

2020 CARIS Phase 2 Assumptions

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Economic Planning

Electric System Planning Working Group (ESPWG)

September 24th, 2020

Agenda

- **Schedule**
- **Model Development / Key Assumptions**
- **Load Forecast Updates**
- **Fuel Price Forecasts**
- **Emission Price Forecast Updates**

Target Schedule

- **Study Kickoff**
 - August 20th ESPWG - Kickoff Presentation
- **Database Development**
 - September 24th ESPWG - Assumptions Review
 - October 5th TPAS – Follow up Assumptions Review
- **Review of Results**
 - October 23rd ESPWG – Preliminary Results
 - November 19th ESPWG – Final Results
- **Final CARIS Phase 2 Database**
 - Presentation at BIC
 - “Additional CARIS Study” and “Specific Project” studies available to use 2020 CARIS Phase 2 database

*All stakeholder meeting dates are based on preliminary estimates and are subject to change

2020 CARIS Phase 2

- **NYISO must update and extend the CARIS Phase 1 database for Phase 2 studies**
 - Economic Planning Process Manual, Section 3.1
 - 2019 CARIS Phase 1 Base Case (2019-2028)
 - 2020 CARIS Phase 2 updates and extends through 2038 for a total of 20-year study period
- **CARIS Phase 2 Base Case to be utilized in evaluation of specific Regulated Economic Transmission Projects (RETP)**
 - Also available for use in optional Additional CARIS Studies

Data Sources

- **Generator updates consistent with latest 2020 RNA**
- **Load forecast updates consistent with 2020 Gold Book**
- **Hurdle rates unchanged from 2019 CARIS Phase 1**
- **Updates for 2020 CARIS Phase 2**
 - Fuel Price Forecast
 - Emission Price Forecast

NYCA Generation Updates

■ Generation Additions

Project Name	Capacity (MW)	Zone	Type	In-Service Date
Baron Winds	238.4	C	Wind	12/1/2021
Eight Point Wind Energy Center	101.8	B	Wind	12/1/2021
Roaring Brook Wind	79.7	E	Wind	12/1/2021
Calverton Solar Energy Center	22.9	K	Solar	12/1/2021

NYCA Generation Updates

- Modified In-service Dates

Project Name	Capacity (MW)	Zone	Type	2019 CARIS 1 In-Service Date	2020 CARIS 2 In-Service Date
Cassadaga Wind	126.5	A	Wind	12/1/2020	12/1/2021
Ball Hill Wind	100	A	Wind	12/1/2019	12/1/2022

NYCA Generation Updates

- Generator Deactivations

Project Name	Capacity (MW)	Zone	Type	Deactivation Date
Albany LFGE	5.6	F	ICE	9/18/2019
Somerset	685.9	A	COAL	2/15/2020
West Babylon	48.9	K	CT	12/11/2020

NYCA Generation Updates

- Modeled status changes represented in compliance plans submitted under the DEC Peaker Rule

Units	No. of Units	Capacity (MW)	Zone	MAY 2023 - SEP 2023	OCT 2023 - APR 2024	MAY 2024 - SEP 2024	OCT 2024 - APR 2025	MAY 2025 - SEP 2025	OCT 2025 - APR 2026
Coxsackie GT	1	23.7	G	O/S	O/S	O/S	O/S	O/S	O/S
South Cairo	1	23.4	G	O/S	O/S	O/S	O/S	O/S	O/S
Astoria GT1*	1	18.9	J	I/S	I/S	I/S	I/S	O/S	I/S
Gowanus 1&4 (1-1 through 1-8, and 4-1 through 4-8)**	15	336.3	J	O/S	I/S	O/S	I/S	O/S	I/S
Gowanus 2&3 (2-1 through 2-8 and 3-1 through 3-8)*	16	371.8	J	I/S	I/S	I/S	I/S	O/S	I/S
Narrows 1&2 (1-1 through 1-8, and 2-1 through 2-8)*	16	382.5	J	I/S	I/S	I/S	I/S	O/S	I/S
Ravenswood GTs (01, 10, 11)	3	54.5	J	O/S	O/S	O/S	O/S	O/S	O/S
Arthur Kill GT1	1	15.1	J	I/S	I/S	I/S	I/S	O/S	O/S
Astoria GTs (2-1 through 2-4, 3-1 through 3-4, 4-1 through 4-4)	12	545.6	J	O/S	O/S	O/S	O/S	O/S	O/S
Con Ed 59th St	1	21.6	J	I/S	I/S	I/S	I/S	O/S	O/S
Con Ed 74th St	2	41.1	J	O/S	O/S	O/S	O/S	O/S	O/S
Con Ed Hudson Ave 3	1	19.5	J	O/S	O/S	O/S	O/S	O/S	O/S
Con Ed Hudson Ave 5	1	19	J	O/S	O/S	O/S	O/S	O/S	O/S
Glenwood GT1	1	13.5	K	O/S	O/S	O/S	O/S	O/S	O/S
Northport GT	1	11.8	K	O/S	O/S	O/S	O/S	O/S	O/S
Port Jefferson GT1	1	15.2	K	O/S	O/S	O/S	O/S	O/S	O/S

