



FTR/ARR Education 2014/2015 Annual Modeling

FTRSTF
October 23, 2014

Simultaneous Feasibility Test

PJM Tariff and OA

7.5 Simultaneous Feasibility.....The goal of the simultaneous feasibility determination shall be to **ensure that there are sufficient revenues from Transmission Congestion Charges to satisfy all Financial Transmission Rights obligations for the auction period** under expected conditions and to ensure that there are sufficient revenues from the annual Financial Transmission Right Auction to satisfy all Auction Revenue Rights obligations.

PJM Manual 6: 9.1 Simultaneous Feasibility Test Overview

Inputs to the SFT model include:

- all newly-requested FTRs and ARRs for the study period,
- all existing FTRs and ARRs for the study period,
- transmission line outage schedules, thermal operating limits for transmission lines, that are expected to last for 2 months or more will be included in the determination of simultaneous feasibility for the Annual PJM FTR Auction and outages of five days or more shall be included in the determination of simultaneous feasibility for monthly PJM FTR auctions **as well as outages of shorter duration that are determined through PJM analysis to be likely to cause FTR revenue inadequacy if not modeled**. Simultaneous Feasibility determinations shall take into account outages based on reasonable assumptions about configuration and availability of transmission capability.
- PJM reactive interface limits that are valid for the study period, and
- estimates of uncompensated power flow circulation through the PJM Control Area from other Control Areas.

2014/2015 Annual ARR/FTR Model included the following:

- Base network model
- Transmission outages
- Updated uncompensated flow (loop flow)
- Proxy interfaces for reactive support
- Single circuit breaker limiting line ratings
- Thermal surrogates for modeled transmission outages if appropriate (i.e. Localized voltage violations)
- NERC Alert impacted facilities derates
- Additional Markets and Reliability facilities for 6/1/14
- M2M flowgates

