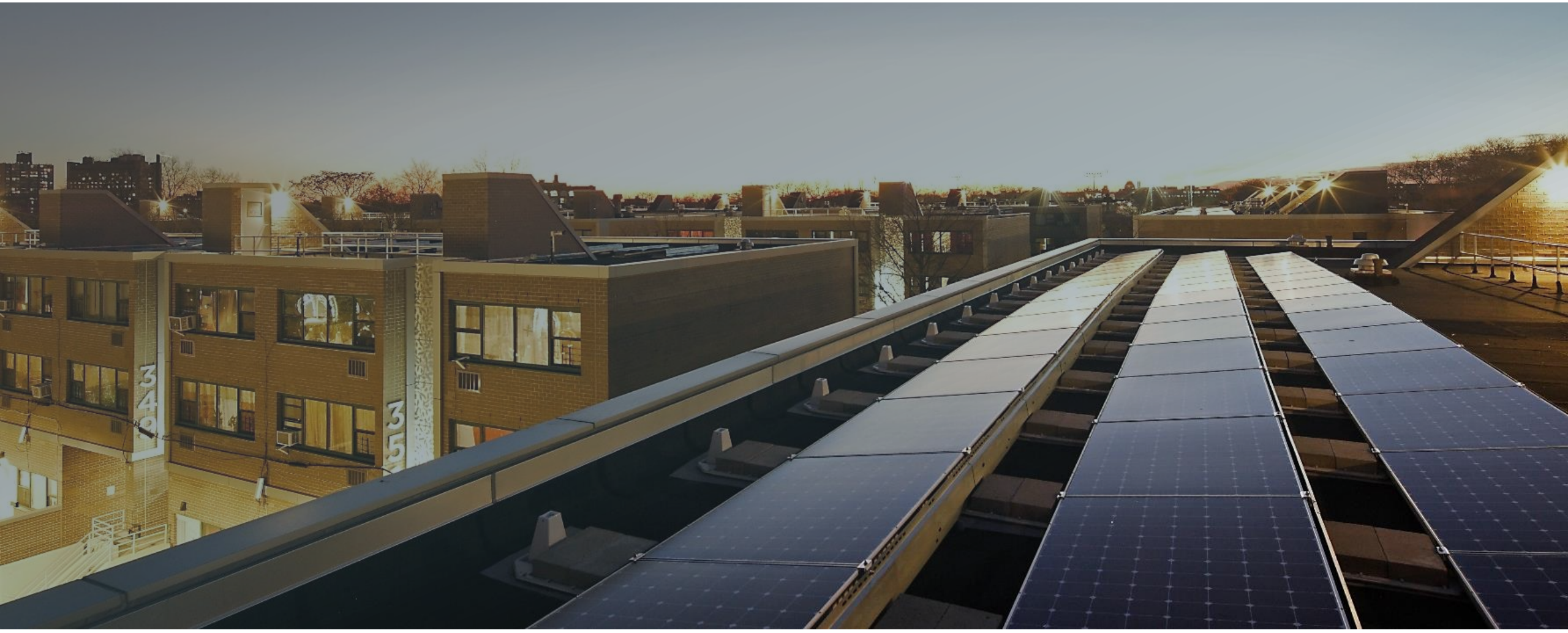

DER Forecasts, System Planning and Market Design

Damian Sciano

June 15, 2021

conEdison

Agenda

- Current Landscape
  - Markets
  - Clean Energy Goals
  - Grid innovation
- Evolving energy policy for DER
  - NYISO programs to date
  - FERC 2222
  - DER planning and operations
- Closing thoughts

