PJM Dynamic Model Development Guidelines: Requirements for DP1 Submissions

April 2024 IPS

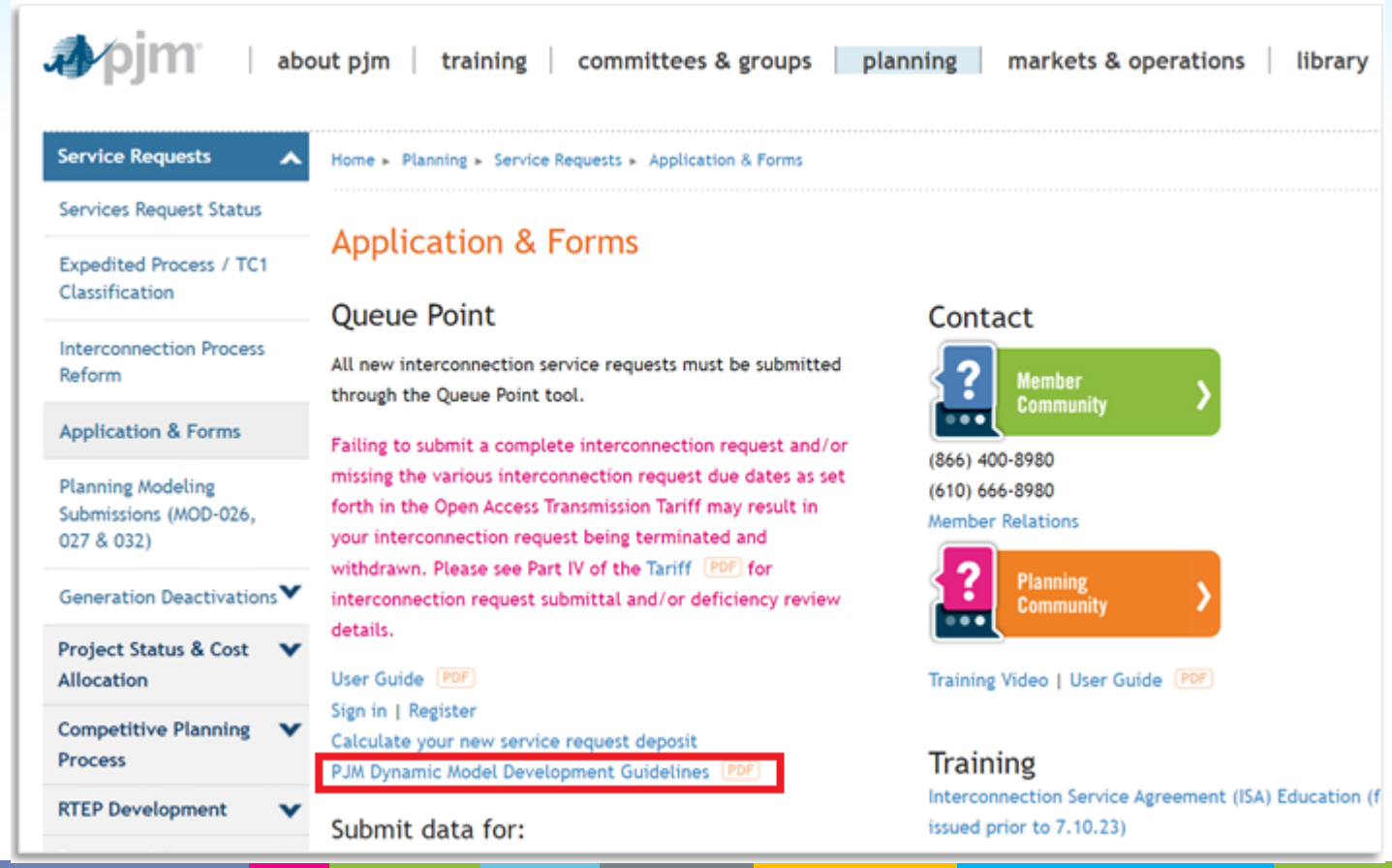
Anisha Fernandes, Sr. Lead Engineer
Interconnection Planning Analysis

