Report

Firm Flow Task Force

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# Purpose

The Engineering Committee (EC) established the Firm Flow Study Task Force (FFTF) to identify issues and make recommendations regarding modeling firm interchange in the near and long term study models. This document provides the background, assessment, and recommendations of the task force.

## Business Need

Accurate coordination and associated modeling of firm transmission service and interchange among Planning Coordinators (PCs) is essential for building multi-regional models used in near-term and long-term assessments. Inaccurate transmission commitment information in planning models may increase reliability risks. This increase in risk is due to

* Models used for near term studies that do not address Transmission Service Reservations (TSRs) accurately,
* Inadequately coordinated transmission expansion plans for complying with FERC Orders 890 and 1000, and
* Potential overselling of transmission capability in excess of System Operating Limits (SOLs) and Interconnection Reliability Operating Limits (IROLs).

Planning studies analyze a variety of possible high-stress states of the transmission system, such as summer peak, winter peak, spring, fall, shoulder, and light load. While it is not possible to characterize firm flows completely, the SERC study groups still need relatively accurate firm flow transfers to produce meaningful assessments.

The EC has tasked the FFTF with identifying firm flow modeling issues and generating conclusions and recommendations for their mitigation.

# Responsible SERC Group(s)

The firm flow issue was identified initially at the 2013 SERC summer regional studies meetings. The SERC Reliability Risk Team (RRT) formally documented this concern in the 2015 RRT report. The EC formed the FFTF at its October 2016 meeting.

## Study Contributors

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| --- |
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| Jack Armstrong  | Duke |
| Bob Pierce  | Duke |
| Bill Hamilton  | Entergy |
| David Duebner  | MISO |
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| Alex Worcester | PJM |

## Meeting Summaries

The FFTF met three times including its kick off meeting on November 7, 2016. While formal meeting minutes are available for each meeting, the following is a summary of items addressed during each meeting.

**November 7, 2016**

1. Issues in capturing adequate firm flow information:
* What firm transmission services should be modeled, and at what level (*e.g.*, how do summer, winter, and light load cases vary when there is only one reservation value for the year?)
* When and how to model partial paths
* How to validate and verify if certain transactions were modeled
* OASIS tool not sufficient for use in transmission planning
* Steps to take when core models are not reflective of expected transactions
* Training needs for a consistent strategy for stakeholders
1. Further action from NAESB will require SERC committee or staff justification.
2. Report needed to capture improvements made and provide a plan forward.

**February 23, 2017:**

Report content to include:

* History;
* Implications to LTSG/NTSG and MMWG;
* NAESB discussions;
* PC assessment of Issue
* MOD 32 and 33 Impact;
* Summary and recommendations;
* Report draft by March 31; 2nd draft by April 30.

**March 3, 2017:**

* Preliminary report review
* SERC PC members to provide their entities’ process for firm flow reservation/modeling.

# Firm Flow Task Force Status Report

## Background

In the 2013-2014 time frame, the North Carolina Planning Collaborative and PJM (MISO was also involved administratively) performed a joint study at the request of the North Carolina Utilities Commission to evaluate potential congestion and reliability impacts on the Duke Energy Progress and Carolinas systems. This request was due to an unprecedented amount of external capacity (about 7,700 MW) clearing in PJM’s Reliability Pricing Model Base Residual Auction for the delivery year 2016/2017 (June 1– May 31). The study revealed that several thousand megawatts of transactions from the Base Residual Auction were not included within the Multi-regional Modeling working group (MMWG) models of the Eastern Interconnection (EI). These omissions could have loop flow implications for the entities in the areas of focus. The study participants contacted PJM and the LTSG members of MISO to better identify firm transmission services and ensure better MMWG model accuracy. The SERC liaison to the MMWG and SERC study group members worked together to correct the interchange issues related to the omitted transfers.

As a result, the RRT identified the accurate modeling of firm interchange in the MMWG as a significant SERC planning risk; the Regional Studies Steering Committee (RSSC) took an action item to assess the problem.

After the summer 2015 RSSC meeting, representatives from the LTSG and NAESB Working Group presented this problem to NAESB Wholesale Electric Quadrant (WEQ) Open Access Same-time Information Systems (OASIS) subcommittee representatives in an effort to see if potential OASIS modifications could decrease the number of transactions excluded from the models.

