Southeastern Regional TRANSMISSION PLANNING

2020 SERTP

SERTP - 1st Quarter Meeting

First RPSG Meeting & Interactive Training Session

March 25th, 2020

WebEx

Process Information

- The SERTP process is a transmission planning process.
- Please contact the respective transmission provider for questions related to real-time operations or Open Access Transmission Tariff (OATT) transmission service.
- SERTP Website Address:
  - www.southeasternrtp.com

2020 SERTP

Agenda

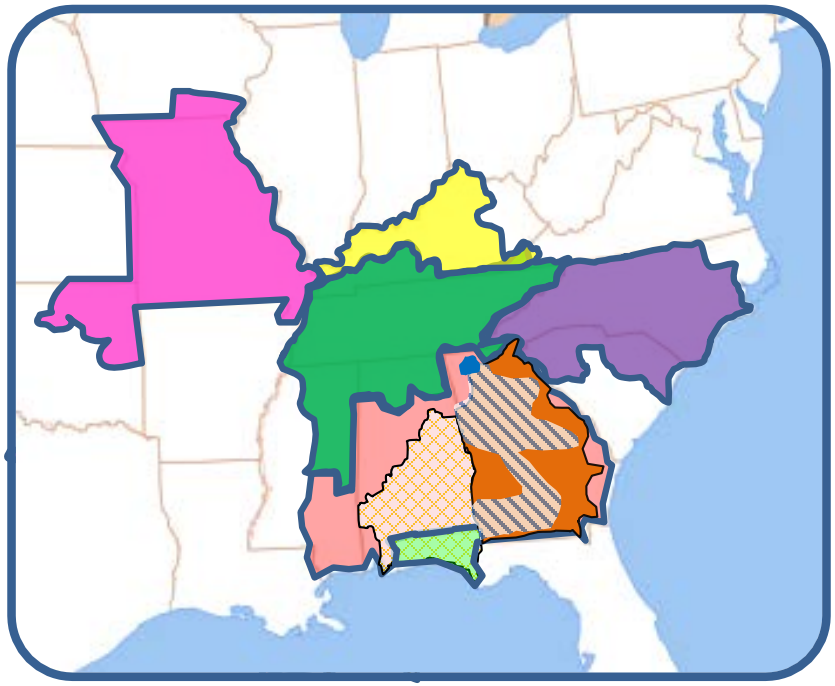
- **2020 SERTP Process Overview**
- **Form the "RPSG"**
  - Regional Planning Stakeholders Group
  - Committee Structure & Requirements
- **Economic Planning Studies**
  - Review Requested Sensitivities for 2020
  - RPSG to Select up to Five Economic Planning Studies
- **Interactive Training Session**
  - Inverter Based Generation – Connection Standards
- **Miscellaneous**
  - Public Policy Requirement Stakeholder Requests
- **Next Meeting Activities**

SERTP

2020 SERTP Process Overview

2020 SERTP

Southeastern Regional Transmission Planning (SERTP)



SERTP

- Associated Electric Cooperative Inc.
- Dalton Utilities
- Duke Energy
- Georgia Transmission
- Gulf Power
- LG&E KU
- MEAG Power
- PowerSouth Energy Cooperative
- Southern Company
- TVA

Upcoming 2020 SERTP Process

- **SERTP 1st Quarter –** ***1st RPSG Meeting & Interactive Training Session***

  March 25th 2020

  – Form RPSG
  – Select Economic Planning Studies
  – Interactive Training Session

- **SERTP 2nd Quarter –** ***Preliminary Expansion Plan Meeting***

  June 25th 2020

  – Review Modeling Assumptions
  – Preliminary 10 Year Expansion Plan
  – Stakeholder Input & Feedback Regarding the Plan

Upcoming 2020 SERTP Process

- **SERTP 3rd Quarter – *2nd RPSG Meeting***

  September 2020

  – Preliminary Results of the Economic Studies
  – Stakeholder Input & Feedback Regarding the Study Results
  – Discuss Previous Stakeholder Input on the Expansion Plan

- **SERTP 4th Quarter – *Annual Transmission Planning Summit & Input Assumptions***

  December 2020

  – Final Results of the Economic Studies
  – Regional Transmission Plan
  – Regional Analyses
  – Stakeholder Input on the 2021 Transmission Model Input Assumptions

SERTP

Regional Planning Stakeholder Group (RPSG)

The SERTP Stakeholder Group

- RPSG – Regional Planning Stakeholder Group
- Serves Two Primary Purposes
  1) The RPSG is charged with determining and proposing up to five (5) Economic Planning Studies on an annual basis
  2) The RPSG serves as stakeholder representatives for the eight (8) industry sectors in interactions with the SERTP Sponsors

RPSG Committee Structure

RPSG Sector Representation

1. Transmission Owners / Operators
2. Transmission Service Customers
3. Cooperative Utilities
4. Municipal Utilities
5. Power Marketers
6. Generation Owner / Developers
7. Independent System Operators (ISOs) / Regional Transmission Operators (RTOs)
8. Demand Side Management / Demand Side Response

RPSG Committee Structure

- Sector Representation Requirements
  - Maximum of two (2) representatives per sector
  - Maximum of sixteen (16) total sector members
  - A single company, and all of its affiliates, subsidiaries, and parent company, is limited to participating in a single sector

RPSG Committee Structure

- Annual Reformation
  - Reformed annually at 1st Quarter Meeting
  - Sector members elected for a term of approximately one year
  - Term ends at start of following year's 1st Quarter SERTP Meeting
  - Sector Members shall be elected by the Stakeholders present at the 1st Quarter Meeting
  - Sector Members may serve consecutive, one-year terms if elected
  - No limit on the number of terms that a Sector Member may serve

RPSG Committee Structure

- Simple Majority Voting
  - RPSG decision-making that will be recognized by the Transmission Provider for purposes of Attachment K shall be those authorized by a simple majority vote by then-current Sector Members
  - Voting by written proxy is allowed

RPSG Formation

2020 SERTP RPSG Sector Members

Sector	Members	Company
Transmission Owners/ Operators		
Transmission Service Customers	Linn Oelker	LG&E/KU
Cooperative Utilities	James Manning	NC Electric Cooperatives
Municipal Utilities		
Power Marketers	Jarret Tate	Southern Co.
Generation Owners / Developers	Alexandra Miller	EDF Renewables
ISO / RTOs		
DSM / DSR		

SERTP

Economic Planning Studies

SERTP Regional Models

- SERTP will develop 6 coordinated regional models
- Models include latest transmission planning model information within the SERTP region
- Typically 3 versions created annually
- Available on the Secure Area of the SERTP website upon satisfying access requirements

No.	Season	Year
1	Summer	2022
2		2025
3		2030
4	Shoulder	2025
5	Winter	2025
6		2030

Economic Planning Study Process

- **RSPG selects the Economic Studies in the 1st Quarter Meeting**
- **SERTP Sponsors identify the transmission requirements needed to move large amounts of power above and beyond existing long-term, firm transmission service commitments**
  - Analysis is consistent with NERC standards and company-specific planning criteria
- **These studies represent analyses of hypothetical scenarios requested by the stakeholders and do not represent an actual transmission need or commitment to build**
- **Completed Economic Study Request Reports are Posted on the SERTP WebSite in the General Documents section of the Reference Library Tab**
- **Scoping Meeting typically held in April/May**

RPSG Selected List of Economic Study Requests

Regional Planning Stakeholders Group (RPSG)

Submitted Economic Planning Studies for 2020

No.	Requestor	Source	Sink	Amount	Year
1	LGE (L. Oelker)	MISO	LGE&KU	200	2022 (S)
2	LGE (L. Oelker)	PJM	LGE&KU	200	2022 (S)
3					

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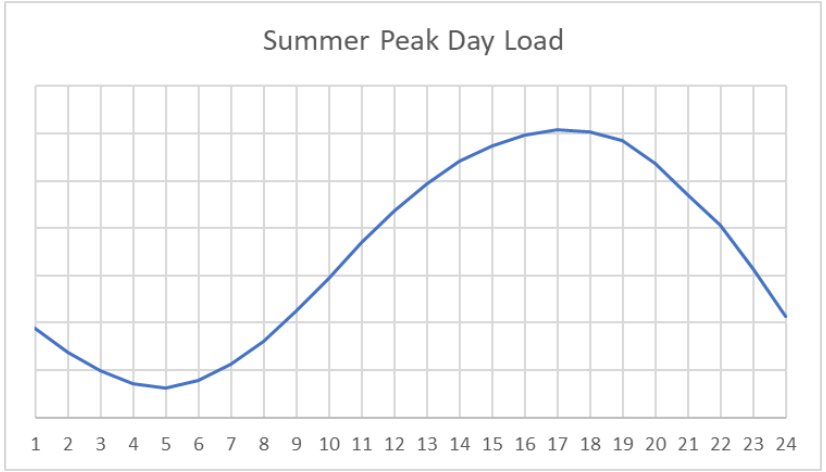
Transmission Planning with Solar Generation