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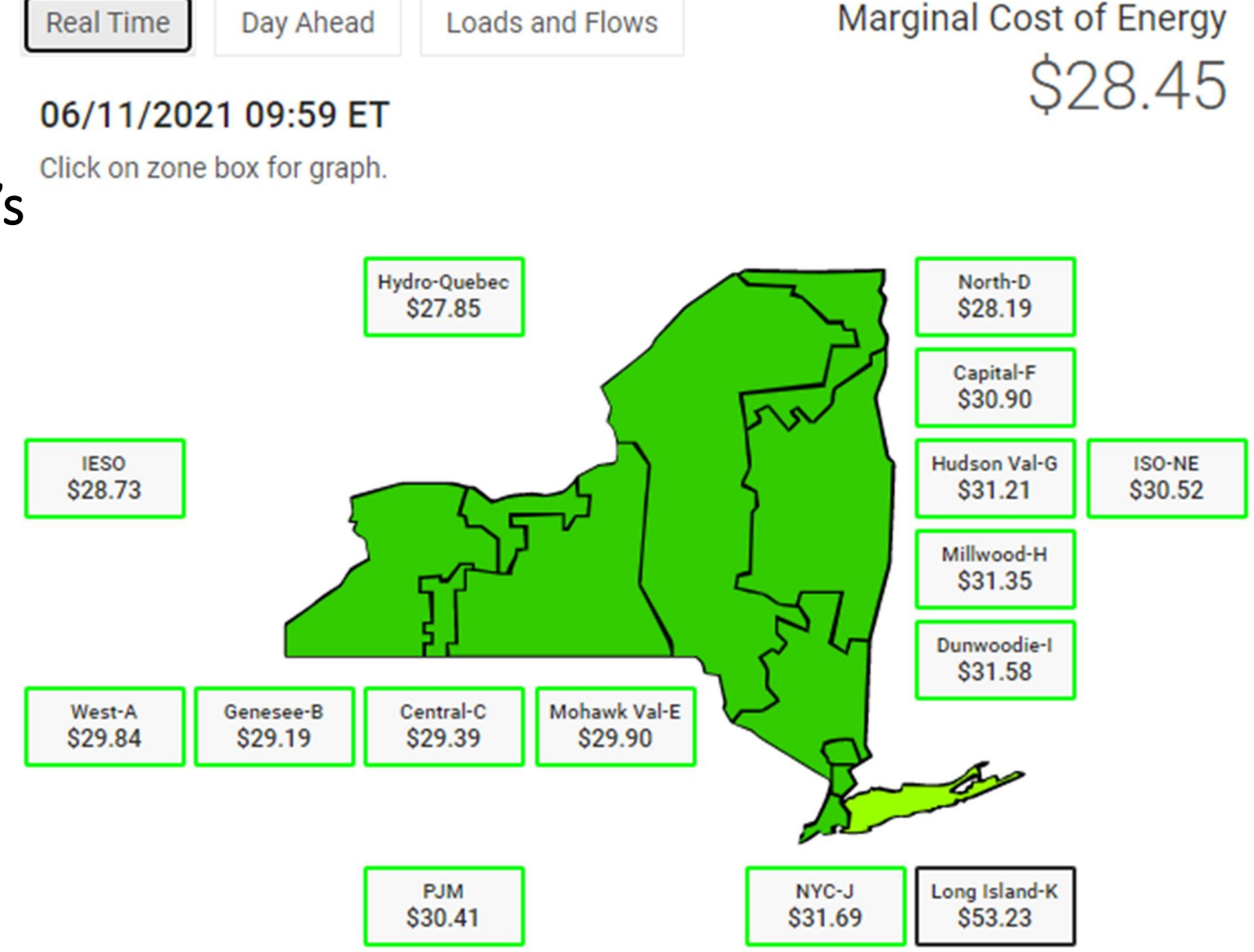
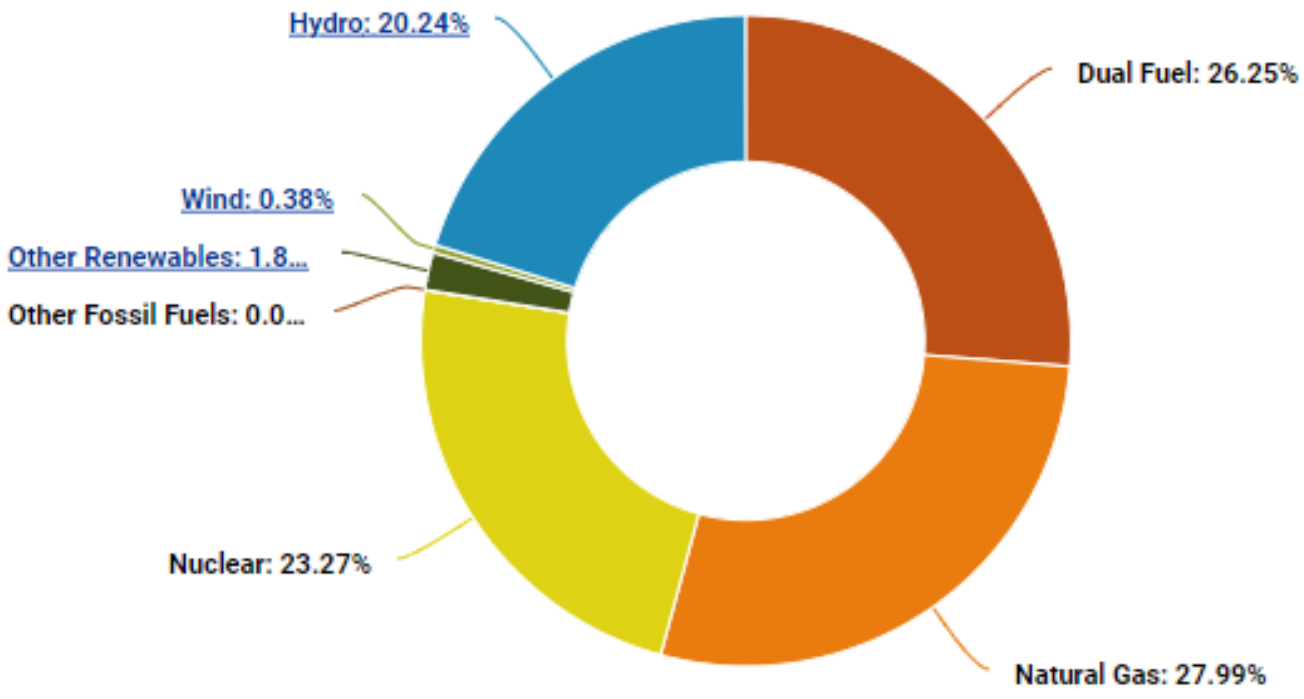
NYS Market Details:

- Generation divested mid-90's
- NYISO runs market
  - Capacity
  - Energy
  - Ancillary Services
- 33 GW peak load





Clean Energy Goals (CLCPA)

- 70% Renewables by 2030
- 100% Renewables by 2040
- Full Decarbonization by 2050

