

2019 CARIS 70x30 Scenario Assumptions and Calculation

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Agenda

- **70x30 Scenario Development Assumptions**
- **70x30 Annual Process and Calculation**
- **Discussion and Suggestions**

- **Appendix - Policy Background**

Getting to 70x30: From the CARIS Base Case

- 70x30 Scenario will be developed from the 2019 CARIS 1 base case 2028 model year
- Initial thought on these topics presented previously at ESPWG on
 - September 11
 - CARIS Preliminary 70 x 30 Scenario Development
 - October 4
 - CARIS Scenario Load Forecast Development
 - CARIS 1 70x30 Scenario ESR Modeling
- Following slides summarize NYISO assumptions on various changes to the base case
 - ~~Red strikethrough text indicates prior assumption~~
 - Green text indicates updated assumption
 - Black/grey text indicates no change in assumption

Getting to 70x30: Base Case Adjustment

- Load Forecast/Shape
- Neighboring system assumptions
- Modeling Energy Storage Resources (ESR)
- NYCA Nuclear and Fossil Fleet Operations
- RE Modeling, Locations and Amounts

Load Forecast/Shape

- **70x30 Scenario load includes zonal 8,760 hourly profiles with non-uniform distribution of EE, electrification (EV and space heating), and BTM-PV**
- **Separate presentations to ESPWG on**
 - October 4th
https://www.nyiso.com/documents/20142/8530408/02%202019_CARIS_ScenarioLoadForecasts.pdf/bc3015b3-26f2-9592-8820-c7eea74c1b4a
 - and today

Neighboring system assumptions

- **Policy expectations in other states/provinces directionally align with NY seeking lower emissions and increasing RE generation**
 - RE resource fleets in neighboring pools modeled as in base case
 - Ontario nuclear operations modeled as in base case
- **Assume imports of Canadian Hydro/HVDC additions counted towards 70x30**
 - ~~Generic HVDC 1,250 MW with HQ schedule to Zone J~~
 - Generic HVDC 1,310 MW with HQ schedule to Zone J 345 kV system
- **Assume average RE% content and emission rate of system mix associated with energy transfers between pools**
 - CES is consumption based (includes imported RE in the 50x30 baseline calculation)
 - Assume similar CLCPA 70x30 calculation

Energy Storage Resource Modeling

- Capacity additions driven by state mandate of 3,000 MW
- Zonal capacity distribution roughly based on the NYSERDA Energy Storage Roadmap
 - Scenario values shown compared to Test values presented in Oct. 4 ESR Modeling presentation
- Model two methods to calculate ESR dispatches for the MAPS optimization
 - MAPS's internal ESR model (weekly cycle/NYCA load)
 - external ESR dispatch optimization (daily zonal net load) treated as hourly resource modifier in MAPS
- Additional information in Oct. 4 ESR Modeling presentation

<https://www.nyiso.com/documents/20142/8530408/04%20CARIS1%2070x30Scenario%20ESRModeling.pdf/3e1fc245-ab8d-6d58-a2c4-d3308a80925b>

Zone	Test MW	Scenario MW
A	120	150
B	60	90
C	60	120
D	60	180
E	60	120
F	420	240
G	240	90
H	60	90
I	120	90
J	1,350	1,320
K	450	480
NYCA	3,000	3,000



NYCA Nuclear Fleet Operations

- Upstate nuclear units eligible for ZECs under the CES through March 2029
- ~~Extend upstate nuclear operations~~
- Sensitivity performed with all upstate nuclear units I/S or O/S in 2030

Nuclear Unit	Zone	NP (MW)	DMNC_SUM (MW)	2015 - 2018 Average Gold Book Net Energy (GWh)	2015 - 2018 Maximum Gold Book Net Energy (GWh)	Online Date	Announced Retirement / NRC Operating License Expiration Date
Indian Point 2	H	1,299	1,016	7,804	8,812	8/1/1973	4/30/2020
Indian Point 3	H	1,012	1,038	7,993	9,076	4/1/1976	4/30/2021
Nine Mile Point 1	C	642	632	5,168	5,377	11/1/1969	8/22/2029
R E Ginna 1	B	614	581	4,808	5,063	7/1/1970	9/18/2029
James A Fitzpatrick 1	C	882	845	6,510	7,382	7/1/1975	10/17/2034
Nine Mile Point 2	C	1,399	1,288	10,576	11,054	8/1/1988	10/31/2046

