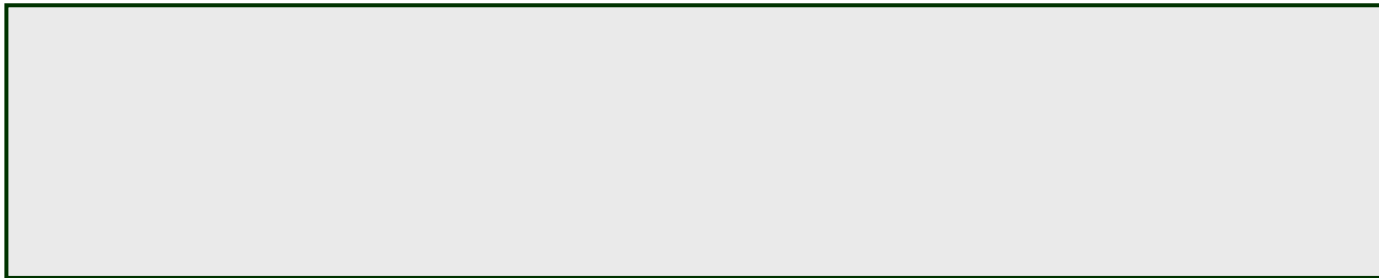


Bulk Electric System (BES) Transfer Distribution Factor (TDF) Methodology

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Purpose of the BES TDF Methodology

1. The purpose of the methodology is to identify Area transmission facilities 100 kV and higher that do not play a significant role in system transfers.
2. Facilities that meet the requirement of 1 above would be classified as non-BES facilities
3. The test must be transparent, repeatable and be non-complex.

TDF Background

1. TDF is:

- *% change (response) in loading on a line due to a power transfer from one point to another*
- *Function of transmission network impedances and topology*
- *PAR controlled circuit: $TDF = 0\%$*

2. TDF analysis widely used and accepted in the industry and as applied meets the requirements of 3 on slide 2.

3. Examples of current TDF applications:

- *NERC Transmission Loading Relief procedure*
- *NYISO CRIS Deliverability methodology*

Transfer Participation Test

1. “Levelized” Base Case

- *All generation online*
- *All dispatched at same % of P_{MAX}*

2. Generation to generation transfers

- *Shift all source gen to all sink gen*
- *TDFs based on gen locations, not judgment*

3. Three types of transfers

1. *Cross-Area (e.g. Ontario → NE)*
2. *Area Interface (upstream → downstream)*
3. *Intra Area (e.g., NY Zone-to-Zone or A → B, B → C, etc.)*

Transfer Participation Test Results

1. Transfer direction does not matter because shifting generation only, not load
 - *For NY A to B results same as B to A*
2. Monitor “all lines in” transfer distribution factors for all elements greater than 100 kV
 - *PARs set to constant flow (i.e. TDF = 0%)*
 - *Element is excluded from BES if TDF is less than cutoff for every transfer studied*

Example for NY: Cross-Area Transfers

1. Objective: transfer power across major NY transmission paths
2. Ontario to New England
 - *Shift from select IESO gens to select ISO-NE gens*
 - *Similar for NE to PJM*
3. HQ to PJM
 - *Shift from proxy HQ 765 kV AC bus to select PJM gens*

Example: Area Interface Transfers

1. Objective: transfer power across major NY interfaces
 - *Dysinger-East, West-Central, Volney-East, Moses-South, Central-East, Total-East, UPNY-SENY, UPNY-ConEd*
2. Example: Volney-East
 - *Upstream zones = A, B, C*
 - *Downstream zones = E, F, G, H, I, J, K*
 - *Shift all ABC gens to all EFGHIJK gens*

