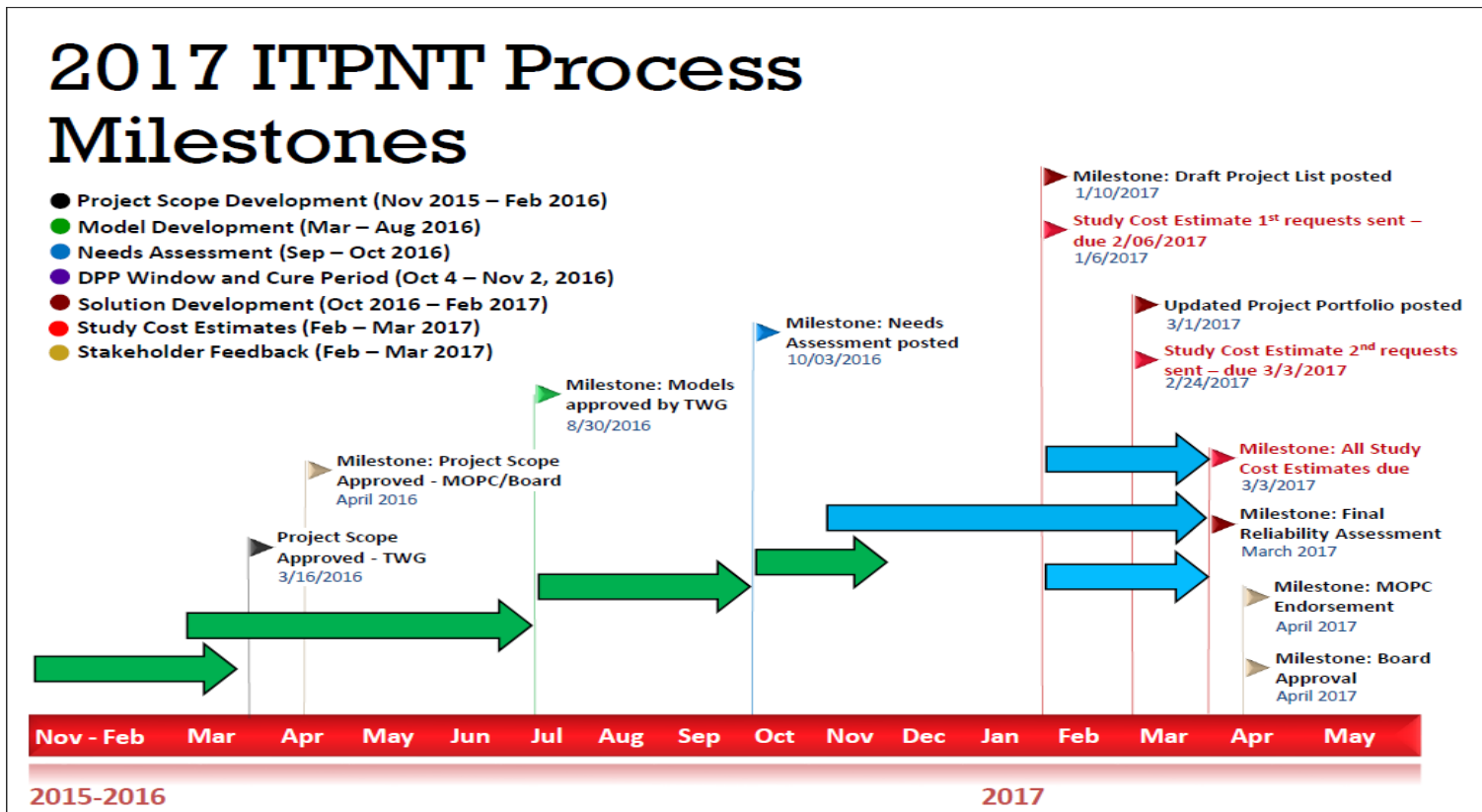
The documents "SPP Modeling Contacts" and "SPP Staff Area Contacts" are highlighted with red rectangular boxes.

# Waiver Process

- Stakeholder-vetted approach on proxy data
- Waiver request to MOPC
  - Post deadline for data/information submission
- SPP Staff
  - Project schedule impacts
  - Schedule mitigation plans
  - Estimate of any costs associated with accommodating the waiver

# MOPC Report

- Included in MOPC update presentation
  - Adherence to milestone timelines
  - Issues requiring mitigation





HELPING OUR MEMBERS WORK TOGETHER  
TO KEEP THE LIGHTS ON... TODAY AND IN THE FUTURE.