2014/2015 Annual Modeling: Transmission Outages

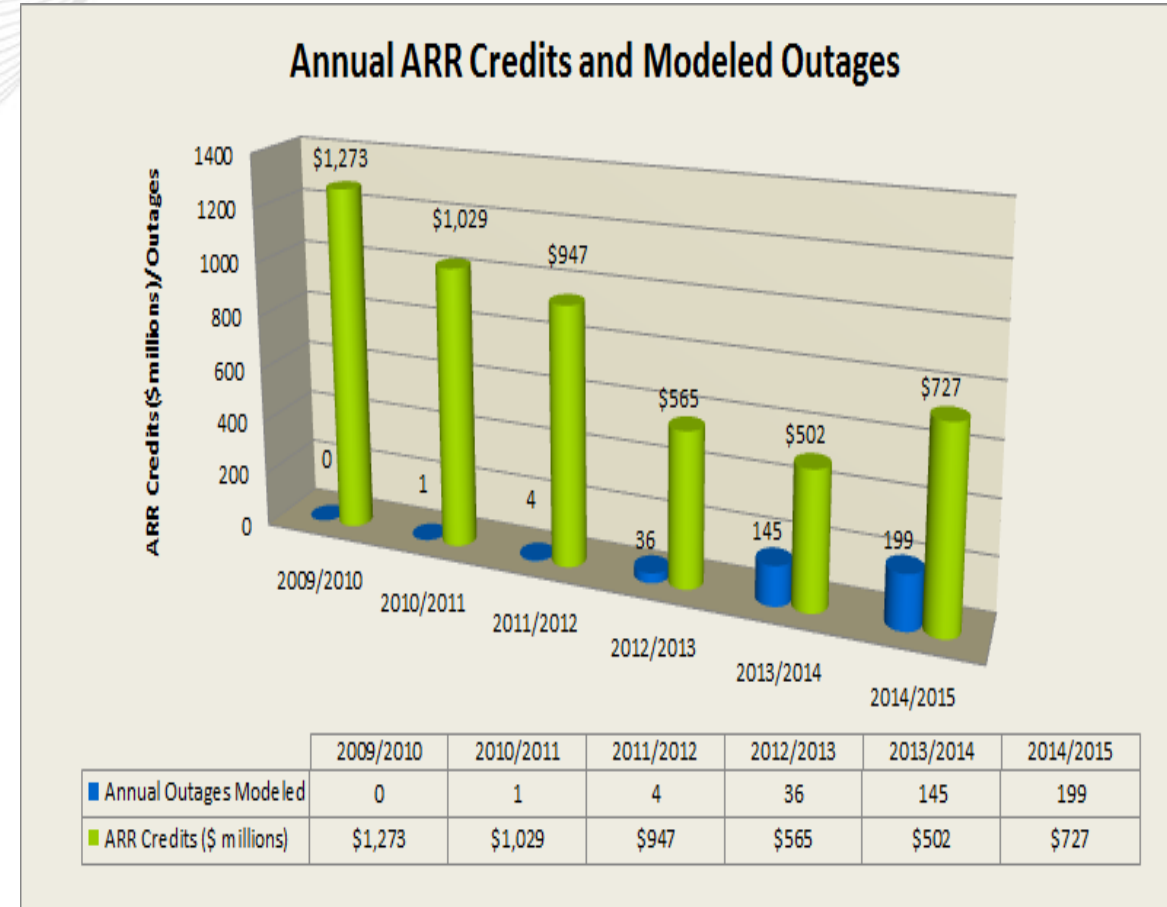
Transmission Outage Modeling

- Detailed description at below link

<http://pjm.com/~media/markets-ops/ftr/annual-ftr-auction/2014-2015/2014-2015-annual-outage-modeling.ashx>

Outage Selection Procedure:

- Initial outage list pulled from PJM OASIS
- Outages identified that are occurring during the period of the Annual ARR allocation and FTR auction which do not occur simultaneously. Outages often occur during different times of the year and would not be approved to occur simultaneously because they would cause reliability concerns.
- Review all transmission outages of interest with the PJM Interconnection and Operations group as well as Transmission Owners for the likelihood of the outages actually occurring.
- Identify transmission outages that could have a large impact on congestion and possibly FTR revenue adequacy.
- PJM determines the actual outages that will be placed in the optimization program and posts to the FTR web page.



Loop Flow

- External flow contribution on the PJM system.
- Flow contribution from all external areas including MISO.
- Impacts all PJM facilities including flowgates.

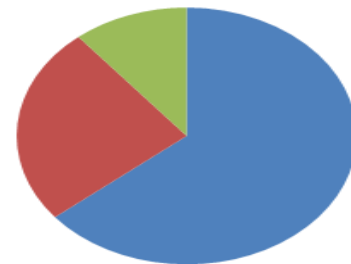
Flowgate Modeling (PJM-MISO)

- Flowgates modeled as part of Joint Operating Agreement between PJM and MISO.
- FTR and Day-ahead markets limit flow on coordinated flowgates based on entitlements on each market.
- Firm Flow Entitlement (FFE) is representative of the loop flow contribution from non monitoring entity.
 - PJM FFE is representative of PJM loop flow on MISO system.
 - MISO FFE is representative of MISO loop flow on PJM system.

Loop Flow Modeling

Type	FTR	Day-Ahead	Real-Time
Method	Prediction of Loop Flow and External Wind	Prediction of Loop Flow and External Wind	Actual
Type	One model for entire year	Updated throughout year as necessary	Actual
Inputs	Tie flows to/from external areas	Tie flows to/from external areas	Actual
Program Utilized	PSS/e and TARA program utilized to determine location and quantity of injection and withdrawal MWs	PSS/e and TARA program utilized to determine location and quantity of injection and withdrawal MWs	N/A

Example of Modeled PJM Flow Contributions



- PJM Market Flow
- MISO Loop Flow
- Non MISO Loop flow