

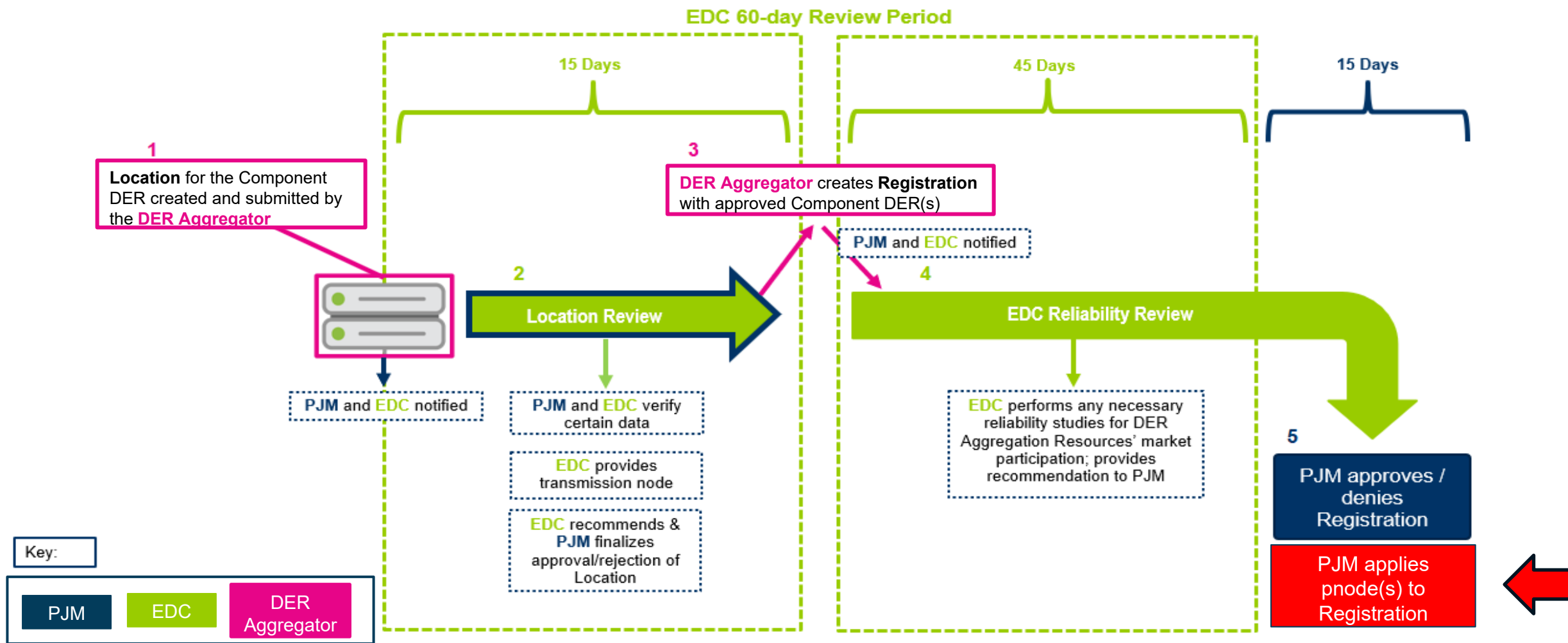
2222: Aggregate PNODE Creation

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DISRS
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Disclaimer: While materials are current at the time of publishing, applicable requirements may change. PJM Governing Documents control.

- Issued in 2020, FERC Order 2222 was intended to enable distributed energy resources (DERs) to participate in wholesale electricity markets.
- “DER” refers to a wide swath of distribution-connected resources and includes battery storage, rooftop solar, EVs, and traditional demand response, among others.
- Because individual DERs may be small and unable to participate on their own, Order 2222 allows the *aggregation* of multiple DERs into one market unit.
- PJM has made a series of compliance filings with FERC outlining in detail the proposed components of its DER Aggregator Participation Model.
- PJM is actively working on the implementation details in preparation for enrollment to begin in Nov. 2027 and for the full model go-live on Feb. 1, 2028.



