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Independent System Operator

2020 RNA
70x30 Scenarios Assumptions

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Scenarios Background

- One of the objectives of the Reliability Planning Process is to identify, through the development of appropriate scenarios, factors and issues that might adversely impact the reliability of the Bulk Power Transmission Facilities (BPTF)
- This presentation summarizes the 2020 RNA 70x30 CLCPA Scenarios Assumptions
- The RNA 70x30 scenarios will be built off of the 2019 Congestion Assessment and Resource Integration Study (CARIS) Phase I, 70x30 scenarios assumptions

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70x30 CLCPA Background

- **On July 18, 2019, New York's Governor Cuomo signed into law the Climate Act or CLCPA, which mandates that 70% of New York State's end-use energy be generated by renewable energy systems by 2030 ("70x30")**
  - The law also creates a Climate Action Council charged with developing a scoping plan of recommendations to meet these targets and place New York on a path toward carbon dioxide ("carbon") neutrality
- **The 2020 RNA envisions performing scenarios that take into consideration full implementation of one of the CLCPA's policy targets of 70% renewable energy by 2030**
- **CLCPA targets (https://climate.ny.gov/):**
  - 85% Reduction in GHG Emissions by 2050
  - 100% Carbon-free Electricity by 2040
  - 70% Renewable Energy by 2030
  - 9,000 MW of Offshore Wind by 2035
  - 3,000 MW of Energy Storage by 2030
  - 6,000 MW of Solar by 2025
  - 22 Million Tons of Carbon Reduction through Energy Efficiency and Electrification

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2019 CARIS Phase I Background

- **The CARIS Phase I is part of a two-phase Economic Planning Process and provides information such as:**
  - Historic (2014-2018) and projected (2019-2028) congestion on the New York State bulk power transmission system;
  - Analysis of the potential costs and benefits of mitigating that congestion using generic transmission, generation, demand response, and energy efficiency solutions
  - Scenarios, which are variations to evaluate the impact on transmission congestion of changed conditions in the base case assumptions. Scenario analyses can provide useful insight on the sensitivity of projected congestion values to differing assumptions included in the base case
- **The "70x30" scenario is based on the policies set forth in the 70x30 CLCPA; the scenario models two hypothetical build-outs of renewable energy facilities and identifies transmission-constrained pockets throughout New York State that could prevent full utilization of that renewable energy**
- **The 70x30 scenarios are not intended as a roadmap for compliance with the mandates of the CLCPA**

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2020 RNA: 70x30 Scenarios
Summary of Major Assumptions

- Resource adequacy and transmission security evaluations will be performed, building off the load shapes and renewable mix assumptions from CARIS
- Load: each of the two load shapes from the 2019 CARIS 70x30 scenarios* are modeled for the MARS resource adequacy 70x30 scenarios:
  - "Base Load": higher energy shape (153 TWh)
  - "Scenario Load": lower energy shape (136 TWh)
- Transmission security analysis will be performed using the CARIS 'Base Load' results
- Renewable resource mix: from the CARIS output for each of the two load models
- External areas: add a 1,310 MW Hydro Quebec to Zone J HVDC tie, consistent with CARIS
- Fossil units removal: staged by age until LOLE violations observed. Those removed resources that bring the NYCA below LOLE of 0.1 days/year will be then modeled as out-of-service in the transmission security assessments
- Storage: zonal MW distribution modeled consistent with CARIS (details in the following slides)

*2019 CARIS I targets July, 2020 for completion

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2020 RNA 70x30 Scenarios: Load Assumptions Summary

RNA 70x30 *"Base Load" from CARIS*	A	B	C	D	E	F	G	H	I	J	K	NYCA
Net Load Energy (GWh)	14,590	9,695	15,394	5,337	7,095	11,312	9,544	2,807	5,881	51,749	19,608	153,012
Net Load Peak (MW)*	2,537	1,937	2,653	838	1,264	2,197	2,174	637	1,405	11,589	4,730	31,303
+ BtM-PV at Zonal Peak (MW)	368	60	556	0	518	584	246	35	35	352	102	2,757
Total Load Peak (MW)	2,905	1,997	3,209	838	1,782	2,781	2,420	672	1,440	11,941	4,832	34,060

RNA 70x30 *"Scenario Load" from CARIS*	A	B	C	D	E	F	G	H	I	J	K	NYCA
Net Load Energy (GWh)	13,034	7,757	12,626	5,101	5,694	9,654	7,911	2,848	5,952	46,354	19,026	135,958
Summer Net Load Peak (MW)*	2,112	1,417	2,171	651	1,052	1,988	1,912	625	1,385	9,129	3,914	25,312
+ BtM-PV at Summer Zonal Peak (MW)	77	16	0	0	0	0	22	2	5	64	24	269
Total Summer Load Peak (MW)	2,189	1,433	2,171	651	1,052	1,988	1,934	627	1,390	9,193	3,938	25,581
Winter Net Load Peak (MW)*	2,234	1,310	2,264	740	1,246	1,934	1,607	636	1,065	7,344	3,841	23,779
+ BtM-PV at Winter Zonal Peak (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Total Winter Load Peak (MW)	2,234	1,310	2,264	740	1,246	1,934	1,607	636	1,065	7,344	3,841	23,779

