



**Southwest Power Pool  
MODEL DEVELOPMENT WORKING GROUP**

**September 8, 2010**

**9:00 a.m. – 11:30 a.m.**

**Conference Call**

**• M I N U T E S •**

**Agenda Item 1 - Administrative**

The meeting was called to order at 9:05 a.m. The following Model Development Working Group (MDWG) members were in attendance:

Scott Rainbolt, Chair – American Electric Power (AEP)  
Joe Fultz, Vice Chair – Grand River Dam Authority (GRDA)  
Reené Miranda – Southwestern Public Service (SPS)  
Dustin Betz – Nebraska Public Power District (NPPD)  
Mo Awad – Westar Energy (WR)  
Nate Morris – Empire District Electric (EDE)  
Mike Clifton – Oklahoma Gas & Electric (OGE)  
Scott Schichtl – Arkansas Electric Cooperative (AECC)  
Nathan McNeil – Midwest Energy (MIDW)  
Jason Shook – GDS Associates (GDS)

SPP Staff in attendance included Anthony Cook (Secretary), Doug Bowman, Kelsey Allen, Scott Jordan, John Snyder, Bob Lux, Mitch Jackson, and Patrick DeLassus.

The following guests were also in attendance:

Liam Stringham – Sunflower Electric Power Corporation (SEPC)  
Moses Harris – Arkansas Electric Cooperative (AECC)  
Loyd Kolb – Golden Spread Electric Cooperative (GSEC)  
Syed Ahmad – Federal Energy Regulatory Commission (FERC)  
Kristen Rodriguez – Wind Coalition

*Meeting Agenda*

The agenda was reviewed by the group. Reené Miranda motioned to approve the agenda as is; Scott Schichtl seconded the motion. The motion passed unopposed (**Attachment 1 - MDWG Agenda 20100908.doc**).

*Meeting Minutes*

Scott Schichtl motioned to approve the August 5-6, 2010 meeting minutes; Mo Awad seconded the motion. The motion passed unopposed (**Attachment 2 - MDWG Minutes 20100805.doc**).

## **Agenda Item 2 – Review of Past Action Items**

Anthony Cook reviewed action items that are currently in progress or have been completed since the August 5, 2010 meeting. Anthony opened discussion about item #1 with data that was provided by SPP Operations on summer peak loading for 2007 to present in the form of average and absolute values. When dividing the average value by the absolute value, the ranges were 75% to 85%. The MDWG procedure manual states that the on-peak average model, or shoulder, is 85% of the total seasonal peak load level; however, the MMWG procedure manual defines summer shoulder as 70% to 80% of the summer peak load. The members wish to use a range of 70% to 85% and will report to SPP the percentage used in the model. The members asked SPP staff to investigate the origin and intended principle behind the 85% requirement and to provide a derivation of this value.

For Item #2, the members asked for the Compliance and Participation worksheet to include dynamics in the future.

Doug Bowman discussed his investigation into Item #45 and revealed that the MDWG procedure manual requires SPP to perform an AC Contingency Analysis on the posted final current year and the farthest out summer peak models; however, it is silent concerning which are final models, Build 1 or Build 2. The group decided that N-1 analysis will be required on Build 1 for informational purposes and Build 2 for mitigation requirements.

Scott Jordan discussed Item # 48 regarding dynamics models and our contract with Powertech Labs Inc. (PLI). He stated that there is a base price for the first model and an incremental amount for each additional model. These amounts were divulged to the group. If additional models are requested subsequent to budget approval, an out-of-budget approval will be required.

**Action Item:** Investigate the origin and intended principle behind the 85% requirement and to provide a derivation of this value. (SPP Staff)

## **Agenda Item 3 – 2011 Series Schedule:**

### *Powerflow*

Reené Miranda and Kelsey Allen made minor changes to the task descriptions. Reené asked which models, Build 1 or Build 2, are considered the final models. Mo Awad stated that it depends on the time of year since the Build 1 models are considered the final models for many of the processes that use the MDWG models as the starting cases and the Build 2 models are considered the last set for a specific series. SPP agreed with Mo's statement.

#### **Agenda Item 4 – 2011 Series Model Set:**

##### *Dynamics*

The group decided that the MDWG 2010 series dynamics model set should be increased by 1 year, as done with the 2011 series powerflow model set. Mo Awad motioned to increase the 2010 series MDWG dynamic model set by 1 year for the MDWG 2011 series dynamic model set. Scott Schichtl seconded the motion. The motion passed unopposed.

**(Attachment 3 - MDWG 2011 Series Model Set\_Approved.xls)**

##### *Short Circuit*

The members were given action item # 49 to determine their company needs for Short Circuit models. Mo Awad stated that Westar requires present year summer while several others also expressed interest in a 5 year model. Reené Miranda asked if these models will be classical models, to which Doug Bowman affirmed that they will be. Discussion ensued concerning the possibilities of building short circuit models for each powerflow model. Reené asked if a short circuit model was really necessary for every seasonal model. Nate Morris and Scott Schichtl stated that summer peak should be sufficient since the highest current flows occur during this time. The group decided that a summer short circuit model should be built for every summer powerflow model.

#### **Agenda Item 5 – MOD:**

Kelsey Allen briefly discussed posting a preliminary matrix that redefines the type, status, and description of projects to attain increased granularity and align with the new Attachment O Tariff language. Kelsey also mentioned having a MOD training net conference for those that would like a refresher course.

#### **Agenda Item 6 – Model Improvement Task Force (MITF):**

Kelsey Allen presented the suggested, member submitted, changes to the white paper. Upon reviewing all of the changes and discussing them, Mike Clifton motioned to accept the Model Improvement Task Force White Paper with the suggested changes. Scott Schichtl seconded the motion. The motion passed unopposed.

**(Attachment 4 – Model Improvement White Paper\_MDWG Approved.doc)**

#### **Agenda Item 11 - Closing Administrative Duties:**

##### *Next Meetings:*

- Conference call will be held after the TWG discusses the MITF White Paper.
- Model Update Meeting will be held the first week of December. Dates will be decided in the above conference call.

