



# Non-wholesale DER Observability

DER Subcommittee

5/21/18

- Review how communication process to non-wholesale DER will work during an emergency
- Determine how to handle confidential issues
- Communication process to munis/coops

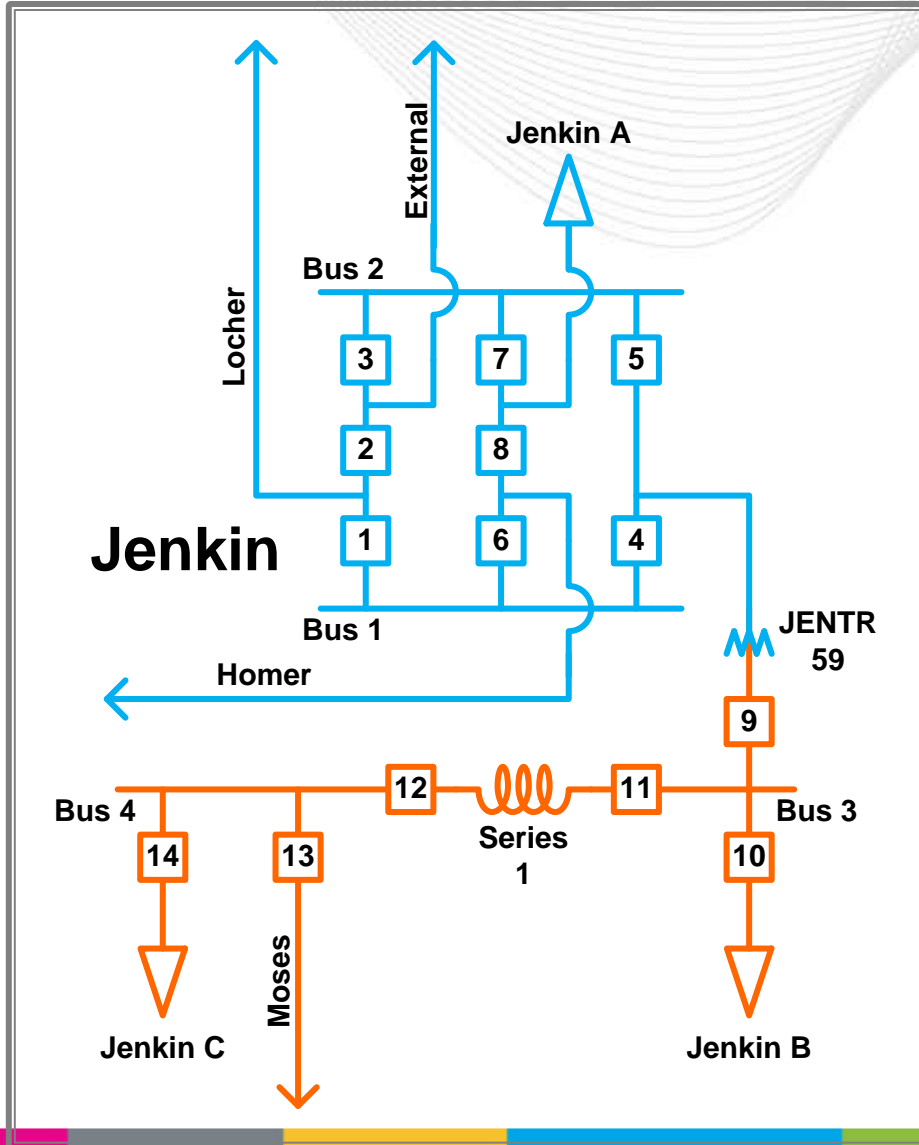
- Identify non-wholesale DER so it can be mapped/modelled
  - Primarily use EIA860 data
  - TO ensures critical information is accurate (so it can be modelled for PCLLRW tool)
    - PJM Transmission Substation
    - PJM Voltage
    - PJM Equipment Name
  - Other information optional (based on availability and ability to release to PJM)
- Communication to non-wholesale DER during grid emergency
  - Augment existing communication process
    - Local issue - use PJM PCLLRW tool for communication to TO
      - TO will communicate downstream as necessary to non-wholesale DER through EDC or muni/coop as necessary
    - Wider area issue – use existing emergency procedure communication, list of all NWDER in zone available through PCLLRW tool to TO.