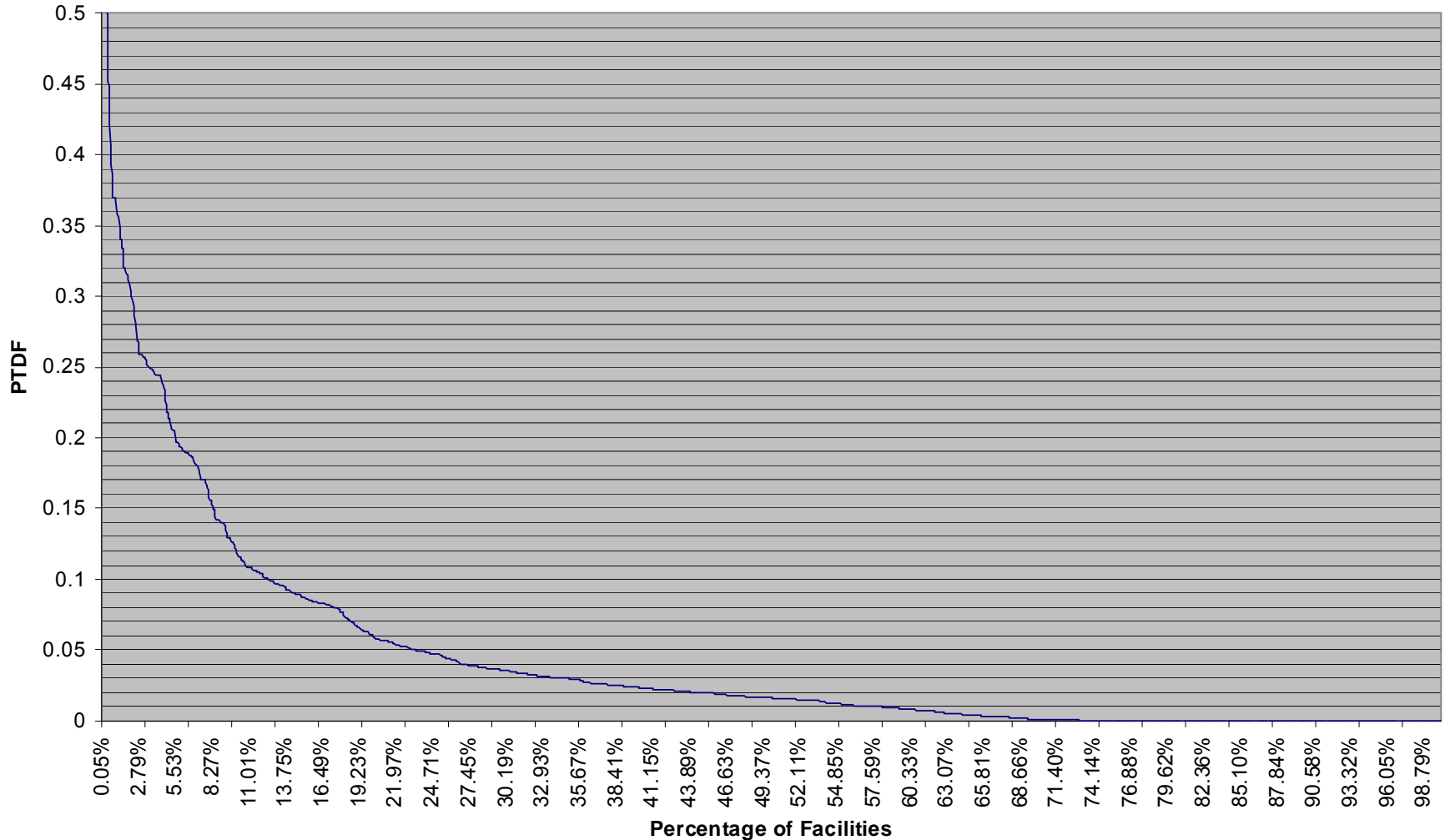
Example: Intra Area – NY Zone-to-Zone

1. Objective: transfer power between neighboring NY zones across lower voltage transmission
 - *A-B, B-C, C-E, D-E, E-F, E-G, F-G, G-H, H-I, H-J, H-K, J-K*
 - Zone H used as source for J & K due to lack of gen in Zone I

2. Example: $A \rightarrow B$
 - *Upstream zones = A*
 - *Downstream zones = B*
 - *Shift all A gens to all B gens*

NY Results: % NYCA Fac. At or Above a TDF level

NYCA BES facilities



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