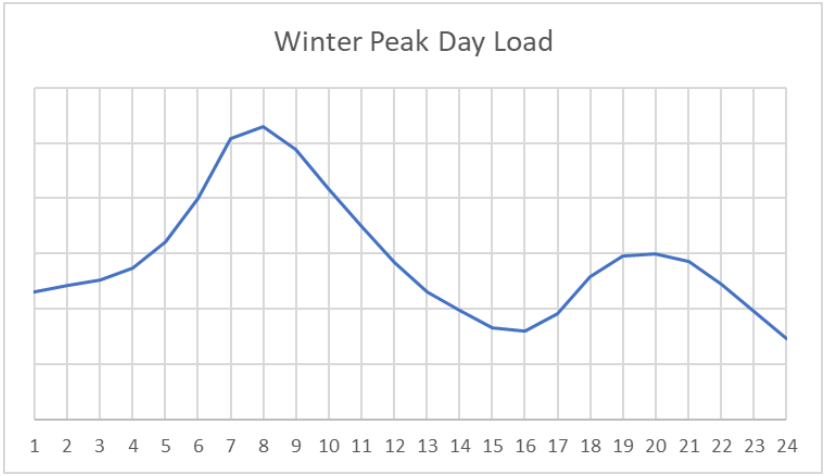
Presentation to SERTP - March 25, 2020

Bill Quaintance
Duke Energy Progress
Transmission Planning
Raleigh, NC

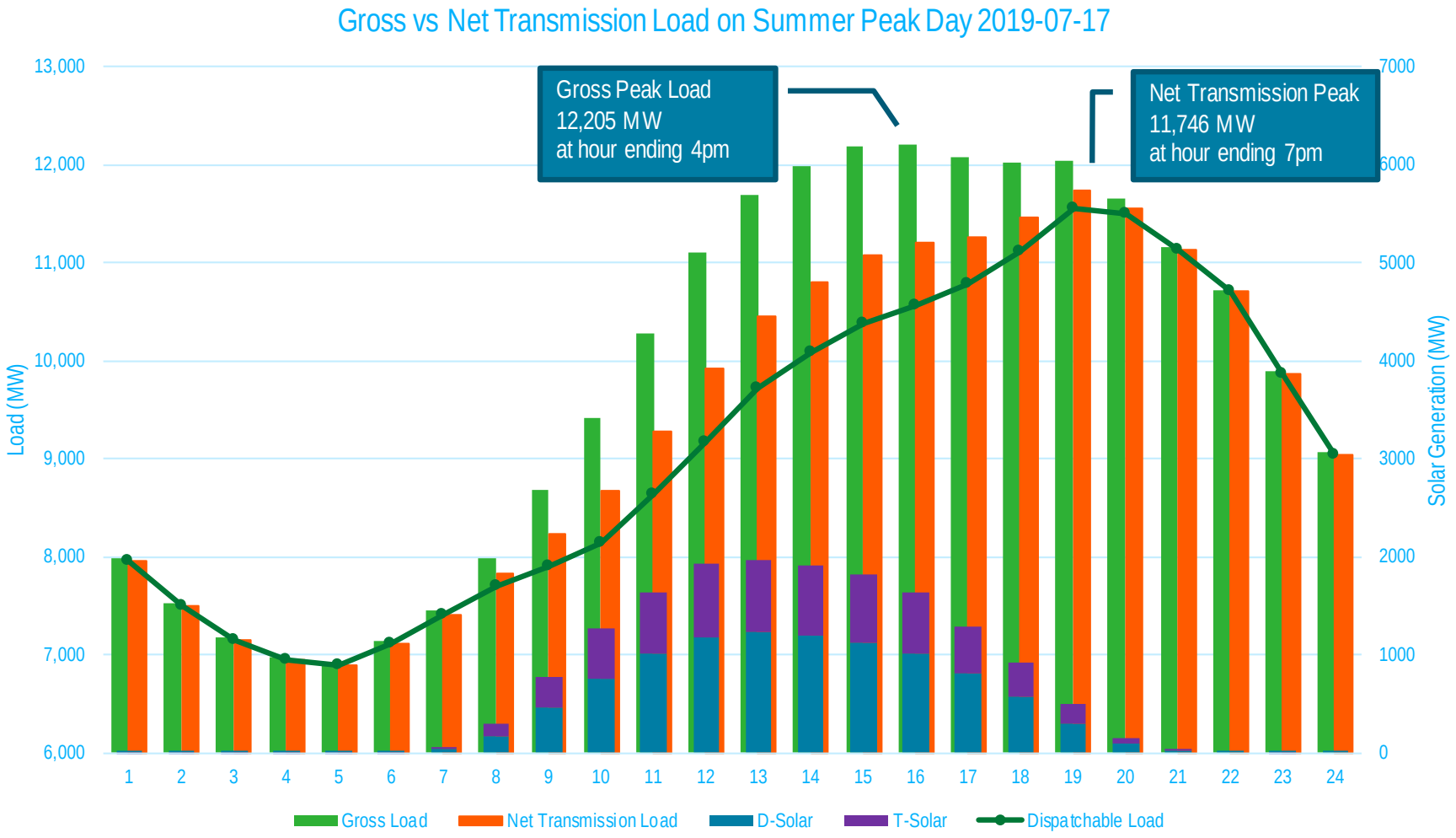
Traditional Transmission Planning

- Load Forecast
  - System Level
  - Substation Level
  - We know load shapes
- Generation Dispatch
  - Base load and dispatchable
  - Imports and Exports
  - Peak
  - Shoulder

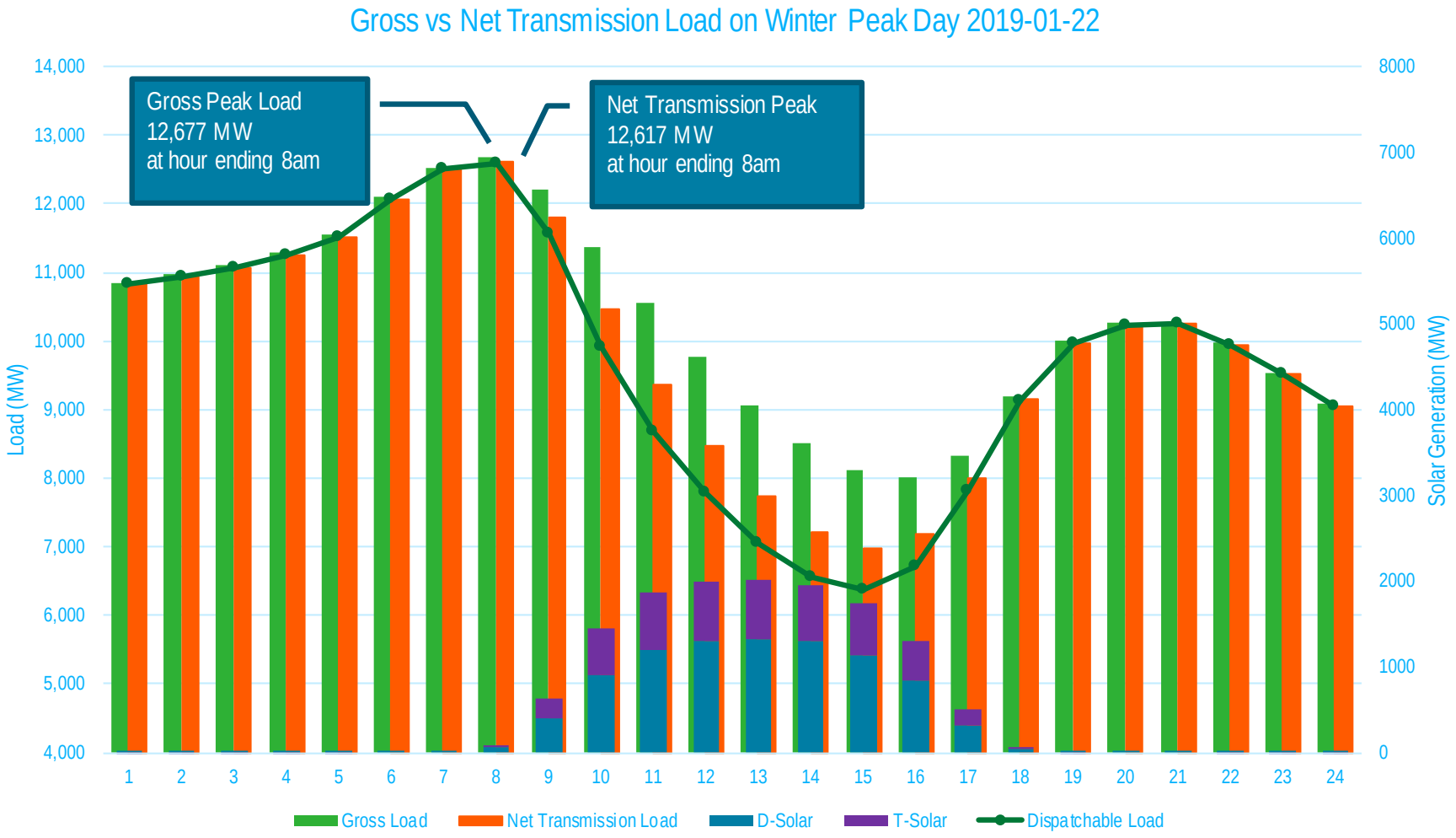




Load and Solar Generation – Summer Peak



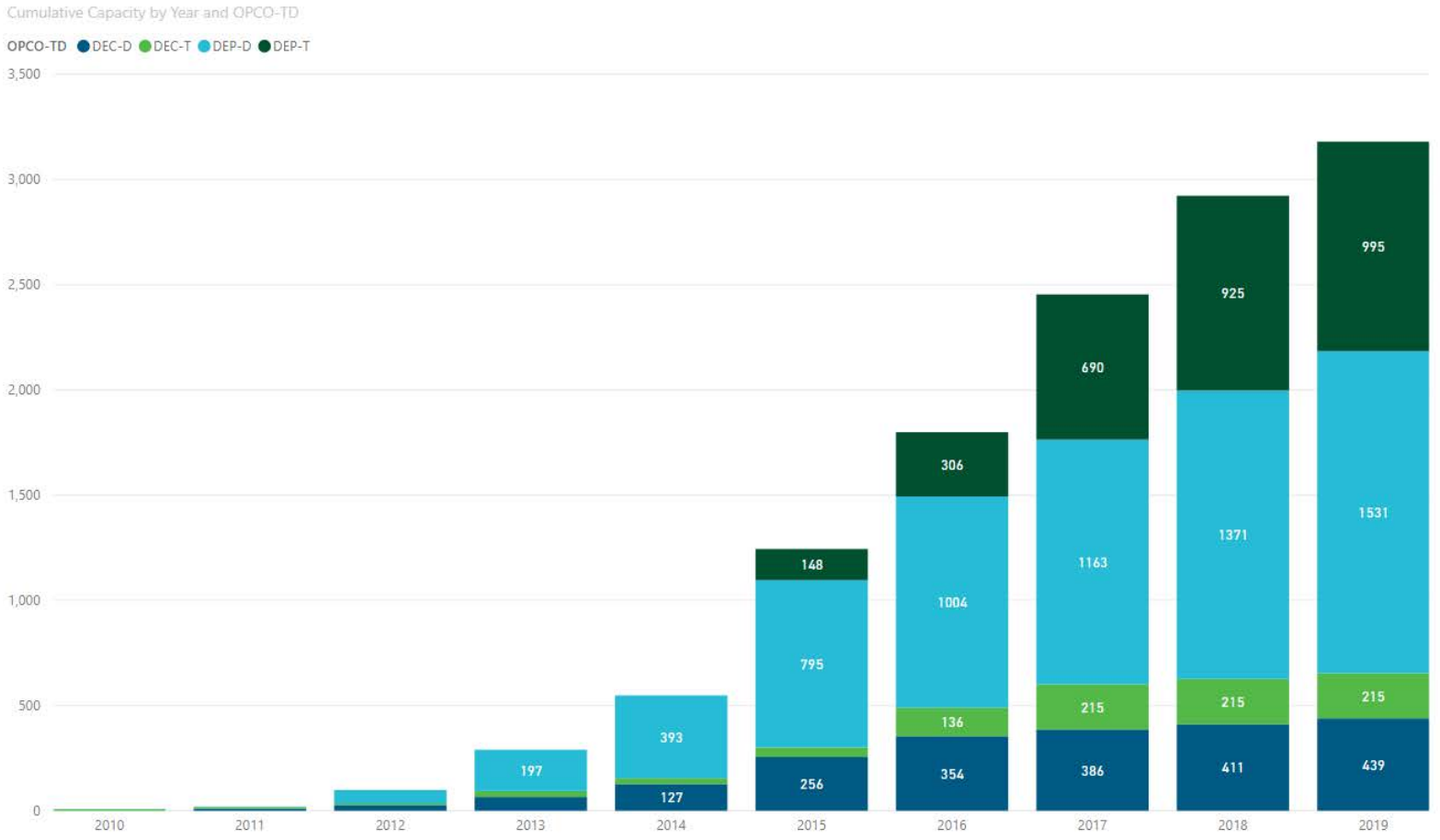
Load and Solar Generation – Winter Peak



What is “Load”?