##### *Upcoming Meetings/Topics:*

Standard for stability load data



MOD matrix  
MITF white paper  
December Modeling meeting

*Summary of New Action Items*

1. Investigate the origin of summer shoulder value being 85% of summer peak load for MDWG models and provide a derivation of the 85%. (SPP Staff)

**(Attachment 5 - SPP MDWG Action Items 20100908.xls)**

*Adjourn Meeting*

Scott Schichtl motioned to adjourn the meeting; Reené Miranda seconded the motion. With no further business to discuss, the MDWG meeting was adjourned at 12:00 p.m.

Respectfully submitted,  
Anthony Cook  
SPP Staff Secretary



**Southwest Power Pool  
MODEL DEVELOPMENT WORKING GROUP  
September 8, 2010  
Conference Call  
9:00 A.M. – 11:30 A.M.**

**• D R A F T   A G E N D A   •**

- 1. Administrative .....Scott Rainbolt
  - a. Call to order
  - b. Proxies
  - c. Approve agenda
  - d. Approve minutes of previous meetings
    - i. August 5-6, 2010
  
- 2. Review of Past Action Items..... Anthony Cook
  
- 3. 2011 Series Schedule ..... All
  - a. Power Flow
  - b. Dynamic
  - c. Short Circuit
  
- 4. 2011 Series Model Set ..... All
  - a. Dynamic
  - b. Short Circuit
  
- 5. MOD ..... Kelsey Allen
  - a. Matrix
  - b. Training/Refresher Net Conference
  
- 6. Model Improvement Task Force..... Kelsey Allen
  - a. White Paper Comments
  - b. Proposed White Paper Changes
  
- 7. Other ..... All
  
- 8. Closing Administrative Duties.....Scott Rainbolt
  - a. Next meeting place and date
  - b. Next meeting topics
  - c. Review of Action Items
  - d. Adjourn meeting



**Southwest Power Pool  
MODEL DEVELOPMENT WORKING GROUP**

**August 5-6, 2010**

**Doubletree Hotel – Overland Park, KS**

**• M I N U T E S •**

*Thursday 1:00 p.m.*

**Agenda Item 1 - Administrative**

The meeting was called to order at 1:00 p.m. The following Model Development Working Group (MDWG) members were in attendance:

Scott Rainbolt, Chair – American Electric Power (AEP)  
Joe Fultz, Vice Chair – Grand River Dam Authority (GRDA)  
Reené Miranda – Southwestern Public Service (SPS)  
Dustin Betz – Nebraska Public Power District (NPPD)  
Mo Awad – Westar Energy (WR)  
Nate Morris – Empire District Electric (EDE)  
Mike Clifton – Oklahoma Gas & Electric (OGE)  
Scott Schichtl – Arkansas Electric Cooperative (AECC)  
John Boshears – City Utilities of Springfield (CUS)  
Jason Shook – GDS Associates (GDS)

SPP Staff in attendance included Anthony Cook (Secretary), John Mills, Kelsey Allen, Scott Jordan, Greg Sorenson (RE), and Doug Bowman.

The following guests were also in attendance:

John Payne – Kansas Electric Power Cooperative (Kepco)  
Liam Stringham – Sunflower Electric Power Corporation (SEPC)  
Racheal Ren – Kansas City Power & Light (KCPL) – Proxy for Brian Wilson  
John Lane – Western Farmers Electric Cooperative (WFEC)  
John Mayhan – Omaha Public Power District (OPPD)

**(Attachment 1 – Attendance List.pdf)**

*New Members*

Scott Rainbolt announced Nate Morris and Nathan McNeil as new members to the MDWG.

*Meeting Agenda*

The agenda was reviewed by the group. Scott Schichtl motioned to approve the agenda as is; Mo Awad seconded the motion. The motion passed unopposed (**Attachment 2 - MDWG Agenda 20100805.doc**).

*Meeting Minutes*

Nate Morris motioned to approve the previous meeting minutes; Scott Schichtl seconded the motion. The March 1<sup>st</sup> minutes were approved unopposed (**Attachment 3 - MDWG Minutes 20100301.doc**).

**Agenda Item 2 – Review of Past Action Items**

Anthony Cook reviewed action items that are currently in progress or have been completed since the March 1<sup>st</sup> meeting. Anthony Cook asked for clarification of action item #1. Jason Shook stated the action item was to inquire if the summer shoulder load of 85% of the summer peak load is a valid value. Anthony discussed progress on item #10 and Kelsey Allen asked that members check their area generators and remove any that are in the MOD base case but not in-service. Staff discussed item #30 in further detail. The group expressed interest in having more involvement in review and/or development of generation and transmission plans for the 20 year study model, in addition to the load forecasts already requested of them.

**Action Item:** Send notice to all modeling contacts reminding members of their obligation to adhere to the remote generation modeling procedure. (SPP Staff)

**Action Item:** Modeling staff will inform Planning staff that the MDWG would like more involvement in review and/or development of generation and transmission plans for the 20 year study model. (SPP Staff)

**Agenda Item 3 – 2010 Series Stability Model Update:**

Scott Jordan gave an update on the status of the 2010 series stability models. He said the models will be received by August 20, 2010 and he will work to get them out as soon as possible. These models are delayed because of the delay of posting the final MDWG B1 powerflow models and adding wind farm topology granularity.

**Agenda Item 4 – 2011 Series Schedule:**

*Powerflow and Dynamics*

Anthony Cook reviewed the proposed schedule. Scott Schichtl asked if the load date submission date matters as long as it is turned in once a year. It is required for Build 1 models because they are new year models. John Payne added that he submits updated load forecasts via NITS application updates every October to meet Tariff requirements. Greg Sorenson commented that mitigation plans submitted need to be usable for real-time. Dustin Betz and Scott Rainbolt commented that these mitigation plans are used for model validation and not for NERC compliance. Reené Miranda asked why N-1 analysis is required for Build 1 models instead of Build 2 models. Doug Bowman said he will look into the SPP Criteria and the MDWG procedure manual requirements to determine which model build set requires the N-1 analysis and mitigation plans. John Payne suggested staff add a list of what the final Build 1 models are used for to the data request email. Anthony Cook suggested building the models in PSSE version 30, as

well as version 32 until September, which is when the MMWG votes to move to version 32 or not. Mo Awad motioned for approval of the full Powerflow and Dynamics schedule with the option to change dates pertaining to mitigation plan submittal, AC analysis, and the model update meeting in Little Rock. Mike Clifton seconded the motion. The motion passed unanimously.

