



Distributed Energy Resources Roadmap

Updates Overview

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MIWG

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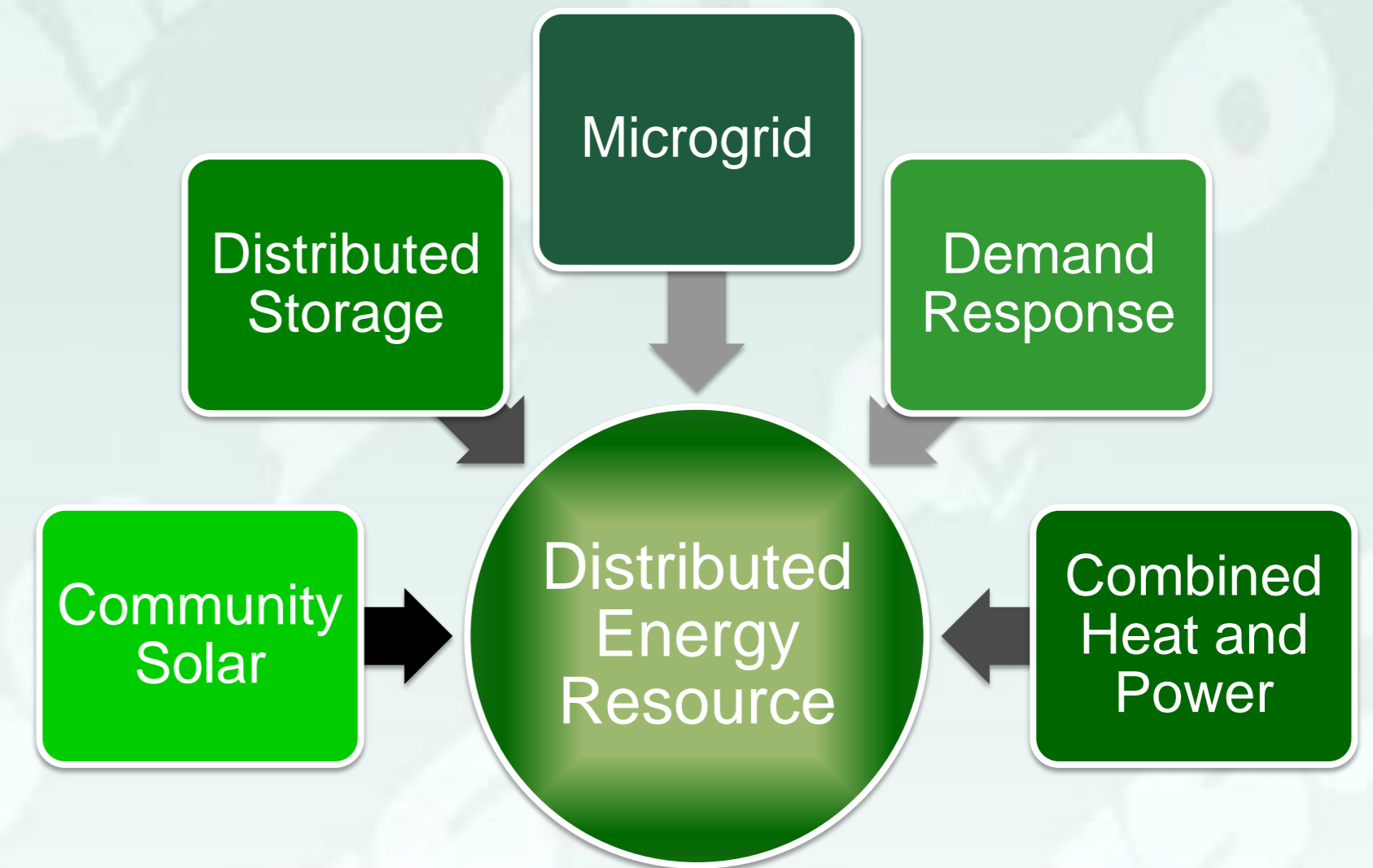
Krey Corporate Center - Rensselaer, NY

Agenda

- **Initiative Scope and Key Objectives**
- **DER Roadmap Development Process, Discussion, and Timeline**
- **Summary of feedback received between 11/29/16 and 12/13/16**
- **Roadmap Purpose**
- **Roadmap Updates Overview**
- **Next Steps**

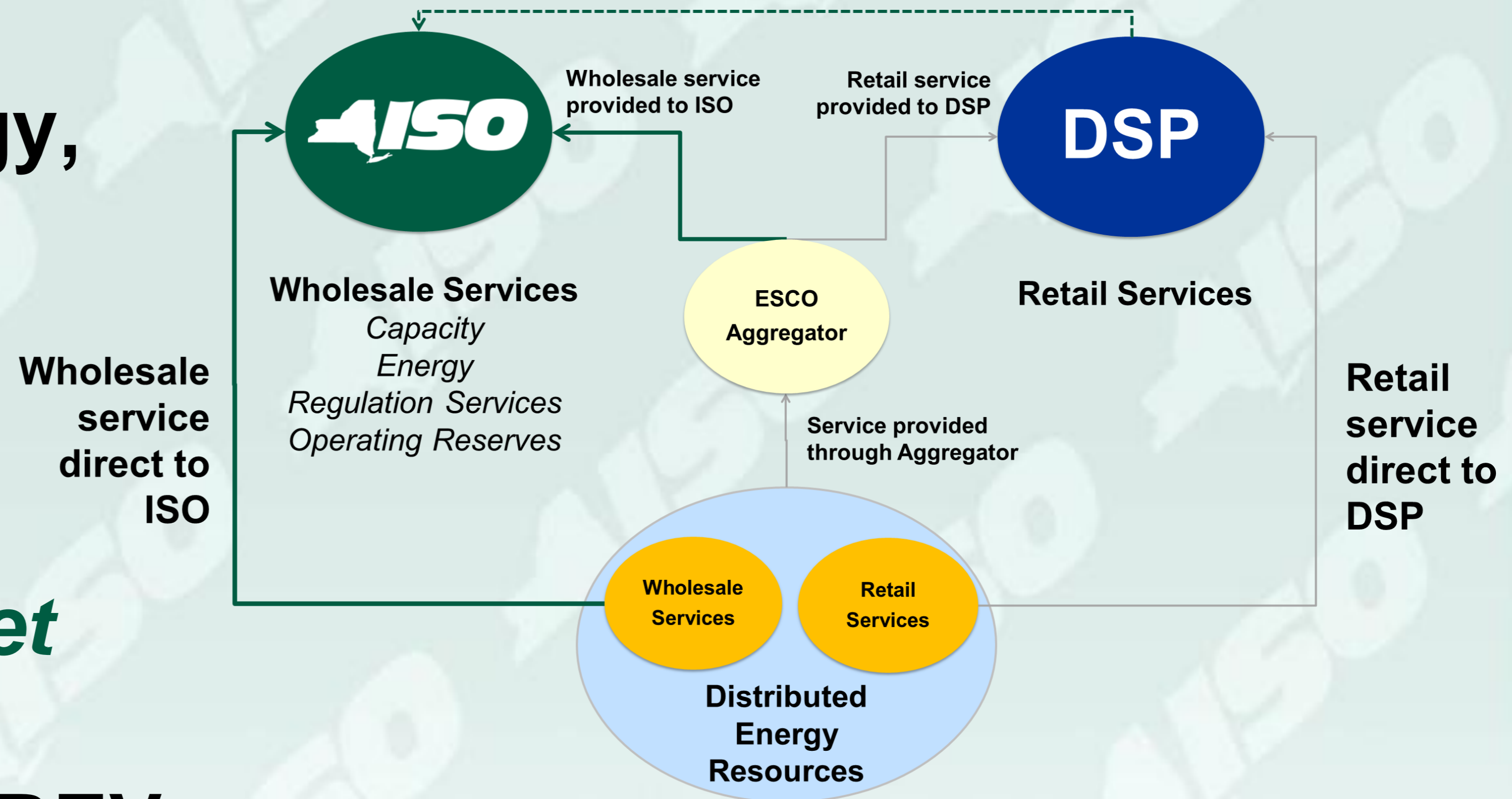
Initiative Scope

- Roadmap for next 3-5 years for integration of DER and evolution of current Demand Response programs
- DER is a resource or set of resources
 - *typically located on an end-use customer's premises and operated for the purpose of supplying customer electric load -- that seeks to provide NYISO wholesale market services*
- *Curtailable load, generation, storage, or various combinations*
- *Individual resources or aggregations*
- *Net load or net generation*