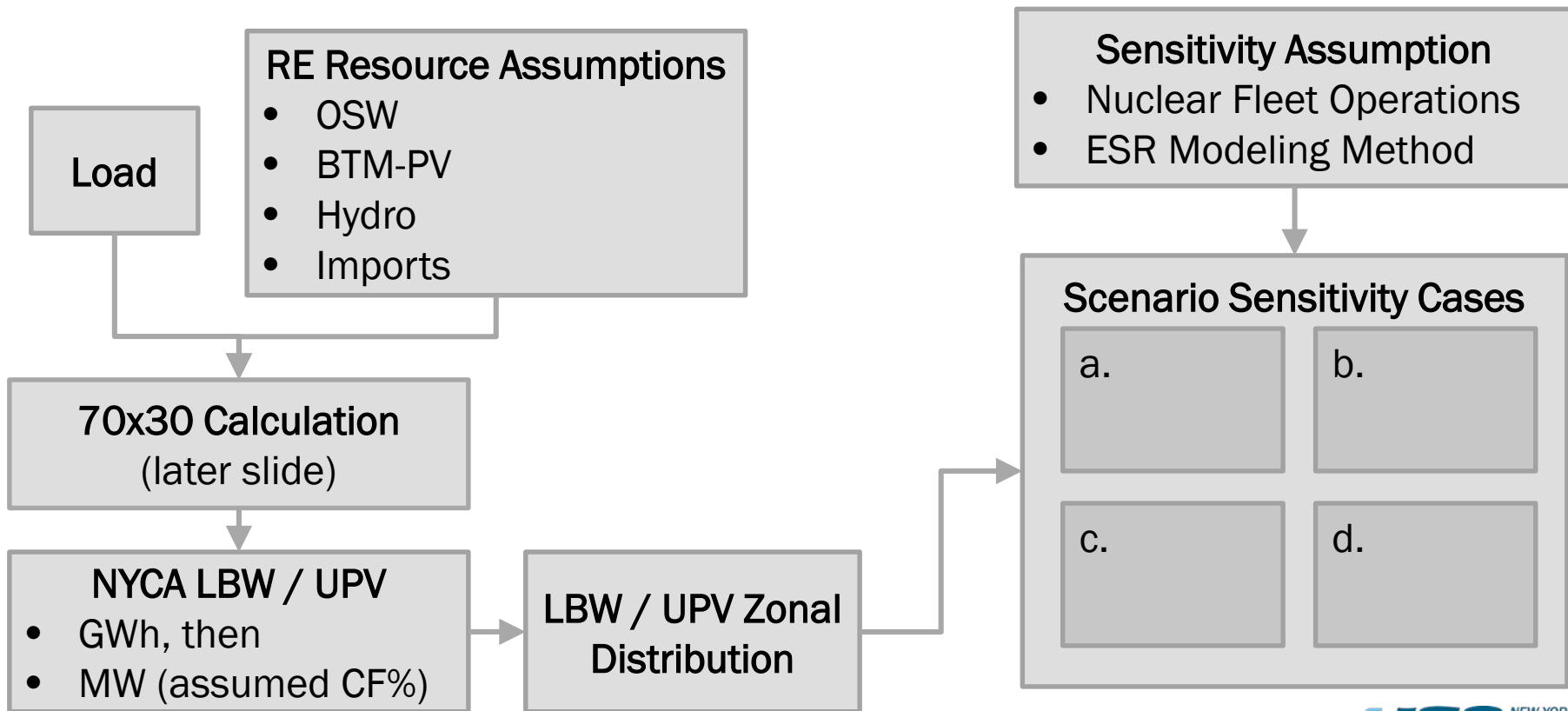
Gold Books, <https://www.nrc.gov/reactors/power.html>