At the October 2016 meeting, the EC generated an action item for the RSSC to form a task force to identify and address modeling issues of firm interchange in the long-term and near-term study models. The RSSC formed the FFTF, which held its initial meeting on November 7, 2016.

## PC Assessment of the Firm Flow Issues

Actions have been taken to improve the coordination of firm flows in assessment models. The MMWG Procedure Manual now contains the following direction on coordination of interchange for model development:

*“Interchange coordination must be performed to ensure generation resources are allocated to the appropriate Balancing Authority Areas (BAA) and therefore, generation in each BAA is accurately dispatched to meet the BAA’s load plus losses. The interchange coordination should consider all transactions that have confirmed annual firm transmission service (for one year or longer, including consideration of rollover rights) along the entire path from source to sink and have a firm energy contract for the resource. The amount of interchange in any given year/season may not utilize the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the expected and agreed upon firm capacity expected to serve load. For clarity and understanding, the table should include information identifying the source generation and the associated transmission service request numbers. It is important that the area where generation resources are expected to be sinking verify that the transfer is properly modeled to ensure the area’s load will be served reliably. Omission of such firm transfers can create both transmission system reliability concerns, as well as resource planning issues. Transmission system reliability concerns are created because the models, when used for evaluation of transmission service requests and planning studies, would not contain the flows associated with these firm transfers that are expected to occur in real time. Resource planning issues, such as double counting of resources and incorrect utilization or dispatch priority of generation, may also not be recognized.*

*Generation resources and transmission service are frequently not contracted for the entire ten years that the models are developed for. Coordination of interchange for these cases will require some judgment because all of the required elements (generation contract, source to sink transmission service) may not be available. Information provided by LSE’s resource forecasts and plans, rollover/renewal of transmission service, and duration of energy contracts should be considered when interchange coordination, particularly in the out-year cases, is being performed.”*

The manual’s instructions were improved in 2015 to encourage better interchange coordination. The required involvement of Planning Coordinators in model development under MOD-032 has brought better focus and overall awareness to interchange coordination. Better tools for tracking coordination of TSR’s have been created and an improvement in known resource plans represented in the models has been noted.

There is no effective way to ensure that all OASIS transactions have been included in the models, nor is there an effective metric to measure the performance of the coordination effort. NERC Reliability Standards require model validation and Event Analysis efforts, which offer some assessment of the quality of coordination.

As explained in the MMWG Procedure Manual, judgment on the part of participants performing the coordination is required on a variety of issues. Additional information is available to Transmission Planners and Planning Coordinators to better support the decisions they must make. FERC’s Pro Forma Open Access Transmission Tariff (pro forma OATT) sections 29.2 and 31.6 require Network Customers to provide a 10-year load and resource forecast. This information, coupled with OASIS reservations, should provide a better picture of what interchange needs to be modeled. FERC Order 890, Appendix B: Pro Forma Open Access Transmission Tariff, section 29.2 (v) (pp 102-103) states

*“For each off-system Network Resource, such description shall include:*

*• Identification of the Network Resource as an off-system resource*

*• Amount of power to which the customer has rights*

*• Identification of the control area from which the power will originate*

*• Delivery point(s) to the Transmission Provider’s Transmission System*

*• Transmission arrangements on the external transmission system(s)*

*• Operating restrictions:*

*− Any periods of restricted operations throughout the year*

*− Maintenance schedules*

*− Minimum loading level of unit*

*− Normal operating level of unit*

*− Any must-run unit designations required for system reliability or contract reasons*

*• Approximate variable generating cost ($/MWH) for re-dispatch computations”*

Although not explicitly called for in the OATT, knowledge of the network customer’s priority for specified resources allows for development of resource priority order. This defines the resources required to serve that customer’s load at any level—light load through peak load—for modeling. Transmission Planners and Planning Coordinators should become familiar with this OATT requirement and acquire this information as part of their annual model development and interchange coordination efforts. Establishing the relationship between projected load in a Balancing Authority Area and the priority of resources acquired to serve that load should allow Transmission Planners and Planning Coordinators to verify models include sufficient and appropriate resources to serve the load in their area of responsibility.