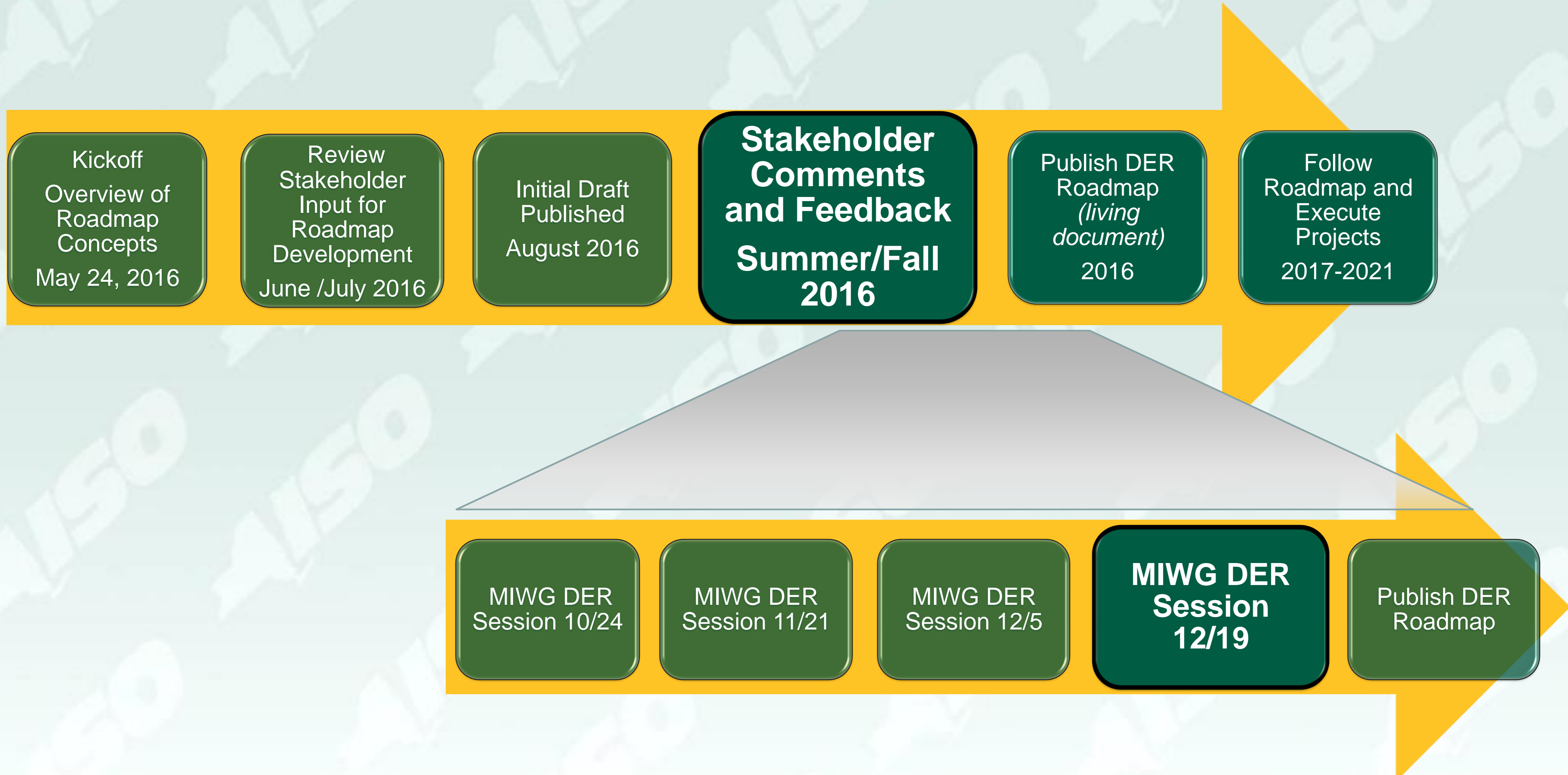


Key Objectives

- Integrate DER into energy, capacity, and ancillary services markets
 - *Ability for real-time scheduling*
 - *Minimize out-of-market actions*
- Align with goals of NYS REV
- Appropriate measurement and verification
- Align payments with performance
- Focus on wholesale market



DER Roadmap Development Process



DER Roadmap Development & Discussion

- MIWG DER Session 10/24
 - *Review of Feedback, Updated Schedule, Discussion: Measurement and Verification, Stakeholder presentations*
- MIWG DER Session 11/21
 - *Stakeholder presentations, Review of Feedback, Updated Schedule, Discussion: Aggregations, Dual Participation and Performance Obligations*
- MIWG DER Session 12/5
 - *Stakeholder presentations, Review of Feedback*
- **MIWG DER Session 12/19**
 - ***Overview of Updates to the DER Roadmap***
- **Publish DER Roadmap**

FERC Notice of Proposed Rulemaking

- Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators
 - *Docket Nos. RM16-23-000; AD16-20-000*
 - *Issued November 17, 2016 (Comments due January 30, 2017)*
- NYISO is currently reviewing and will provide comments at a later date

Feedback Received

Feedback Received – General

- **Align DER Roadmap to NY PSC REV & FERC NOPR on Energy Storage and DER Aggregations**
- **Refine definition of DER to explicitly specify which technologies are included**
- **Allow passive / non-dispatchable DER to participate in NYISO markets**
- **Allow 100 kW DER aggregations to participate in NYISO markets**
- **Heterogeneous / “mixed” technology aggregations should be allowed**
- **Stakeholder engagement & process thus far has been valuable. Continue this process moving forward**
- **Pilot programs should be designed to provide feedback to program design process**

Feedback Received – Performance Obligations

- Performance obligations should be at the aggregation level, not at the individual customer/resource level
- Need comprehensive review of non-performance penalties for DER
 - *Existing wholesale market penalties are not designed to consider simultaneous wholesale and retail participation models*
- Recommend having only the full day (24-hour) tier DER performance obligation and uniform capacity payments for all capacity resources

Feedback Received – Coordination with Utilities

- **NYISO and Utilities should work together to develop coordinated approach to interconnection, dispatch, communication, and forecasting of DER**
 - *Coordination should continue throughout the roadmap development timeline*
- **Operational coordination between NYISO and Utilities should be established to minimize operational issues with heterogeneous/“mixed” technology aggregations**

Feedback Received – Dual Participation

- **A single DER/Aggregation should not be compensated twice for providing a single service to the wholesale market and a retail provider**
- **NYISO should continue to allow simultaneous participation in wholesale and retail programs when DER provides distinctly different and incremental services**

Roadmap Purpose

Roadmap Purpose

- **The purpose of the Roadmap is to describe high level concepts that will be addressed in designing and implementing a Dispatchable DER program**
 - ***Aggregations***
 - ***Measurement & Verification***
 - ***Performance Obligations***
 - ***Simultaneous Participation in Wholesale/Retail Programs***
 - ***Other Supporting Initiatives***