**Operating Training One-line**

**KEY**

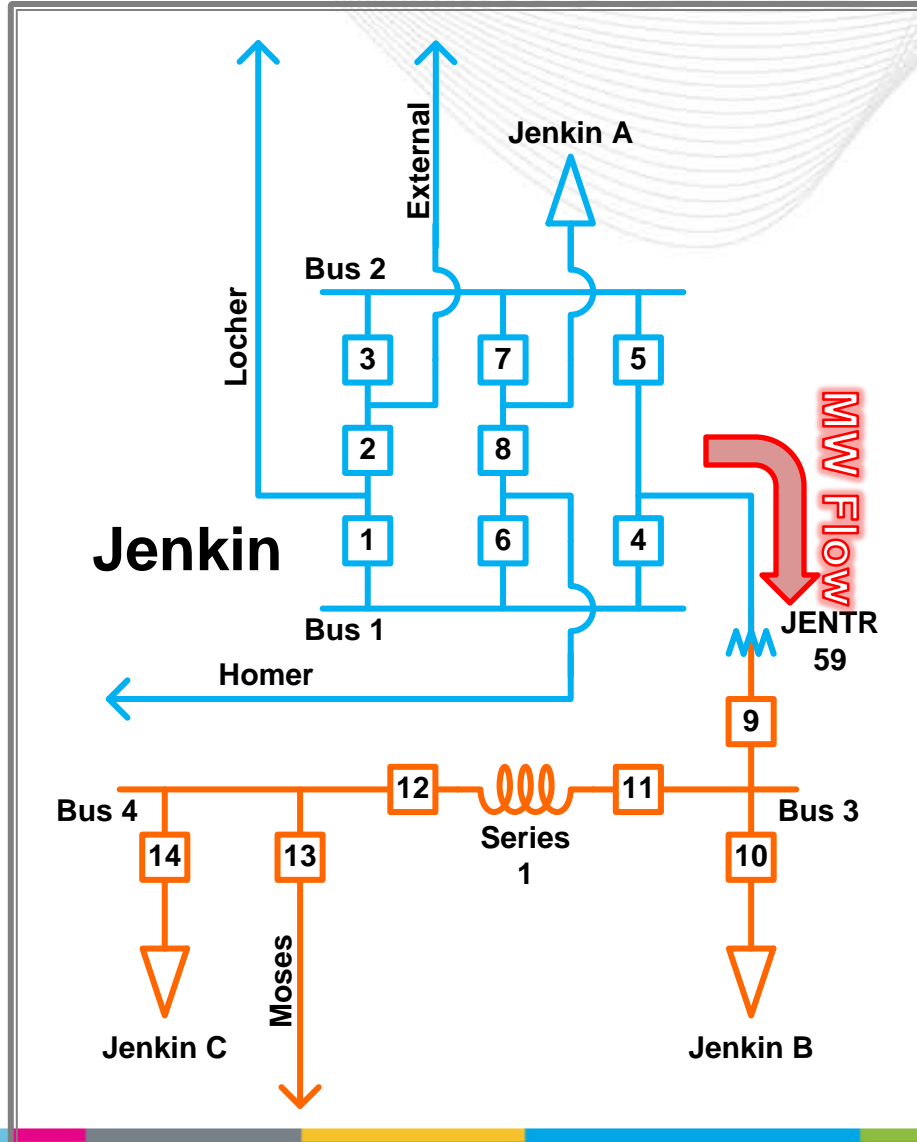
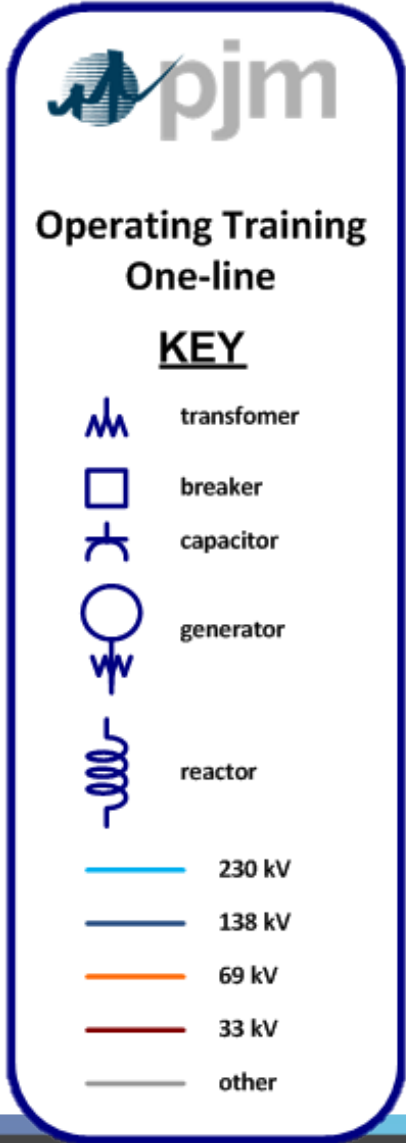
- transformer
- breaker
- capacitor
- generator
- reactor