#### *Short Circuit*

A schedule was not proposed from SPP staff for short circuit models for the 2011 series build. Anthony Cook added that the Short Circuit white paper states that the model build schedule should coincide with the schedule of the powerflow model build. Anthony also suggested the short circuit model build for the 2011 series should begin with the build 2 process of the powerflow model build schedule; however, at least two passes are needed to work through any issues.

**Action Item:** Determine which model build set N-1 analysis and mitigation plans are required. (Doug Bowman)

**Action Item:** Staff to add a list of what the final Build 1 models are used for to the data request email. (Staff)

**Action Item:** Send out notification of MMWG vote on PSSE version 32 after MMWG meeting in September. (Anthony Cook)

### **Agenda Item 5 – 2011 Series Model Set:**

#### *Powerflow*

Kelsey Allen discussed the differences of building cases based on the MMWG provided models or the proposed MMWG model set. The MMWG increased their model set by 1 year for the 2011 series models. Mo Awad motioned to increase the MDWG model set by 1 year and add a 2013 spring case for the MDWG 2011 series powerflow model set. Reené Miranda seconded the motion. Dustin Betz requested a 2022 winter model. Mo amended his motion to add a 2022 winter model to the MDWG 2011 series powerflow model set. The motion passed unopposed.

#### *Dynamics*

Scott Rainbolt expressed interest in a 10 year stability model. Discussion arose about the cost and scheduling impact of adding more dynamic models. Scott Jordan accepted the responsibility to determine such impact. This item will be tabled until Scott gathers the necessary information.

**Action Item:** Determine the cost and schedule impact of additional dynamic models. (Scott Jordan)

Scott Schichtl motioned to adjourn the meeting and to move Friday's meeting start time to 8:30 a.m. Dustin Betz seconded the motion. Motion passed unopposed.

*Chair adjourned the meeting at 5:00 p.m.*

*Chair reconvened at 8:30 a.m. Friday.*



**Agenda Item 5 continued – 2011 Series Model Set:**

*Short Circuit*

Scott Rainbolt discussed having short circuit models for every powerflow model. Anthony Cook suggested only producing one or two models as test models for the 2011 series. The Short Circuit white paper states having present year and plus two year models. Mo suggested tabling the decision so that everyone can discuss the issue with their company short circuit personnel.

**Action Item:** Discuss short circuit needs with company personnel. (MDWG members)

**Agenda Item 6 – MDWG Procedure Manuals:**

Anthony Cook reviewed the MDWG Powerflow Manual changes that Staff was proposing. Anthony asked if section E, “Power Flow Development Manual Changes”, can be made into an appendix of the powerflow procedure manual. Scott Rainbolt suggested making it an appendix and adding change dates to each topic. Reené Miranda asked if hyperlinks can be added to direct the reader to SPP.org for documents that are referenced in the manual. He also asked if the model building schedule and model set list can be joined into one document. Anthony Cook took the task of reformatting the powerflow procedure manual and adding hyperlinks. Kelsey Allen will combine the schedule and model set list into one document.

**Action Item:** Reformat the MDWG procedure manual and add hyperlinks for referenced documents. (Anthony Cook)

**Action Item:** Combine the MDWG model building schedule and model set list into one document. (Kelsey Allen)

**Agenda Item 7 – MOD:**

*Maintenance*

Kelsey Allen discussed the importance of maintaining MOD. He stated that PTI was given the SPP database to analyze and they suggested purging data to minimize the size of the database. Kelsey asked the group for an acceptable time frame to purge the data. Nate Morris asked if projects are backed up or if they will be lost forever. Kelsey added that all MOD projects are backed up. Mo Awad suggested purging data on a monthly basis. The group agreed to Mo’s suggestion.

Kelsey then explained the problems associated with keeping modeling data, external to SPP, in MOD that may not get updated and suggested deleting it. Dustin Betz asked if a load can be added to an external bus if it is not in the database and the validation errors that might be produced. Kelsey asked the members about zone updates for members with load on other systems and stressed that SPP can not change other region’s data. The members need to coordinate these changes with the other regions. Anthony Cook

discussed SPP staff reviewing MOD projects that contain regional ties and using the information to update the Master Tie Line (MTL) file for the members.

**Action Item:** Investigate if MOD will allow a load to be added to an external bus that is not in the database, and the validation errors that might arise. (Kelsey Allen)

#### *Recap of New Features*

Kelsey Allen briefly discussed the new features of MOD version 7.

#### *Expectations*

Anthony Cook discussed staff's responsibility of uploading the master profiles of the models into MOD when the models are posted. Members are to supply profiles through MOD by amending the master profile, as well as, make sure projects are complete with all necessary data. Reenée Miranda asked if SPP staff can clean up the list of profiles currently in MOD. Kelsey Allen agreed to reduce the list. Kelsey asked about updating MOD with ownership data and how that data will be updated. Scott Rainbolt expressed concern with the amount of work involved in updating ownership data for his area. Joe Fultz asked if an AEPW bus will show up on the GRDA load tab if filtered by GRDA owner. Scott Schichtl answered that it should. Kelsey suggested providing some files for a bulk update.

**Action Item:** Clean up the profile list currently in MOD. (SPP Staff)

#### **Agenda Item 8 – Line Mileage and Ownership:**

Anthony Cook discussed the task that Liz Coffield (SPP intern) was given to gather line mileage and ownership data. The majority of data has been compiled and a project will be uploaded into MOD. Reenée Miranda asked about "name" field for branches in PSSE. Anthony discussed how PTI prioritizes requests and that they are aware of this request. Reenée also requests that PTI add a generator code to indicate outages and not just in-service or out-of-service. Scott Rainbolt asked if the Compliance and Participation workbook can be finalized. Anthony agreed to send out a final workbook.

**Action Item:** Send out final Compliance and Participation workbook. (Anthony Cook)

#### **Agenda Item 9 – Model Improvement Task Force:**

Kelsey Allen discussed the MITF White Paper. It was decided that the MDWG members need to supply comments on the MITF White Paper to Kelsey by August 27, 2010. The MDWG will vote on the white paper at the next meeting.