PJM©2024

Location on PJM.com

[PJM Dynamic Model Development Guidelines] posted on

PJM.com > Planning > Service Requests > Application & Forms

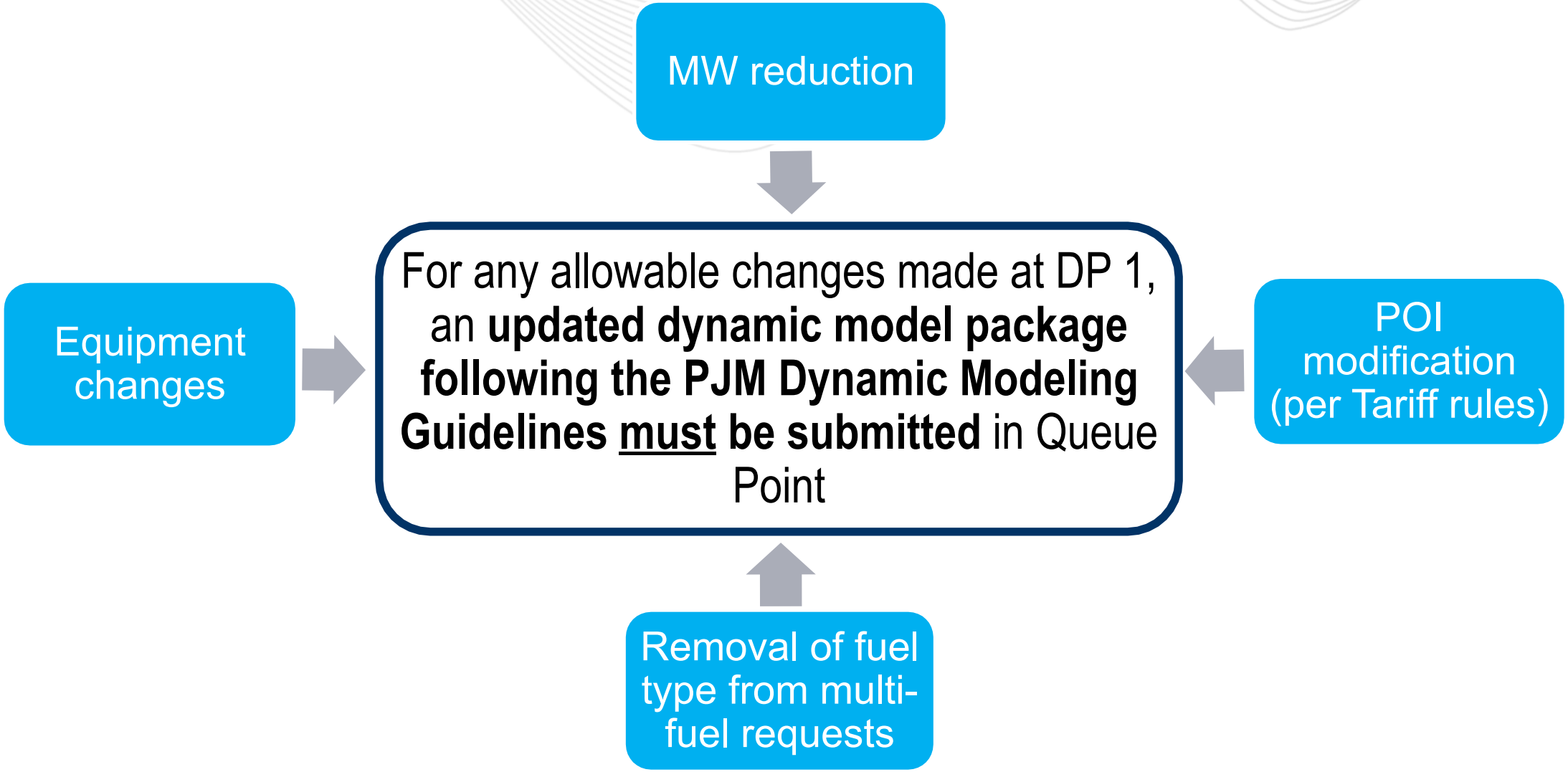


Used for:

- New Service Request Projects
- Necessary Study Requests
- As-built Data Submissions

PJM©2024

Transition Cycle 1 – Decision Point 1



PJM©2024

Transition Cycle 1 – Decision Point 1 (cont'd)

Requirements

- Updated dynamic model & equipment up to the POI
- Meet all Section 8, Deliverables for submission to be considered valid
- Include a Dynamic Model Report & Checklist (Appendix 10.4)

Consequences

- Per PJM Manual 14H, Section 2.1.2, **failure to comply or cure deficiencies within DP1 deficiency review period will result in withdrawal**

Queue Point Attachment

- Dynamic Model package must be uploaded in Queue Point with the updated Queue Point Data Application Form during the DP1 window of TC1

PJM©2024

Few Key Points

- Review Deliverables section to ensure all items applicable are included
- MFO Assessment
- Power Factor Assessment
- Dynamic model files, with project specific settings/parameters are included

For questions, send an email to InterconnectionSupport@pjm.com with your project name/number and mention Dynamic Model Guidelines in the subject line.

PJM©2024

Applicability

All New Service Requests are subject to evaluations to determine the need for stability analysis.