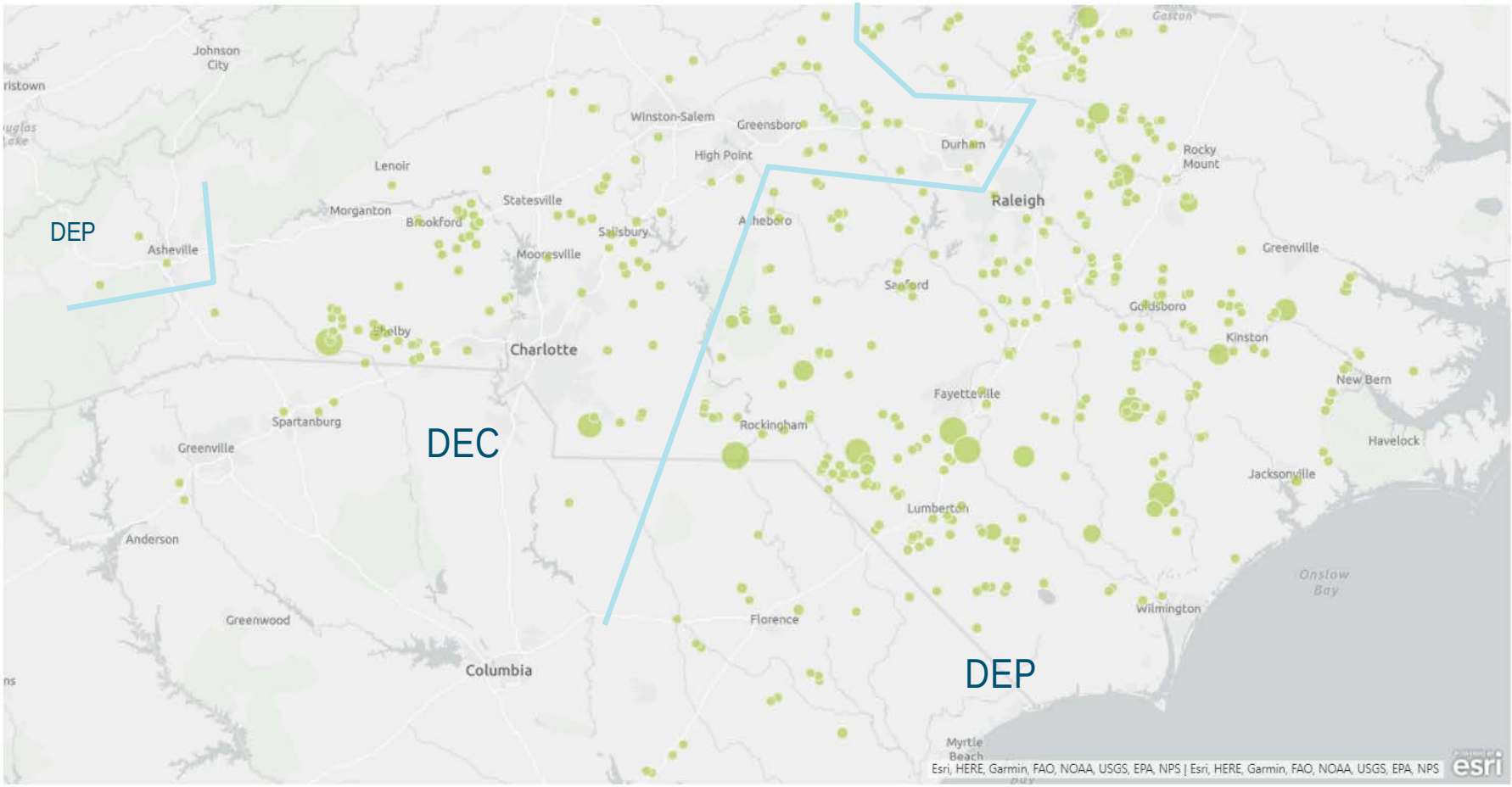
- Grid Operations: Generation + Net Imports (i.e. total resources)
  - = End Use Load + T&D Losses (can’t measure directly)
- Net Imports: net flow coming in on tie lines
- But what is “Generation”? Which generators?
  - Traditionally measured a small number of large plants
  - What if we have 600 DG’s totaling 1500 MW? (DEP as of 2/29/2020)
    - Can we meter all 600 to add in to our BA Load calculation? Yes.
  - What if you have 1,000s or 10,000s of residential rooftop solar sites?
    - California – No real time metering