— 230 kV  
— 138 kV  
— 69 kV  
— 33 kV  
— other



## Generic Substation from PJM Operator Training

- Loads represented by Triangles (“Jenkin A”, “Jenkin B”, “Jenkin C”)
- Loads are at different voltage levels (230 & 69 kV).
- Depending on the facility overloaded, the loads (and NWDER at the loads) have different impact.
- BTM location determines if the facility is a *Help* or a *Hurt*.



## Example: Jenkins 59 TR Overload

- Flow going from 230kV towards 69kV network
- NWDER at Jenkin A would aggravate (*Hurt*) the Jenkins 59 TR overload
- NWDER at Jenkins B or Jenkins C would reduce (*Help*) the flow down the Jenkins 59 TR.
- Depending on impedance of the Series 1 Reactor, Jenkins B may *Help* more than Jenkins C.

PJM *Emergency Operations Manual* ([M-13](#)):

## Load Shed Directive

- Local in nature;
- Typically to protect a single piece of transmission equipment.

## Manual Load Dump Action

- Wide-area System issues;
- Typically to protect the System from collapse.

Overload / System Issue Occurs



PJM Directs TO to curtail load:  
Protect equipment / System 1<sup>st</sup>!!!



Bring on NWDER help(s), if any:  
If not on already & prolonged issue



Restore % of load while ensuring  
equipment within limits / System  
reliability

## *Protect the System & Equipment 1<sup>st</sup>!*

- Operators have very little time to take action to protect an overloaded piece of equipment or System emergency;

1<sup>st</sup>: Resolve the issue (Load Shed is fastest solution);  
2<sup>nd</sup>: Refine the solution (via NWDER);  
3<sup>rd</sup>: Restore load as conditions permit.

## *Location, Location, Location*

- Knowing *where* significant NWDER exists is nearly as important as knowing its existence;
- Operators need this *information ahead of the emergency*;
- Chasing down such information during an event gives the Operator *another problem when they need it the least*.





M#	Method	UC#	Use Case	Local Load Shed event - local (use PCCLRW - list of help/hurt and unknown but in zone)	Area wide Manual Load Dump (use current notification process, list of NWDER for each zone available in PCCLRW)
1	PJM>TO>EDC>DER	1	PJM>PECO(TO)>PECO(EDC)>DER		
		2	PJM>AEP (TO) >APCO (EDC)>DER	AEP (TO) to implement load shed to meet need. AEP (TO) reviews PCCLRW and coordinates with APCO (EDC) during prolong event on NWDER contact/availability	same process but notification through ALL CALL, Emergency Procedures, Dispatch
		3	PJM>Comed (TO) >City of(EDC)>DER	Comed (TO) to implement load shed to meet need. Comed (TO) reviews PCCLRW and coordinate with City of (EDC) during prolong event on NWDER contact/availability.	same process but notification through ALL CALL, Emergency Procedures, Dispatch
		4	PJM>AEP (TO)>City of(EDC)>DER		
2	PJM>TO>EDC>Muni>DER	1	same as method 1		
		2	same as method 1		
		3	PJM>Comed (TO) >Comed (EDC)> City of (EDC)>DER	same as method 1 except Comed (EDC) coordinates with City of (EDC) instead of Comed (TO) coordination with City of (EDC)	
		4	PJM>AEP (TO)>APCO(EDC)>City of(EDC)>DER		
3	PJM>EDC>DER	1	PJM>PECO(EDC)>DER	Since this is triggered on TO load shed plan, it may be confusing to go directly to EDC. Also, need to sort out notification issues (PCCLRW)	
		2	PJM >APCO (EDC)>DER		
		3	PJM>City of(EDC)>DER		
		4	PJM>City of(EDC)>DER		



