

# Long Term Transmission Service Modeling and Studies

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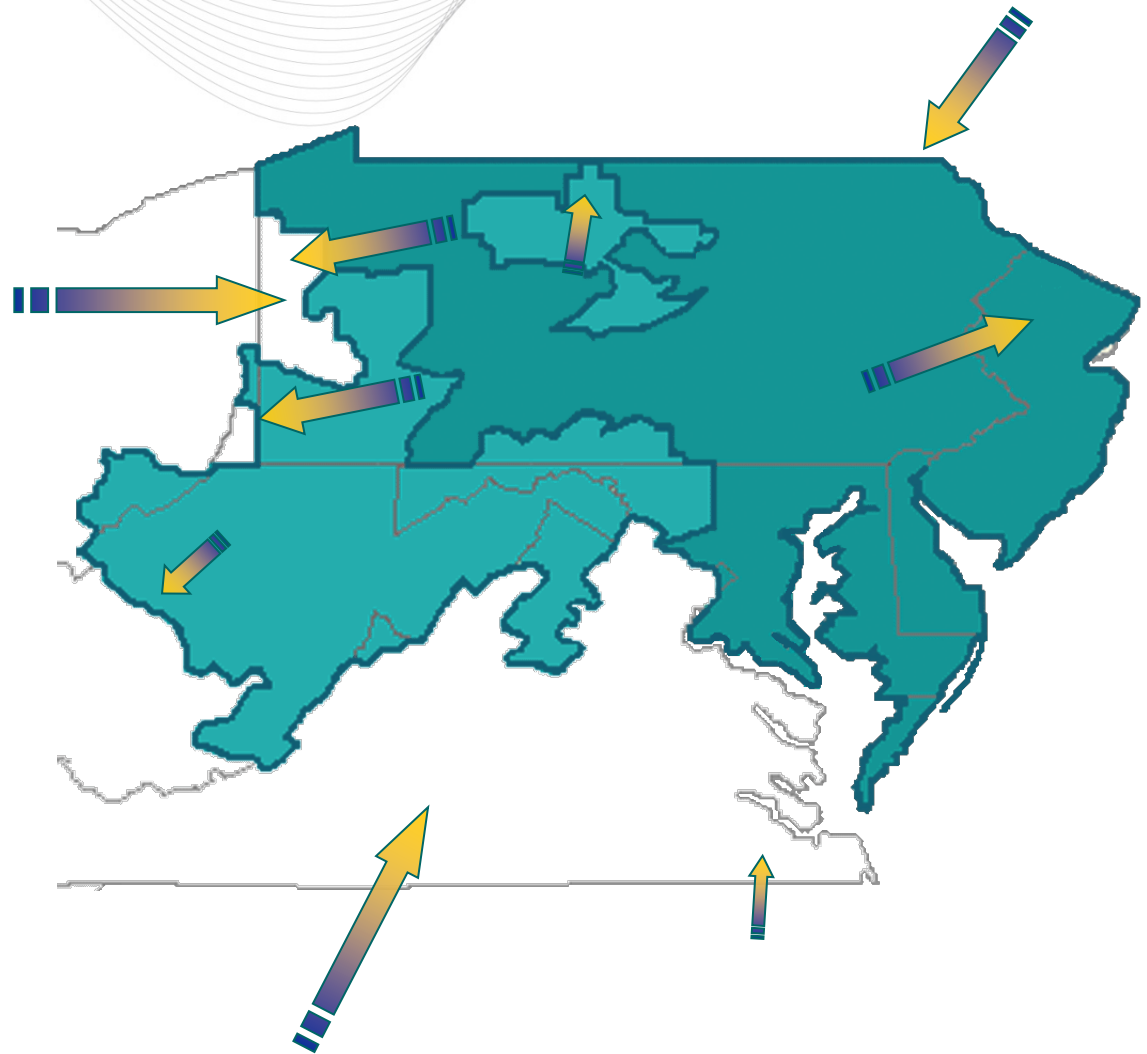
- Customers enter through the PJM OASIS requesting the service for a specific time period
- PJM determines if the time period meets roll over requirements and then places the request in the PJM New Services Queue for study

## Why do customers wish to obtain this service?

- Network External Designated Service is required in order to participate in PJM's capacity market (RPM)
- Point to Point Service can be used to serve load

- New year cases have topology based on previous year
- Transmission Owners provide additional changes for supplemental items as well as additional topology corrections
- PJM implements an interchange table based on confirmed firm Transmission Service reservations
  - Defines the flows into and out of PJM at the border