Duke Energy Cumulative Solar in the Carolinas



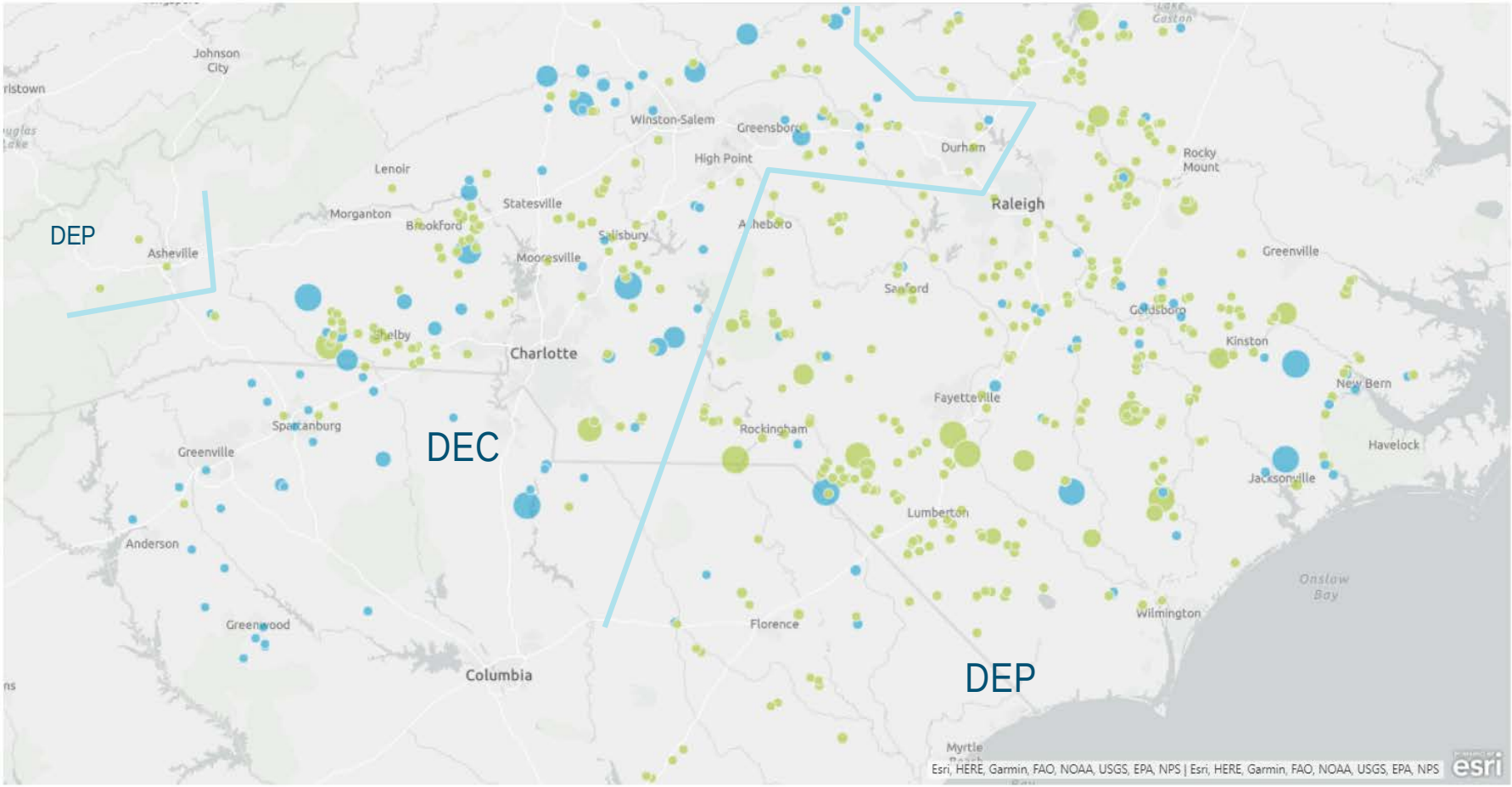
DEP and DEC

NC/SC Solar – Operational



Utility Scale - 1 to 80 MW

NC/SC Solar – Operational & IA

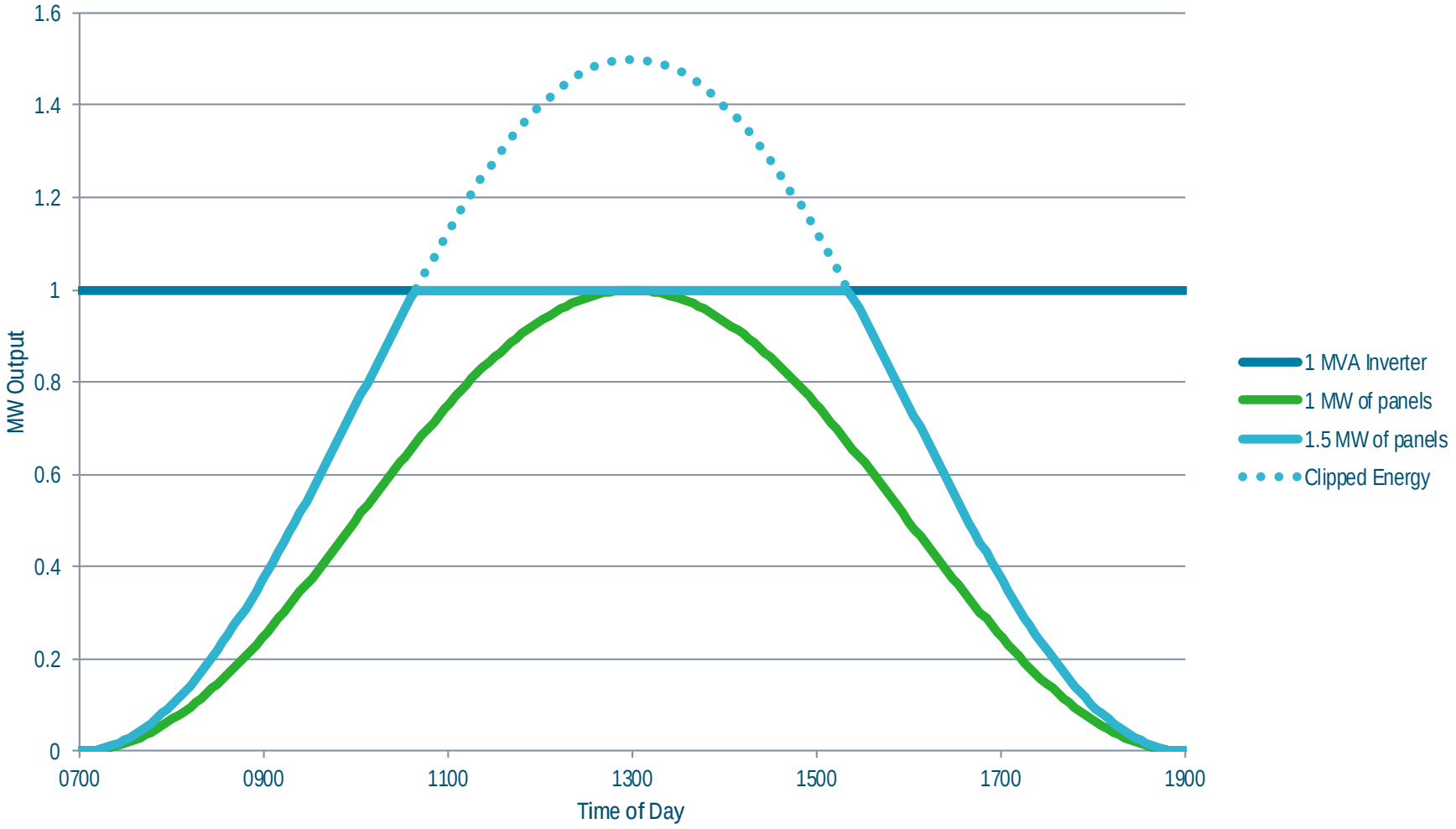


Utility Scale - 1 to 80 MW

Transmission versus Distribution

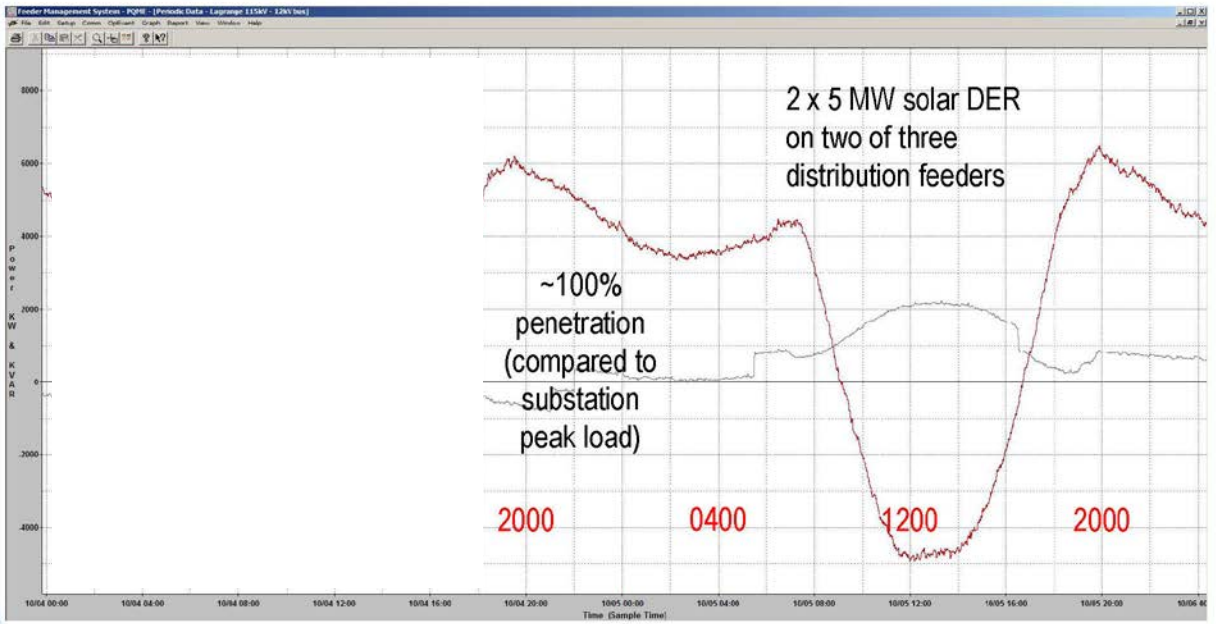
- Transmission-connected Solar Plants
  - We've always cared about them. They're on transmission after all.
  - Generator Interconnection Studies
    - FERC or State
- Distribution-connected Solar Plants (DER)
  - Initially little impact on transmission
  - But DER started growing fast
  - As it reached 100s of MW, Transmission planners started to take more notice
  - Generator Interconnection Studies
    - DER use State interconnection procedures
    - Too many to do individual transmission impact studies
    - Power flow screening in groups (e.g. by quarter year)
  - Transmission Models
    - Periodic updates of aggregate DER in service by substation

DC / AC Ratio (aka Over-paneling)



DER Effect on T-D Substation

DISTRIBUTION IMPACTS
Duke Energy Progress, Lagrange 115/12 substation near Lagrange, NC: **October 4 & 5, 2014**

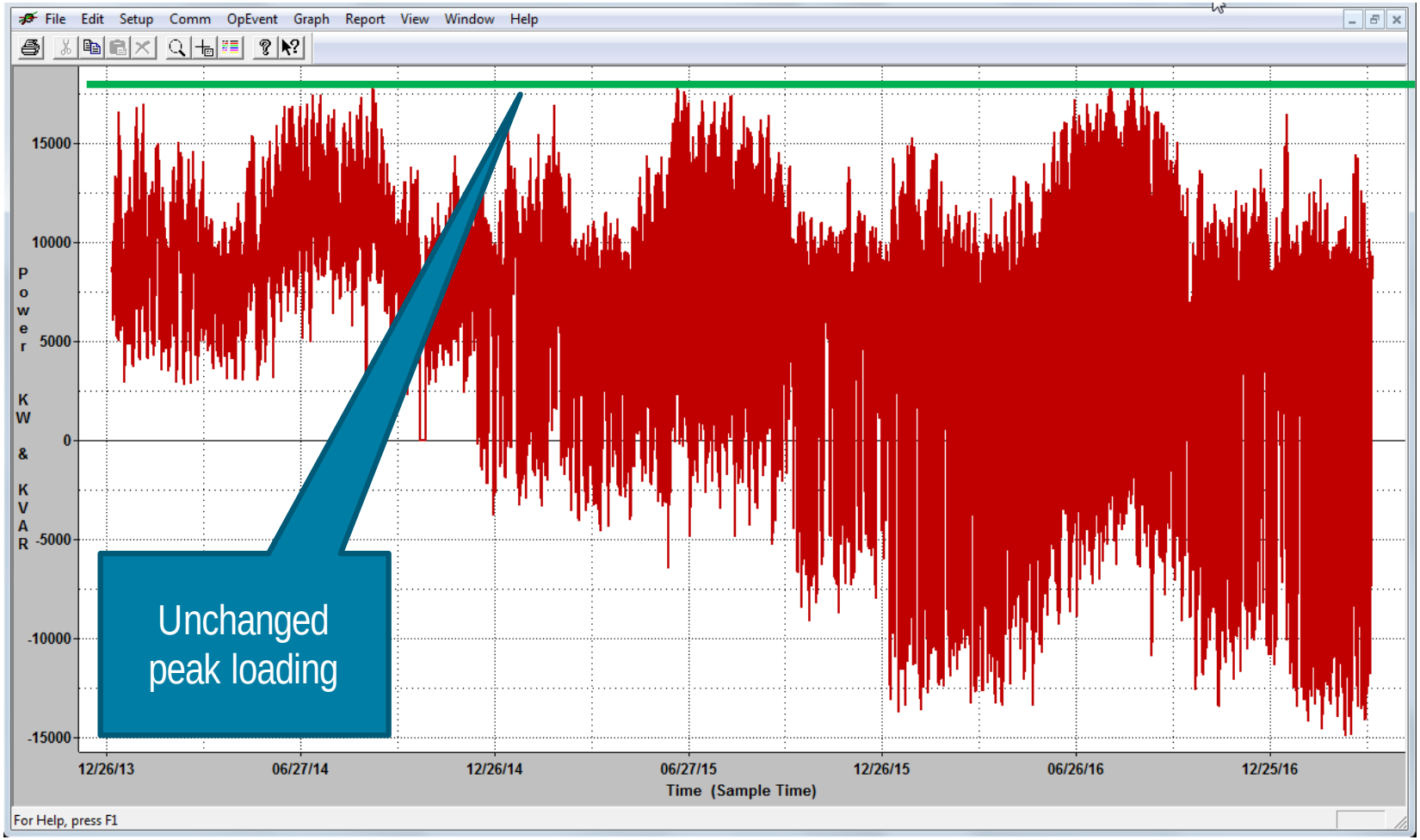


One-minute real & reactive power flow measured at distribution bus, 48 hour period