# Scope Standardization – Modeling Firm Service in the Light Load Season

Michael Odom

# Background

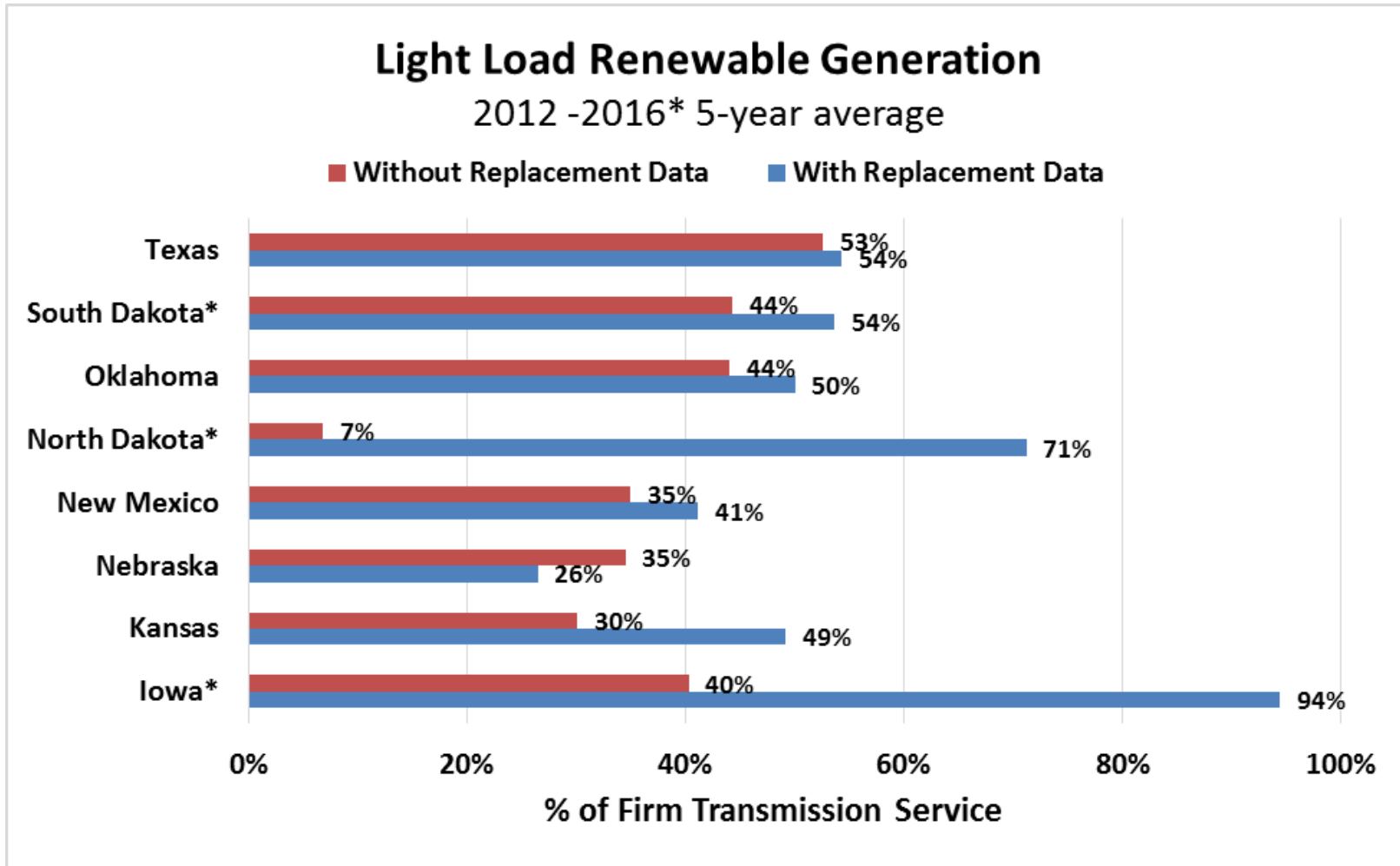
- Base Reliability model based on expected conventional and renewable resource output levels
- TPITF approved a Summer peak 5-year average
- TWG approved a Winter peak 5-year average similar to the Summer peak 5-year average
- TWG approved use of state average replacement data
- Light load model renewable modeling method still outstanding