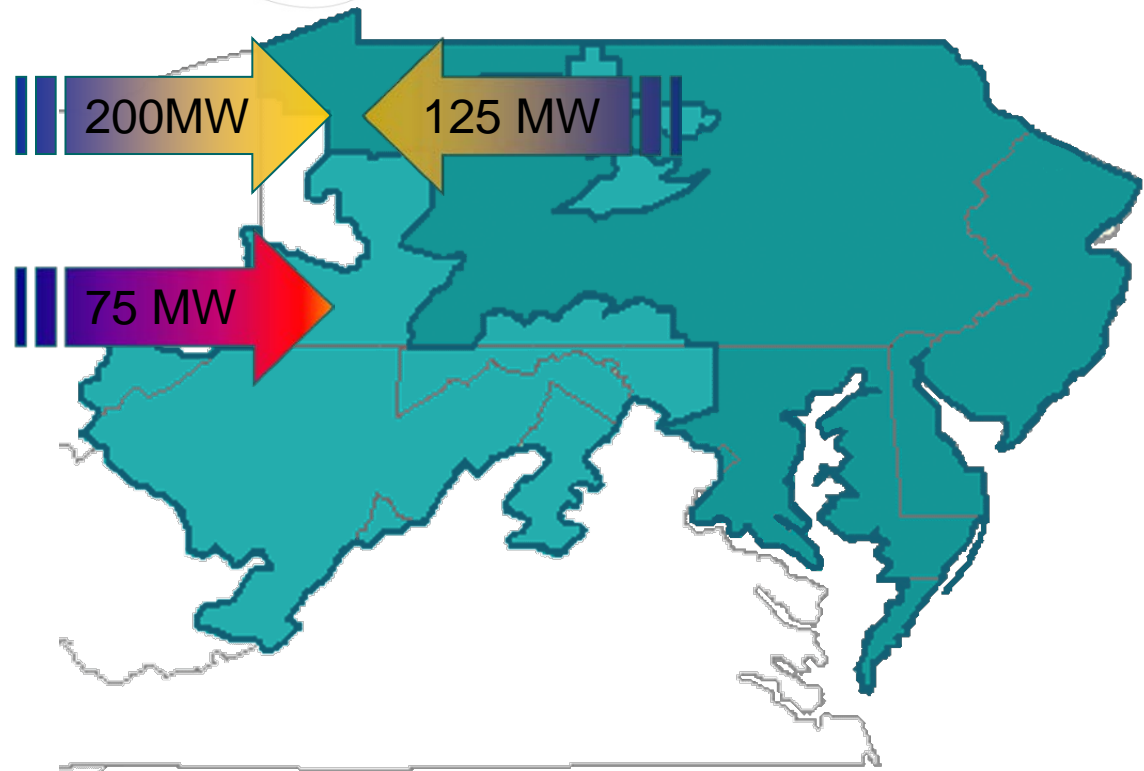
- Transactions are first individually identified
- Transactions for individual paths on OASIS are then netted
- Resulting interchange is the sum of the flows along any path
- Resulting interchange is modeled in the case



Example:

On a single path, e.g.:  
AMIL-PJM, one customer  
has a reservation for  
200MW import into PJM  
while a second customer  
has a 125MW export from  
PJM