This effort has focused on improving planning models; however, it is important to note that economic power transfers occur in real-time. Therefore, a planning model with firm transactions modeled and minimal economic transactions modeled, will not likely match actual historical performance in real-time. We plan for firm system use. Reliability planning models intentionally do not contain economic transactions.

## Accounting for Transactions by SERC PCs

To clarify the differences in Planning Coordinator practices in the SERC Region, sections 3.3.1 through 3.3.13 summarize the majority of the SERC Region Planning Coordinators’ practices for including transactions in their PC load flow model.

### Alcoa Power Generating, Inc. – Tapoco Division

Alcoa Power Generating, Inc. – Tapoco Division (Tapoco) has no generation.

Tapoco contracts power from an outside source (*e.g.,* TVA) to service the load at Tapoco. The power transfer is represented in each SERC case and MMWG case.

### Associated Electric Cooperative Inc.

Associated Electric Cooperative Inc. (AECI) does not differentiate between the criteria used for internal or Regional model building processes and that used for the MMWG model building effort. AECI’s interchange mainly consists of

* Long term hydro or wind allocation capacity contracts, and
* Transactions to serve non-native load on the AECI system (*e.g.*, municipal loads not members of AECI).

The amount of interchange for a year/season represents the expected and agreed upon firm capacity to serve load, and thus the resulting model would contain the flows associated with these firm transfers that are expected to occur in real time.

### Cube Hydro Carolinas LLC – Yadkin Division

Cube Hydro Carolinas LLC – Yadkin Division (Yadkin) has no firm contracts for power.

Yadkin would represent any firm yearly contract they had in the SERC and MMWG cases.

### Duke Energy Carolinas

Duke Energy Carolinas (DEC) bases SERC models of the DEC interchange on the following guidelines.

As mandated by the OATT, each Load Serving Entity (LSE) must provide projected load and resource forecasts. DEC uses those resource assumptions to determine which resources are needed to meet the modeled load and whether or not those resources are fully utilized. The value of the interchange is set in accordance with section 6.2.B of the MMWG Procedural Manual. Each LSE reviews the modeling assumptions for DEC’s internal models; those assumptions serve as the starting point for the SERC models.

In order to determine interchange for a specific year/season, DEC utilizes a combination of load forecasts and resource assumptions (available resources and resource priority) for each LSE on the DEC system. Because generation resources and transmission service reservations are not always in place years in advance, determining interchange reflected in the models may require engineering judgment. Unless otherwise specified by an LSE, DEC assumes rollover rights for all transmission service reservations requested and granted for a period of at least five years.

The inclusion of inter-area transfers in the SERC models requires either 1) confirmed firm transmission service (and a firm energy contract) on the path for a period of at least one year or 2) an agreement between areas on the path to model a transaction based on available information. In addition to agreeing whether to model a transaction or not, the areas on the path must also agree on the value at which the transfer is modeled and the duration for which the transfer is modeled. The value and duration of the transfer to be modeled will not exceed the lowest/least value/duration for each area on the path.

As appropriate, DEC includes reservation numbers and other pertinent information for each transaction.

### Duke Energy Progress

Duke Energy Progress (DEP) does not differentiate between the criteria it uses for any internal or Regional model building processes and what it uses for the MMWG model building effort. DEP uses the following criteria to determine if a transaction can be or should be modeled.

First, all transactions must have confirmed annual firm transmission service, for one year or longer, along the entire path from source to sink.

Second, a firm energy contract for the resource must be in place. The amount of interchange in any given year/season is not necessarily the same as the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the agreed upon firm capacity expected to serve load, and thus the resulting model would contain the flows associated with these firm transfers expected to occur in real time.

Third, all parties involved in the transfer must agree to the dates and transaction value. If transmission service reservation dates do not line up along the full path, then only the dates for which the reservations overlap will be modeled. This is also true when considering rollover rights. If there are different amounts on either side, then the lower amount becomes the coordinated value.

