Expectations for Deficiency Review Periods

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TC1 DP II Data Review Timeline

- PJM will exercise Reasonable Efforts to inform Project Developer or Eligible Customer of deficiencies within 10 Business Days after the close of Decision Point II.

- Project Developer or Eligible Customer then has 5 Business Days to respond to PJM's deficiency determination.

- PJM then will exercise Reasonable Efforts to review Project Developer's or Eligible Customer's response within 10 Business Days, and then will either terminate and withdraw the New Service Request, or include the New Service Request in Phase III, or proceed to a final interconnection-related agreement for accelerated projects that meet the criteria.

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TC2 Application Data Review Timeline

- PJM will exercise Reasonable Efforts to inform Project Developer or Eligible Customer of deficiencies within 15 Business Days after the close of Application Phase.

- Project Developer or Eligible Customer then has 10 Business Days to respond to PJM's deficiency determination

- PJM then will exercise Reasonable Efforts to review Project Developer's or Eligible Customer's response within 15 Business Days, and then will either terminate and withdraw the New Service Request or include the New Service Request in Phase I.

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Decision Point Permissible Technological Advancement

- PJM Manual 14H section 9.8.5 specifies a Permissible Technological Advancement (PTA) as:

A Project Developer may request to modify its New Service Request to include a Permissible Technological Advancement provided that the request and the associated machine modeling data are submitted no later than the close of Decision Point II. A Permissible Technological Advancement is a technological advancement to turbines, inverters, plant supervisory controls or other similar advancement to the technology proposed in the New Service Request that does not:

- Increase the capability of the Generating Facility;
- Represent a different fuel type; or
- Cause any material adverse impact(s) on the Transmission System with regard to:
  - Short Circuit Capability limits
  - Steady-state thermal and voltage limits
  - Dynamic system stability and response

If a proposed technological advancement is deemed a Permissible Technological Advancement, then the proposed change will not be considered a Material Modification and no additional PJM study will be required. All other proposed technological changes will not be permitted after Decision Point II.

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PTA Further Detail

- PTA (wind turbine, inverter, plant supervisory controls, etc. updates) must have at least the same performance characteristics as the existing equipment
  - There shall be no degradation to voltage or frequency ride through, grid voltage and frequency support, harmonic and oscillatory behavior, or other characteristics that impact the reliability of the electric grid
- Standalone transformer changes are not allowed
  - Transformer changes required as a result of PTA are allowed
    - I.E. changing from 3 MVA to 4.5 MVA inverters/turbines may require changing inverter step-up transformers to accommodate inverter/turbine change
- Standalone collector system equivalent changes are not allowed
  - Changes required as a result of PTA are allowed
- Any project wishing to utilize a PTA will be required to submit a dynamic modeling package in compliance with the PJM Dynamic Model Development Guidelines.

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Importance of Data Integrity

- PJM analytical evaluations are data driven
- Resulting requirements, associated costs, timelines, contingencies and rights are all depend on the input data
- Adherence to PJM's modeling guidelines, such as the Dynamic Model Development Guidelines, ensures accurate simulations and prevents PJM from making potentially impactful technical decisions based on insufficient data

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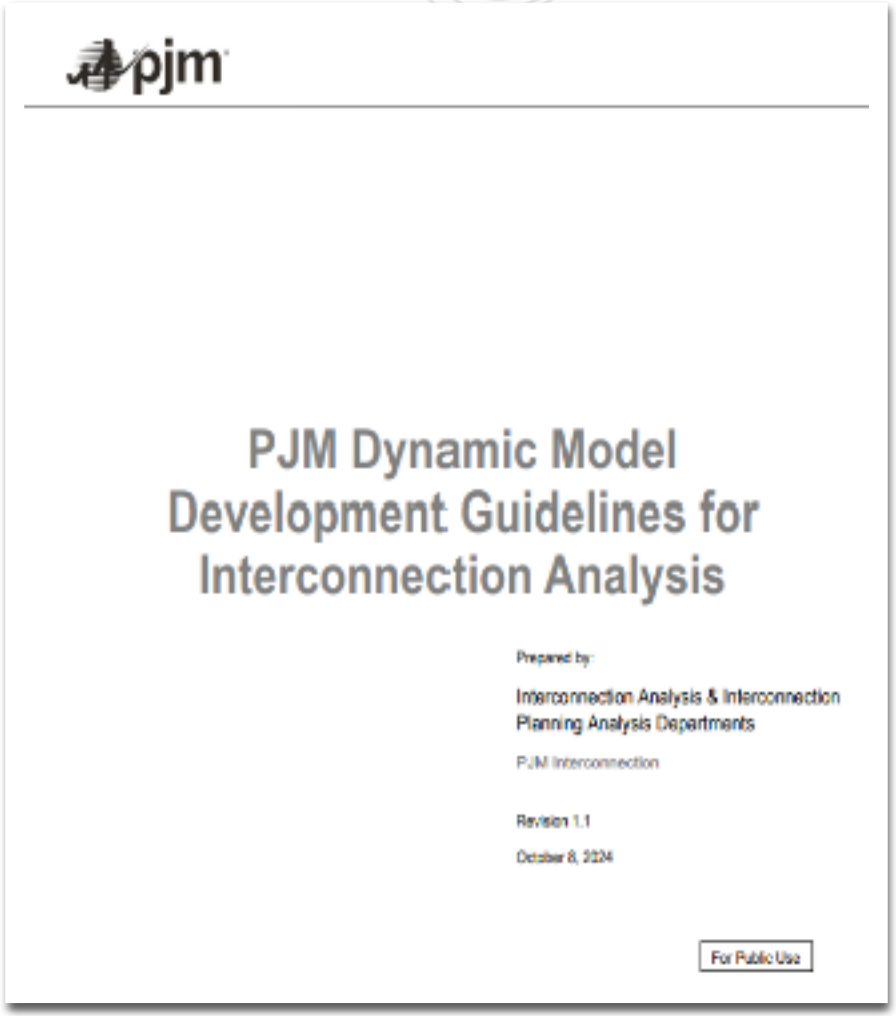
DMDG Requirement

- Dynamic Model Development Guidelines for Interconnection Analysis (DMDG)
  - Requirements
  - Deliverables
  - Consistency
  - Example Data



- https://www.pjm.com/-/media/planning/services-requests/pjm-dynamic-model-development-guidelines.ashx

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Common Deficiencies

- Data discrepancies
  - Mismatch between data entered in Queue Point and uploaded files (single line diagram, dynamic model package, etc.)
  - Mismatch between interfacing equipment specifications
    - Generator terminal voltage and step-up transformer voltage
    - Transformer MVA base and ratings
    - Transformer ratings and generator capability (insufficient transformer rating)
- Incomplete dynamic model package (elements required to satisfy Dynamic Model Development Guidelines missing)
- Data entered in wrong format (volts vs kv, percent vs per unit)

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Lessons Learned

- Changes in Queue Point are allowed if made in response to a deficiency. Overall changes to any data cannot be made in Queue Point deficiency cure submissions.
  - Updating the data that is not related to deficiency is not allowed
  - Example: Inverter changes are not allowed in response to unrelated deficiencies identified in the data review

- Caution to not introduce new deficiencies when curing identified deficiencies
  - e.g. if an update is made to the single line diagram, ensure Queue Point and the dynamic package match

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Contact

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