2

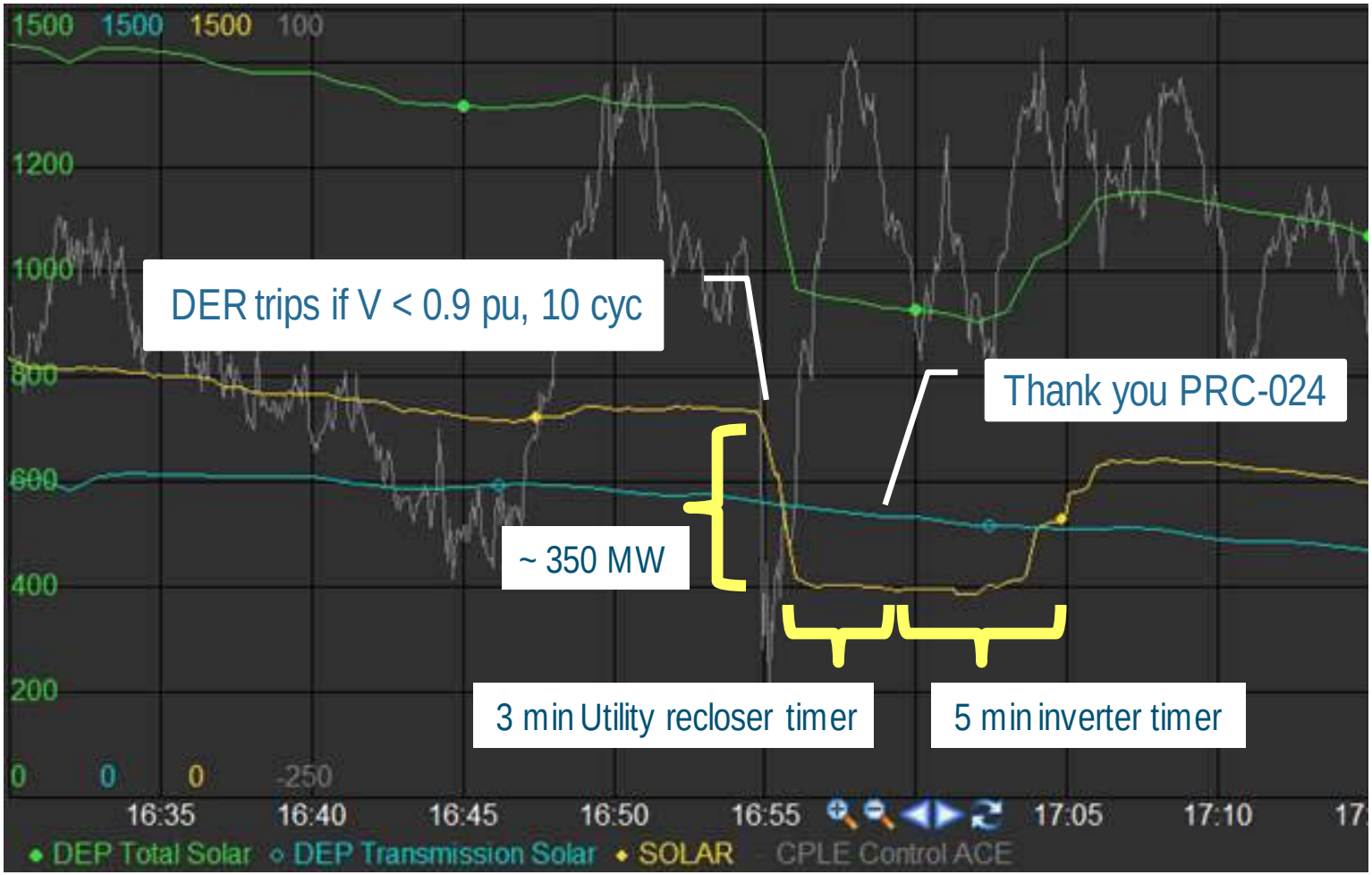
Utility-scale DER

solar farm operations: capacity impacts

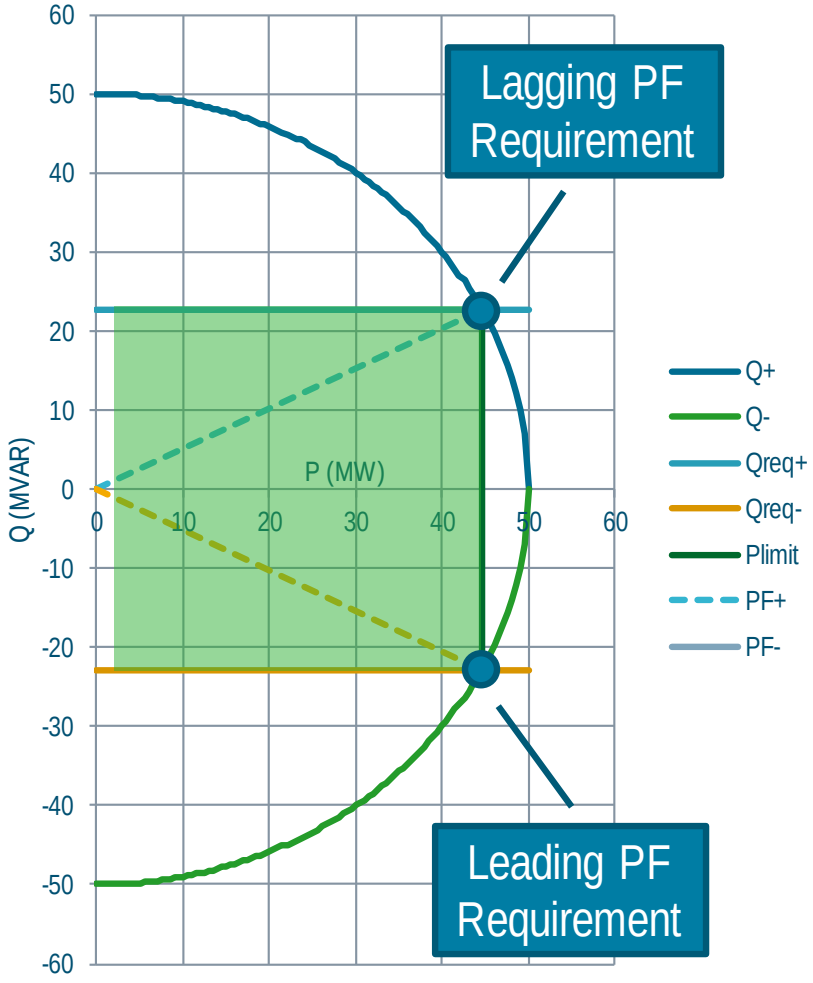


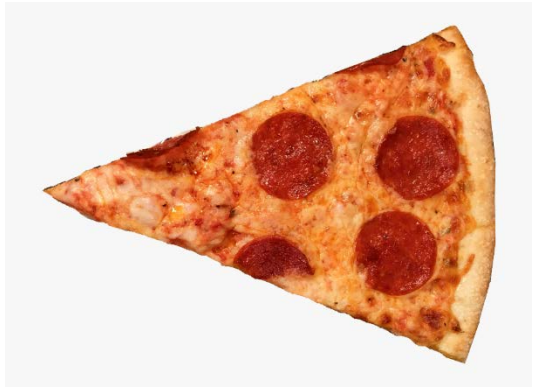
Losses on the distribution system found to increase with the growth of utility-scale DER on distribution, due to backfeed