* Registration details have been reviewed at the Jan, Feb, Mar, Apr 2026 DISRs meetings

- What is the locational requirement for DER aggregations?
 - Each Component DER in an aggregation must be at the **same primary electrical location** (i.e., interface with the same primary pricing node), except:
 - in the case of a DER Aggregation that only provides ancillary services and is less than or equal to 5 MW, the Component DER within the aggregation may interface with multiple primary pricing nodes, so long as those nodes are in the same state, service territory of a single EDC, and are in the same Transmission Zone;
 - in the case of a DER Capacity Aggregation Resource, the Component DER linked to the resource may interface with multiple primary pricing nodes, so long as those primary pricing nodes are located within a defined zone or sub-zonal Locational Deliverability Area;
 - the case of the limited multi-nodal option

Multi-Nodal Option

- Given the difficulty of aggregating to 100 kW at a single node for very small DERs, especially while the market is immature, PJM will permit **limited multi-nodal** aggregations as outlined below.

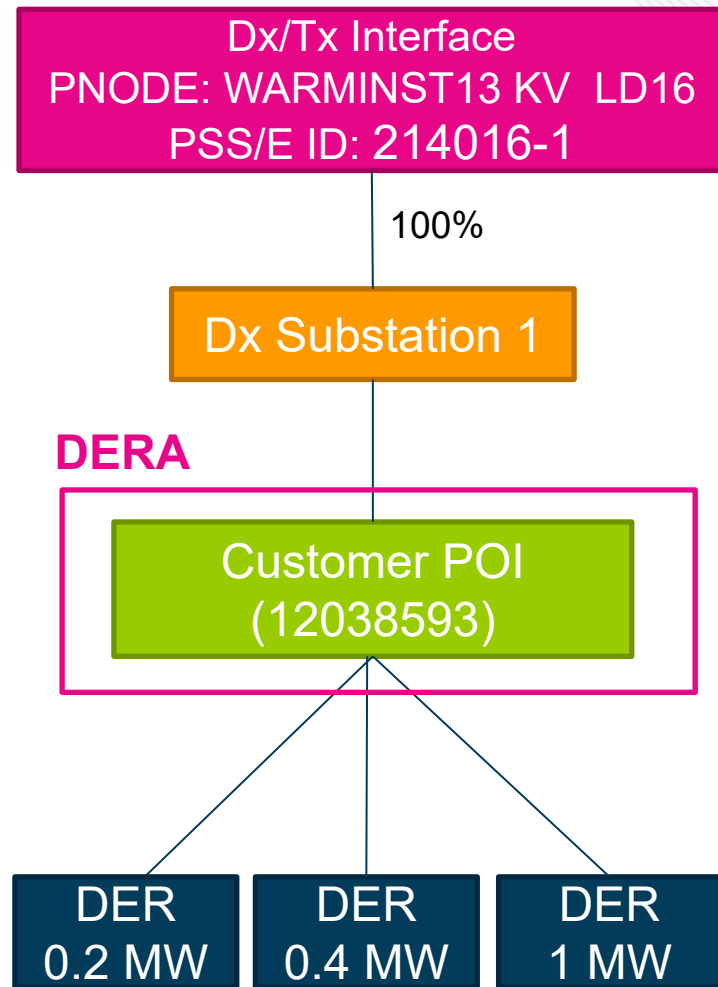
Component DER can aggregate across nodes under the following rules:

- (1) Only one Component DER, or group of Component DER, may be >100kW at a single node because only one is required to be an “anchor” for smaller DERs.
- (2) The total MWs of **all** multi-nodal aggregations in a transmission area must not exceed 167 MW across the RTO.
- (3) All Component DER in a multi-nodal aggregation must be in the same state, service territory of a single EDC, and in the same Transmission Zone.

PJM will review this cap once the penetration of multi-nodal aggregations reaches at least 90% of the cap.

To determine the Aggregation Definition of the Aggregate PNODE which will be created to model each DER Aggregation Resource (DERA), the following factors will be calculated:

- (inputs/registration) **Capability Factors** (At the DER level)
 - PJM will determine a capability factor, based on the capability indicated for each DERs in a DERA during the registration process. These will not be updated unless the aggregation changes and it is reviewed and approved by PJM/EDC.
- (inputs/registration) **Locational Factors** (At the DER level)
 - This is the mapping that the EDC provides for transmission location(s) during registration process. The values provided will be the PSSE Bus ID(s) and weighting factors, if multiple. This will not be updated unless reviewed and approved by PJM/EDC.
- (operations/markets) **Modeling Impact Factor** (At the DERA level)
 - The factor to be used in pricing/dispatch. It will be calculated from the capability factor and locational factor. There will not be a dynamic update of this value (hourly/daily) but can change over time if DERA changes occur (via registration process).