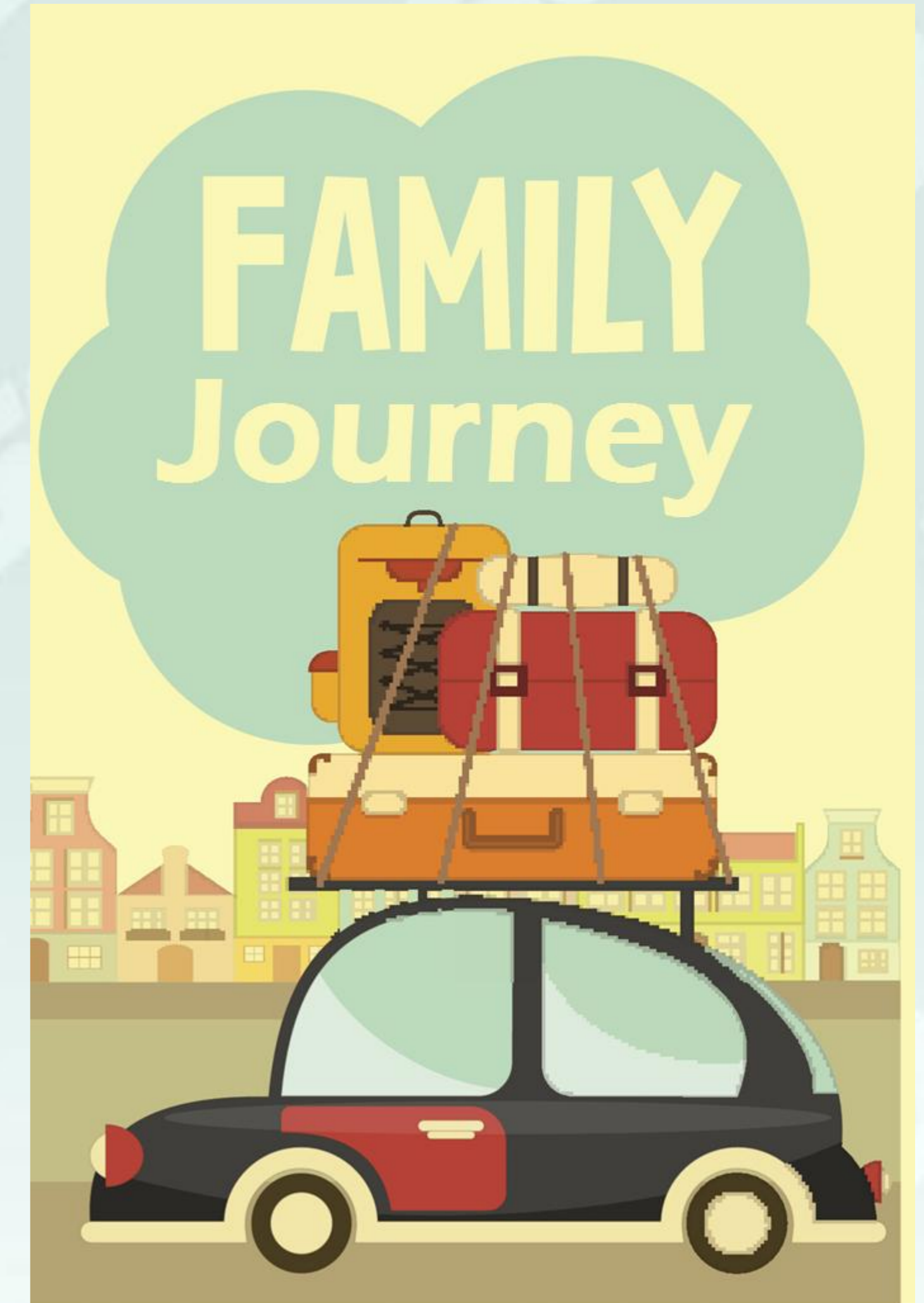


Roadmap Purpose (cont'd)

- **The Roadmap will not include detailed market rules for each high level concept**
 - *To the extent that NYISO has begun to fill in detail to high level concepts, that detail will be included in the Roadmap*

2017 & Beyond

- **Beginning in 2017 NYISO will work with stakeholders, discussing detailed market rules and tariff language needed to implement the high level concepts as we continue to develop and implement Dispatchable DER**
- **We may need to adjust the DER Roadmap concepts and timeline due to unforeseen events as we proceed ahead**



Roadmap Updates Overview

Roadmap Concepts

- **Details on the following concepts are necessary to develop the Dispatchable DER program:**
 - ***Aggregations***
 - ***Measurement and Verification***
 - ***Operational Requirements and Resource Obligations***
 - **Real-time**
 - **Day-Ahead**
 - ***Eligibility Criteria and Performance Obligations***
 - ***Simultaneous participation in wholesale markets and retail programs***
 - ***Additional issues that need to be addressed in conjunction with these big concepts***

Aggregations

- **A DER Coordinator Entity (DCE) is the aggregator**
- **The DCE Aggregation (DCEA) will be at the Transmission Node Level**
- **DCEAs must be a minimum of 100kW**
- **DCEAs can be:**
 - ***One or more DER***
 - ***Technology agnostic***
 - ***Homogeneous or heterogeneous***
 - **The NYISO is evaluating options for aggregations of Intermittent Power Resources**

Aggregations (cont'd)

- NYISO uses Security Constrained Economic Dispatch (SCED) to optimally dispatch resources to meet load while respecting transmission constraints every five minutes
- This is a computationally complex mathematical optimization that needs to be performed every five minutes
 - *Adding a multitude of smaller resources below a certain size to this already complex optimization problem adds significant computational time with each small resource having little to no impact on the total production cost*
- NYISO will use a threshold of 1 MW to decide whether a DCEA gets optimized by SCED
 - *DCEA less than 1 MW will still be able to participate in the energy and capacity market, just not optimized by SCED*
 - *This is the same threshold applied to traditional generators*

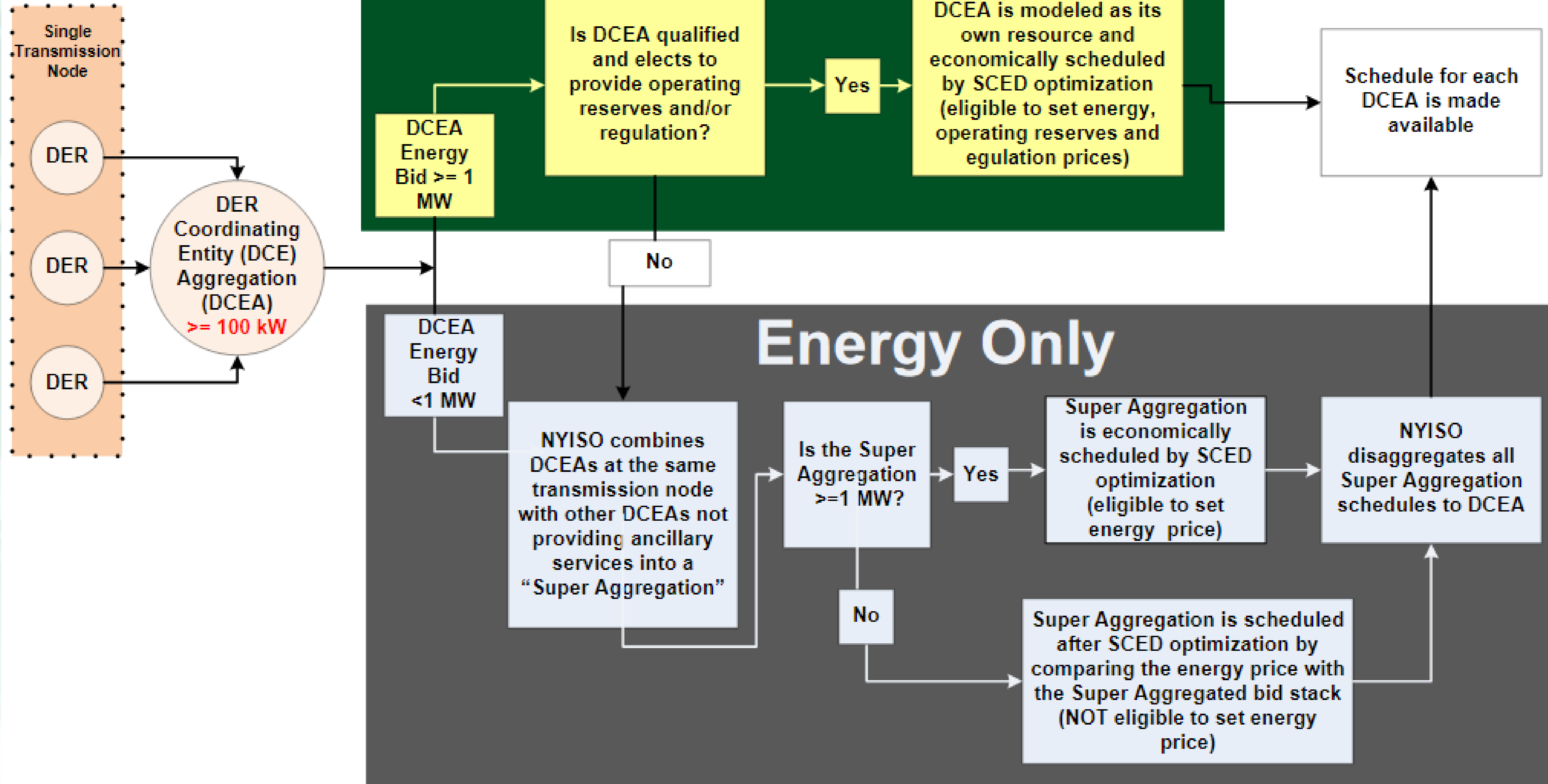
Aggregations (cont'd)