DER Tripping from 3ph Transmission Fault

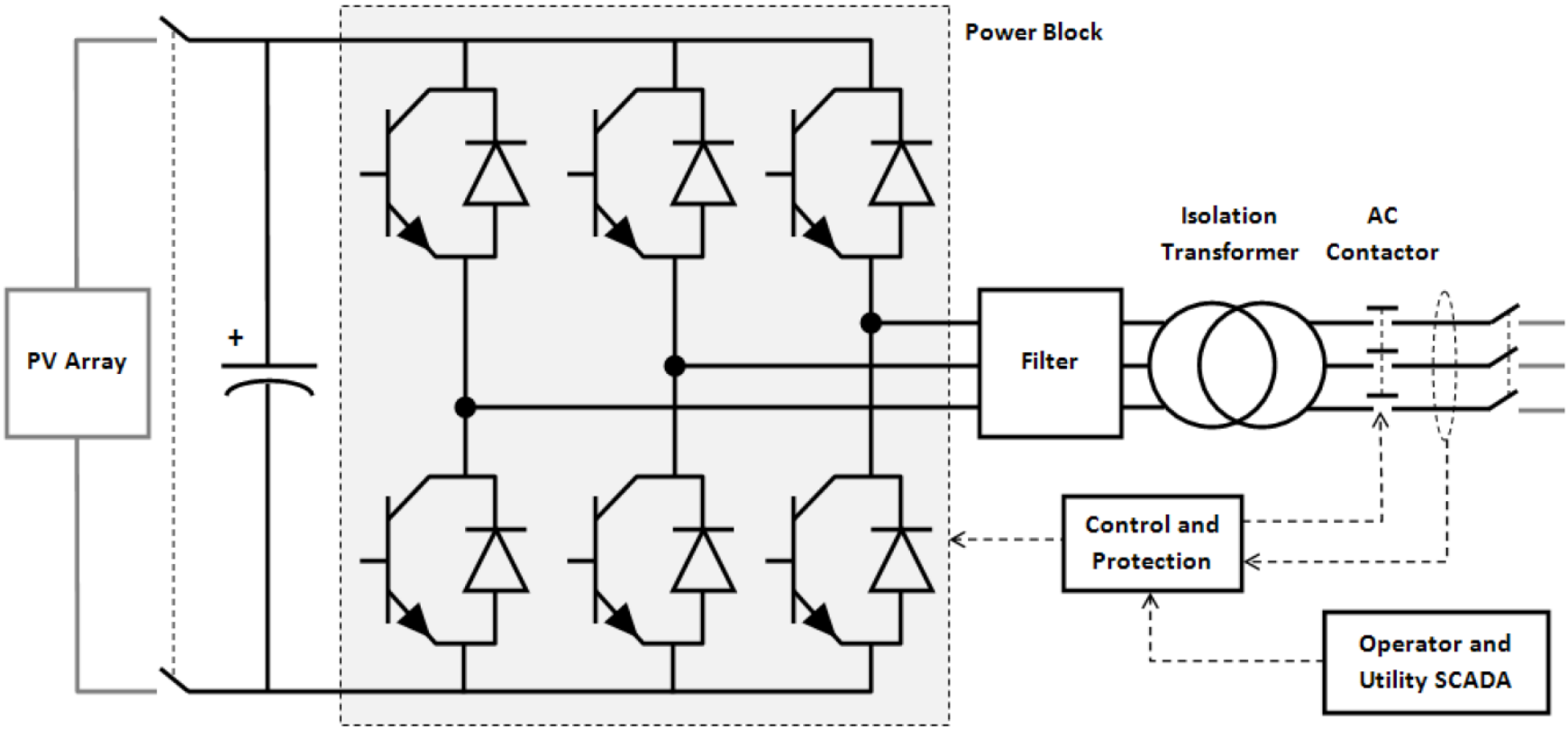


Transmission Connected Solar - Power Factor Requirement



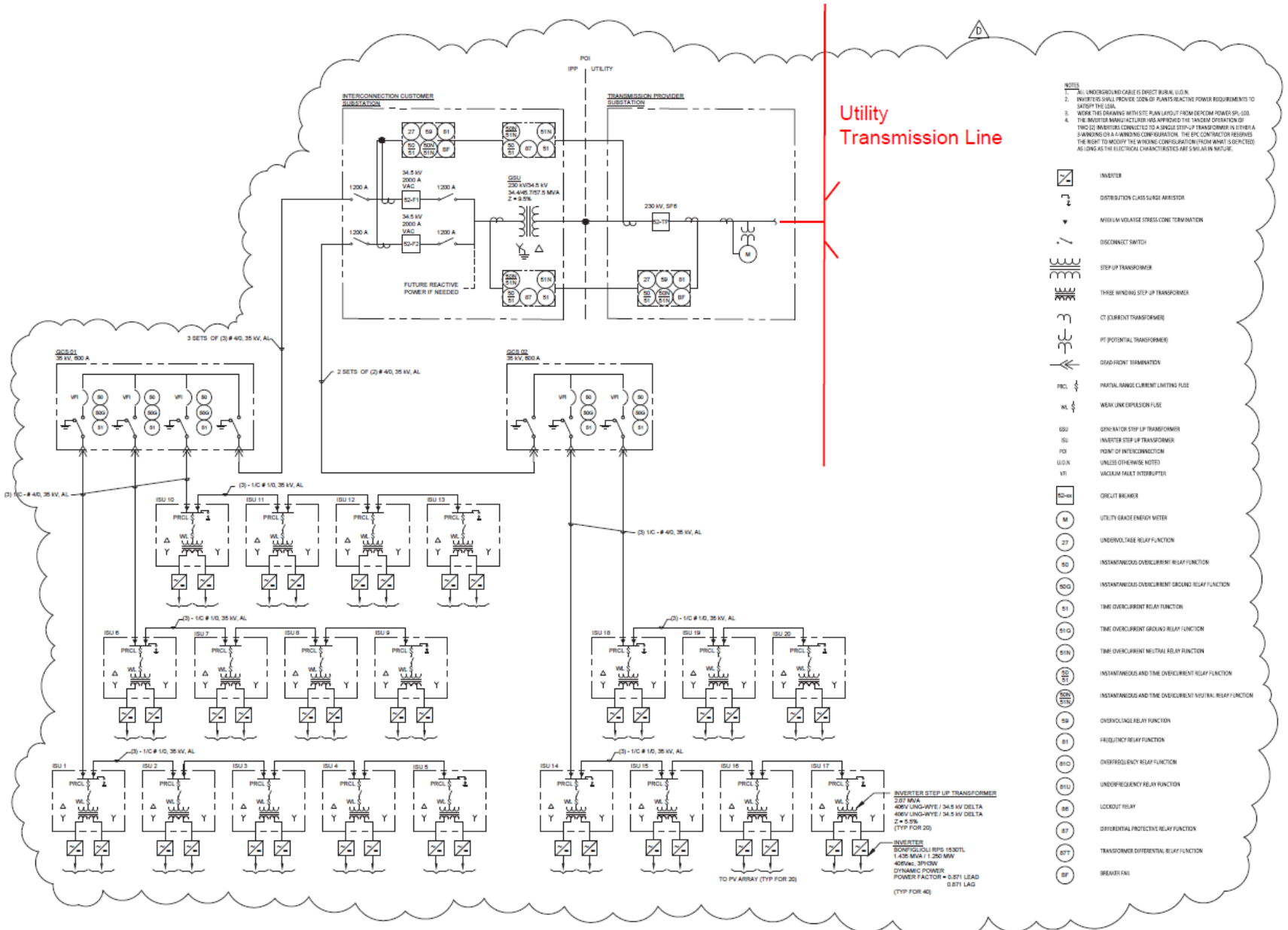


PV Inverter

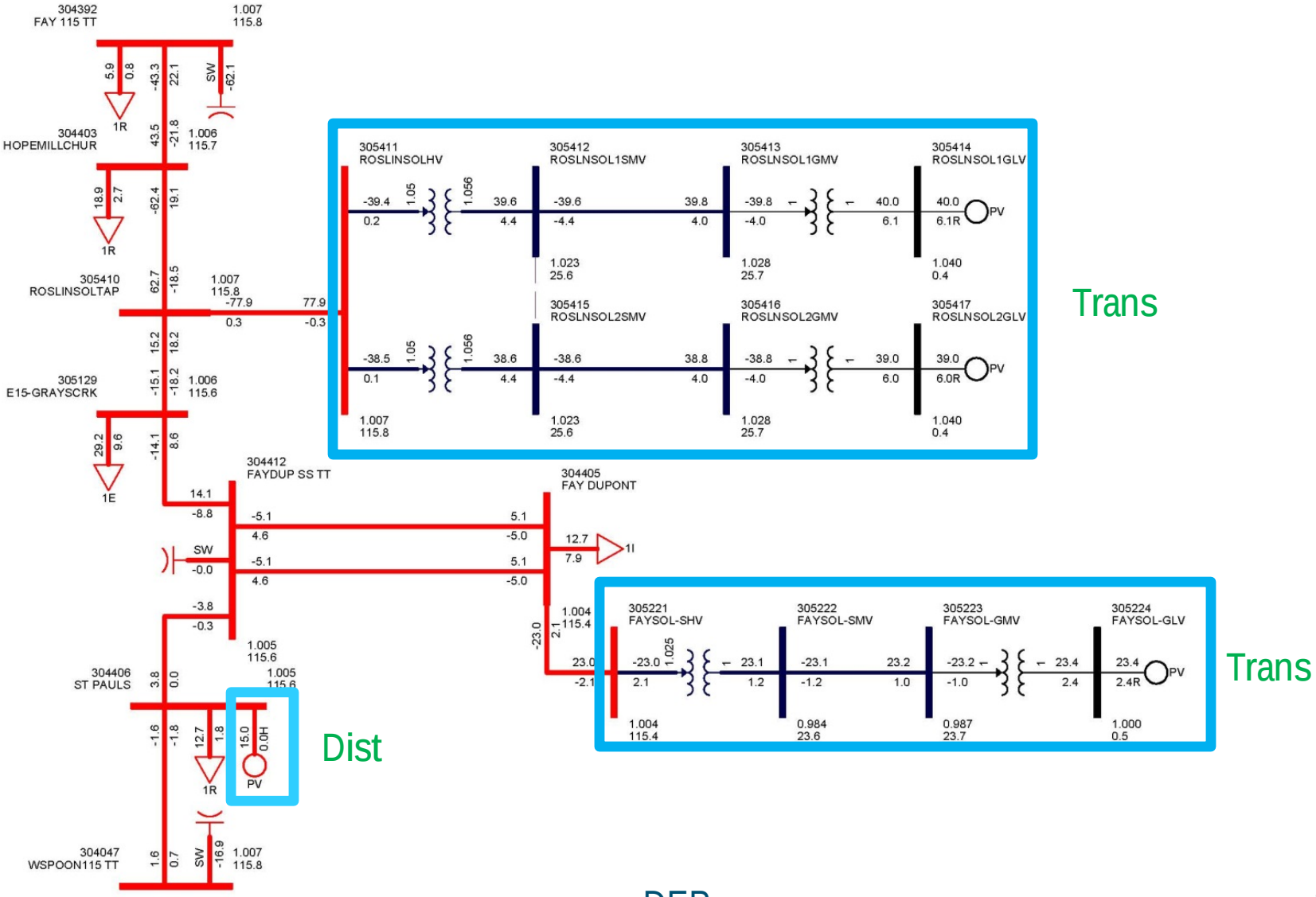


* WECC Guide for Representation of Photovoltaic Systems In Large-Scale Load Flow Simulations