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, Including the Highest
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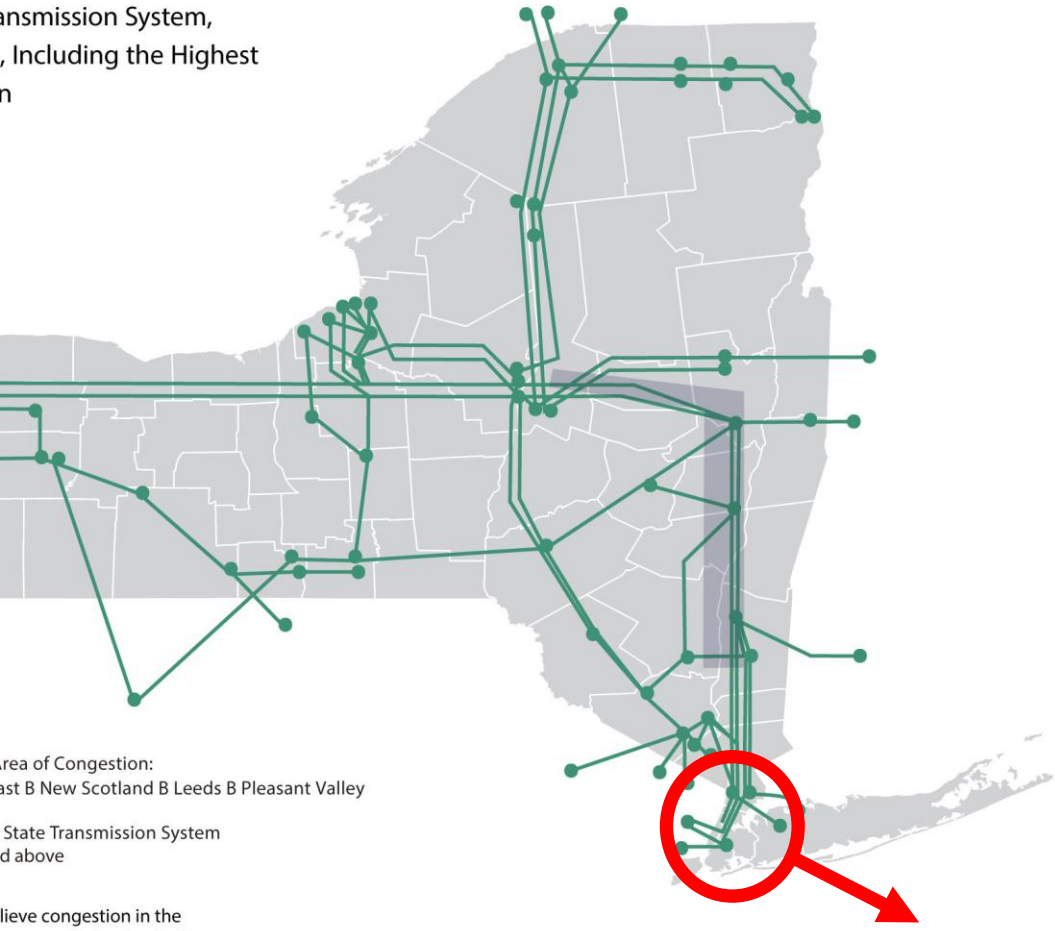
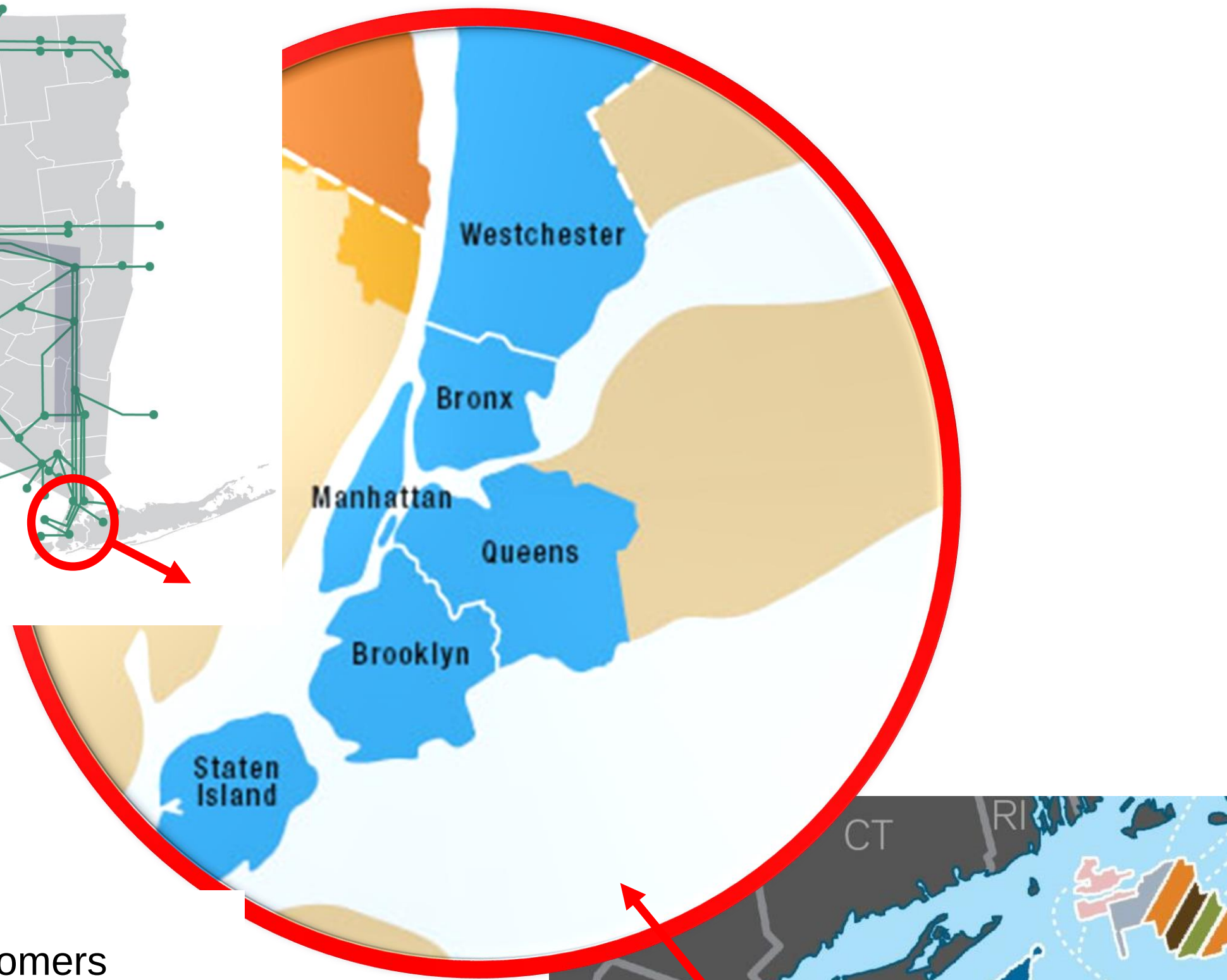
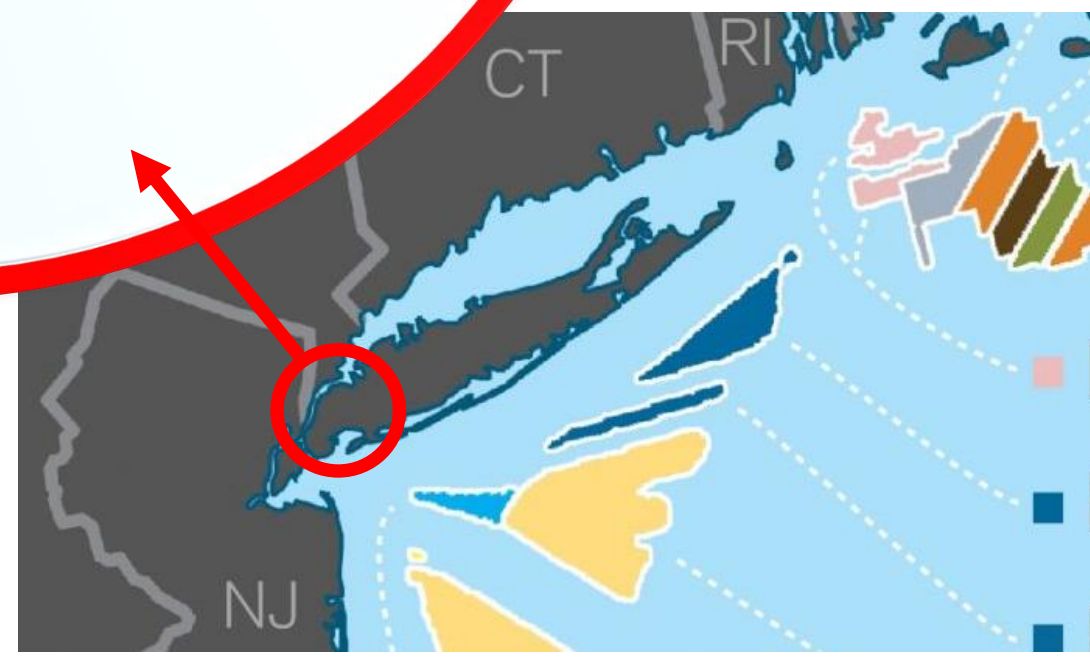