# Base Reliability Renewable Dispatch

- Light Load
  - Renewable resource output will be dispatched at 100% firm transmission service
- Summer Peak
  - Renewable resource output with firm service will be modeled in the summer peak base reliability scenario model at each facility's latest 5-year average for the SPP coincident summer peak, not to exceed each facility's firm service
- Winter Peak
  - Renewable resource output with firm service will be modeled in the winter peak base scenario model at each facility's latest 5-year average for the SPP coincident winter peak, not to exceed each facility's firm service



# Light Load 5-year average



2018 MDWG				
Year	Season	Power Flow Model	Dynamic Model	Short Circuit Model
2018	Spring	X		
2018	Summer	X		X
2018	Summer Shoulder	X		
2018	Fall	X		
2018	Winter	X		
2019	Light Load	X	X	
2019	Spring	X	X	
2019	Summer	X	X	X
2019	Fall	X		
2019	Winter	X	X	
2020	Light Load	X		
2020	Spring	X		
2020	Summer	X	X	
2020	Fall	C		
2020	Winter	X		
2021	Annual for Future 1			
2021	Spring			
2021	Light Load	C	C	
2021	Summer	C	C	C
2021	Winter	C		
2022	Summer (Topology Only)			
2023	Light Load	X	X	
2023	Summer	X	X	X
2023	Summer Shoulder	X		
2023	Winter	X	X	
2024	Annual for Future 1			
2024	Annual for Future 2			
2024	Summer	C		
2024	Winter	C		
2024	Light Load	C		
2028	Light Load			
2028	Summer	X	X	
2028	Winter	X	X	
2029	Annual for Future 1			
2029	Annual for Future 2			
2029	Summer	C	C	
2029	Winter	C		
2029	Light Load	C		

MDWG: Model Development Working Group  
ERAG MMWG: Eastern Interconnection Reliability Assessment Group  
Multiregional Modeling Working Group