**Action Item:** MDWG members need to supply any comments on the MITF White Paper to Kelsey by August 27, 2010. (MDWG)

**Action Item:** Discuss with Entergy about SPP members modeling load with zero impedance lines. (SPP Staff)

**Agenda Item 10 - Other:**

Reené Miranda asked how stability load data is converted in the existing stability models and if the current method is too conservative. John Boshears added that the previous method was to use the national average. Scott Jordan will determine if the current method of converting stability load data is too conservative. This may require feedback from the transmission planners depending upon the types of loads represented at certain buses.

**Action Item:** Determine the standards for stability load data. (Scott Jordan)

Reené Miranda asked if SPP can edit the docucheck program so that unnecessary checks are removed. Anthony Cook requested the members to provide specific changes they would like to see implemented. Reené also requested use of if SPP would provide the program to the modeling contacts for their use.

**Action Item:** MDWG members to supply docucheck changes to staff. (MDWG)

**Action Item:** Provide updated docucheck program to modeling contacts. (SPP Staff)

**Agenda Item 11 - Closing Administrative Duties:**

*Next Meeting:*

The next meeting will be a conference call to be held on Wednesday, September 8, 2010 from 9:00 a.m. to 11:30 a.m.

*Upcoming Meetings/Topics:*

Which model build set N-1 analysis and mitigation plans are required  
Cost/schedule impact for additional dynamic models  
Standard for stability load data  
Dynamics model set  
Short Circuit model set  
MOD matrix  
Status of zone update  
MITF white paper comments  
December Modeling meeting

*Summary of New Action Items*

1. Determine which model build set N-1 analysis and mitigation plans are required. (Doug Bowman)
2. Staff to add a list of what the final Build 1 models are used for to the data request email. (Staff)
3. Send out notification of MMWG vote on PSSE version 32 after MMWG meeting in September. (Anthony Cook)

4. Determine the cost and schedule impact of additional dynamic models. (Scott Jordan)
5. Discuss short circuit needs with company personnel. (MDWG members)
6. Reformat the MDWG procedure manual and add hyperlinks for referenced documents. (Anthony Cook)
7. Combine the MDWG model building schedule and model set list into one document. (Kelsey Allen)
8. Determine if MOD will allow a load to be added to an external bus that is not in the database and what validation errors might arise. (Kelsey Allen)
9. Clean up the profile list currently in MOD. (SPP Staff)
10. Send out final Compliance and Participation workbook. (Anthony Cook)
11. MDWG members need to supply any comments on the MITF White Paper to Kelsey by August 27, 2010. (MDWG Members)
12. Discuss with Entergy about SPP members modeling load with zero impedance lines. (SPP Staff)
13. Determine the proper conversion methodology for stability load data. (Scott Jordan)
14. MDWG members to supply docucheck changes to staff. (MDWG Members)
15. Provide updated docucheck program to modeling contacts. (SPP Staff)

**(Attachment 4 - SPP MDWG Action Items 20100805.xls)**

*Adjourn Meeting*

Mo Awad motioned to adjourn the meeting; Reené Miranda seconded the motion. With no further business to discuss, the MDWG meeting was adjourned at 12:00 p.m.

Respectfully submitted,  
Anthony Cook  
SPP Staff

## Southwest Power Pool

### Model Development Working Group

(August 2010 - January 2011)

#### 2011 Series Model Selection

Model	Year	Season	Power Flow	Dynamics
1	2011	Spring	X	
2	2011	Summer	X	
3	2011	Summer Shoulder	X	
4	2011	Fall	X	
5	2011/12	Winter	X	
6	2012	Light Load	X	X
7	2012	Spring	X	
8	2012	Summer	X	X
9	2012	Summer Shoulder	X	X
10	2012	Fall	X	
11	2012/13	Winter	X	X
12	2013	Spring	X	
13	2013	Summer	X	X
14	2013	Winter	X	
15	2017	Light Load	X	X
16	2017	Summer	X	X
17	2017/18	Winter	X	X
18	2022	Summer	X	X
19	2022	Winter	X	



# **SPP** *Southwest Power Pool*

## **SPP Model Improvement White Paper**

**Prepared by: Model Improvement Task Force**

**September 30, 2010**

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## History and Background

The Model Improvement Task Force (MITF) was formed by the Transmission Working Group (TWG) to address increasing concern regarding the modeling process and the models produced by SPP. The MITF began work in February of 2010, comprised of members from the TWG and the Model Development Working Group (MDWG).

## Purpose and Objective

The MITF was instructed to identify areas for process improvement within modeling. This group aimed efforts at adjusting and expanding the current set of practices associated with the MDWG in order to allow that group to develop a common base data set that will expand stakeholder input and instill efficiency and accuracy into each of the model sets it supports.

This document addresses issues put forth by SPP staff and members of the MITF.

### 1. Modeling Data Requirements

The following topics are addressed to highlight, adjust and expand the current MDWG data requirements in order to increase granularity and consistency of the modeling data being used for the different SPP model sets.

#### A. *Uniform Generation Modeling*

**Issue:** No uniform requirements exist to model generation.

- ✓ Seasonal maximum and minimum capabilities and forecasted capabilities are often not accounted for.
- ✓ Some members model station service or auxiliary load and others do not.
- ✓ Municipal Generation listed in EIA reports is often netted with load.

**Solution:**

- ✓ Any distributive or otherwise generation registered with the SPP market shall be represented appropriately in the base model set such that generation is not netted with customer load.
- ✓ Net capability of units as listed in data reporting vehicles, such as EIA reports or SPP NITS applications, should be reflected in the base model set.
- ✓ Generator auxiliary load should be included in net capability of units. If an individual member company prefers to model gross generator capability, reports shall be provided detailing the bus number and ID for auxiliary load associated with each generator or plant.
- ✓ Ownership assignments per Load Serving Entity (LSE) shall be modeled with each machine.

**Benefit:** More effort spent to accurately model generator data will help to improve efficiency and accuracy of study processes and results.



### ***B. Uniform Load Modeling***

**Issue:** The modeling world can vary from the real world in some respects. Often, methods used by members to model special loads (location or owner issues) skew the area interchange numbers. Some of the examples are:

- ✓ Pseudo-Tie Modeling
- ✓ Varying methods of assigning one's Load in another Area

**Solution:**

- ✓ Zero-impedance tie lines shall not be used to connect a load bus.
  - Load shall be represented as it physically exists on the transmission system as accurately as the base model set will allow.
- ✓ Load shall be modeled on the metering bus (as allowed by the base model set) and shall be identified per LSE by the assignment of ownership, load area, or both.
  - See Appendix A: Methods 1 and 2 will be used to model load for those members who have a modeling area and serve load which physically exists in another modeling area.