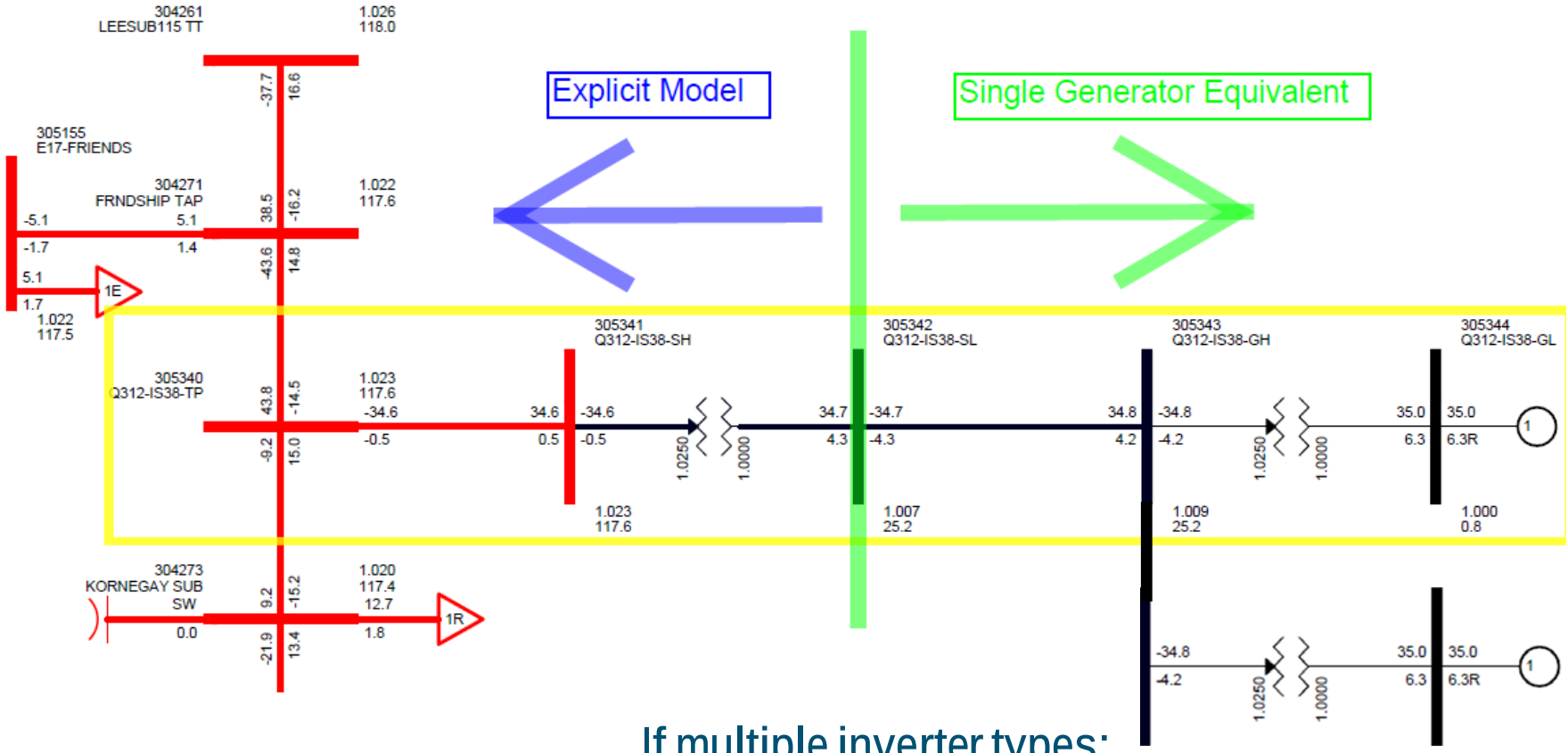
Solar Plant One-line



Transmission Connected Solar – modeling

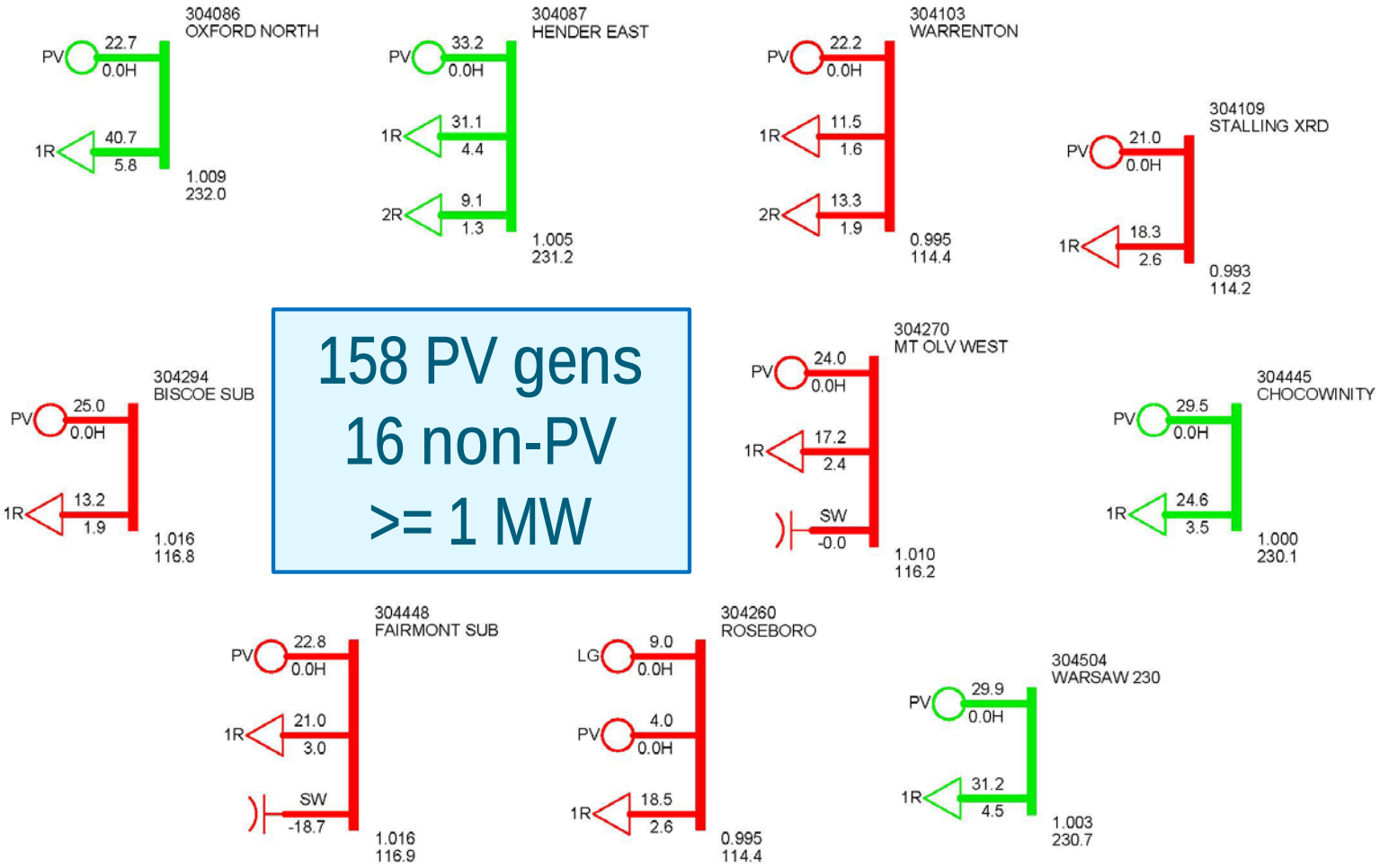


Transmission Connected Solar – modeling - 2

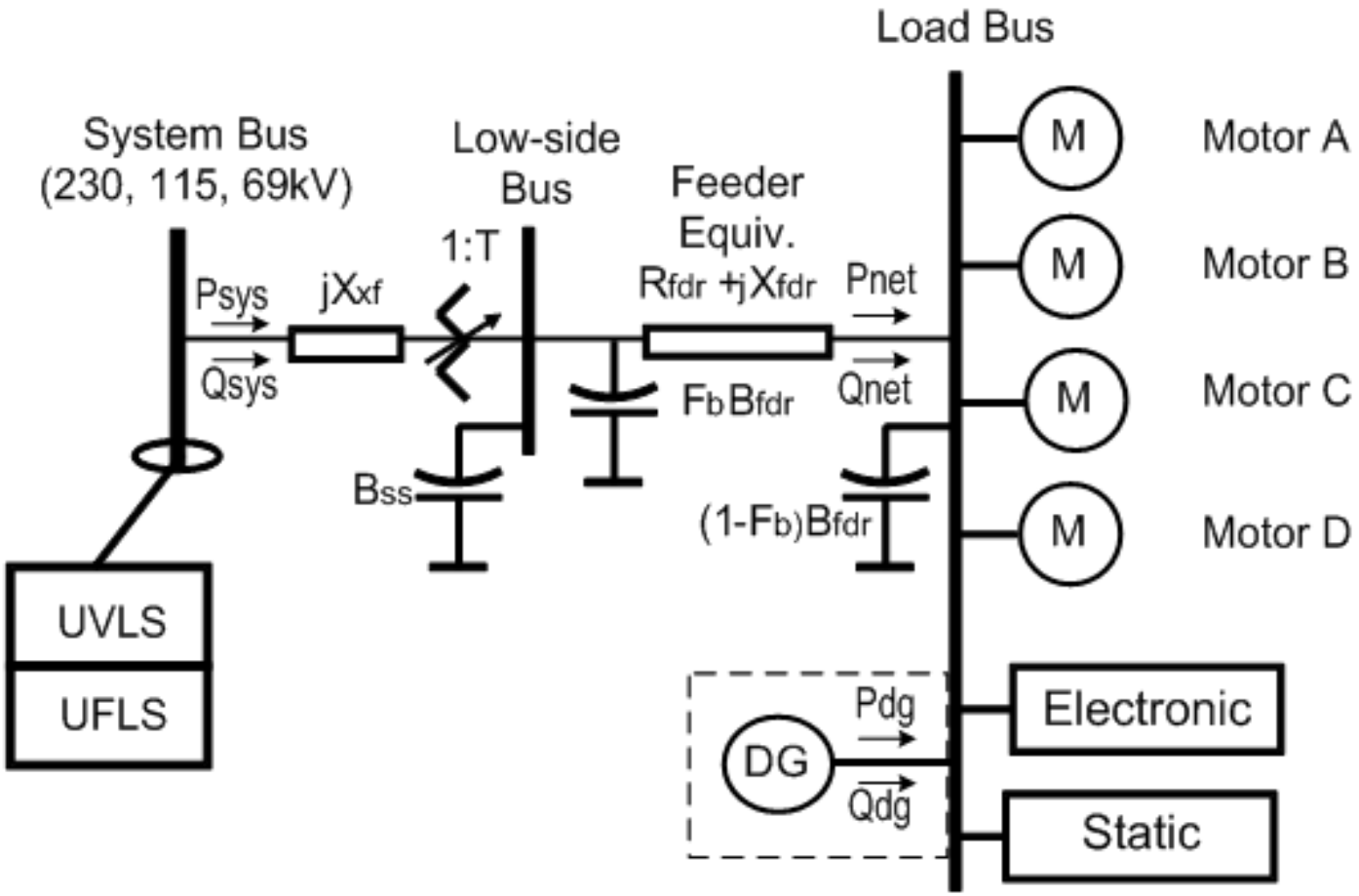


If multiple inverter types:

DER Modeling Step 1 (U-DER and R-DER)

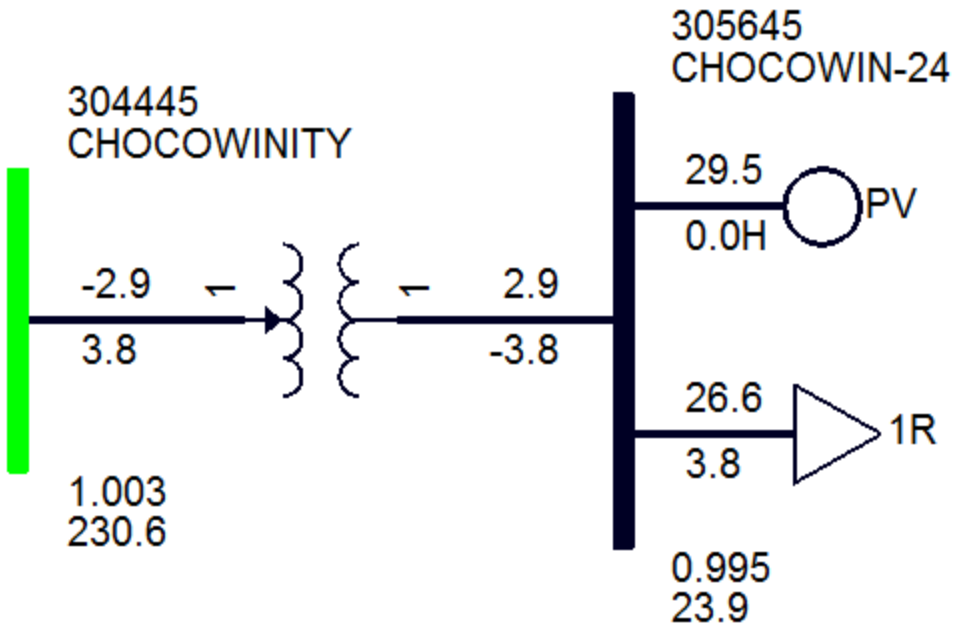


Recommended Model for Load + R-DER



DER Modeling Step 2 (U-DER)

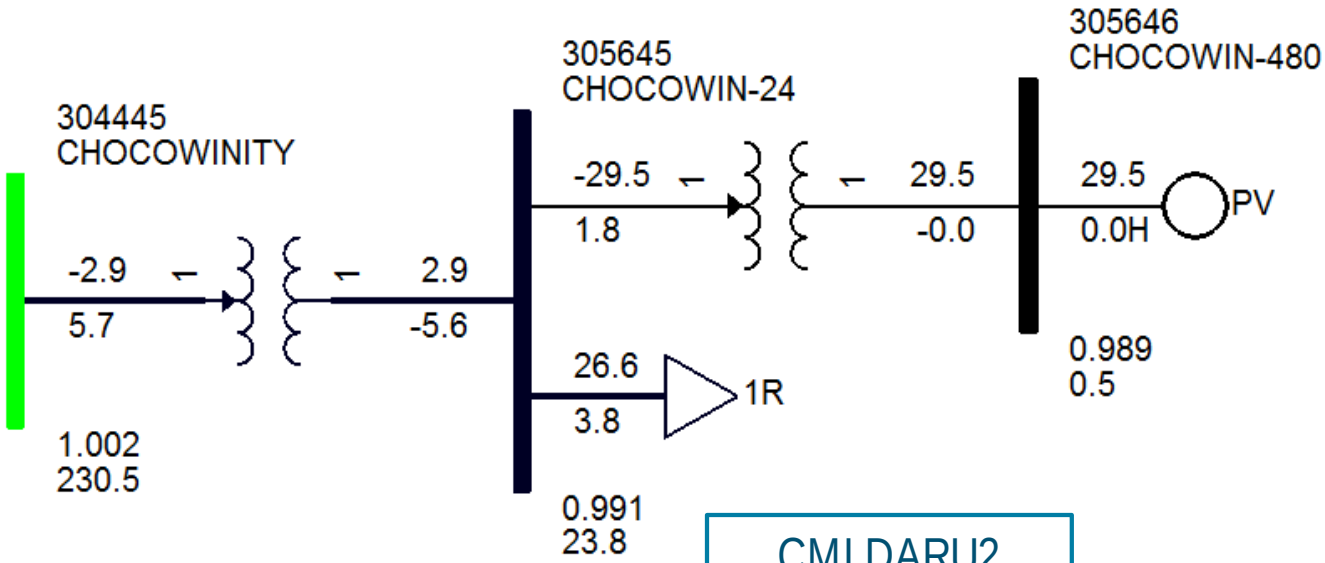
Model the T-D (Retail) transformer



CMLDARU2
(no transformer)

2. In using this model the implicit transformer modeling should not be used (i.e. RT and XT in the power flow record of generator should be zero).