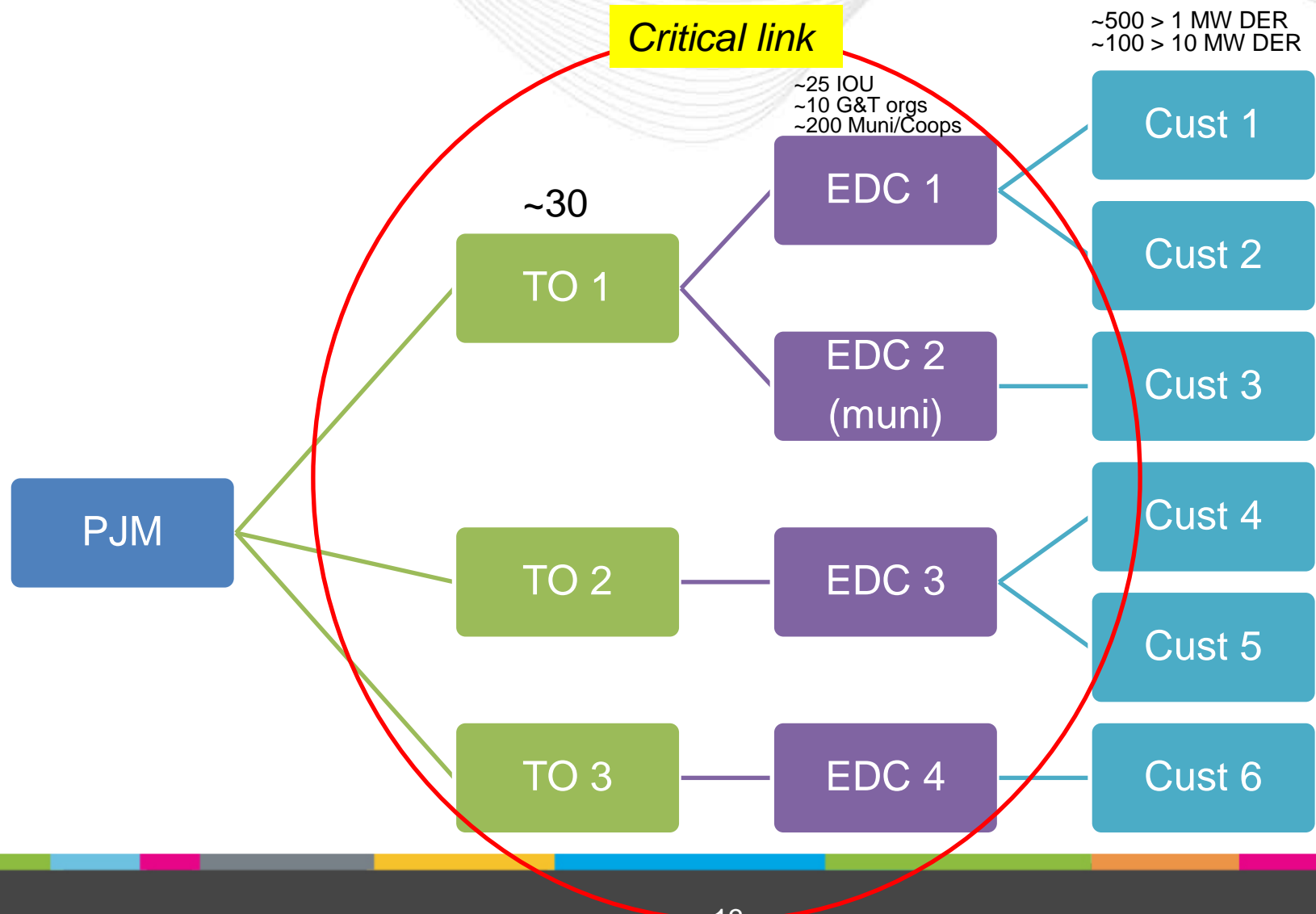
- Identify non-wholesale DER resources and associated information
  - PJM to start with public information (EIA860) and create/update list
  - PJM to reconcile list for resources that are currently in the wholesale market (front of meter or DR).
  - PJM to provide complete list which identifies NWDER plants to TO
  - TOs to verify/update information or add additional plants
    - Required information
      - Transmission substation, voltage and equipment name (enables accurate PCLLRW mapping)
    - Optional
      - Information is available (EDC/TO already captured)
      - Information can be made available to PJM
        - » PJM will keep confidential and only PJM, EDC and TO have access