New Service Request Projects

- All projects beginning with Transition Cycle 2
- Transition Cycle 1 projects, that choose to make changes at Decision Point 1 and/or 2

Necessary Study Requests & As Built Data Submissions

- Effective immediately, for any new requests/submissions made after 9/20/23

All projects, irrespective of size or kV level, must submit data/models per the PJM Dynamic Model Development Guidelines

PJM©2024

Contact

Presenters:

Anisha Fernandes, Sr. Lead Engineer
Interconnection Planning Analysis
Anisha.Fernandes@pjm.com

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

PJM©2024

Appendix

PJM©2024

Deliverables

Deliverable	Included items
Dynamic Model Report:	• Quality Assurance sign-offs • Completed Dynamic Model Checklist must be included • Dynamic Model package/folder containing relevant files as outlined in the Checklist
Completed Queue Point Application Form:	All required data and documentation
Dynamic Model:	• Library Models (preferred): PSSE .idv and .dyr • User Defined Models: PSSE .sav, .idv, .dyr and .DLL appropriately parameterized

PJM©2024

Deliverables (cont'd)

Deliverable	Included items
PSSE Case:	Full build of generator project (.raw, .sav, .cnv, .snp, and .sld file)
Test Results:	• MFO assessment table • Power Factor Assessment Table (including .sav cases for this assessment) • Confirmation unit meets FERC Order No. 827 AVR requirements • Results of flatstart test including log, out and test plots • Results of VRT test including log, out and test plots

Refer to Section 8 for complete list of Deliverables.

PJM©2024

Dynamic Model Checklist

Item	Description	Comments	Check
1	Completed Queue Point Data Application form along with all requested files are submitted via Queue Point Portal.		
2	If a PSSE library model is submitted (preferred), .idv and .dyr files developed using the guidelines in this document are included.		
3	If a UDM is submitted, a properly compiled PSSE version .sav case along with .idv, .dyr, and .dll files appropriately parameterized for the project using the guidelines in this document is included.		
3a	A report on how the settings of the model were parameterized along with the manufacturer's documentation, including a user guide of the UDM.		
3b	Block diagram for the model and sub modules, along with values, names, and detailed explanation of all model parameters.		
4	.raw, .sav case, .cnv, .snp, and .sld file for the project (case setup folder/files) are submitted.		

PJM©2024

Dynamic Model Checklist (cont'd)

Item	Description	Comments	Check
5	Verify all testing requirements are met.		
5a	MFO assessment table is included in the Dynamic Model report.		
5b	Power Factor Assessment table along with PQ curve used and case setup for power factor assessment (lagging and leading scenarios) is included in the Dynamic Model report.		
5c	Confirm that the unit meets FERC Order No. 827 with regards to automatic voltage regulation, with appropriate model settings included in the Dynamic Model report.		
5d	Results for the flatstart test including log, out and test plots showing Power, VARs, Eterm, Freq and Volt for each inverter/generator is included.		
5e	Results for the VRT test including log, out and test plots showing Power, VARs, Eterm, Freq and Volt for each inverter. Provide confirmation that Momentary Cessation is eliminated (if not, provide a reason).		
5f	Confirm Primary Frequency Response is enabled.		

PJM©2024

Common Deficiencies Observed

- Data/values on QP form does not match data/values provided in attachments and/or single line diagram
- Values are not entered in the requested format (eg.: per unit vs percent)
- Discrepancies in MFO (Net MW's) based on Gross MW and Station/Aux load values entered
- Missing dynamic model report and/or checklist files; Ensure that the Modeling Guideline checklist is reviewed, completed and submitted.
- Files provided in the incorrect PSSE version

PJM©2024

Necessary Study Requests

Purpose: Once a Necessary Study Agreement is initiated, the PJM Dynamic Modeling Guideline must be used to develop the dynamic model for the project

Expectations: The dynamic model shall be parameterized as closely as possible to the intended design/settings

Queue Point Attachment: The dynamic model and files per the Deliverables section must be uploaded in Queue Point with the completed Necessary Study data submission

Submissions that do not include the dynamic model and files per the modeling guideline will be marked deficient, resulting in delays

PJM©2024

As Built Data Submissions

As Built data is **required** to be submitted within (1) one month following commercial operation

Purpose: The PJM Dynamic Modeling Guideline must be used to develop the dynamic model for an As Built project submission

Expectations: The As Built dynamic model must reflect the facility settings after commissioning. ALL projects, irrespective of size or kV level, must submit As Built data per these requirements.

Queue Point Attachment: The dynamic model and files per the Deliverables section must be uploaded in Queue Point with the completed As Built Data submission. A Factory Acceptance Test (FAT) report for each transformer is also required.

Submissions that do not include the dynamic model and files per the modeling guideline will be marked deficient, resulting in delays

PJM©2024