rea of Congestion:
ast B New Scotland B Leeds B Pleasant Valley

State Transmission System
d above

lieve congestion in the
necessarily be physically





CECONY

- 3.4M electric customers
- 1.1M gas customers
- 1,700 steam customers
  - 700 MW of regulated generation
- System Peak = 13,200 MW

2020 – 13.2 GW Summer Peak
(NYC = 11.5 GW Summer Peak)

2020 – 9.0 GW Winter Peak
(NYC ~ 8.0 GW Winter Peak

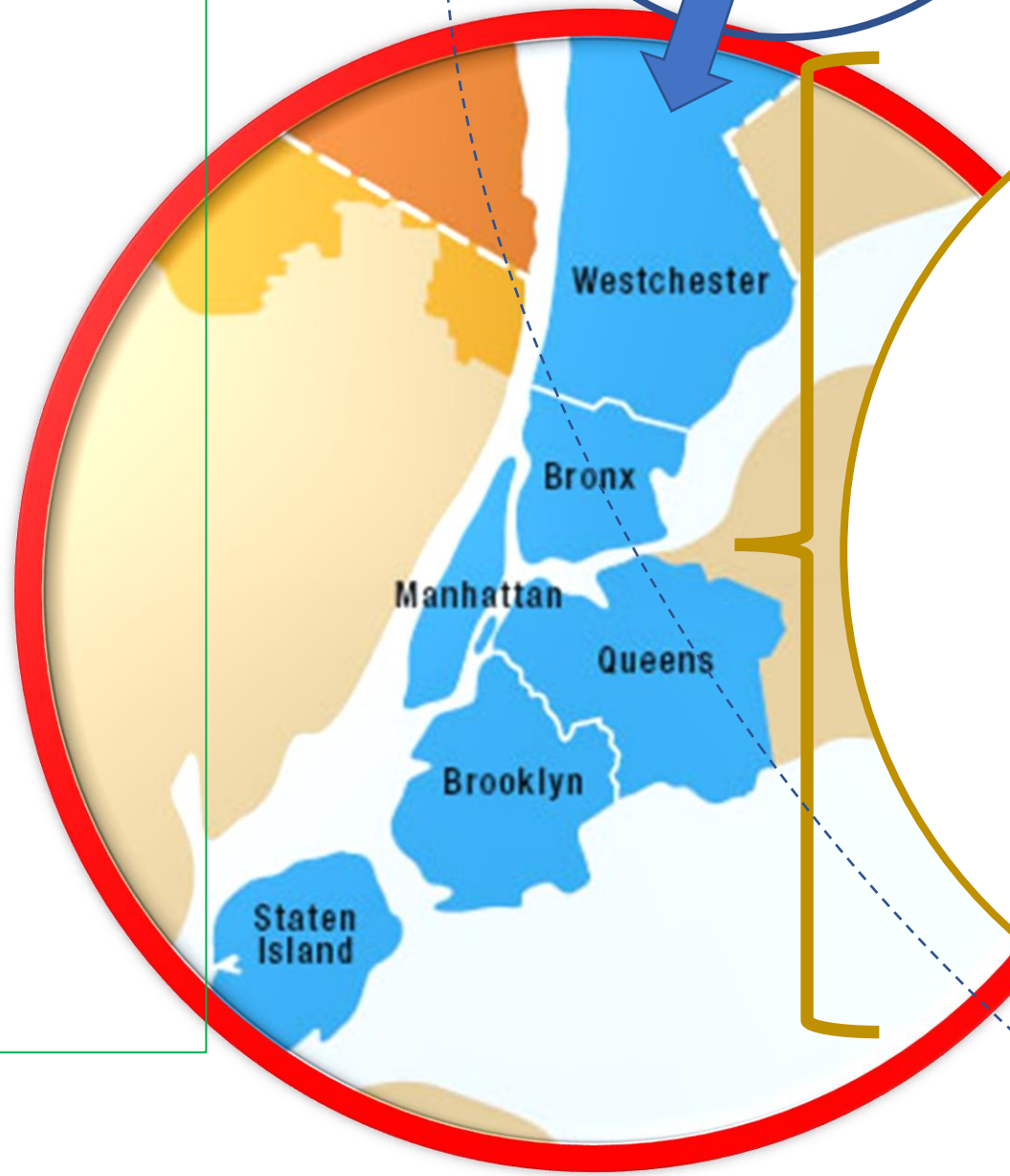
TRANSMISSION
(4.5GW)