**Benefit:** This improvement will enhance model granularity and allow SPP Staff to accurately validate the area interchange when constructing the models.

### ***C. Stability Load Modeling***

**Issue:** More representative load modeling needs to be utilized for dynamic studies. 100% constant current data, which may be worst case, is unrealistic.

**Solution:** Each LSE may provide more detailed dynamic load data for each dynamic model supported by the MDWG. If this data is not provided by the LSE, staff should assume data based on recognized national standards.

**Benefit:** This will provide consistency and help prevent unrealistic dynamic studies.

### ***D. Explicit Modeling of Reactive Control Devices***

**Issue:** Net var modeling is sometimes used in power flow cases instead of showing the discrete capacitor or reactor banks that are available for switching.

**Solution:**

- ✓ All capacitor banks shall be modeled as switched shunts as specified in section 5.10 of the MDWG Power Flow Manual.
- ✓ Reactive devices shall be modeled to show individual blocks and steps available for switching.
- ✓ The MDWG should provide modeling assistance to SPP members and the Multi-Regional Modeling Working Group on voltage bandwidth for switched shunts.

**Benefit:** This improvement will provide additional guidance of what can be done in contingencies to remedy voltage problems.

### ***E. Identification of Generation Types***

**Issue:** Proper identification of generation types, especially with respect to wind, does not currently exist in the base model set. Some study processes currently mix in non-firm generation that should not be dispatched.

**Solution:**

- ✓ The MDWG should discuss the implementation of uniform generator identification as done with load.

- ✓ Develop a set of generator IDs for the purpose of identifying different generation types such as:
  - Long-term firm
  - EIS market (non-firm)
  - Wind QF
  - Customer owned (behind the meter)

**Benefit:** Better rules for identifying generation “buckets” will aid those using models developed by SPP and the MDWG in discerning what generation is dispatchable.

## **2. Detailed Reporting and Data Synching**

The following topics are addressed to expand the current practices of the MDWG and SPP staff in order to reconcile data sources within SPP and help bridge the gaps between models developed by the MDWG and those developed by SPP staff for the current STEP processes.

### ***A. Joint-Owned Unit Coordination and Reports***

**Issue:** The information staff receives for the dispatching of jointly owned units is simply a generation output value as modeled which makes it very difficult to determine which owners are using what amount of power.

**Solution:** Members shall provide reports detailing Inter-area and intra-area transactions that represent the modeling of the dispatched power from each jointly owned unit or plant.

**Benefit:** This improvement will remove any guesswork done by staff and improve efficiency in verifying usage rights.

### ***B. Delivery Point Changes and Load Owner Reports***

**Issue:** Additions, modifications, and abandonment of delivery points are not clearly documented.

- ✓ Each year staff has to correct intra-area transfers between Host TO and Load Serving Entities (Load Owners, Municipals, Coops, etc.).
- ✓ With the new tariff addition of Attachment AQ, “new” loads cannot be added to the model without first being studied.
- ✓ With the new tariff addition of Attachment AR the transfer of an existing load is studied.

**Solution:** In conjunction with implementation of the new SPP modeling assignments, which will create more granularity in defining load ownership, load reports should be provided on a per LSE basis. These reports would include, as necessary:

- ✓ Load values
- ✓ Generation required to serve load
- ✓ Transactions and any resulting changes to area interchange
- ✓ Losses incurred in serving load

SPP must work with each member to ensure that all LSE reports are provided.

**Benefit:** These detailed reports will help facilitate and instill accuracy into SPP processes.

- ✓ Transmission Service Studies
- ✓ Studies pursuant to Attachment AR
- ✓ Studies pursuant to Attachment AQ

### ***C. MDWG Transaction Improvement***

**Issue:** Currently, connectivity to both MDWG Models and OASIS Data is limited. This leads to a significant amount of time spent to validate, correct and expand the transactions in the MDWG Transaction Workbook by hand in order to create the STEP base scenario models. Non-firm transactions or exploratory and proposed transactions above reserved amounts are currently included in the MDWG models. In order to build the STEP base scenario models these transactions are removed; staff also adds transmission service that is not included in the MDWG models:

- ✓ DNR and PTP DC tie adjustments
- ✓ Inter-area DNR at reserved amount
- ✓ Intra-area DNR not in TO or TDU dispatch order
- ✓ Intermittent wind generation at reserved amount
- ✓ PTP (inter-regional, intra-regional, intra-area, designated resource) at reserved amount.

Netting and combining transactions practices:

- ✓ Transactions are netted from A to B with B to A transactions making it difficult to correlate with OASIS reservation amounts
- ✓ Transactions summed together making it difficult to correlate with OASIS reservation amounts

**Solution:** Staff would like to work with members to bridge the gap in the development of models suitable for NERC Compliance versus studies governed by SPP Tariff requirements in relation to transaction schedules and OASIS reservations.

- ✓ The MDWG transaction workbook should be expanded to include data from SPP OASIS.
- ✓ Transactions should be more comprehensive with all inter-area and intra-area reservations accounted for thereby allowing the members to make their own forecasts about usage of these capacity and roll-over rights.
- ✓ Eliminate the practice of netting and summing transactions.
  - Transactions should only be summed if they are from the same resource/source and load owner/sink.

**Benefit:** The amount of hours spent by engineers to develop transactions correlation can be reduced and thereby reducing STEP base model development time, making the process more efficient.

## **3. Modeling Methods**

The following topics are addressed to highlight and better define modeling methods that will help create more uniformity across the SPP footprint.

### ***A. Forecasting of Rollover Rights***

**Issue:** Currently, the MDWG manual encourages planners to model roll-over rights for transmission service. However, this assumption can result in the identification of reliability issues where none would have been identified otherwise.

**Solution:**

- ✓ In developing transaction schedules, each LSE should continue to project their use of long-term firm transmission roll-over rights in the base model set.

- ✓ SPP will continue to address boundary conditions associated with modeling any unused roll-over rights in the scenario models, as required by Section III.1.d. of Attachment O to the SPP Tariff.