Fossil Fleet Operations

- **Assume all coal plants retired by 2021**
 - Somerset in the base case, removed in 70x30 scenario
- **Assume “peaker” rule replacements corresponding to local Compensatory MW additions identified in 2019-2028 CRP**
 - 660 MW in Zone J and 620 MW in Zone K
 - Assume new compliant GTs are installed to secure for the complete duration of deficiencies identified with deactivation of impacted GTs

70x30 Annual Calculation Process



RE Amounts

- Assume energy from ~6,000 MW of OSW in 2030
 - ~~50/50 split between Zone J and Zone K~~
 - ~70/30 load ratio share split between Zone J and Zone K
- First determine net effect of the mandated resources in the CLCPA and then calculate annual energy required from Utility PV (UPV) and Land Base Wind (LBW) to achieve 70x30
 - Assume RE content of imported electricity
 - Assumed energy split 50/50 between UPV and LBW

RE Locations

- Capacity additions of UPV and LBW calculated at annual NYCA level to achieve 70% RE requirement must then be ultimately distributed to the bus level to be modeled
- Developed capacity distribution schedule based on UPV and LBW capacity shares by zone from the 2017 and 2018 CES REC solicitation awards and the interconnection queue
- Capacity schedule shown will as a first step assign UPV and LBW capacity values to each zone

Nameplate Capacity Distribution			
	UPV	LBW	LBW
A	27%	40%	30%
B	3%	0%	5%
C	20%	28%	30%
D	0%	7%	15%
E	10%	25%	20%
F	25%	0%	0%
G	15%	0%	0%
H	0%	0%	0%
I	0%	0%	0%
J	0%	0%	0%
K	0%	0%	0%
NYCA	100%	100%	100%

RE Modeling

- **Incremental RE resources will be modeled as follows**
 - BTM-PV: scaling base case BTM-PV to desired output level
 - UPV: NREL Solar Power Data for Integration Studies
 - OSW: NREL Wind Toolkit
 - LBW: modeled consistent with new LBW additions in the base case
- **Additional information on NREL wind and solar data included in appendix to September 11 ESPWG presentation**
 - www.nyiso.com/documents/20142/8263756/07%20CARIS1_70x30ScenarioDevelopment.pdf/ab02dbff-69b0-0b2f-04da-8e9d0bd74b76

Preliminary Annual 70x30 Calculation

- **RE = Wind + Solar + Hydro + Hydro Imports**
- **Assume, %RE = RE / (Load + BTM-PV)**

2030	OSW	LBW	UPV	BTM-PV	Hydro	Hydro Imports	RE	Load	Load + BTM-PV	%RE
MW	6,098	3,853	6,422	7,542	5,329	3,000	32,244			
GWh	23,344	10,126	10,126	9,366	28,832	19,941	101,735	135,970	145,335	70%
%CF	44%	30%	18%	14%	62%	76%	36%			

- **RE additions independent of nuclear operation assumption**

70x30 Scenario Sensitivity Cases

Scenario Sensitivity Cases

a.
Upstate Nuclear In-Service
MAPS ESR Model

b.
Upstate Nuclear Out-Service
MAPS ESR Model

c.
Upstate Nuclear In-Service
External ESR Dispatch Model

d.
Upstate Nuclear Out-Service
External ESR Dispatch Model

Feedback/Comments?