- **To accommodate smaller DCEAs, NYISO will aggregate DCEAs less than 1 MW into “super aggregations” for scheduling purposes**
 - *If the “super aggregation” is 1 MW or greater, the “super aggregation will be eligible to set price*
 - *If the “super aggregation” is less than 1 MW, the “super aggregation will NOT be eligible to set price*
- **DCEAs less than 1 MW in size can offer only capacity and energy**
 - *Will receive schedule based on the price identified by SCED at the transmission node*
 - *Ineligible to offer Operating Reserves or Regulation Service*
 - **For scheduling Operating Reserves or Regulation, SCED trades-off between what portion of a resource provides energy versus Operating Reserves or Regulation**
 - **Since NYISO will “super-aggregate” DCEAs less than 1 MW with other DCEAs and create a super aggregated bid stack, this trade-off is challenging when disaggregating schedules to individual DCEA**

Aggregations (cont'd)

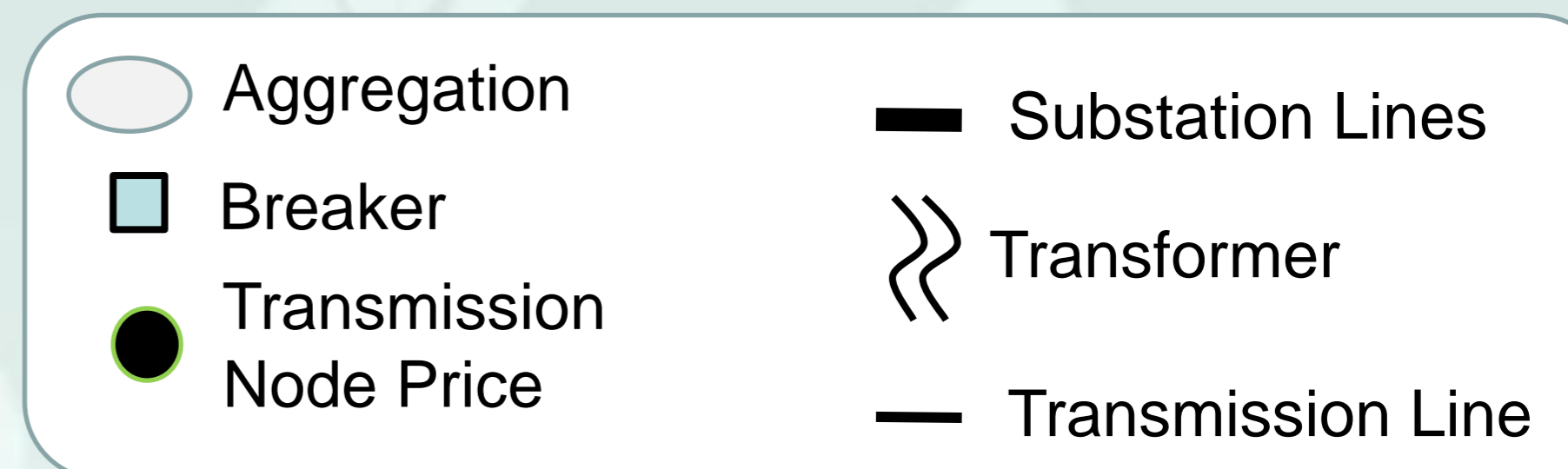
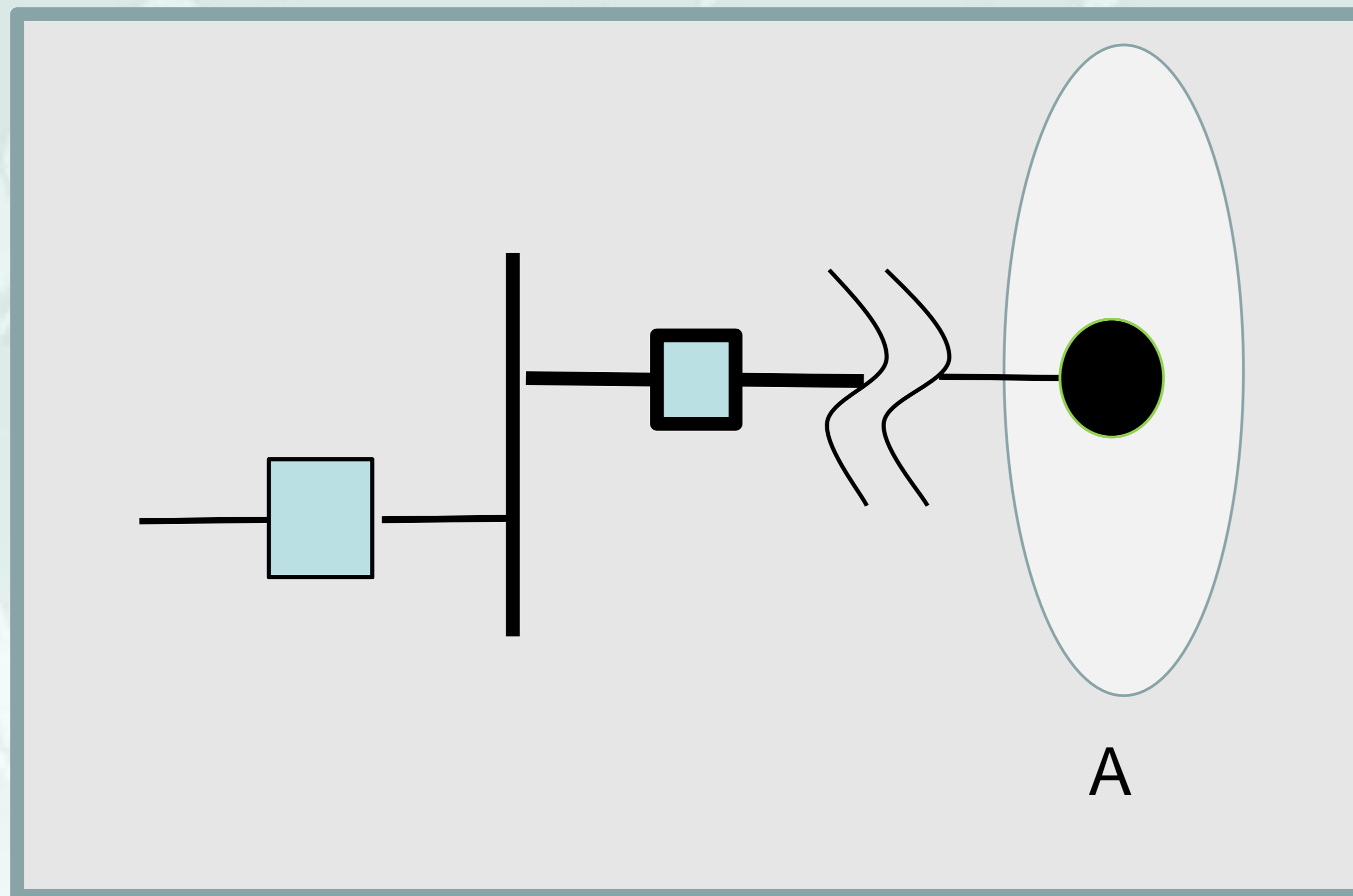
- **DCEAs greater than or equal to 1 MW can offer capacity, energy and ancillary services**
 - *Eligible to set price*
 - *If a DCEA is 1MW or larger, qualifies and elects to offer ancillary services it will be modeled as a single resource*
- **Further coordination will be required between NYISO and the utilities in identifying aggregation mapping to the transmission network**