Performed by PJM:

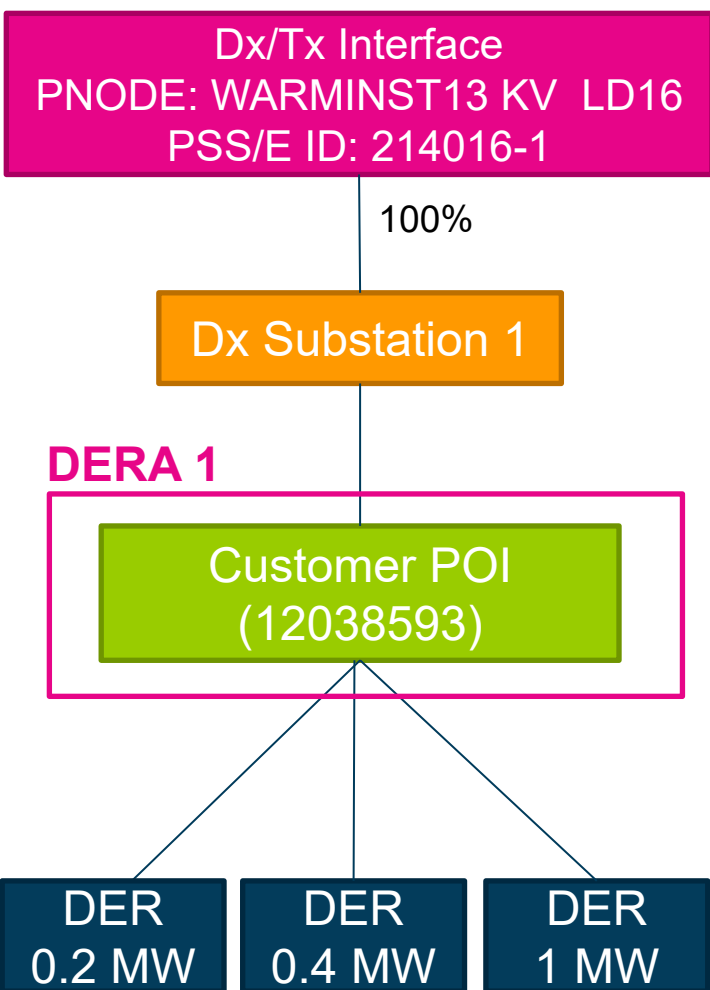
- Conversion of PSS/E ID to an existing PNODE
- Creation of Aggregate PNODE

Provided by the EDC:

- Electrical Location (PSS/E ID)
- Locational Factor (100%)

Provided by DER Aggregator and approved by the EDC:

- MW Capability
- EDC Account Number (12038593)