*Non-coincident zonal peak

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2020 RNA 70x30 Scenarios Resource Adequacy Assumptions

RNA 70x30 Scenarios: Two Load Variations

- **CARIS 70x30 "Base Load":**
  - 2002 load shape scaled up to Y2028 energy forecast from the 2019 Gold Book
  - Same load shape used in all MARS load levels
- **CARIS 70x30 "Scenario Load":**
  - 2002 load shape scaled to match CARIS 70x30 Scenario Load Forecast
  - Same load shape used in all MARS load levels

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RNA 70x30 Scenarios:

Generation Assumptions Common to Both Load Variations

- **External Areas**
  - HQ to J modeled as a unit in MARS with shape from CARIS output in Zone J
  - HQ to D modeled as a unit in MARS with shape from CARIS output in Zone D
- **Fossil Generation Initial Removal**
  - All peaker units affected by the Peaker Rule were removed in 2023 and 2025 to further align with the CARIS assumptions; this includes removal of those peakers kept in service in the RNA Base Case due to their compliance plans, mainly in Zone K

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RNA 70x30 Resource Adequacy Scenarios:

Generation Assumptions Common to Both Load Variations

- **Energy Storage**
  - MARS energy storage model, which allows for charging and discharging, and also includes temporal constraints (*e.g.*, hours/days or hours/month)
  - 8-hour storage resources will be modeled (similar to CARIS)
    - Note: at this time only 100% roundtrip efficiency can be modeled in MARS, which does not account for losses in charge/discharge cycle

Storage zonal distribution (similar to CARIS)

Zone	MW
A	150
B	90
C	120
D	180
E	120
F	240
G	100
H	100
I	100
J	1,320
K	480
NYCA	3,000

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RNA 70x30 High and Low Load Variations: Renewables Mix Assumptions

- **Renewables mix assumptions – similar to CARIS**
  - Land-based wind
    - Output shapes from CARIS (including curtailments)
    - 2009 National Renewable Energy Laboratory (NREL) data
  - Off-shore wind
    - Output shapes from CARIS (including curtailments)
    - 2009 NREL data
  - Utility-scale PV
    - Output shapes from CARIS (including curtailments)
    - 2017 DSS data used for existing plants, 2006 NREL data for new plants

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RNA 70x30 Scenarios:

Renewable Mix by NYCA Zone

Renewable Resources Mix (Nameplate MW) for RNA 70x30 'Base Load Case' from CARIS)

Zone/Type	OSW	LBW	UPV	BTM-PV
A		2,286	4,432	995
B		314	505	298
C		2,411	2,765	836
D		1,762		76
E		2,000	1,747	901
F			3,592	1,131
G			2,032	961
H				89
I				130
J	4,320			950
K	1,778		77	1,176
Total	**6,098**	**8,772**	**15,150**	**7,542**

Zonal Renewable Mix (Nameplate MW) for RNA 70x30 'Scenario Load Case' from CARIS

Zone/Type	OSW	LBW	UPV	BTM-PV
A		1,640	3,162	995
B		207	361	298
C		1,765	1,972	836
D		1,383		76
E		1,482	1,247	901
F			2,563	1,131
G			1,450	961
H				89
I				130
J	4,320			950
K	1,778		77	1,176
Total	**6,098**	**6,477**	**10,832**	**7,542**

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Additional Fossil Removal Simulations

- Additional MARS simulations will be performed by removing the remaining fossil plants by age (from older to newer) until criterion violations observed

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2020 RNA 70x30 Scenarios: Transmission Security Assumptions

2020 RNA 70x30 Scenario: Transmission Security Assumptions

- Load will be modeled based on the 2020 Gold Book forecast for 2030 with adjustments for behind-the-meter solar
- Neighboring area interchanges are modeled at the values in the 2020 FERC 715 cases plus an HQ to Zone J 1,310 MW import consistent with the CARIS 70x30 scenario
- Additional fossil generation removals included in the resource adequacy assumptions are also used in the transmission security assumptions along with additional age-based removals
- The renewable resource additions will be modeled at the locations identified for the CARIS 70x30 Base Load case
  - Capacity values are treated as “Pmax” in the model
  - Other model parameters are developed for the model based on scaled values from the interconnection queue projects that were utilized in the CARIS assumptions, when available

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2020 RNA 70x30 Scenario: Transmission Security Assumptions

- Transmission security will assess under steady state various dispatches of renewable resources and different load levels

Case #	Case Load (Net Load including BtM solar reductions, MW)	Land-Based Wind (% of Pmax)	Off-Shore Wind (% of Pmax)	Solar (% of Pmax)
1	Day Peak Load (30,000)	10	20	45
2	Evening Peak Load (31,100)	0	0	0
3	Light Load (12,500 MW)	15	45	0
4	Light Load (12,500 MW)	0	0	0
5	Shoulder Load (21,500 MW)	0	0	40
6	Shoulder Load (21,500 MW)	15	45	40

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Questions?

Our mission, in collaboration with our 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 policymakers, stakeholders and investors in the power system

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