DISTRIBUTION LEVEL

Solar
0.4 GW

Efficiency & Demand Response
0.5 GW

Storage
0.0 GW



In-City GENERATION
(10 GW)

2030 – 13.3 GW Summer Peak
(NYC = 11.6 GW Summer Peak)

2030 – 11.0 GW Winter Peak
(NYC ~ 10.0 GW Winter Peak

DISTRIBUTION LEVEL

Solar
1.0 GW

Efficiency &
Demand
Response
1.5 GW

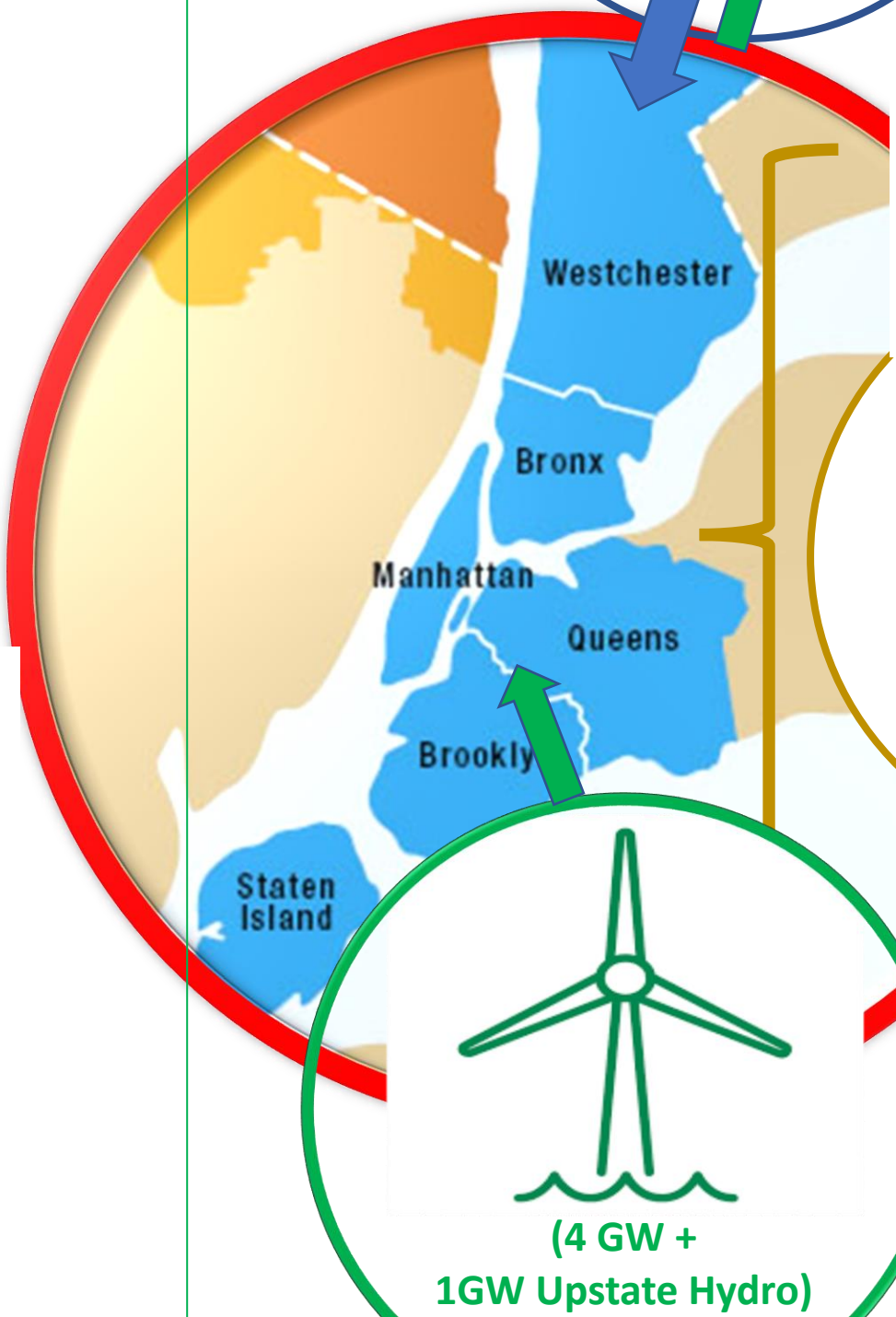
Heat
Pumps

EVs

Storage
0.3 GW

TRANSMISSION
(4.5GW)