Aggregations (cont'd)



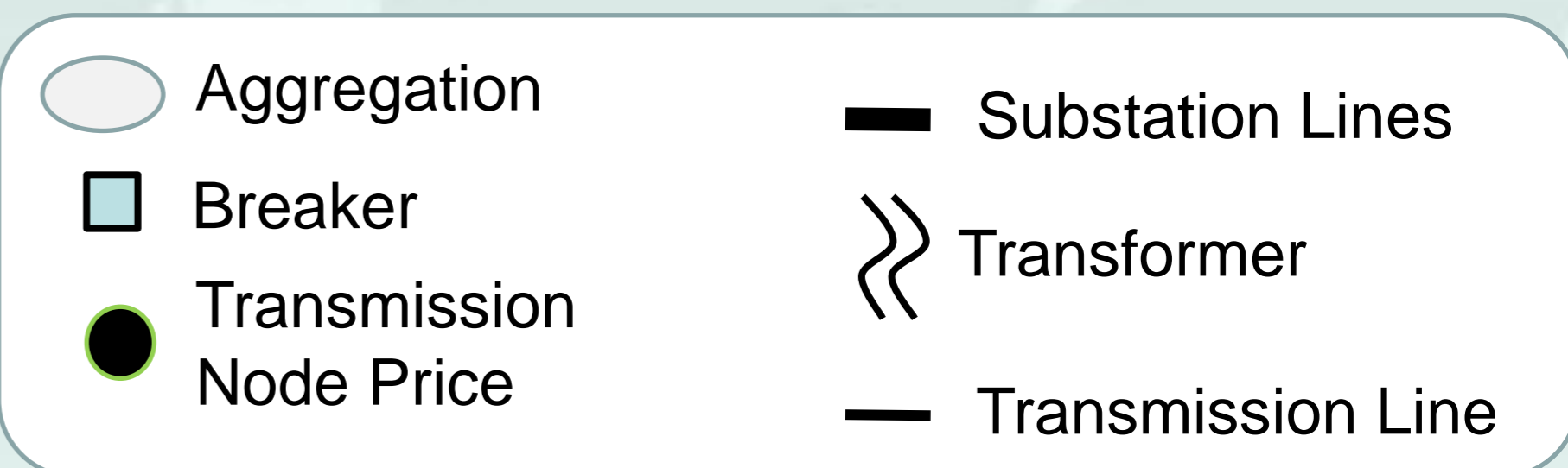
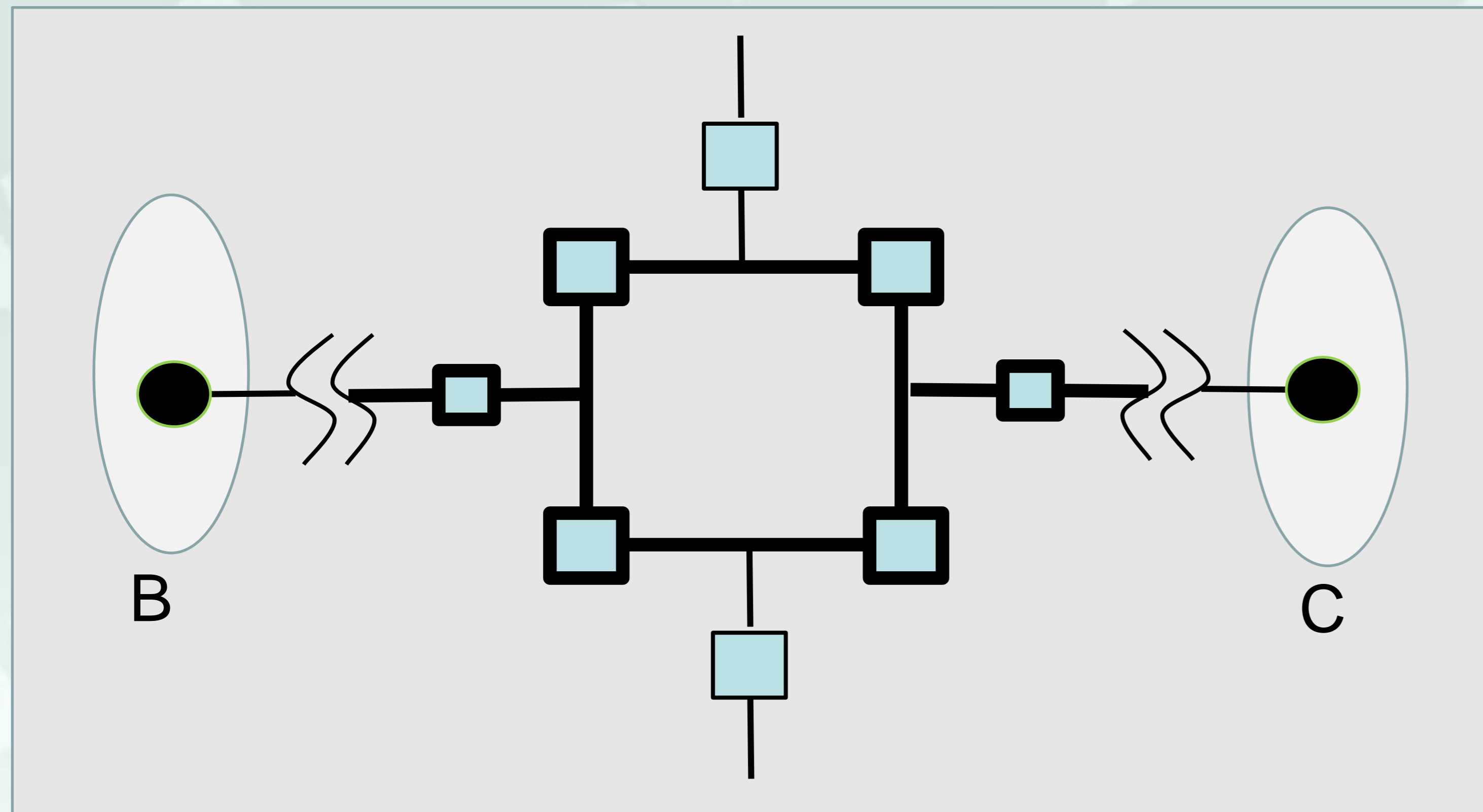
Aggregations (cont'd)