In recent years, the DEP Balancing Authority Areas (BAAs) have shown the following transactions and interchange schedules in the MMWG series, in no particular order:

* Exports to and from DEC are coordinated between DEP and DEC each year.
* Exports to and from PJM are coordinated each year between DEP and all affected parties (PJM, AEP, DVP).
* Imports from TVA are coordinated between DEP and TVA each year.
* Imports from SC are coordinated between DEP and SC each year.
* Transfers between the DEP BAAs are reviewed each year and adjusted based on expected transfers.

Because generation resources and transmission service are frequently not contracted for the entire ten years of models in a series, interchange coordination in some cases may require engineering judgment. This is due to the inherent unavailability of certain key elements, such as confirmed transmission service or a firm energy contract. Resource forecasts and plans, rollover/renewal of transmission service, and duration of energy contracts are all considered when coordinating interchange in the out-year cases. In general, DEP assumes rollover rights for all transmission service requested and granted for a period of at least five years.

As appropriate, DEP includes reservation numbers and other pertinent information for each transaction.

### Louisville Gas & Electric

Louisville Gas and Electric and Kentucky Utilities Energy (LG&E and KU) utilizes the data requested and received yearly from each Resource Planner (in support of MOD-032) for any internal model building processes and for Regional and MMWG model building efforts. LG&E and KU uses the following criteria to determine if a transaction can be or should be modeled.

Firm transmission service reservations that are annual, confirmed, and have a contract period of five or more years (or have rollover rights) are to be included in the models. The amount of interchange in any given year/season is not necessarily the same as the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the expected and agreed upon firm capacity to serve load, and thus the resulting model would contain the flows associated with the firm transfers expected to occur in real time.

For internal model building, LG&E and KU utilizes the MOD-032 data requested and received. If there are resource deficiencies for LSE loads on the LG&E and KU system, determination of the appropriate resource to cover the deficiency is made on a case-by-case basis.

For MMWG and Regional model building, LG&E and KU coordinates with the other PC party involved in the transfer to agree to the transaction dates and values. If transmission service reservation dates do not line up along the full path, then only the dates and values for which the reservations overlap will be modeled. This is also true when considering rollover rights. If there are resource deficiencies for LSE loads on the LG&E and KU system, determination of the appropriate resource to cover the deficiency is made on a case-by-case basis.

As appropriate, LG&E and KU includes reservation numbers and other pertinent information in the spreadsheet’s comment cells for each transaction.

### Midcontinent Independent System Operator

The Midcontinent Independent System Operator (MISO) internal model development process uses the same process used by the Eastern Interconnection Reliability Assessment Group Multi-regional Modeling Working Group (ERAG MMWG) process for decades. Parties submit their transactions and MISO reconciles them. Both buyers and sellers will need to submit the same transactions. MISO considers them as confirmed transactions when both parties agree on the value. It is possible to miss a transaction if both parties fail to submit a transaction.

MISO requests OASIS reference numbers to go with each transaction. Assigning OASIS reference numbers with each transaction is effective for tracking. However, where MISO has a transaction with PJM, the challenge is to match MISO reference number with a PJM reference number. The process is different when the transaction goes to an external party. In that case, MISO would go over them with PJM and SPP to ensure all Planning Coordinators agree on what is modeled. MISO does not model partial path transactions.

When there is not an exact match, MISO will maximize the firm, agreed upon, transaction amount based on the reservations that are available on each side. For example, if there is a 1000 MW transaction from MISO to PJM (from MISO’s perspective), designated as a 1100 MW transaction by PJM, the confirmed transaction would be 1000 MW, not 1100 MW.

To initiate the process of submitting transactions, MISO provides the historic transactions to its entities. Submitted transactions are checked with OASIS.

Transmission Service Requests (TSRs) with long reservation duration may have rollover rights. MISO’s review of OASIS information assumes TSRs with rollover rights may continue with the reservation after the initial reservation period. MISO treats TSRs that have rollover rights like other reservations, but both buying and selling parties must agree to modeling of the TSR in the planning horizon. MISO allows modeling of TSRs that may be in contention for extension of service using rollover rights.

### PowerSouth

PowerSouth models transactions that are considered firm and have full path contracts of one year or longer. The amount modeled will be the full amount appropriate for the year or season, or the transaction may be reduced to the amount that is available from the source.