Storage
1.2 GW

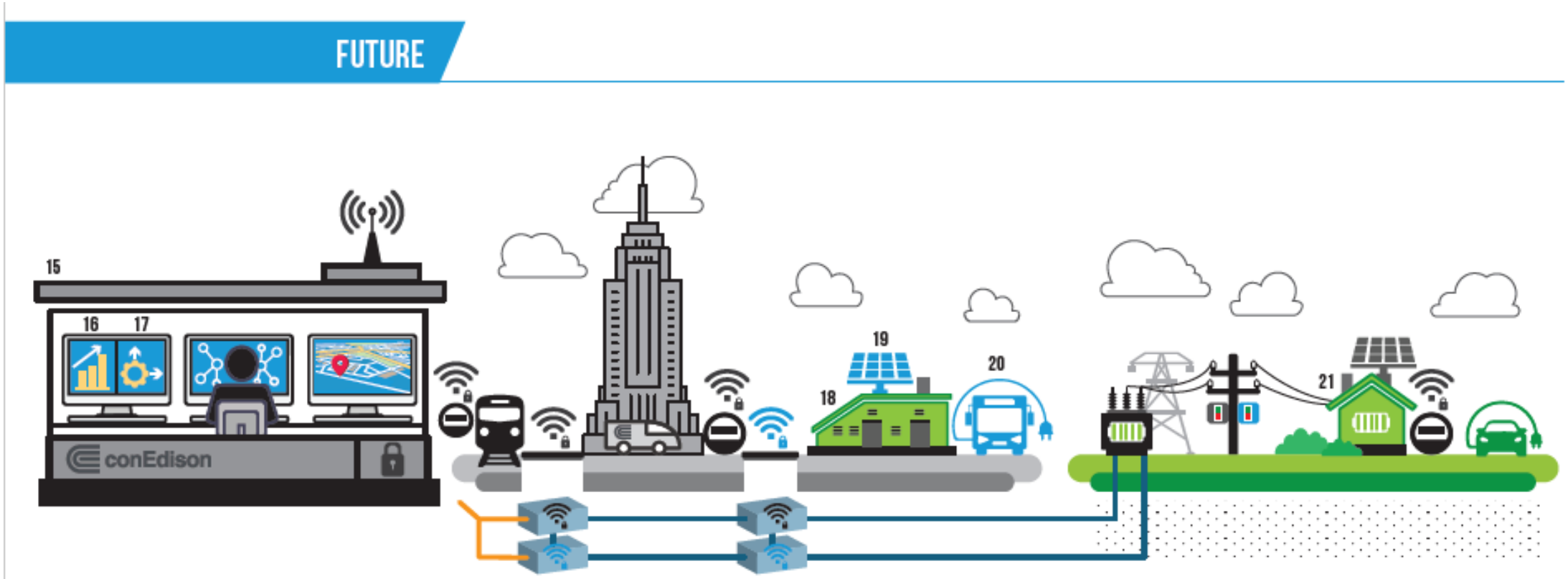


In-City
GENERATION
(? GW)

(4 GW +
1GW Upstate Hydro)

Illustration of one potential outcome

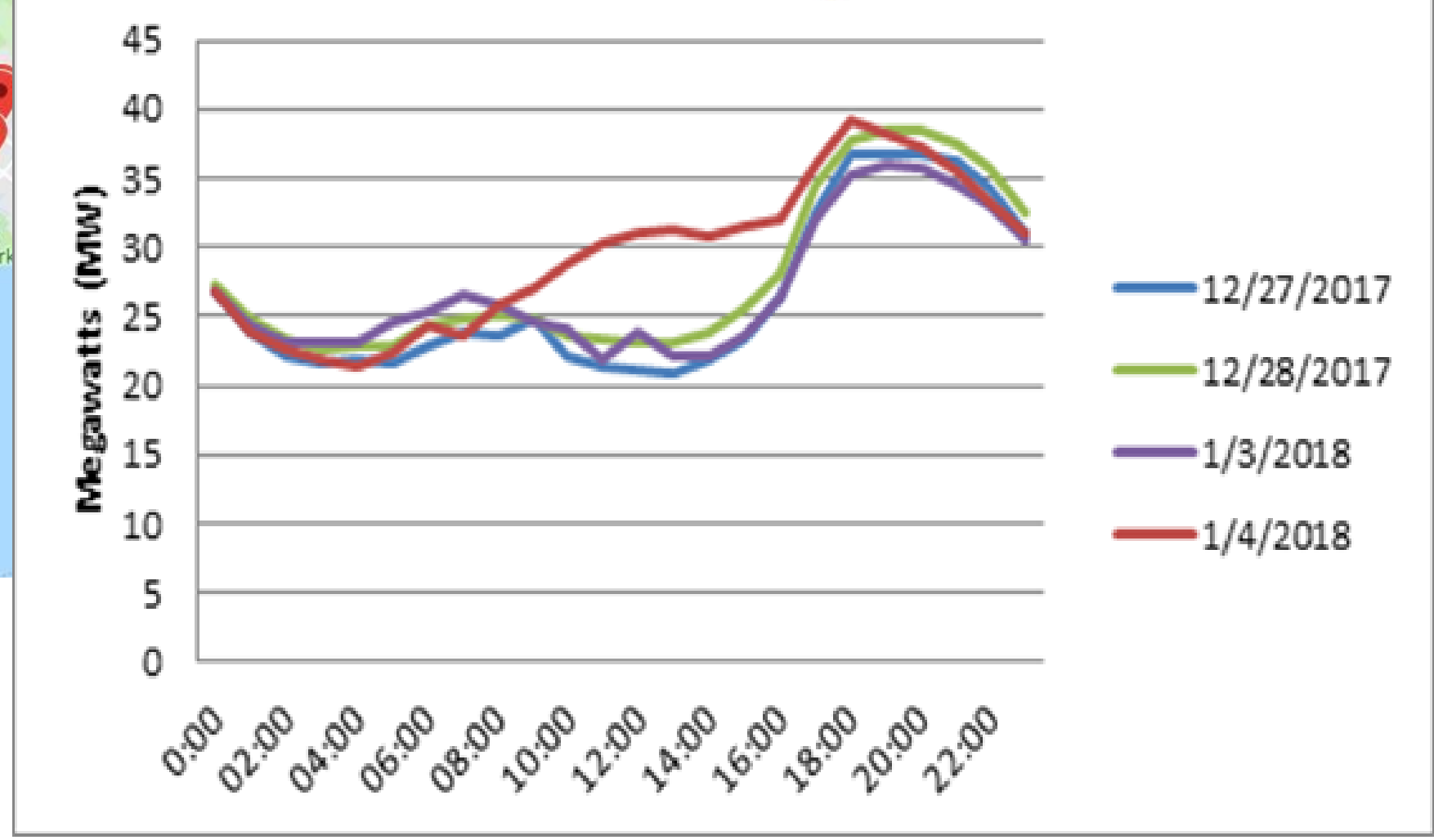
Grid Innovation and Investment is critical to success