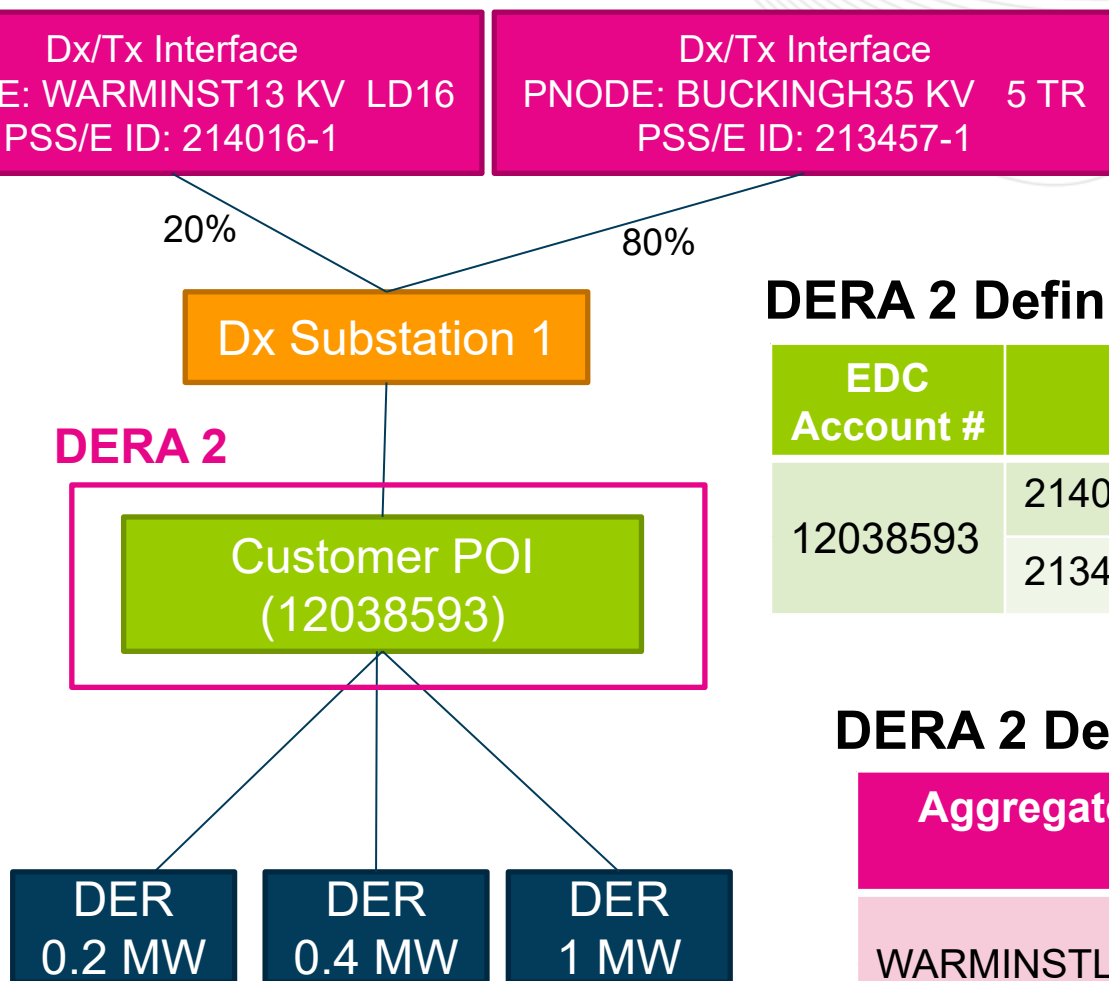


DERA 1 Definition as part of Registration process

EDC Account #	PSS/E ID	Corresponding PNODE	Locational Factor	Capability Factor
12038593	214016-1	WARMINST13 KV LD16	1	1

DERA 1 Definition as part of the PJM modeling process

Aggregate Markets PNODE Name	Child PNODE	Modeling Impact Factor
WARMINSTLD16 1DE	WARMINST13 KV LD16	1