X = MMWG

\*MMWG 2017 Series is based off of 2016 Series rolled up by 1 year

PSS/E Version 33.7  
MOD Version 8.1.0.1

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		<b>2019 ITP Powerflow &amp; 2018 MDWG Model Series (Powerflow, Short Circuit, Dynamics) - PSS/E 33.7 - MOD 8.1.0.1</b>	<b>313 days</b>	<b>Mon 6/26/17</b>	<b>Wed 9/5/18</b>		
2		June - Staff/Member Conference Call	1 day	Mon 6/26/17	Mon 6/26/17		
3		July (Pass 0)	19 days	Wed 7/5/17	Mon 7/31/17		
4		Pass 0 - Member and SPP Staff reconciliation/collaboration of Area Summary workbook	14 days	Wed 7/5/17	Mon 7/24/17		
5		Pass 0 - Member Area Summary Workbooks due	0 days	Mon 7/24/17	Mon 7/24/17	4	
6		Pass 0 - Staff/Member Conference Call	1 day	Fri 7/14/17	Fri 7/14/17		
7		Pass 0 - SPP Staff compile Area Summary workbooks	5 days	Tue 7/25/17	Mon 7/31/17	4	
8		Pass 0 - Topology Model (unsolved) & Member Area Summary workbook posted	0 days	Mon 7/31/17	Mon 7/31/17	7	
9		<b>2019 ITP &amp; 2018 MDWG Powerflow/Short Circuit Models</b>	<b>148 days</b>	<b>Tue 8/1/17</b>	<b>Thu 2/22/18</b>		
10		Pass 1	25 days	Tue 8/1/17	Mon 9/4/17		
11		Pass 1 - Member Review Pass 0 Powerflow Model/Powerflow & Short Circuit Data submission	10 days	Tue 8/1/17	Mon 8/14/17	8	
12		Pass 1 - Member Area Summary Workbooks due	0 days	Mon 8/14/17	Mon 8/14/17	11	
13		Pass 1 - SPP Staff/Member Conference Call	1 day	Fri 8/4/17	Fri 8/4/17		
14		Pass 1 - Lock Down MOD	15 days	Tue 8/15/17	Mon 9/4/17	11	
15		Pass 1 - SPP Staff Review of Member Data Submissions	10 days	Tue 8/15/17	Mon 8/28/17	11	
16		Pass 1 - SPP Staff Builds Pass 1 Powerflow Models (Merge with MMWG Current or Prior year)	5 days	Tue 8/29/17	Mon 9/4/17	15	
17		Pass 1 - SPP Staff Posts Pass 1 Powerflow Models/Docucheck Corrections Needs Workbook	0 days	Mon 9/4/17	Mon 9/4/17	16	
18		Pass 2	22 days	Tue 9/5/17	Wed 10/4/17		
19		Pass 2 - Member Review Pass 1 Powerflow Models/Powerflow & Short Circuit Data submission	12 days	Tue 9/5/17	Wed 9/20/17	17	
20		Pass 2 - Member Area Summary Workbooks due	0 days	Wed 9/20/17	Wed 9/20/17	19	
21		Pass 2 - Model Update Meeting	3 days	Tue 9/12/17	Thu 9/14/17		
22		Pass 2 - Lock Down MOD	10 days	Thu 9/21/17	Wed 10/4/17	19	
23		Pass 2 - SPP Staff Review of Member Data Submissions	5 days	Thu 9/21/17	Wed 9/27/17	19	
24		Pass 2 - SPP Staff Builds Pass 2 Powerflow Models	5 days	Thu 9/28/17	Wed 10/4/17	23	
25		Pass 2 - SPP Staff Posts Pass 2 Powerflow Models/Docucheck Corrections Needs Workbook	0 days	Wed 10/4/17	Wed 10/4/17	24	
26		Pass 3 (Loads & Interchange Locked Down)	30 days	Thu 10/5/17	Wed 11/15/17		
27		Pass 3 - Member Review Pass 2 Powerflow Models/Powerflow & Short Circuit Data submission	10 days	Thu 10/5/17	Wed 10/18/17	25	
28		Pass 3 - Member Area Summary Workbooks due	0 days	Wed 10/18/17	Wed 10/18/17	27	
29		Pass 3 - SPP Staff/Member Conference Call	1 day	Fri 10/13/17	Fri 10/13/17		
30		Pass 3 - Lock Down MOD	20 days	Thu 10/19/17	Wed 11/15/17	27	
31		Pass 3 - SPP Staff Review of Member Data Submissions	10 days	Thu 10/19/17	Wed 11/1/17	27	
32		Pass 3 - SPP Staff Builds Pass 3 Powerflow Models	10 days	Thu 11/2/17	Wed 11/15/17	31	