**Benefit:** This improvement will lead to more accurate and realistic modeling.

### ***B. Modeling New Generation and Transmission Projects***

**Issue:** No common practice currently exists for including new generation and transmission projects in the MDWG model set. Transmission Owners are allowed to add any new transmission and generation projects to meet load requirements and NERC reliability standards.

**Solution:**

- ✓ STEP Base Models (Used by SPP as the base for ITP Reliability, Transmission Service, and Generation Interconnection studies):
  - New Generation
    - New generation will only be modeled if it has a signed Interconnection Agreement and not on suspension.
    - New generation modeled will only be dispatched if it has an executed transmission service agreement.
    - Exceptions to the above requirements will be based on the TWG approved “Rules and Exceptions for Generation Deficiencies”.
      - This rule set will aid in reducing the reliance on heavily weighted transmission solutions until the SPP ITP can give more guidance on resource planning.
  - New Transmission will only be modeled if:
    - There is an existing Notification to Construct issued by SPP which has been accepted by the Transmission Owner.
    - It has been budgeted and approved by the Transmission Owner with firm commitment to build.
- ✓ MDWG Base Models (Used by SPP for NERC Compliance studies)
  - In addition to generation and transmission meeting the STEP base model requirements, projects may be modeled as necessary to meet load requirements and/or NERC reliability standards.
- ✓ The MDWG manual should be updated to reflect the following for generation deficiencies:
  - Inclusion of proposed generation to meet load requirements within the LSE
  - Inclusion of existing generation and proposed transactions based on the method described in Appendix B.

**Benefit:** This set of rules will provide guidance in modeling new projects in order to create more consistent modeling practices across the SPP footprint.

### ***C. Review, Expansion, and Implications of MOD Project Types***

**Issue:** The current MOD project type/status matrix contains errors and is incomplete.

**Solution:** The MDWG should review and adjust the current MOD project matrix to account for issues addressed in this white paper and Tariff changes made to implement the ITP.

**Benefit:** This will aid members and staff alike in classifying projects correctly to feed into study processes and project tracking.

#### ***D. Modeling Projects in MOD before the RTO Need Date***

**Issue:** It has been noted that often a TO will submit a project in MOD before the RTO Determined Need Date which can result in masking inherent reliability issues or allowing SPP to oversell the transmission system.

**Solution:** Any transmission project that has been issued an NTC by SPP shall not be modeled earlier than the later of the RTO Determined Need Date or the Transmission Owner Projected In-Service Date unless energized.

**Benefit:** This improvement would eliminate inherent ATC provided by projects modeled with no commitment to build. It would also allow the ITP reliability and transmission service analyses to accurately complete the following:

- ✓ Determine the need for Reliability Projects.
- ✓ Reassess the need for Reliability Projects without a NTC or with a NTC under review.
- ✓ Rescind the need for Reliability Projects with a NTC.
- ✓ Minimize the number of reliability analysis studies needed to determine whether a modeled TO Planned Project has reliability need.
- ✓ Protect SPP and its members against selling transmission service on ATC that may not exist due the delay of a transmission project.

#### **4. Data Errors and Coordination**

The following topics are addressed to expand the current practices of the MDWG and SPP staff in order to better address modeling errors and increase effectiveness of coordination efforts with neighboring regions and members.

##### ***A. Improve Identification of Major Model Changes and Errors***

**Issue:** Tools in our model building processes should be implemented both external and internal to SPP modeling that flag major data changes and errors.

**Solution:**

- ✓ The Docucheck program now being used by SPP will aid in correcting model errors.
  - This python script developed for the MMWG produces reports of errors and warnings for review by each transmission owner.
  - SPP and the MDWG should work to adjust and expand the data errors flagged in these reports.
- ✓ MOD Anomalies and MOD Detailed Case Build posted with each model set.
- ✓ SPP will develop tools and processes to compare the models to other data sources available to SPP, which will aid in data verification.
- ✓ SPP should provide a summary of changes between each final build of any one model series year.

**Benefit:** More effort in implementing secondary checks to validate major changes to the models will result in increased reliability of study results, avoiding project proposals and other issues that stem from simple modeling errors.

##### ***B. Improve Regional Data Coordination and Checks***

**Issue:** Due to the selection of seasons for a model series and the differing cycles of model building, SPP models inherently contain missing ties lines and outdated topology and

transactional data for neighboring systems. The SPP MDWG attaches the “best match” MMWG model as the external case and this can create confusion if not coordinated between the regions.

**Solution:**

- ✓ SPP shall coordinate with external regions to ensure understanding of seams throughout the model series.
- ✓ The MDWG should consider all internal and external processes it supports when selecting the seasons for an annual a model series.
  - A one-to-one match for external regions is not always available and may require data modification.
  - SPP shall swap data with 1<sup>st</sup> tier companies consistent with the obligations of seams agreements.
- ✓ All members within SPP and all regions shall use the MMWG Master Tie File for all updates to NERC regional ties.

**Benefit:** SPP and first tier data will be more accurate and produce more realistic representation of powerflow across seams.

**C. Coordination Between G.I. and Modeling**

**Issue:** New generation (especially wind) with signed interconnection agreements interconnecting to the SPP footprint is often not coordinated directly into the MDWG Models by SPP Staff or SPP members.

- ✓ In the case of wind generation, accurate reactive capabilities are often not modeled if the generation is modeled at all.
- ✓ Proprietary stability models are being provided to the SPP for the purpose of the GI process and cannot be added to the MDWG models due to confidentiality reasons.
- ✓ Lack of good generic wind models in PSS/E Rev 30 is also an issue. Often wind generation plants are modeled with generic CIMTR1 or CIMTR3 models in lieu of more detailed generic wind models which are available in Rev 32.

**Solution:**

- ✓ Once a generator meets requirements to be included in the base model set, SPP Staff shall verify the data used in the SPP Generation Interconnection study and ensure that accurate data is submitted to MOD by Staff or the host SPP member.
- ✓ SPP shall step up enforcement of current data requirements of members and customers.
- ✓ SPP shall require that non-SPP member GI customers supply non-proprietary modeling data that can be added to the MDWG models.\*
  - If this data cannot be supplied in order to meet NERC MOD standards and SPP Tariff requirements then the GI request should be rejected.