Full path means there must be transmission service on both sides of the interface from the source generator to the sinking LSE.

The amount of interchange should represent the expected and agreed upon firm capacity required to serve the load.

### PJM

PJM uses different criteria for their regional process Regional Transmission Expansion Plan (RTEP) than for the MMWG model building effort. PJM’s internal planning cases (RTEP) are rights-based and include all transmission service granted by PJM, independent of confirmation from the other party or parties involved in the transfer.

Transactions are only modeled in MMWG if all parties involved in the transaction path agree to the dates and transaction value. If there are different values on either side they are coordinated at the lower value, as explained above in the MISO description. Additionally, if transmission service reservation dates do not line up along the full path, only the dates for which the reservations overlap will be modeled.

Unlike MISO’s process, PJM does not consider transmission service from one PJM Transmission Owner to another PJM Transmission Owner. PJM operates as a single Balancing Authority, and as such transmission service is scheduled to and from PJM. To represent this on the MMWG interchange table, PJM uses Area 225 as the source/sink for all PJM transactions. Area 225 represents the Mid-Atlantic 500 kV network area as “PJM Classic.” Every other PJM area has a line as an intra-PJM transaction in the MMWG interchange spreadsheet; calculated as a result of the pool-wide security constrained economic dispatch (SCED)

For the purpose of MMWG, PJM includes all granted OASIS reservations in the interchange table, with their reservation number and MW values identified in the comments, whether coordinated as full path transactions or not. Those reservations that have not obtained a full path reservation will have ‘0” interchange modeled for each study case. This information may be of interest as it shows what interchange may be added to the model if the other portion(s) of the path were to be confirmed.

PJM assumes rollover rights for all transmission service requested and granted for a period of five years. It has been observed in the MMWG interchange coordination process that a reservation may have rollover rights on one side, but only have a granted reservation for a shorter period (less than 5 years) on the other side. In this case, the interchange is only modeled for the years in which the reservations overlap.

PJM conducts the Base Residual Auction (BRA) annually to procure capacity resources three years in the future. A small portion of this capacity may be units external to the PJM footprint. In order to participate in the auction, a unit must have applied for transmission service to PJM, but that transmission service does not need to be granted at the time of the auction. Additionally, through annual incremental capacity auctions, an external resource may buy themselves out of their capacity commitment to PJM, whether transmission service has been secured or not. As such, results of the BRA are of limited use in developing the interchange schedules.

###  South Carolina Electric and Gas

South Carolina Electric and Gas (SCE&G) does not differentiate between the criteria it uses for internal or Regional model building processes and what it uses for the MMWG model building effort. SCE&G uses the following criteria to determine if a transaction can be or should be modeled.

First, all transactions must have confirmed annual firm transmission service, for one year or longer, along the entire path from source to sink. Second, a firm energy contract for the resource must be in place. The amount of interchange in any given year/season is not necessarily the same as the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the expected and agreed upon firm capacity to serve load, and thus the resulting model would contain the flows associated with these firm transfers expected to occur in real time. Third, all parties involved in the transfer must agree to the dates and transaction capacity.

In recent years, the SCE&G Balancing Authority Area (BAA) has shown the following transactions and interchange schedules in the MMWG series, in no particular order:

* Imports from South Eastern Power Administration’s (SEPA's) Clarks Hill/Strom Thurmond system, modeled at fixed contractual values during conditions when their hydro is dispatched
* Firm imports from South Carolina Public Service Authority (SCPSA) to numerous delivery points on the SCE&G system
* Grandfathered exports to SCPSA for their share of the VC Summer Nuclear projects
* Chappells, an individual delivery point in Duke Energy Carolinas BAA served by SCE&G, as native load
* Firm fixed capacity and energy sale from SCPSA to SCE&G.

Because generation resources and transmission service frequently are not contracted for the entire ten years modeled in a study case, interchange coordination may require engineering judgment. This is due to the inherent unavailability of certain key elements such as confirmed transmission service or a firm energy contract. Resource forecasts and plans, rollover/renewal of transmission service, and duration of energy contracts are all considered when coordinating interchange in the out-year cases. In general, SCE&G assumes rollover rights for all transmission service requested and granted for a period of at least five years.