- See excel worksheet with required/optional data and associated source

- PJM non-wholesale DER needs
- Current Btmg data collection form

- Non-wholesale DER – generation (including storage) that does not participate directly in the wholesale markets (either as "front of meter" generation or demand response) and is used to self-serve load
  - Behind the Meter Generation (BTMG)
    - Cogen/CHP, emergency diesel, CTs, batteries, solar, etc.
  - Non-retail Behind the Meter Generation (NRBTMG)
    - Primarily Muni/Coop generation

# DER data collection/validation and communication channel



- System Operations
  - Address System issues/mitigate manual load dump (i.e.: Sturgis)
    - Coordinate post-contingency load shed plan
  - Operational awareness for communication process
  - Improve short term load forecast and/or better understand load forecast variance
- Planning
  - RTEP load flow studies (may model explicitly as gen or implicitly through load forecast)
  - Improve long term load forecast or better understand load forecast variance
- Manage existing NRBTMG and BTMG requirements (including telemetry & metering)



**BtMG Form Description**  
 This form is to gather information on Behind the Meter Generators. PJM will use this information to update the EMS model. Refer to [PJM Manual 3A Section 1.2.1](#) for more details regarding this form.

General Information			
In Service Date:		Transmission Owner:	
Utility Company Name:		Generator Name:	
Utility Company Address:		Generator Address:	
Utility Company Phone:		BtM Generator Contact:	
Utility Company Email:		Generator Email:	
System Operating to (check one): Distribution (<100 kV) <input type="checkbox"/> Transmission (>100 kV) <input type="checkbox"/>		Generator Code:	
GIS Data (latitude, longitude):			

Modeling Information	
<b>Generator Model Update (required section):</b>	
<ul style="list-style-type: none"> <li>&gt; Commercial name:</li> <li>&gt; Attach Generator single-line diagram</li> <li>&gt; Generator Information:               <ul style="list-style-type: none"> <li>◆ Unit Type (see below):</li> <li>◆ Fuel Type:</li> <li>◆ Maximum Output P<sub>Max</sub> (total):                      MW</li> <li>◆ Number of Units:</li> <li>◆ Operating Voltage:    (kV)</li> </ul> </li> </ul>	
<b>Transmission Model Details (can be supplied by TO in Network Model Request):</b>	
<ul style="list-style-type: none"> <li>&gt; Nearest Transmission Substation name:</li> <li>&gt; Attach Transmission Substation single-line diagram</li> </ul>	
<b>Telemetry (see Manual 14D, Appendix A (9) to determine applicability):</b>	
<ul style="list-style-type: none"> <li>&gt; From TO via ICCP               <ul style="list-style-type: none"> <li>◆ Provide status of circuit breakers and switches</li> <li>◆ Provide MW and MVAR measurements</li> <li>◆ Provide Voltage</li> </ul> </li> </ul>	

<http://www.pjm.com/~media/committees-groups/subcommittees/dms/postings/btmg-submission-form.ashx>

Description of each data entry field is given in PJM Manual 3A, Appendix D.

Please complete and attach to eDART Network Model Application