- Email additional feedback to: BCohen@nyiso.com

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



Appendix – Policy Background

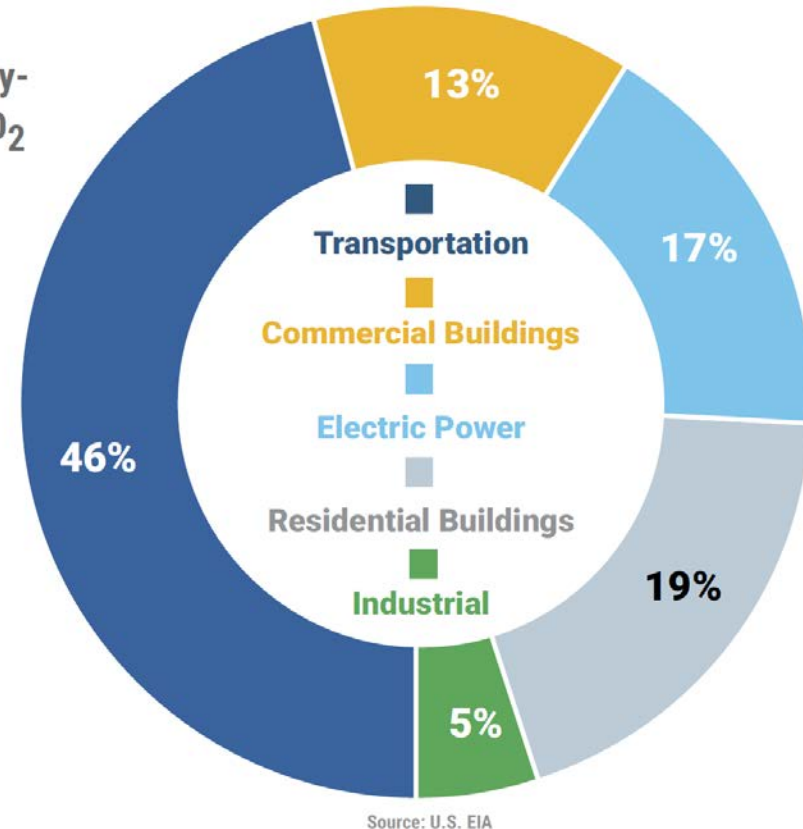
Renewable and Clean Energy Mandates

- **2025 – 6,000 MW Behind-the-meter PV (BTM-PV): - CLCPA**
 - NY-Sun 3,000 MW BTM-PV by 2023 – REV/CEF
- **2025 – 185 TBtu site-energy savings Energy Efficiency (EE) Target – EE Order**
 - 600 TBtu primary-energy savings by 2030 – 2015 NYS Energy Plan Goals
- **2029 – Zero Emission Credits (ZECs) eligible to upstate nuclear through March - CES**
- **2030 – 70% Renewable Energy (RE) - CLCPA**
- **2030 – 3,000 MW Energy Storage Resources (ESR) - CLCPA**
 - Energy Storage 1,500 MW by 2025 - energy storage order
- **2035 – 9,000 MW Offshore Wind (OSW) - CLCPA**
 - 2,400 MW by 2030 - New York State Offshore Wind Master Plan
 - 2018 OSW Solicitation resulted in 1,696 MW procurement - inaugural solicitation

Emission Reductions Not Considered

- 2030 – 40% economy-wide GHG reduction - **CLCPA**
- 2040 – “zero emission” power sector - **CLCPA**
- 2050 – 85% economy-wide GHG reduction (and up to 15% additional as offsets) - **CLCPA**
 - “Sources in the electric generation sector shall not be eligible” to offset emissions

Figure 23:
NYS Energy-
Related CO₂
Emissions
by Sector



Source: U.S. EIA
2019 Power Trends (2016 data),

<https://www.nysenate.gov/legislation/bills/2019/s6599>

CES RE Accounting

In 2014, approximately 26% of the fuel mix serving load in New York State was supplied from renewable energy resources. These resources included all generation that delivered energy into the New York Control Area, net of exports. This baseline generation includes both in-state and out-of-state generation, as well as both RPS eligible and non-eligible renewable generation, such as large scale NYPA hydro. Staff used the Environmental Disclosure Program (EDP) data to determine the amount of electricity used in the State by fuel type. To this amount, we added the BTM electricity generated by renewable resources, such as photovoltaic panels.²

CES Staff Whitepaper, Jan. 25, 2016 (2014 RE Baseline Calculation)

¹⁰ Renewable facilities that receive compensation for the environmental component of the value stack in VDER (the “E-value”), are required to assign the RECs generated by such facilities to the interconnecting utility. The utility may use such RECs to satisfy the Tier 1 obligation.

CES 2019 Divergence Test and Target Setting Filing, Sept. 30, 2019 (VDER RECs/CES compliance)

NYS DEC Air Regulations

- DEC proposed “Peaker Rule” Part 227-3 could impact ~3,300 MW peaking generation in Zone J and Zone K
- DEC final Part 251 precludes coal-firing in 2021