As appropriate, SCE&G includes reservation numbers and other pertinent information for each transaction.

### South Carolina Public Service Authority

South Carolina Public Service Authority (SCPSA) uses the same methods for internal and Regional model building processes as the methods used for the MMWG model building effort. SCPSA uses the following criteria to determine if a transaction or contract should be modeled and built into the SERC interchange data for the load flow base cases:

* Each interchange transaction should be reviewed during/prior to the SERC database update process with SCPSA’s internal Transmission Services to verify the following:
* Transaction amount and timeframe
* Transaction type of firm or non-firm: typically only firm transactions are used in the interchange data
* Long term contract: amount and timeframe
* All transactions and contracts should have designated source and sink areas.
* All transactions and contracts should have a common name that’s understood by both source and sink areas.

All source and sink areas or companies involved in the transactions must agree to both the transaction values and the dates or the applicable seasons for the load flow cases of interest. SCPSA’s transmission planners coordinate with other companies’ transmission planners or planning coordinators to achieve this.

In recent years, SCPSA has shown the following interchange schedules in the MMWG/SERC LTSG series (not an all-inclusive list):

* Exports to Duke Energy Carolinas of the New Hampshire Electric Cooperative (NHEC) load
* Exports to Duke Energy Carolinas of the Piedmont Municipal Power Agency (PMPA) load
* Exports to Duke Energy Carolinas of the Seneca load
* Imports from Duke Energy Carolinas of the Haile Gold Mine load
* Exports to Southern Company of the AMEA load
* Import from SCE&G of the V.C. Summer generation (one third of the plant output is owned by SCPSA)
* Exports to SCE&G of the Charleston Navy Yard load and NHEC load
* Imports from South Eastern Power Administration (SEPA) at Russell and Thurmond

The term of the transmission service may not be contracted for the entire ten years series of models included, therefore interchange coordination may require engineering judgment. The SCPSA transmission planners coordinate with external transmission planners or planning coordinators for any judgment. Planners consider resource forecasts, rollover/renewal of transmission service, and duration of energy contracts when coordinating interchange in the future year cases where firm transactions or contracts are not scheduled.

###  Southern Company

Southern Company does not differentiate between the criteria it uses for internal base case model building processes and that used for the MMWG model building effort.

There are several criteria that a transaction must meet to be modeled in the Southern Company planning models. Generally, all transactions that have a long-term firm, full path reservation, and an available source, will be modeled. The following provides some detail on each of these criteria:

* Long-term firm transmission service is defined as transmission service with a length of at least one year or more. If the transmission service is for five years or greater, rollover rights shall be preserved throughout the planning horizon.
* Full path designation indicates there must be transmission service on both sides of the interface, from the source generator to the sinking load serving entity.
* The source generator of the transaction must be available and able to provide the capacity needed for the reservation.

Before any long-term firm, full path transaction is modeled, all affected Transmission Providers along the path of the transaction must agree that the transaction meets the above listed criteria.

The amount modeled will be the full reservation amount, unless all affected Transmission Providers agree upon another value. For instance, if the source generator does not have enough capacity to facilitate the full contract amount, the transaction will be reduced to the amount available from the source.

Southern Company has attempted to include OASIS reservation numbers and/or source generators in the description field of the interchange spreadsheet.

### Tennessee Valley Authority (TVA)

TVA does not differentiate between the criteria it uses for any internal or Regional model building processes and what it uses for the MMWG model building effort. TVA uses the following criteria to determine if a transaction can be or should be modeled.

*First*, all transactions must have confirmed annual firm transmission service, for one year or longer, along the entire path from source to sink.

*Second*, a firm energy contract for the resource must be in place. The amount of interchange in any given year/season is not necessarily the same as the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the expected and agreed upon firm capacity to serve load; thus, the resulting model would contain the flows associated with these firm transfers that are expected to occur in real time.

*Third*, all parties involved in the transfer must agree to the dates and transaction value. If transmission service reservation dates do not line up along the full path, then only the dates for which the reservations overlap will be modeled. This is also true when considering rollover rights. If there are different amounts on either side, then the lower amount becomes the coordinated value.