Example 1 – single transmission node @ Substation



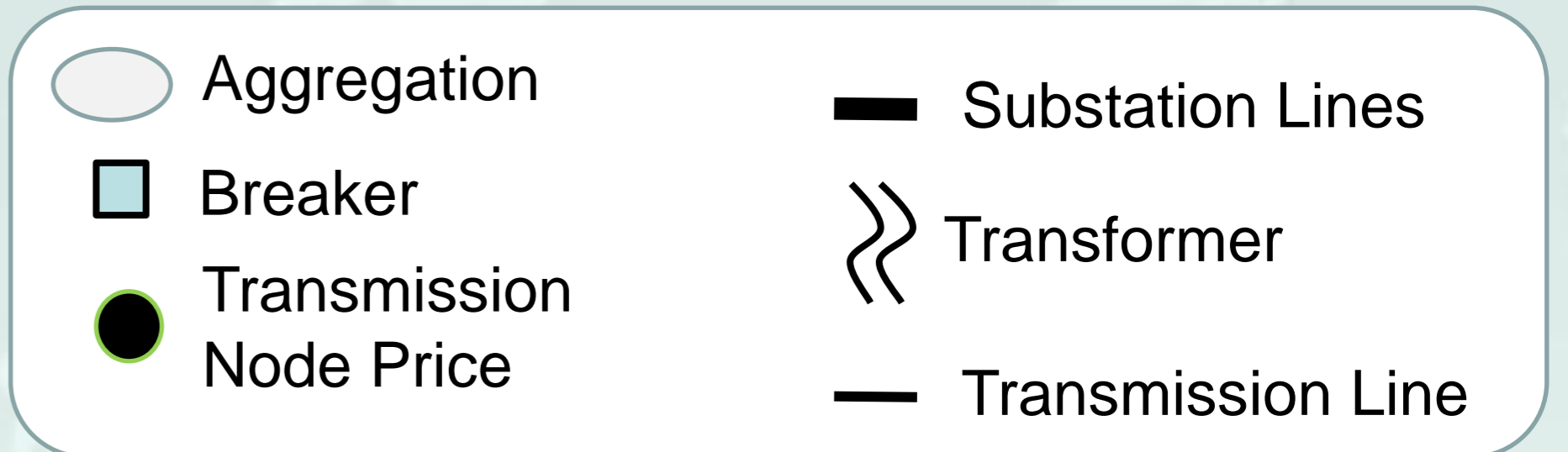
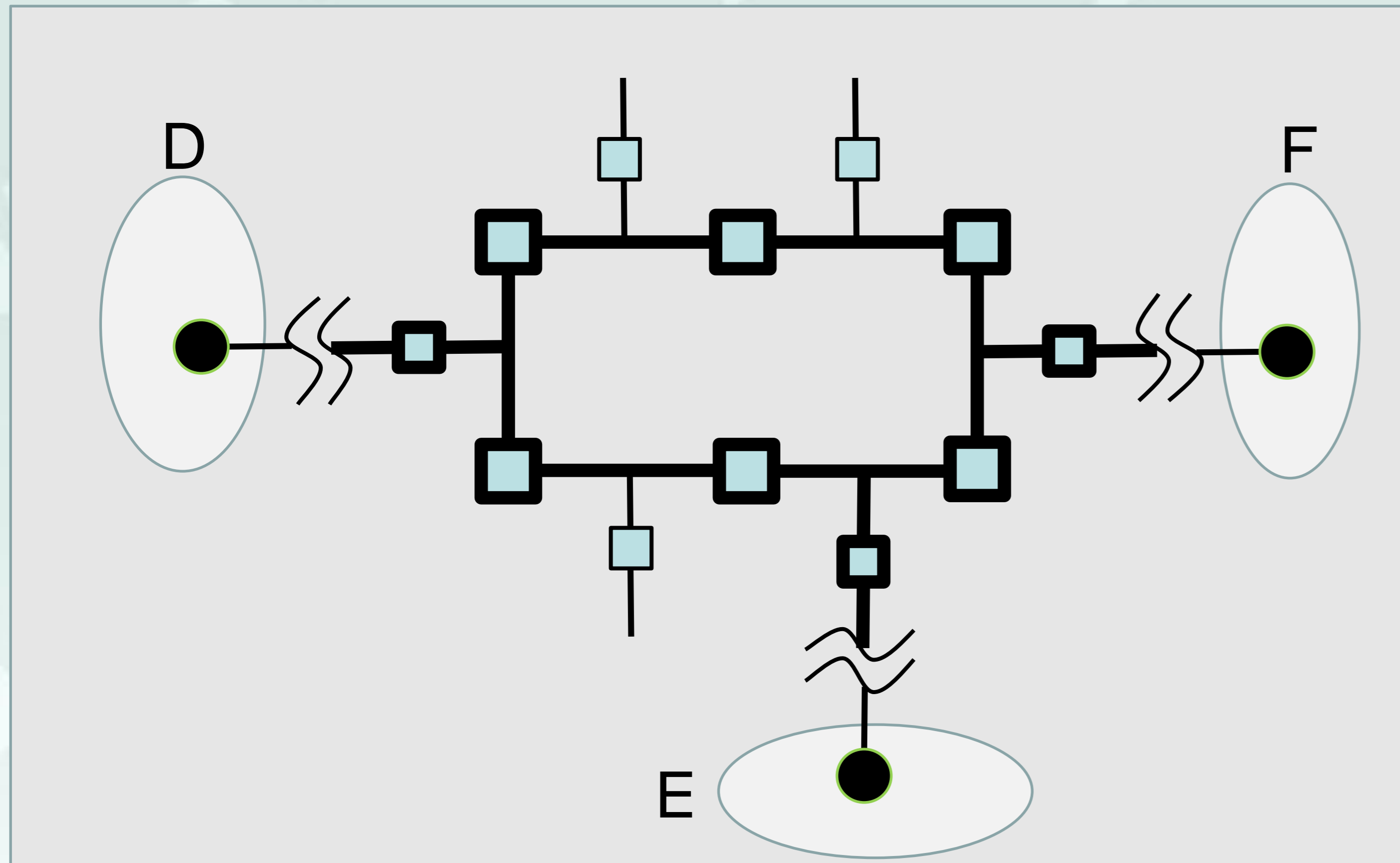
Aggregations (cont'd)