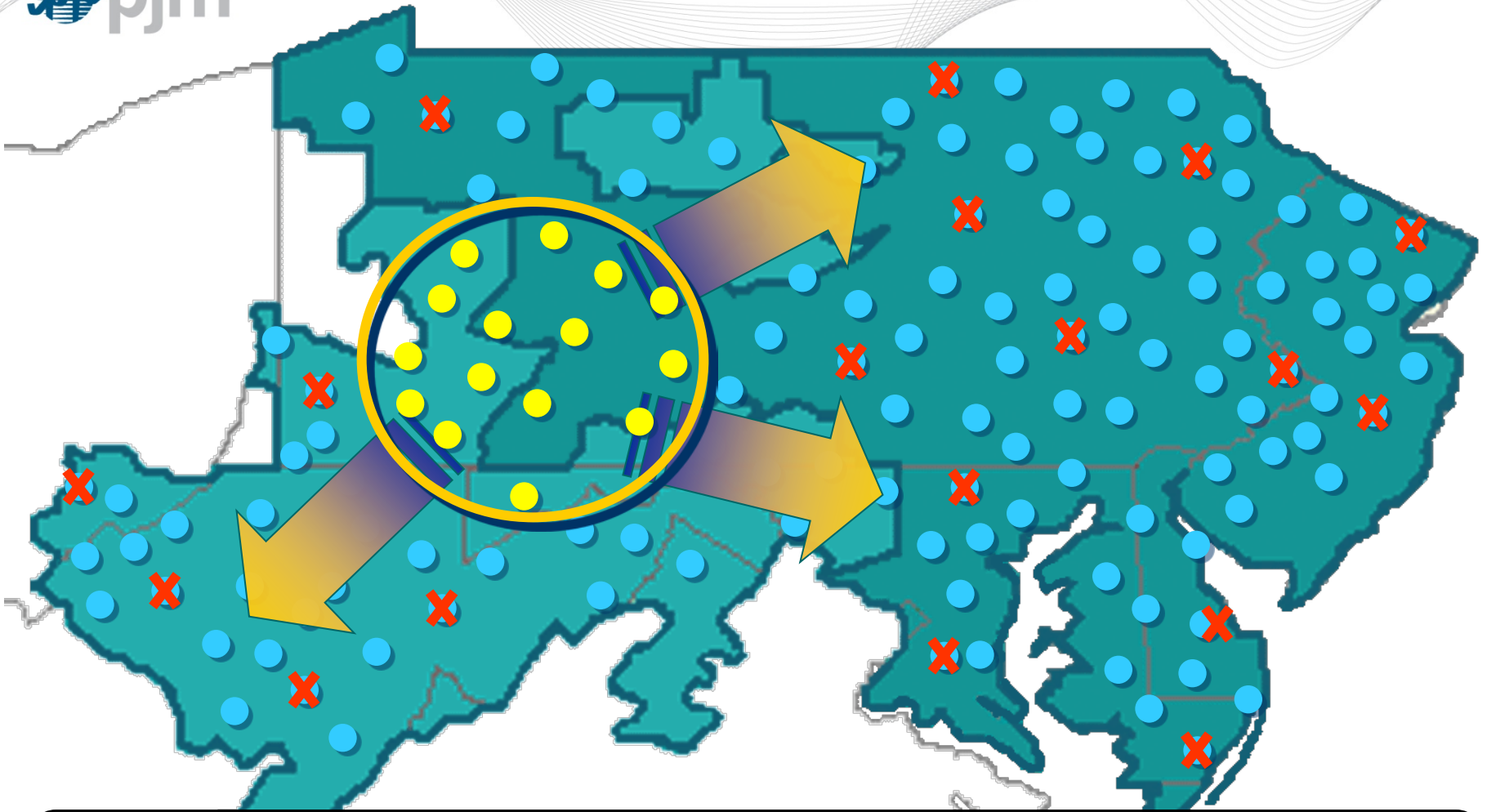
The interchange is then  
netted such that a  
representation of 75MW is  
imported at the border



- ATC & ASTFC
- Initial Study
  - Monitor PJM and external areas
    - External areas screened for 3% distribution factor
- System Impact Study
  - Monitor PJM and external areas
    - External areas screened for 3% distribution factor
  - Determine need for short circuit and stability studies
    - Likely not necessary depending on proximity to PJM border