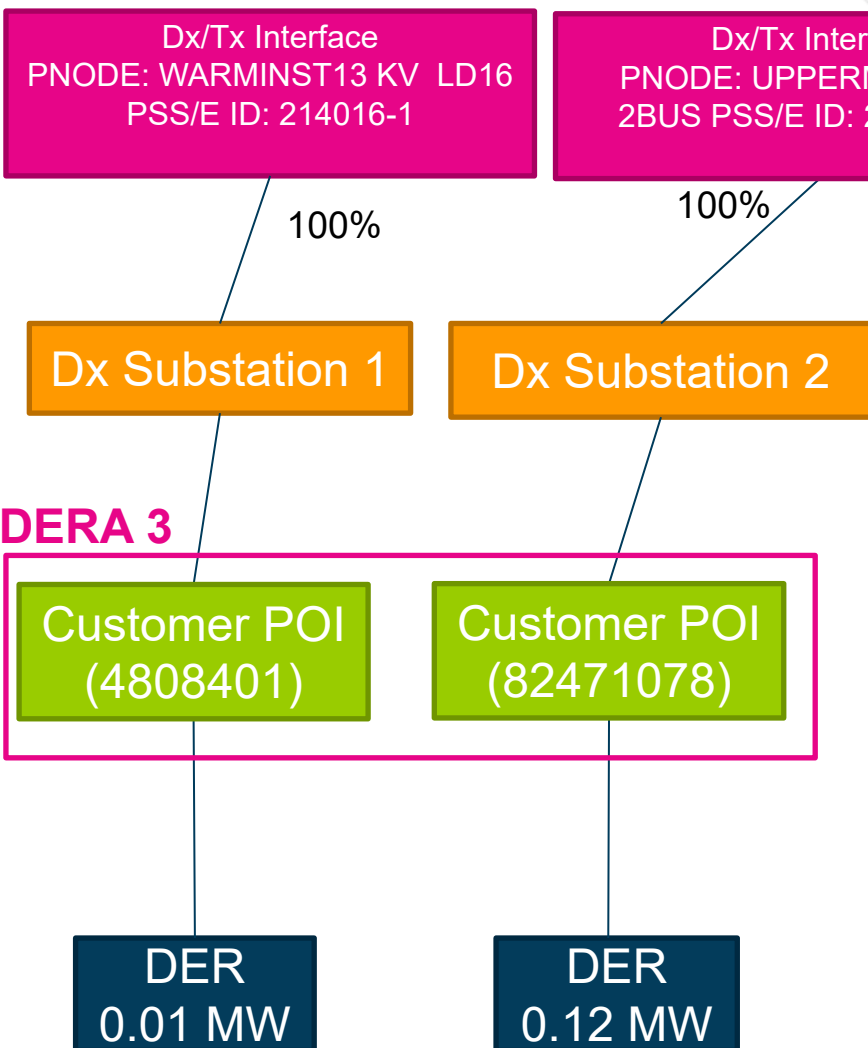


DERA 2 Definition as part of Registration process

EDC Account #	PSS/E ID	Corresponding PNode	Locationa l Factor	Capabilit y Factor
12038593	214016-1	WARMINST13 KV LD16	0.2	1
	213457-1	BUCKINGH35 KV 5 TR	0.8	1

DERA 2 Definition as part of the PJM modeling process

Aggregate Markets PNode Name	Child PNode	Modeling Impact Factor
WARMINSTLD16 2DE	WARMINST13 KV LD16	0.2
	BUCKINGH35 KV 5 TR	0.8



DERA 3 Definition as part of Registration process

EDC Account #	PSS/E ID	Corresponding PNODE	Locational Factor	Capability Factor
4808401	214016-1	WARMINST13 KV LD16	1	0.08
82471078	214004-R1	UPPERMER35 KV 2BUS	1	0.92

DERA 3 Definition as part of the PJM modeling process

Aggregate Markets PNODE Name	Child PNODE	Modeling Impact Factor
UPPERMER2BUS 1DE	WARMINST13 KV LD16	0.08
	UPPERMER35 KV 2BUS	0.92