In recent years, the TVA Balancing Authority Area (BAA) has shown the following transactions and interchange schedules in the MMWG series, in no particular order:

* Exports from SEPA's Cumberland River system, modeled at fixed contractual values during conditions when they dispatch hydro. Receiving entities include BREC, EKPC, CPLW, SMEPA, MEAM (in Entergy), MDEA (in Cleco), SIPC, KMPA (in LGEE), KyMEA (also in LGEE), and OMUA.
* Modeled wind farm power purchase agreements from ComEd (Cayuga Ridge and Bishop Hill, both at full contractual values in all years/seasons) and from ALTW (Pioneer Prairie, at partial contractual values in varying years/seasons). TVA has several more firm energy contracts for wind from other resources; however, due to the various industry positions on how to appropriately dispatch and model wind farm output, TVA has had limited success in its efforts to coordinate and model these imports.
* Native loads served by a neighboring transmission system, including individual TVA delivery point loads on SOCO, LGEE, and Entergy, and SOCO delivery point loads on TVA. TVA loads on LGEE and Entergy use the ‘tie lines + loads” solution method to achieve interchange, rather than by scheduling them as transactions.
* Choctaw, which is a generation asset owned by NRG and modeled in the TVA BAA, dispatched and exported to LAGN (also owned by NRG) for the entire plant output.
* Exports to Alcoa, a TVA industrial customer load in TAP.
* Imports from Brookfield in SMT (the remaining non-firm portion of their dispatched hydro).

Because generation resources and transmission service frequently are not contracted for the entire ten years of models in a series, interchange coordination in some cases may require engineering judgment. This is due to the inherent unavailability of certain key elements such as confirmed transmission service or a firm energy contract. Planners consider resource forecasts and plans, rollover/renewal of transmission service, and duration of energy contracts when coordinating interchange in the out-year cases. TVA assumes rollover rights for all transmission service requested and granted for a period of at least five years.

As appropriate, TVA includes reservation numbers and other pertinent information each transaction.

# MOD-032 Impact

With the July 1, 2016 MOD-032 implementation, Planning Coordinators are expected to coordinate with each other to model firm transactions in building ERAG models. This should provide an additional layer of coordination among transacting parties.

# Conclusions & Recommendations

While characterizing firm flows within the SERC Region is challenging, inadequate coordination may be responsible for studies not accurately addressing TSR’s. While assessments/studies are never exact representations of the system, they should represent them closely enough to allow generally accurate assessment conclusions and recommendations.

General FFTF conclusions/recommendations include:

1. The FFTF recognizes that all PCs currently make significant efforts to model expected firm flows and thus generate valid SERC assessments.
2. Actual system flows contain economic power transactions. Therefore, it is likely that firm flows in planning models will not match the historic flows on the system that contain both firm and economic transactions.
3. Entities’ coordination of transfers should be extensive enough to provide good approximation of actual firm transfers. Entity procedures should ensure that this occurs. RSSC action may be needed if entity coordination is not deemed adequate.
4. Variations between PC internal processes/models and those used for MMWG models are notable. PCs with such variations should ensure that models forwarded to the MMWG are equally valid and effective as those transfer models/processes used internally. Ideally, these models/processes should be identical. If not, technical justification for deviations should be provided to the RSSC.
5. While the MMWG procedural manual now includes FFTF associated changes, report findings should be communicated to the ERAG management committee, the MMWG, and to the NERC System Analysis and Modeling Subcommittee (SAMS).
6. The firm-flow issue was identified when study models differed significantly from confirmed OASIS transactions. The FFTF believes that the recent focus has improved coordination. To prevent reoccurrence, the SERC RSSC should determine how to maintain the coordination focus, and how frequently to make checks/reviews.

The FFTF recommends that the RSSC review the above conclusions and recommendations and develop a follow-up plan.

# References

* MMWG Procedure Manual
* FERC Order 890, Appendix B: Pro Forma Open Access Transmission Tariff, section 29.2 (v)
* NERC MOD-032.1 – Data for Power System Modeling and Analysis

# Revision History

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| --- | --- | --- | --- |
| **Revision** | **Date** | **Originator** | **Comments** |
| 0 | 9/11/17 | FFTF |  |
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