DER Modeling Step 3 (U-DER)



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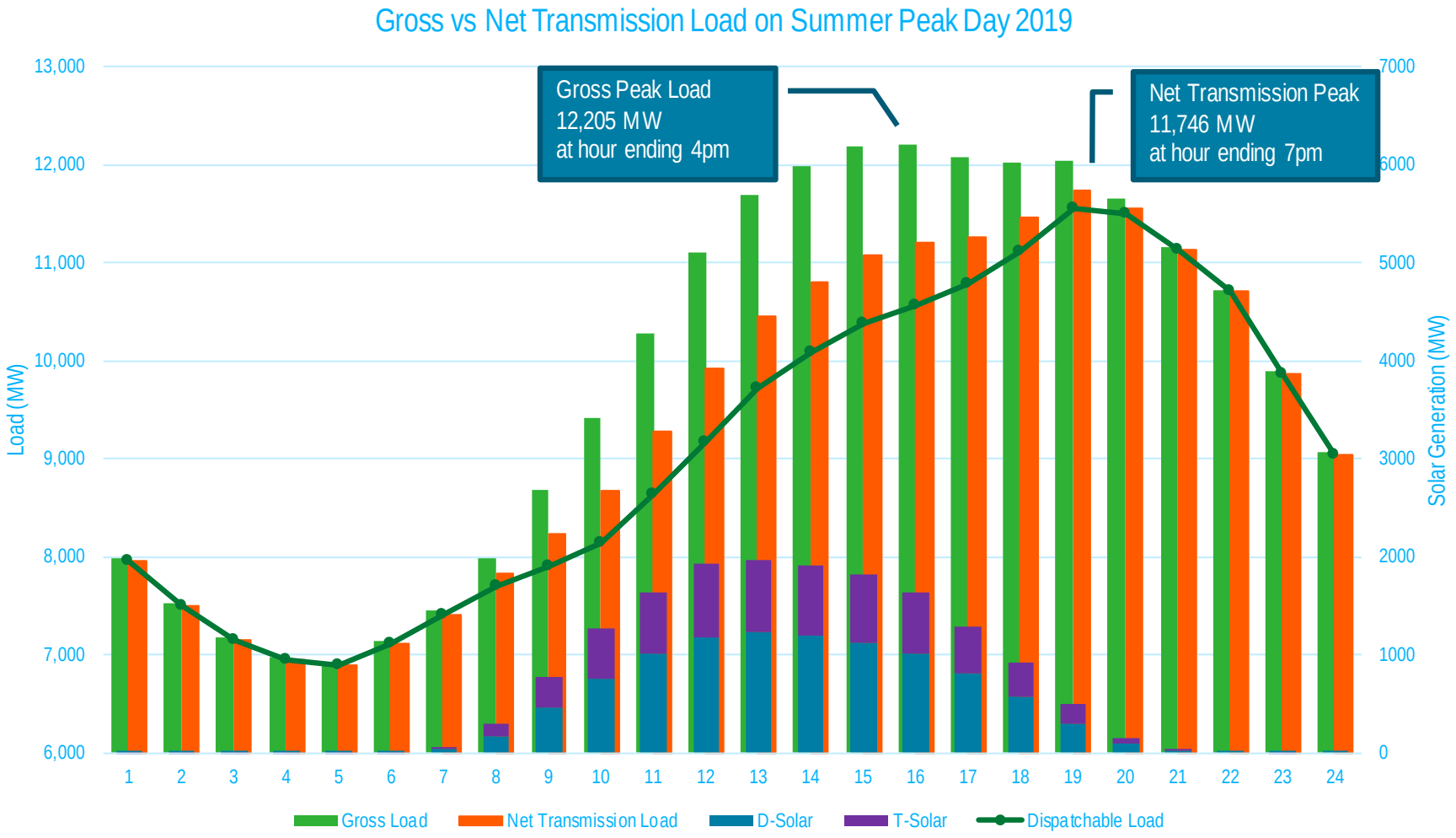
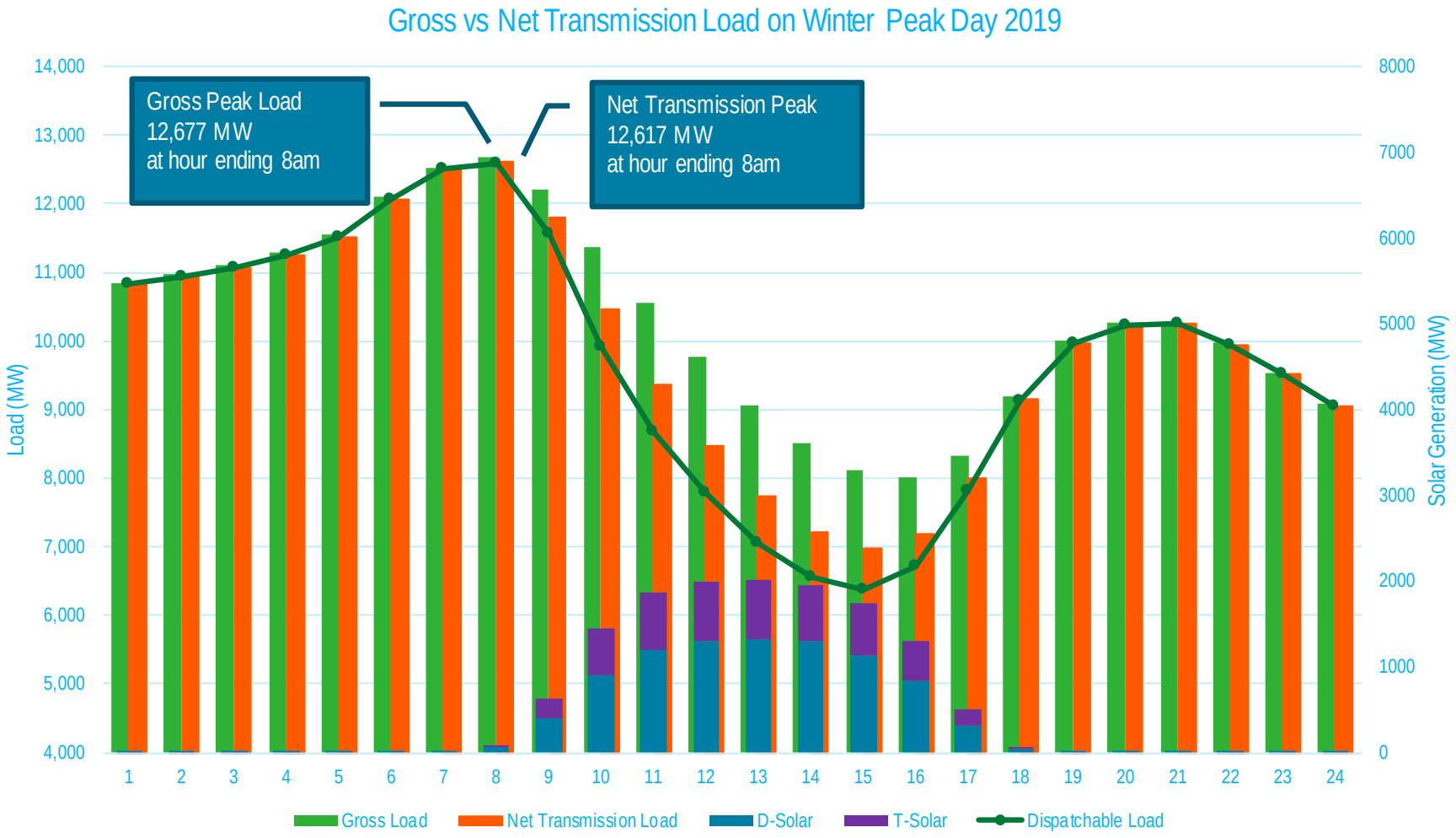


Load and Solar Generation – Winter Peak

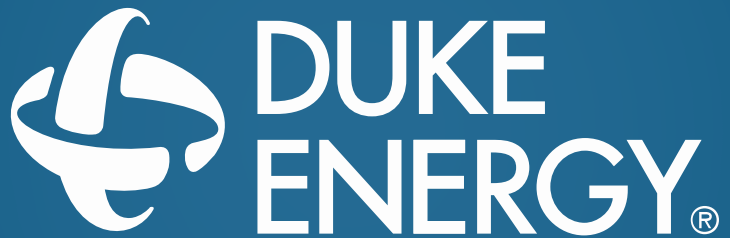


Base and Sensitivity Cases for Solar in DEP

Scenario	System Load (% of Peak)	Solar Generation (% of rated)
Base Cases		
Summer Peak (5pm)	100%	50%
Winter Peak (7am)	100%	0%
Light Load (Spring Sunday 4am)	35%	0%

Base and Sensitivity Cases for Solar in DEP

Scenario	System Load (% of Peak)	Solar Generation (% of rated)
Base Cases		
Summer Peak (5pm)	100%	50%
Winter Peak (7am)	100%	0%
Light Load (Spring Sunday 4am)	35%	0%
Sensitivities		
Summer Shoulder (1pm peak day)	90%	100%
Summer Shoulder (sunset on peak day)	90%	0%
Light Load (Spring Sunday noon)	40%	100%



SERTP

Public Policy Requirements Stakeholder Proposal

SERTP Evaluation

Transmission Needs Driven by Public Policy Requirements (PPRs)

- **The SERTP process did not receive any proposals for transmission needs driven by Public Policy Requirements for the 2020 planning cycle. Therefore, no transmission needs have been identified for further evaluation of potential transmission solutions in the 2020 SERTP planning cycle.**

Next Meeting Activities

- **2020 SERTP 2nd Quarter Meeting**
  - **Date: June 2020**
  - **Purpose:**
    - Review Modeling Assumptions
    - Discuss Preliminary 10 Year Expansion Plan
    - Stakeholder Input & Feedback Regarding the Plan

2020 SERTP

Questions?

www.southeasternrtp.com