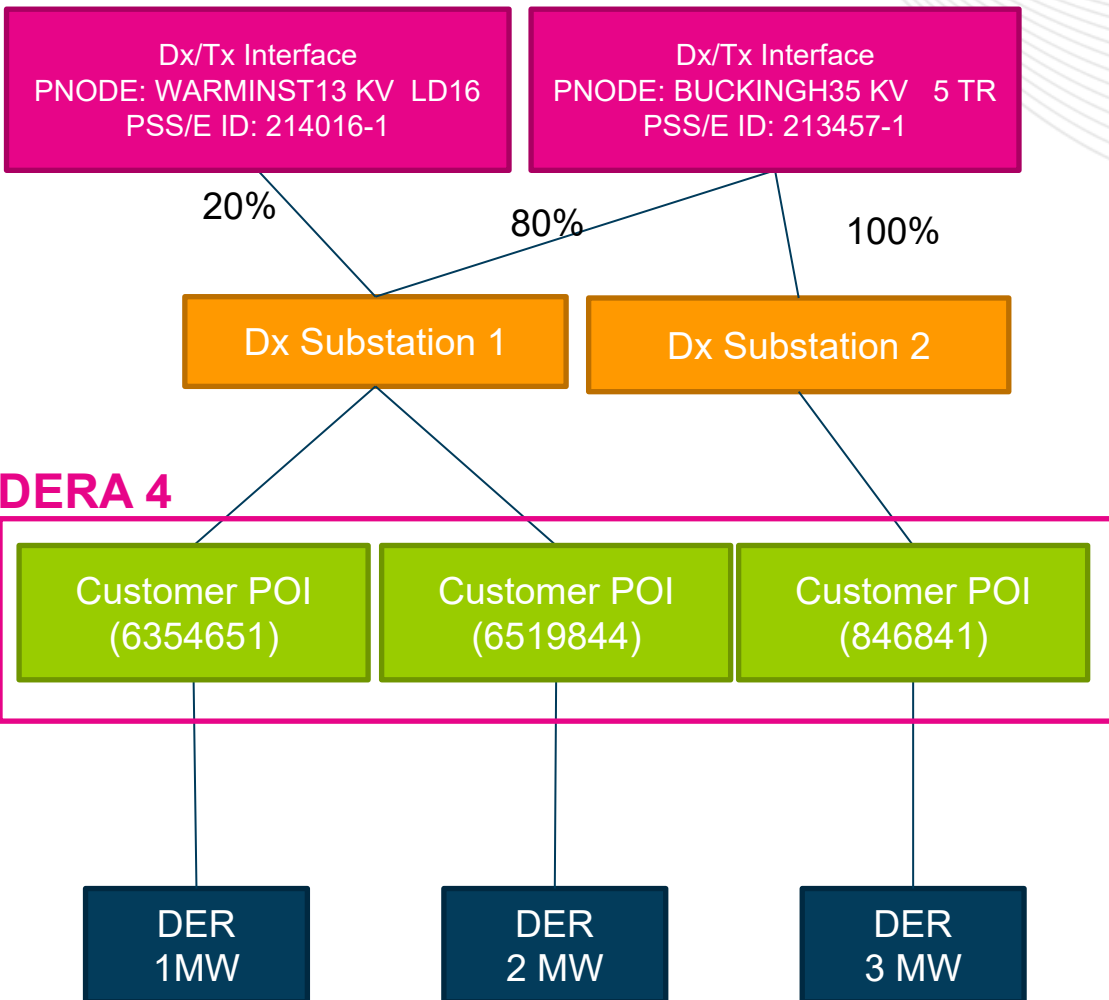
- Updates to the Aggregate PNODE will be conducted in line with the ability to update aggregations per OATT, Attachment K-Appendix, section 1.4B (b) and OA, Schedule 1, Section 1.4B (b)
- Aggregate PNODEs will not be biddable for Virtuals or for FTRs
- Aggregate PNODE definitions will be posted to Data Miner 2 on the Fixed Weighted Average Aggregate Definitions data set
 - Updates, if they occur, will be reflected in Data Miner 2
- Aggregations must consist of components that have the same market participation designations

Appendix

DERA 4 Definition as part of Registration process

EDC Account #	PSS/E ID	Corresponding PNODE	Locational Factor	Capability Factor
6354651	214016-1	WARMINST13 KV LD16	0.2	0.17
	213457-1	BUCKINGH35 KV 5 TR	0.8	0.17
6519844	214016-1	WARMINST13 KV LD16	0.2	0.33
	213457-1	BUCKINGH35 KV 5 TR	0.8	0.33
846841	213457-1	BUCKINGH35 KV 5 TR	1	0.5

DERA 4



DERA 4 Definition as part of the PJM modeling process

Aggregate Markets PNODE Name	Child PNODE	Modeling Impact Factor
BUCKINGH5 TR 2DE	WARMINST13 KV LD16	0.1
	NEW EXAMPLE NODE	0.9

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DERA Aggregate PNODE Creation



Member Hotline

(610) 666 – 8980

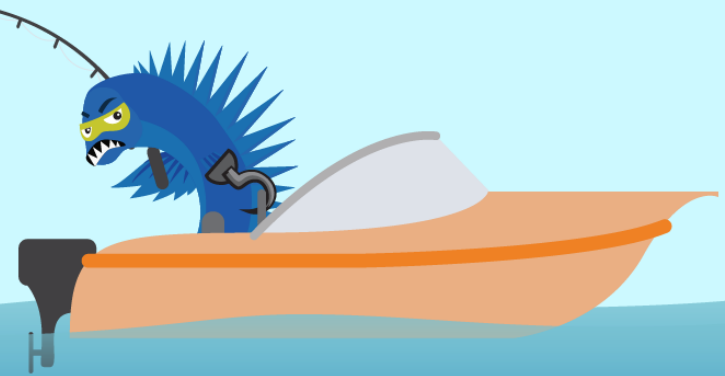
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