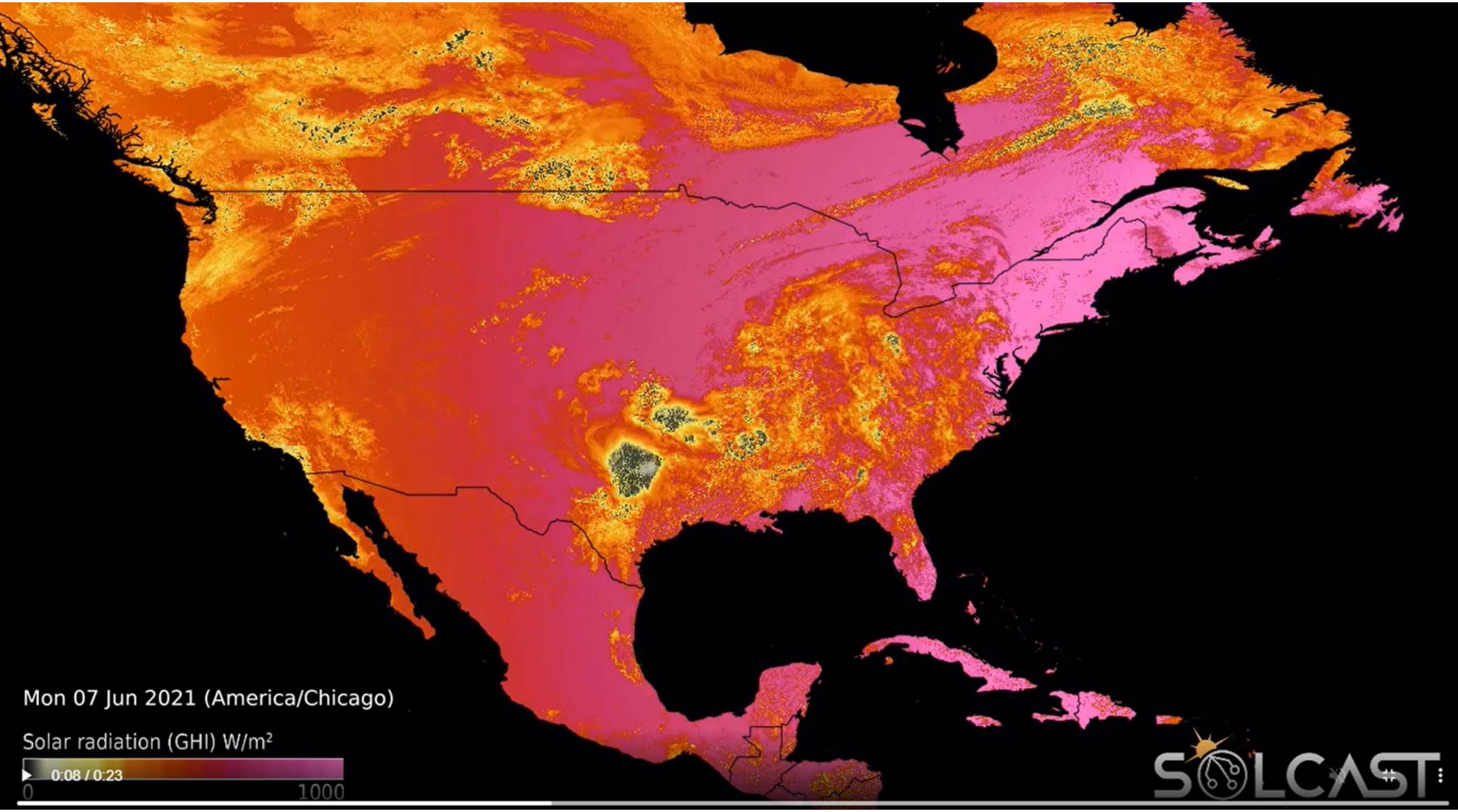
Grid Innovation efforts can be grouped into three focus areas:

Reliability & Resiliency	Safety & Security	Clean Energy & Flexibility
To meet and exceed customer expectations in an era of increasingly diverse resources	*To protect people, data, and infrastructure in an ever changing environment*	*To enable customer choice – including clean, reliable, affordable energy*

We are starting to see a Staten Island Duck Curve (duckling?) and utiliting a ConnectDER collar to help quantify



Intermittent resources will require increasingly granular forecasts



SOURCE: https://solcast.com/solar-radiation-map/north-america-region/#2021-06-07

Energy storage will be needed from customer level to utility level to bulk transmission level

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Distributed energy resources (DER) will play an increasing role in the marketplace

- Demand response (i.e. shutting off lights or motors) has a decades long history
- DER (i.e. solar, energy storage) is just emerging and behaves differently on the grid b/c power is injected
- Current markets for DER
  - NYISO ICAP and SCR (special case resources)
  - Utility demand response programs
- COMING SOON: FERC 2222
  - Allow aggregators to bid in 100kW of more of resources
  - Likely to start with energy storage

FEDERAL AND STATE REQUIREMENTS

Key regulatory changes for DER

FERC Order 2222 (Live Sep 2022)

- Order 2222 allows DER aggregations to compete in the energy, capacity and ancillary services markets operated by the regional transmission organizations (RTOs) and independent system operators (ISOs) that manage the transmission grids

FERC Order 841 (Live Sep 2020)

- Order 841 creates a framework for storage resources to operate in all wholesale electric markets and expands the universe of solutions that can compete to meet electric system needs

Con Edison's Role

- As distributed system platform (DSP) we will be the "aggregator of aggregators"
- We require new tools to be able to understand the impact of these DER aggregations will have on our circuits in near real-time
- Changes to functional roles are required to manage the process changes and change management
- Our control center environment will need to evolve