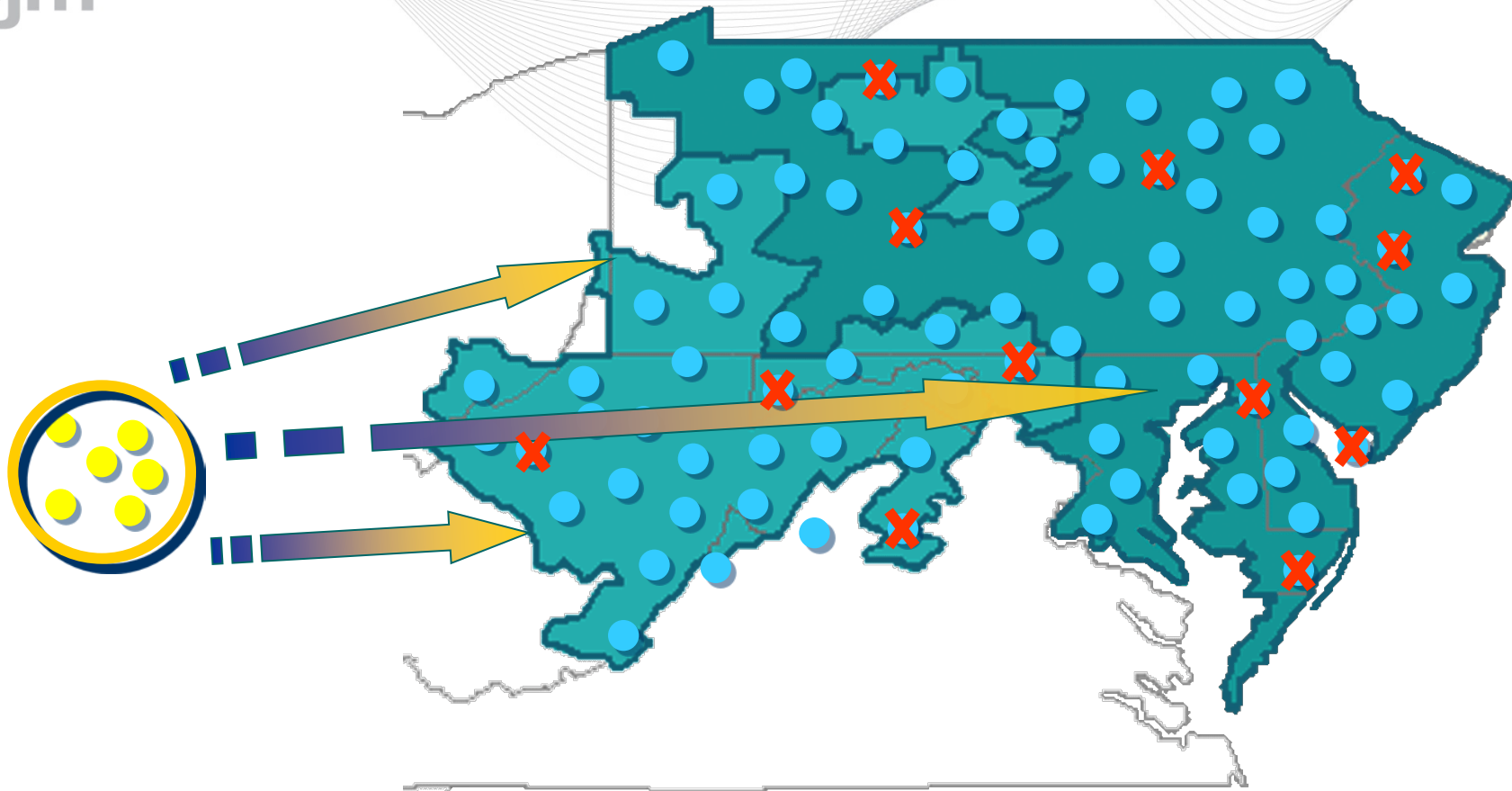
- Test examines strength of the transmission system to ensure that the aggregate of generators can be reliably transferred to PJM load
- Test assumes capacity in an area needs to be ramped up to serve load in a different part of the system experiencing a capacity deficiency
- Test identifies transmission limits that results in generation that is “bottled” inside an area that cannot be reliably exported to rest of PJM
- Test evaluates every flowgate in PJM and considers the contribution from all PJM generation





Strength of the transmission system to ensure that generation can be reliably transferred to the aggregate of PJM load.