33		Pass 3 - SPP Staff Posts Pass 3 Powerflow Models/Docucheck Corrections Needs Workbook	0 days	Wed 11/15/17	Wed 11/15/17	32	
34		Pass 4	41 days	Thu 11/16/17	Thu 1/11/18		
35		Pass 4 - Member Review Pass 3 Powerflow Models/Powerflow & Short Circuit Data submission	16 days	Thu 11/16/17	Thu 12/7/17	33	
36		Pass 4 - SPP Staff/Member Conference Call	1 day	Fri 12/1/17	Fri 12/1/17		
37		Pass 4 - Lock Down MOD	25 days	Fri 12/8/17	Thu 1/11/18	35	
38		Pass 4 - SPP Staff Review of Member Data Submissions	15 days	Fri 12/8/17	Thu 12/28/17	35	
39		Pass 4 - SPP Staff Builds Pass 4 Powerflow Models	10 days	Fri 12/29/17	Thu 1/11/18	38	
40		Pass 4 - SPP Staff Posts Pass 4 Powerflow Models/Docucheck Corrections Needs Workbook	0 days	Thu 1/11/18	Thu 1/11/18	39	
41		Pass 5	30 days	Fri 1/12/18	Thu 2/22/18		
42		Pass 5 - Member Review Pass 4 Powerflow Models/Powerflow & Short Circuit Data submission	10 days	Fri 1/12/18	Thu 1/25/18	40	
43		Pass 5 - SPP Staff/Member Conference Call	1 day	Fri 1/19/18	Fri 1/19/18		
44		Pass 5 - Lock Down MOD	10 days	Fri 1/26/18	Thu 2/8/18	42	
45		Pass 5 - SPP Staff Review of Member Data Submissions	10 days	Fri 1/26/18	Thu 2/8/18	42	
46		Pass 5 - SPP Staff Builds Pass 5 Powerflow Models	10 days	Fri 2/9/18	Thu 2/22/18	45	
47		Pass 5 - SPP Staff Posts Pass 5 (Final) Powerflow Models/Docucheck Corrections Needs Workbook	0 days	Thu 2/22/18	Thu 2/22/18	46	
48		<b>2018 MDWG Short Circuit Models</b>	<b>129 days</b>	<b>Tue 9/5/17</b>	<b>Fri 3/2/18</b>		
49		Pass 1	27 days	Tue 9/5/17	Wed 10/11/17		
50		Pass 1 - SPP Staff Builds Pass 1 Short Circuit Models	27 days	Tue 9/5/17	Wed 10/11/17	17	
51		Pass 1 - SPP Staff Posts Pass 1 Short Circuit Models/Docucheck Corrections Needs Workbook	0 days	Wed 10/11/17	Wed 10/11/17	50	
52		Pass 2	27 days	Thu 10/12/17	Fri 11/17/17		
53		Pass 2 - SPP Staff Builds Pass 2 Short Circuit Models	27 days	Thu 10/12/17	Fri 11/17/17	51	
54		Pass 2 - SPP Staff Posts Pass 2 Short Circuit Models/Docucheck Corrections Needs Workbook	0 days	Fri 11/17/17	Fri 11/17/17	53	
55		Pass 3	45 days	Mon 11/20/17	Fri 1/19/18		
56		Pass 3 - SPP Staff Builds Pass 3 Short Circuit Models	45 days	Mon 11/20/17	Fri 1/19/18	54	
57		Pass 3 - SPP Staff Posts Pass 3 Short Circuit Models/Docucheck Corrections Needs Workbook	0 days	Fri 1/19/18	Fri 1/19/18	56	
58		Pass 4 - Final	30 days	Mon 1/22/18	Fri 3/2/18		
59		Pass 4 - SPP Staff Builds Pass 4 Short Circuit Models	30 days	Mon 1/22/18	Fri 3/2/18	57	
60		Pass 4 - SPP Staff Posts Pass 4 (Final) Short Circuit Models/Docucheck Corrections Needs Workbook	0 days	Fri 3/2/18	Fri 3/2/18	59	
61		<b>2019 ITP &amp; 2018 MDWG Powerflow Finalization</b>	<b>5 days</b>	<b>Fri 2/23/18</b>	<b>Thu 3/1/18</b>		
62		Final	5 days	Fri 2/23/18	Thu 3/1/18		
63		Members Review for Finalization of 2019 ITP & 2018 Series MDWG Powerflow Models	5 days	Fri 2/23/18	Thu 3/1/18	47	
64		Finalization - Conference Call Vote	0 days	Thu 3/1/18	Thu 3/1/18	63	
65		<b>2018 MDWG Short Circuit Finalization</b>	<b>5 days</b>	<b>Mon 3/5/18</b>	<b>Fri 3/9/18</b>		