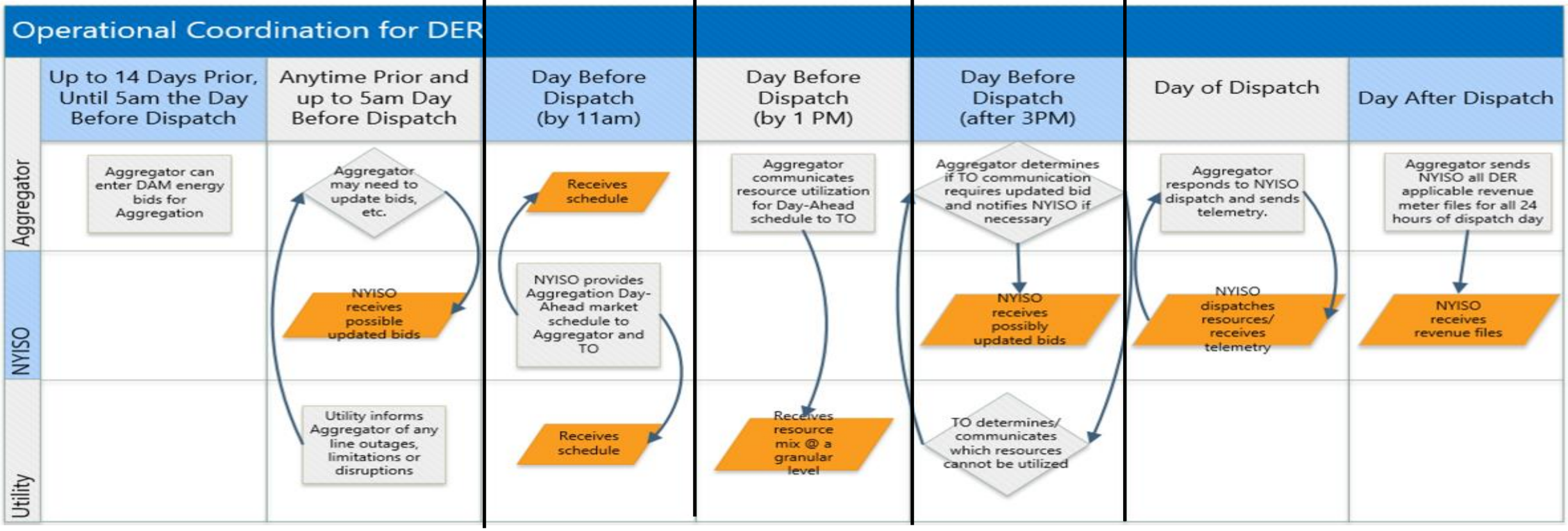
FEDERAL AND STATE REQUIREMENTS

DAY AHEAD MARKET (DAM)

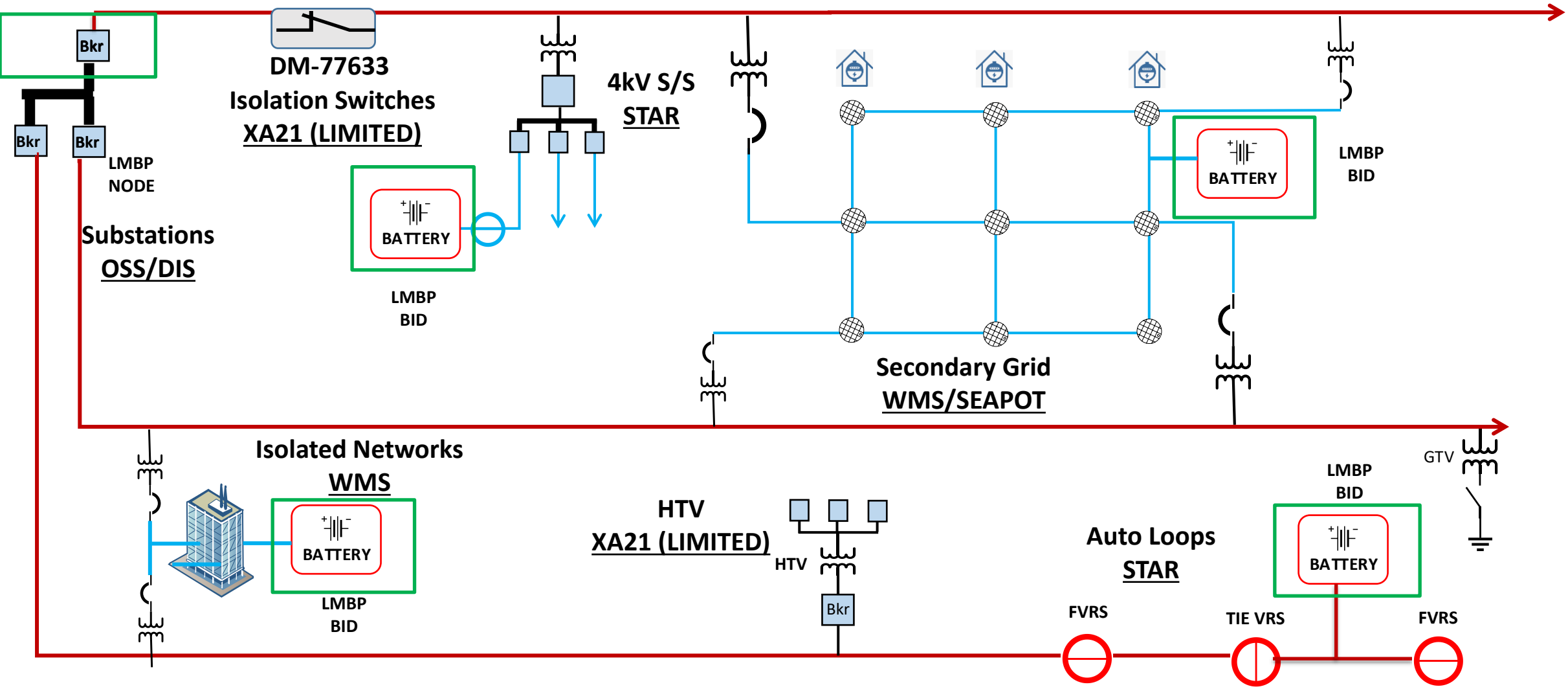
11AM - Receive DAM Schedule from NYISO

1PM – Aggregator sends Con Ed resource utilization for DAM

3PM – Con Ed sends Aggregator derates based on schedule



We is evaluating system impact of DER challenging?



Building out a distributed energy resource management system (DERMS) will require many evolutions

- Demand response programs are currently handled with DRMS management systems
- The first version of DERMS will focus on customer registration, three way communications with the NYISO and system impact evaluation
- Future DERMS tools will include advanced forecasting, single phase power analysis, financial transactions, etc.
- Seamlessly integrating DRMS and DERMS into the control center of the future is critical to success

All of this will complement the large scale renewables also participating in the market place

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Closing thoughts

- Large scale renewables (LSR) are needed to drive the generation mix greener but distributed energy resources (DER) are a complementary partner
- The distributed system platform (DSP) is a critical tool to customer choice and resiliency
- Energy Storage across a spectrum of uses is critical to success
- Electrification is a game changer that will further drive growth at both the transmission and distribution level
- Grid innovation, including DERMS, will be the glue that holds it all together