*\*Staff Note: No SPP Tariff requirements currently exist that allow SPP reject GI requests based on failure to meet this criteria.*

**Benefit:** This will ensure all planned or operational generators with a signed interconnection agreement are included in the MDWG models, thereby improve accuracy of SPP models and provide for much better inputs into SPP study processes.

**D. Model Sharing Instructions**

**Issue:** SPP transmission owning members are not allowed access to certain models sets because of sensitive data. This lack of access puts a burden on transmission owners when developing solutions for responding to study-related data requests.

**Solution:** The SPP non-disclosure agreement (NDA) shall be sufficient to allow full access and use of the various models developed in support of administration of the tariff to be used by signatories to validate study results.

**Benefit:** FERC jurisdictional or Public Power Entity SPP transmission owning members who have completed the necessary requirements will have model access to better replicate SPP study results and provide more accurate solutions for system violations.

#### ***E. Auxiliary Files Coordination and Organization***

**Issue:** Currently, staff members that are involved in the STEP model building process are responsible for requesting updates to the auxiliary files used for analysis and reporting (monitor, subsystem, contingency, invalid contingency and common name). These requests can potentially come from a number of different SPP employees from different engineering groups.

**Solution:** In keeping with the effort to create a common data set for all study tracks, the MDWG shall take over coordination and organization of auxiliary files used for study analysis.

- ✓ A single contingency file should be used for a full planning horizon.
- ✓ The MDWG needs to develop a process to identify and track contingencies that change due to topology changes through a model series.

**Benefit:** Stakeholders will have more control over the schedule of updating and maintaining these files producing more accurate results in all study processes.

#### ***F. Integrity of Forecasted Load Data***

**Issue:** SPP staff has noted that discrepancies exist between load forecasts as they appear in the models produced by the MDWG and load forecasts submitted via other processes. No uniformity exists across the SPP footprint for developing load forecasts; each LSE or reporting BA has their own process.

**Solution:** The MITF believes that these concerns expressed by SPP staff are a non-issue.

- ✓ There is no one-for-one match of the different sources used to report load.
- ✓ EIA-411 is a separate data vehicle and should not be used for model verification.
  - Load and losses are not separated in the reports as they are in the powerflow models.
  - EIA-411 doesn't have the granularity of load forecasts as represented in the models.
- ✓ Some companies have multiple forecasts per year that are fed into different processes at different times.
- ✓ SPP should assess the need and consider the elimination of October updates to NITS Applications as required by the Tariff. These are redundant data updates that can be found in the powerflow models developed by the MDWG.
- ✓ MITF does not recommend pursuing a common load forecasting tool.
  - Each company has developed a process that has been vetted by their own staff and necessary State Commissions.

## 5. Uniform Generation Dispatch

The following topics address the gap in process related to generation dispatch and resulting interchange between the current MDWG practices and those employed by SPP staff to develop the different STEP model sets.

### A. *Generation Dispatch Coordination and Expansion*

**Issue:** Generation dispatch is currently being requested by multiple groups within SPP Engineering for different model sets. For the MDWG and STEP models, these requests for generation profiles and generation dispatch orders are generally provided by the same member staff. Once the MDWG models are developed, SPP Planning and Transmission Service staff uses an automated process to redispatch generation when performing reliability analysis and studying new requests for transmission service.

**Solution:** In addition to the generation profiles developed for the MDWG models used for compliance, MDWG modeling contacts will aid SPP staff in developing generation dispatch orders during the annual model update.

- ✓ The dispatch orders used for these purposes need to include both intra-area and inter-area generation.
- ✓ Dispatch orders would be per LSE where remote generation would be dispatched according to the transaction workbook net scheduled interchange (NSI) requirements.
- ✓ Since the majority of joint owned resources and purchases are base load generation per LSE, joint ownership and purchases would be included in the host TO dispatch order with the Pmax being equal to the sum of the allocated amounts if the host TO has a Joint Ownership or purchase of the same resource.
  - Exceptions to this would initially be manually dispatched when building models due to interchange and usage accounting requirements.
- ✓ The automated process incorporates:
  - Must-run unit commitments
  - Unit Outages
  - Transmission operating directives
- ✓ Non-dispatchable generation (wind, hydro, ect...) profiles will not be changed by the automated dispatch and would still need to be developed by members.

**Benefit:** In developing both sets concurrently, the base models for all study tracks will have a more consistent generation dispatch. Once the automated process becomes more refined, consideration should be given to implementing it to develop the MDWG models. This would eliminate SPP staff's work to adjust MDWG models for ITP Reliability, Transmission Service, and Generation Interconnection studies as well as reduce the burden on the members to create separate MDWG dispatches by hand.

### B. *LSEs That Cannot Meet Their Load*

**Issue:** Clear guidelines are not available to account for the issue of how to solve cases where a LSE doesn't have enough designated network resources to serve their load in a far-term case. Currently, LSEs add fictitious generation or transactions to address this deficit. To build the STEP base models, these generators are removed; when there is a shortfall between Interchange, generation and load, the process described in Appendix B is used.



**Solution:** The shortfall process described in the document referenced above is implemented through the automated dispatch process described in the Generation Dispatch Coordination and Expansion issue and would be fine-tuned to prepare for future implementation at the MDWG level. The MDWG should include this detailed process as an option to modeling proposed generation in the MDWG model set used for compliance.

**Benefit:** Any LSE that is not able to meet their load in a far term case will have specific guidelines to solving their case in a manner that is uniform across the SPP footprint. Additionally, this will improve the documentation of SPP Processes.

### ***C. Determining Generation and NSI Profiles***

**Issue:** Generation and Net Scheduled Interchange (NSI) data rely heavily on our transmission owners to develop snapshots. Additional profiles are needed for other model sets which would require much more work from the transmission owners to develop these following the current MDWG process.