Example 2 – two transmission nodes @ Substation



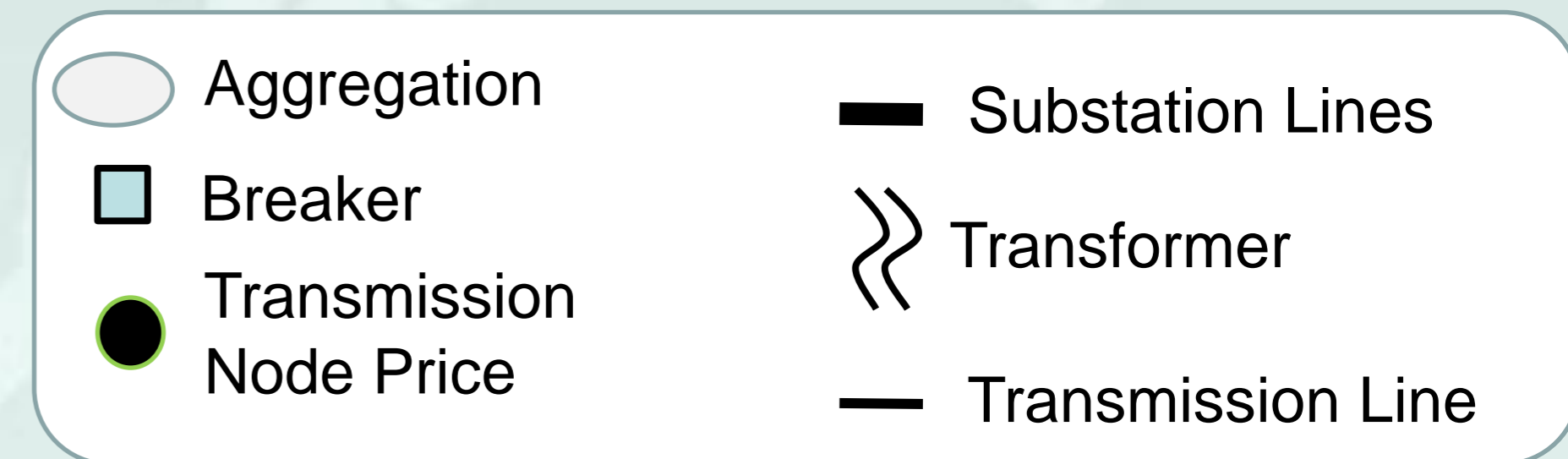
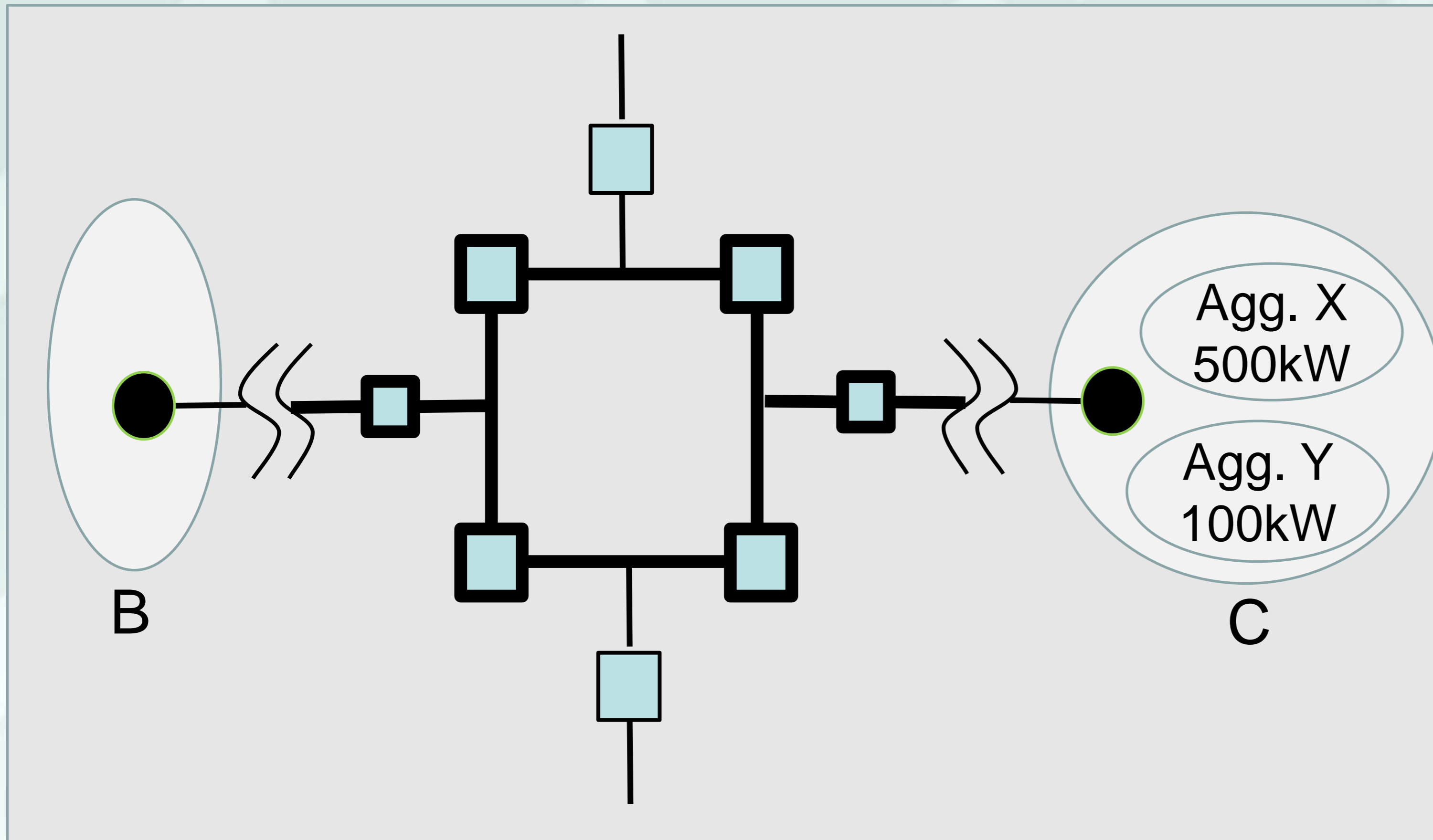
Aggregations (cont'd)

Example 3 – three transmission nodes @ Substation



Aggregations (cont'd)

Example 4 – two transmission nodes, one node has multiple DCEAs less than 1MW aggregated into NYISO super aggregation C



Measurement & Verification

- **DCEAs at least 1MW in size**
 - ***SCADA Telemetry (per DCEA)***
 - Must have 6-second telemetry to offer regulation service
 - 30-second telemetry is required for each DCEA not offering Regulation Service
 - Telemetry communications must be through utility to NYISO or to utility and NYISO at the same time
 - ***Settlement/Revenue/Billing Data (per DCEA)***
 - Minimum of ANSI C12 hourly interval metering
 - ***Verification/Auditing/Data Requests (per resource in DCEA)***
 - Minimum of Hourly interval data from each resource's net meter
 - Additional metering may be required for resources with energy storage

Measurement & Verification (cont'd)

- **NYISO intends to use:**
 - *Customer Baseline Loads (CBL) methodology for instances when they are net loads*
 - *Net meter data for instances when they are net injections*
 - **Baselines may still be needed for special situations**
 - *Detailed requirements will be established as part of market design effort*

Measurement & Verification (cont'd)

- **Aggregation Sampling**
 - *Optional for those DCEAs that are less than 1MW in size*
 - Intended for small residential or C&I customers
 - *Could be used for settlement, revenue, verification and telemetry*
 - *At least 30% of customers must have ANSI C12 hourly net meters*
 - *Detailed requirements will be established as part of market design effort*
- **2017 Meter Data Policy initiative**
 - *Who is the Meter Data Service Provider going forward? Is it the utility/DSP?*

Dual Participation

- **Aggregations participating in utility Demand Response programs would continue to be eligible to participate in NYISO SCR program and EDRP**
 - *The utility notifies the NYISO when they are calling on their DR participants*
- **Exploring whether resources used as Non-Wire Alternatives (NWA) (i.e., distribution system investments that defer or replace the need for distribution equipment upgrades) are eligible to participate in the dispatchable DER program**

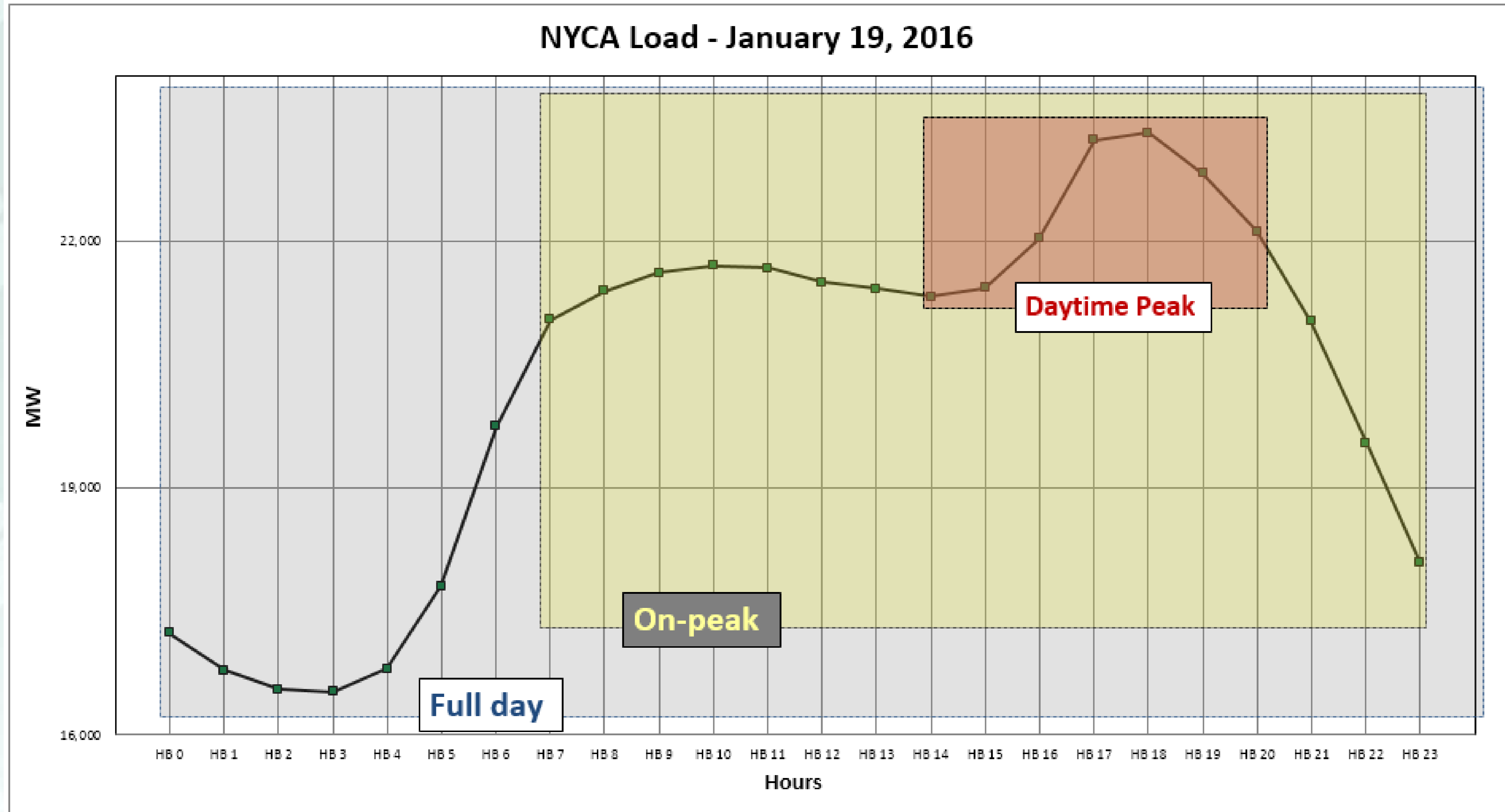
Dual Participation (cont'd)