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
66		<b>Final</b>	<b>5 days</b>	<b>Mon 3/5/18</b>	<b>Fri 3/9/18</b>		
67		<b>Members Review for Finalization of 2018 Series MDWG Short Circuit Models</b>	5 days	Mon 3/5/18	Fri 3/9/18	60	
68		<b>Finalization - Conference Call Vote</b>	0 days	Fri 3/9/18	Fri 3/9/18	67	
69		<b>2018 MDWG DYNAMICS MODELS</b>	<b>169 days</b>	<b>Fri 1/12/18</b>	<b>Wed 9/5/18</b>		
70		<b>MMWG 2017 Series Dynamic Models</b>	<b>1 day</b>	<b>Fri 1/12/18</b>	<b>Fri 1/12/18</b>		
71		Receive ERAG MMWG SDDB (Dynamics Database)	1 day	Fri 1/12/18	Fri 1/12/18		
72		<b>Initial Data Update</b>	<b>40 days</b>	<b>Mon 1/15/18</b>	<b>Fri 3/9/18</b>		
73		<b>Initial Data Update - Build and Post DYRE Files, Wind Farm Data, and Docureport</b>	<b>2 days</b>	<b>Mon 1/15/18</b>	<b>Tue 1/16/18</b>		
74		Initial Data Update - Build and Post DYRE Files, Wind Farm Data, and Docureport	2 days	Mon 1/15/18	Tue 1/16/18		
75		<b>Initial Data Update - Members Submit Data Updates</b>	<b>38 days</b>	<b>Wed 1/17/18</b>	<b>Fri 3/9/18</b>	<b>74</b>	
76		<b>Initial Data Update - Member Data Due</b>	<b>0 days</b>	<b>Fri 3/9/18</b>	<b>Fri 3/9/18</b>	<b>75</b>	
77		<b>Powerflow Adjustments</b>	<b>20 days</b>	<b>Fri 3/2/18</b>	<b>Thu 3/29/18</b>		
78		Powerflow Updates	10 days	Fri 3/2/18	Thu 3/15/18	64	
79		Wind Farm Topology and GI Updates	10 days	Fri 3/16/18	Thu 3/29/18	78	
80		<b>Dynamic Case Adjustments</b>	<b>37 days</b>	<b>Fri 3/16/18</b>	<b>Mon 5/7/18</b>		
81		Update SDDB (ERAG/MMWG Dynamic Database)	4 days	Fri 3/16/18	Wed 3/21/18	78	
82		Duplicate Models	2 days	Thu 3/22/18	Fri 3/23/18	81	
83		Generator Data Checks	2 days	Mon 3/26/18	Tue 3/27/18	82	
84		SDDB Governor Limits and Small Time Constant Reset	2 days	Wed 3/28/18	Thu 3/29/18	83	
85		WMOD/Generic WTG Checks	2 days	Fri 3/30/18	Mon 4/2/18	84	
86		CONL & GNET Files Updates	4 days	Tue 4/3/18	Fri 4/6/18	85	
87		Post Member Feedback for Dynamic Data & Case Issues	1 day	Mon 4/9/18	Mon 4/9/18	86	
88		<b>Members Submit Data Updates</b>	<b>15 days</b>	<b>Tue 4/10/18</b>	<b>Mon 4/30/18</b>	<b>87</b>	
89		<b>Member Data Due</b>	<b>0 days</b>	<b>Mon 4/30/18</b>	<b>Mon 4/30/18</b>	<b>88</b>	
90		Process SPP Member Updates	5 days	Tue 5/1/18	Mon 5/7/18	89	
91		<b>Dynamic Case Initialization</b>	<b>15 days</b>	<b>Tue 5/8/18</b>	<b>Mon 5/28/18</b>		
92		Case & Dyre File Corrections based on Initialization Messages	15 days	Tue 5/8/18	Mon 5/28/18	90	
93		<b>Build Final Models</b>	<b>35 days</b>	<b>Tue 5/29/18</b>	<b>Mon 7/16/18</b>		
94		20 Second No-fault Test & Case Adjustment	10 days	Tue 5/29/18	Mon 6/11/18	92	
95		60 Second Ring-Down Test & Case Adjustment	10 days	Tue 6/12/18	Mon 6/25/18	94	
96		NERC B&C Faults Test & Case Adjustment	5 days	Tue 6/26/18	Mon 7/2/18	95	
97		Dynamic Case Reduction	10 days	Tue 7/3/18	Mon 7/16/18	96	
98		<b>Dynamic Case Review and Finalization</b>	<b>37 days</b>	<b>Tue 7/17/18</b>	<b>Wed 9/5/18</b>		
99		Post Initial Models	5 days	Tue 7/17/18	Mon 7/23/18	97	
100		<b>Member Review of Initial Models</b>	<b>10 days</b>	<b>Tue 7/24/18</b>	<b>Mon 8/6/18</b>	<b>99</b>	
101		<b>Member Data Due</b>	<b>0 days</b>	<b>Mon 8/6/18</b>	<b>Mon 8/6/18</b>	<b>100</b>	
102		Final Data Update - Build Final Models	10 days	Tue 8/7/18	Mon 8/20/18	101	
103		Post Final Models	1 day	Tue 8/21/18	Tue 8/21/18	102	
104		<b>Member Review for Finalization of Dynamic Models</b>	<b>10 days</b>	<b>Wed 8/22/18</b>	<b>Tue 9/4/18</b>	<b>103</b>	
105		<b>Finalization - Conference Call Vote</b>	<b>1 day</b>	<b>Wed 9/5/18</b>	<b>Wed 9/5/18</b>	<b>104</b>	