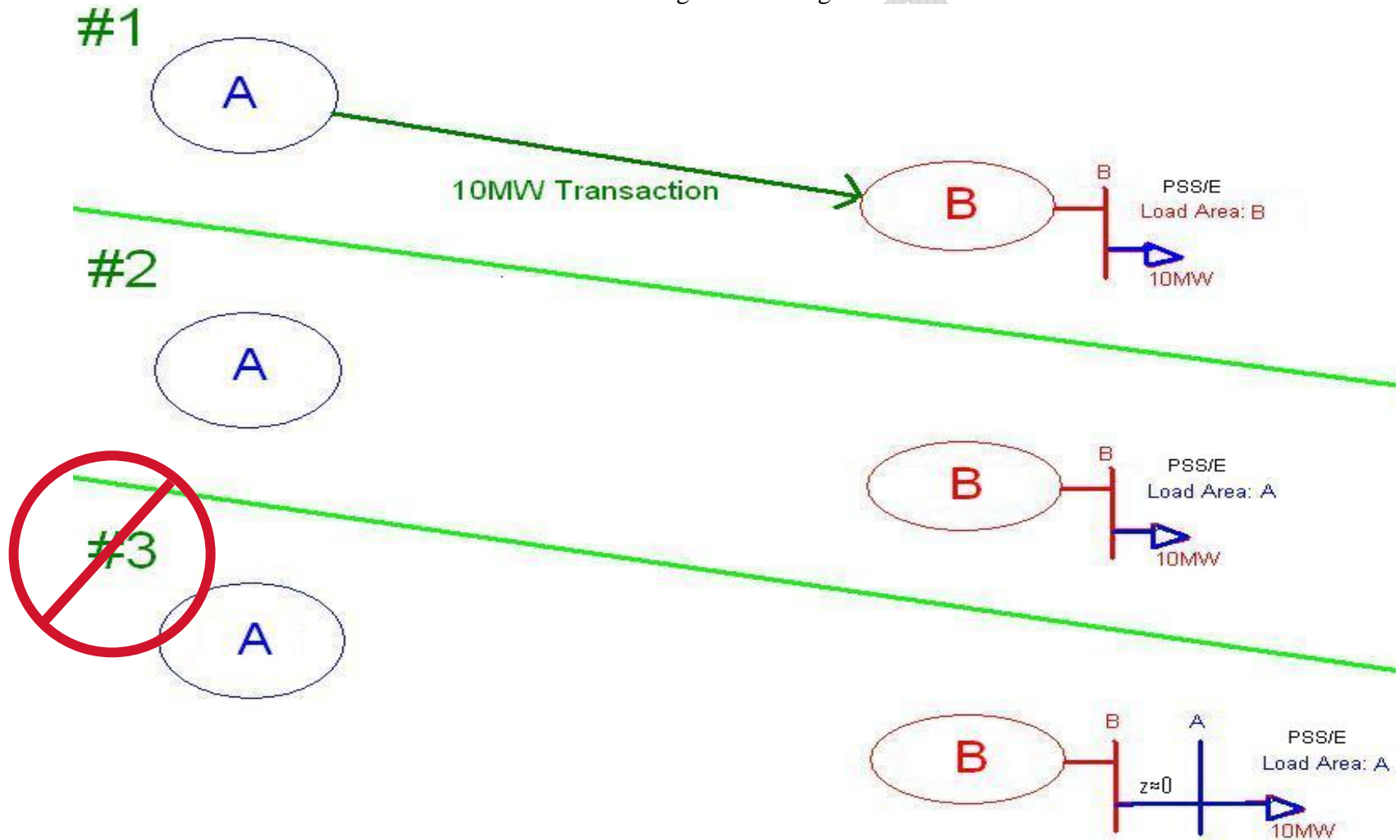
**Solution:** SPP processes are available to aid in the development of the generation and NSI profiles for the Transmission owners to review. Profiles are already being developed by staff for other STEP model sets, yet these processes need to be expanded.

**Benefit:** Applying these processes at the MDWG level will save both staff and members time in creating and verifying generation and NSI profiles.

# Appendix A

## External Load Modeling Methods

Area "A" serving load existing in Area "B"



## Appendix B

### LSEs That Cannot Meet Their Load

1. MDWG Compliance Models - The dispatch orders will include a NERC Standard Compliance flag to allow for new generation and existing generation capacity changes that do not meet the requirements for inclusion in the STEP and ATSS to be dispatched in merit order. If there is a shortfall between generation and load then the detailed shortfall process for the STEP and ATSS will be utilized.
2. ITP Near-Term Reliability Assessment and ATSS Models - When there is a shortfall between the amount of designated network resources and designated network load for a LSE or transmission customer, the following sequential steps are outlined below.
  - i. Step One: Exhaust the customer's designated network resources until the network resources are sufficient to meet network load.
    - a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP Transmission Owners and by representatives of the transmission service customers.
    - b. Add generation from behind the meter generating units. This generation consists of dispatchable behind the meter generation that may not already included in the SPP Model Development Working Group Base Cases.
    - c. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.
  - ii. Step Two: If the customer's designated load cannot be served after Step One, then exhaust the customer's other operational generation that is not designated.
    - a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP Transmission Owners and by representatives of the transmission service customers.
    - b. Add generation from behind the meter generating units. This generation consists of behind the meter generation that may

not already included in the SPP Model Development Working Group Base Cases.

- c. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.
- iii. Step Three: If the customer's designated load cannot be served after Step One and Step Two, Exhaust the Host Transmission Owner's existing generation. These intra-area transfers will be documented in the LSE reports.
- a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP Transmission Owners and by representatives of the transmission service customers.
  - b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.
- iv. Step Four: If the customer's network load cannot be served after the above steps, exhaust Independent Power Producer's ("IPP") existing generation in the Host Transmission Owner's modeling area.
- a. Exhaust IPP generation on a pro rata, as available basis accounting for firm transmission commitments. In other words, Use power from each IPP to meet the customer's designated load. The amount of power from each IPP will be determined using the total amounts available based on the IPP's historical generating levels minus the amount of power to model existing transmission service from the IPP.
  - b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.
- v. Step Five: Finally, if a customer's network load cannot be served after applying the above steps, exhaust existing primary modeling area generation with includes IPP's existing generation and existing primary modeling area generation.

- a. Similar to Step Four, exhaust this generation on a pro rata, as available basis for firm transmission commitments. The amount of power from each IPP and from each primary modeling area generation will be determined using the total amounts available based on the maximum generating levels minus the amount of power to model existing transmission service from the IPP and primary modeling area generation.
  - b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.
3. ITP 10 Year and 20 Year - The studies will use ESWG approved resource plans and futures for the SPP region.

DRAFT