- **NYISO is in ongoing conversations with utilities to explore the possibility of additional dual participation opportunities**
 - *This issue is also still being evaluated by FERC*

Performance Obligations

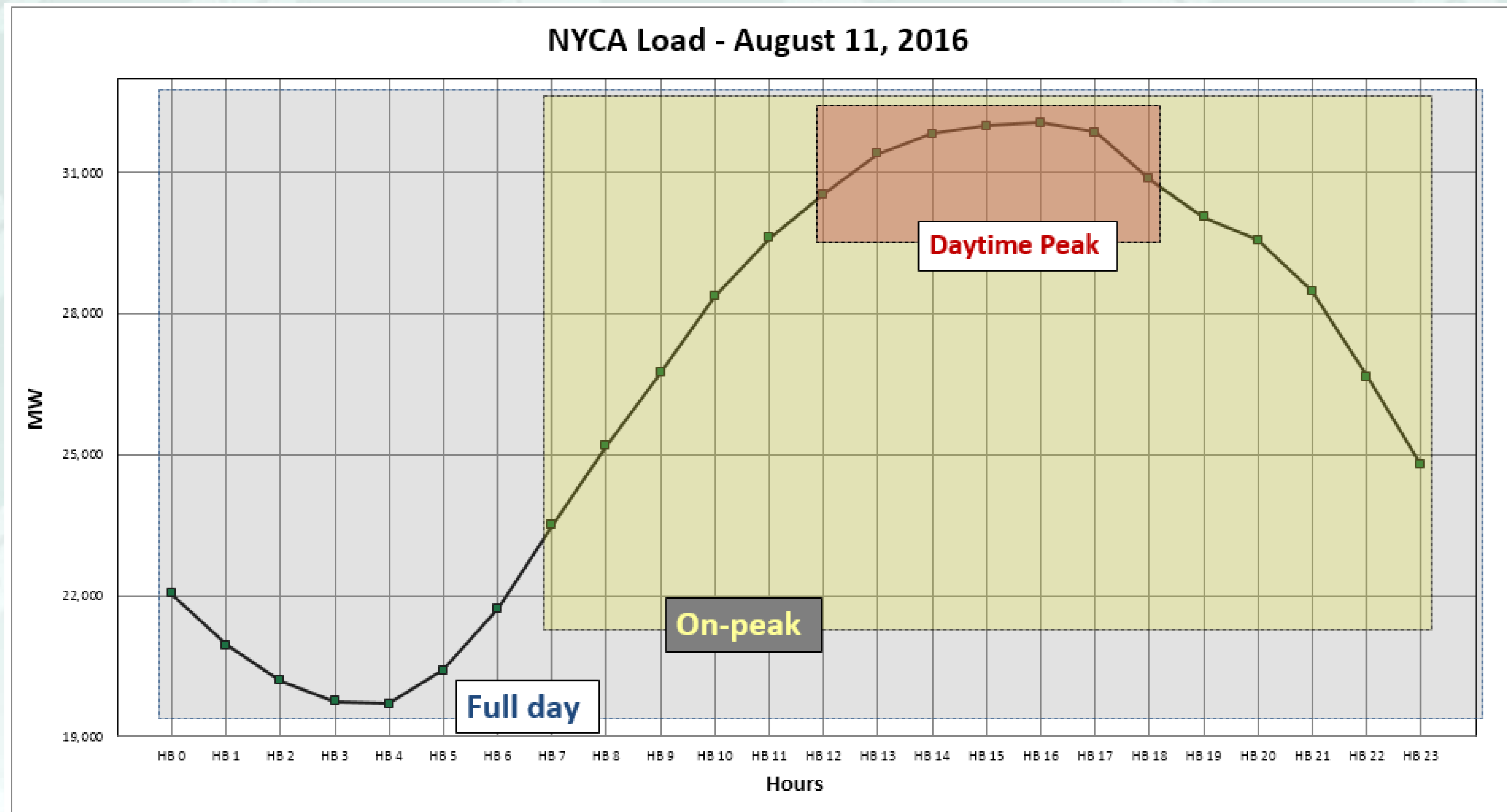
- **Payments from NYISO should be aligned with the value of the service provided by dispatchable DER to the transmission grid**
 - *The Roadmap envisions multiple service “tiers” (e.g., full day, on-peak and daytime peak [see following examples])*
 - *The value of these service tiers will be established as part of the dispatchable DER program market design*
 - *The dispatchable DER performance obligations will be at the DCEA level*
- **NYISO is still considering feedback received including, whether alternative Capacity market obligations or eligibility criteria for DER are feasible with the current market structure**

Performance Obligations (cont'd)



Note: NERC defines “On-peak” as 7am to 11pm (HB 7 to HB 22) for the Eastern Interconnection

Performance Obligations (cont'd)



Note: NERC defines “On-peak” as 7am to 11pm (HB 7 to HB 22) for the Eastern Interconnection

Performance Obligations (cont'd)

- DCEAs that are awarded Capacity market payments will be subject to the Day-Ahead Energy Market must offer obligation
 - *This obligation also applies to Supplement Resource Evaluation*
 - *The DCEA must submit offers for consecutive hours of the Day-Ahead Market that correspond to the number of hours in the service tier in which it participates*

The Roadmap Path Forward

- **NYISO will develop the following Dispatchable DER program concepts as we move ahead**
 - ***Aggregations***
 - ***Measurement and verification***
 - ***Operational requirements and resource obligations***
 - **Real-Time**
 - **Day-Ahead**
 - ***Performance obligations***
 - ***Simultaneous participation in wholesale and retail programs***
 - ***Evaluation of changes to existing SCR program and EDRP as well as development of a transition plan for such changes***
 - ***Additional issues that need to be addressed in conjunction with these big concepts***

Next Steps

- **MIWG DER Session 10/24**
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Comments & Questions

DER_Feedback@nyiso.com

[August 2016 Draft DER Roadmap](#)

- **The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefit to consumers by:**
 - *Maintaining and enhancing regional reliability*
 - *Operating open, fair and competitive wholesale electricity markets*
 - *Planning the power system for the future*
 - *Providing factual information to policy makers, stakeholders and investors in the power system*

- ***www.nyiso.com***