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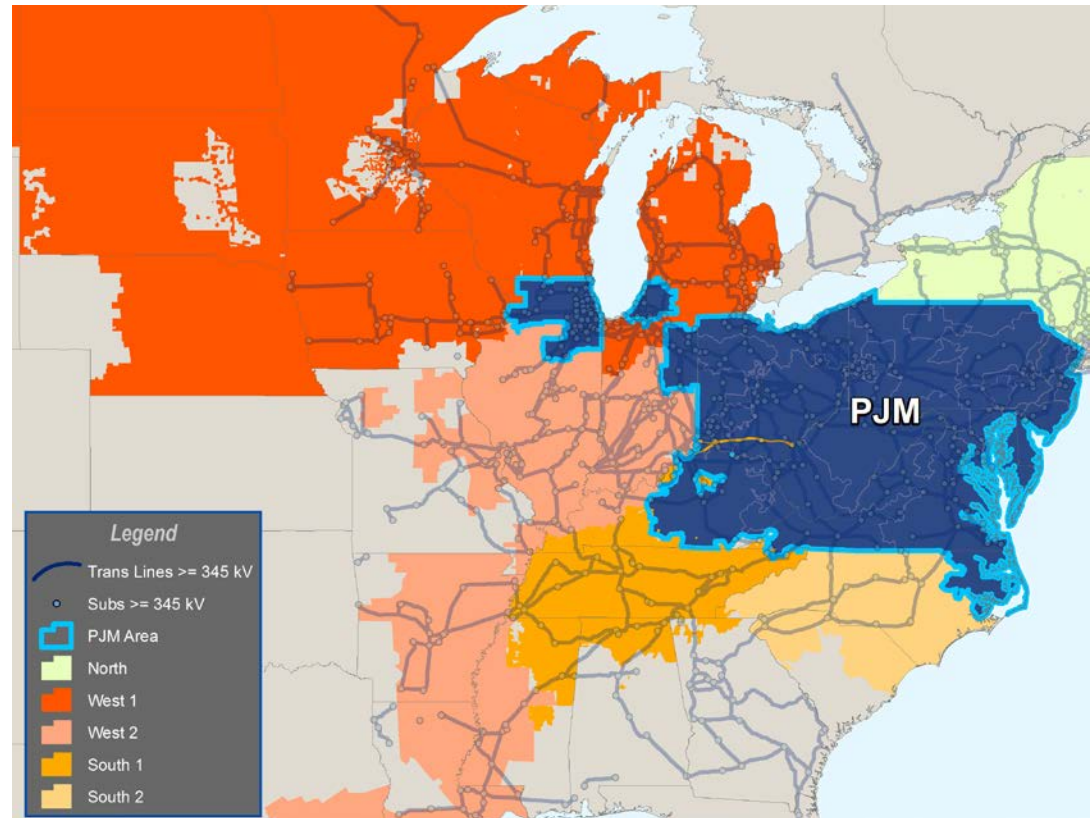
- Impacts are diffuse at the border and continue to reduce impact into PJM
- Generation Deliverability testing was intended to look for internal impacts
- External sources of power, while still arriving at locations in PJM, not as great an impact on individual elements in the case (small distribution factor)
- External sources still providing same number of MWs as an internal resource
  - 500MW internal generator is same power as 500MW external generator
- Lower distribution factor can remove the external resource from calculations to determine element loading in studies

- Due to the number of tie lines from external locations to PJM, the MWs are diffuse at any single point (element)
- Similar to a new internal generator which may have 10, 20, 30 or more individual attachment lines to different locations on the system
- While diffuse flow is appropriate and represents how some of the energy is transferred, these MWs are discounted in calculations due to their magnitude
  - If the MWs impacting a flowgate have greater than the distribution factor cut-off, or do not exceed a percentage of line rating, the impacts are removed from the calculation for total impacts to an element

- Internal resources are part of a larger group of sources which interact to impact the system
  - The assessment of impacts to an element in the case is calculated based on probabilities and includes interactions with other nearby sources which serves the same load (PJM)
- External resources do not interact with the internal resources in the same manner
  - Other sources near the external resource not delivering to PJM and does not play a part in the calculations
- Generation Deliverability routine looks for sources closer to the impacted facilities first then works further away, limiting the impacts from more distant sources

- The Capacity Import Limit (CIL) establishes the maximum amount of power that can be reliably transferred to PJM from defined regions external to PJM
- Reflects the maximum amount of external capacity that can be cleared in the PJM capacity market auction(s)
- These external supply regions will be divided into five zones for the purpose of determining both a simultaneous import limit and five directional non-simultaneous import limits

- Northern Zone: NYISO & ISO NE
- Western Tier 1 Zone: MISO East, MISO West & OVEC
- Western Tier 2 Zone: MISO Central & MISO South
- Southern Tier 1 Zone: TVA & LGEE
- Southern Tier 2 Zone: VACAR (non-PJM)





- Load uniformly scaled down in the external supply zone(s)
- PJM generation (MW) scaled down uniformly to simulate the power imported from external resources
- PJM will establish a 3% outage transfer distribution factor cutoff to limit participation in the loading
- The aggregate transfer into PJM which would result in a reliability criteria violation less the Capacity Benefit Margin (CBM) will be the simultaneous PJM Capacity Import Limit
- Non-simultaneous limits are also determined



- Similar approach will be employed to determine the maximum power transfer from any one of the five defined zones into PJM. For determining the non-simultaneous limits, a portion of the CBM will be allocated to each of the five directional transfer paths in proportion to the ratio of their transfer amount divided by the simultaneous Capacity Import Limit plus the PJM CBM

- CBM not added to the generation deliverability transfers
- CIL study functions more like load deliverability