* On outage during Summer Ozone season starting 2025

** On outage during Summer Ozone season starting 2023

NYCA Network Model Assumption

- Leeds Hurley SDU in-service Summer 2021*
- Cedar Rapids Transmission Upgrade in October 2021
- L33P (Ontario PAR) out of service until January 2022, and then modeled back in-service
- Empire State Line Project/Western PP Selected Project modeled in-service January 2022*
- Selected AC Transmission PP Projects modeled in-service January 2024*

*Date adjusted due to software limitation, and does not reflect actual in-service date

Hurdle Rates

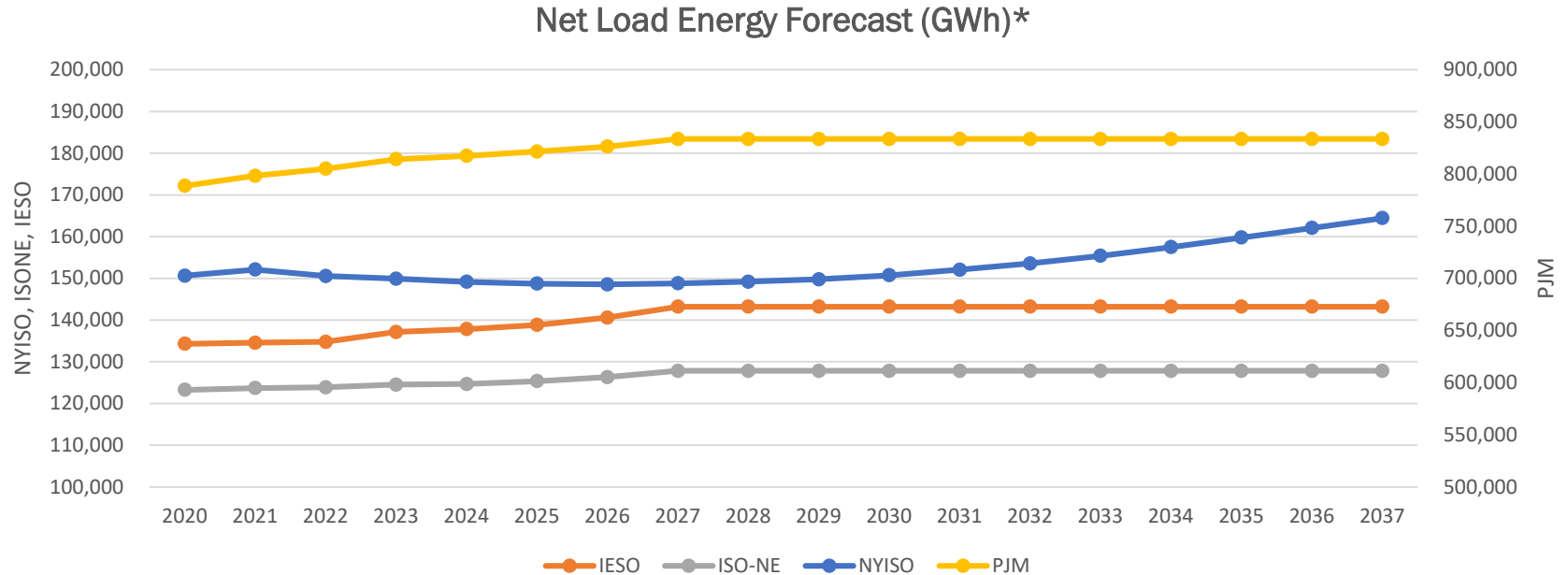
Commitment Hurdle Rate	Export (from NYCA)			Import (into NYCA)		
	Transaction Cost**	2019 CARIS 1	2020 CARIS 2	Transaction Cost**	2019 CARIS 1	2020 CARIS 2
PJM	\$ 8.0	\$ 5.0	\$ 5.0	\$ 5.0	\$ 2.0	\$ 2.0
Linden VFT	\$ 8.0	\$ 5.0	\$ 5.0	\$ 5.0	\$ 4.0	\$ 4.0
Neptune	\$ 8.0	\$ 8.0	\$ 8.0	\$ 5.0	\$ 1.8	\$ 1.8
HTP	\$ 8.0	\$ 8.0	\$ 8.0	\$ 5.0	\$ 9.0	\$ 9.0
ISONE	\$ 2.0	\$ 2.5	\$ 2.5	\$ 2.0	\$ 2.5	\$ 2.5
Cross Sound Cable	\$ 2.0	\$ 2.0	\$ 2.0	\$ 2.0	\$ 2.0	\$ 2.0
Northport Norwalk Cable	\$ 2.0	\$ 4.0	\$ 4.0	\$ 2.0	\$ 3.0	\$ 3.0
IMO	\$ 6.0	\$ 6.0	\$ 6.0	\$ 4.0	\$ 3.0	\$ 3.0

** Transaction Costs are annual average costs per CRA report
 (Export Transmission Service (ETS) Tariff Study, IESO, Charles River Associates, May
 16, 2012)

Hurdle Rates

Dispatch Hurdle Rate	Export (from NYCA)			Import (into NYCA)		
	Transaction Cost*	2019 CARIS 1	2020 CARIS 2	Transaction Cost*	2019 CARIS 1	2020 CARIS 2
PJM	\$ 6.0	\$ 3.0	\$ 3.0	\$ 3.0	\$ 1.0	\$ 1.0
Linden VFT	\$ 6.0	\$ 3.0	\$ 3.0	\$ 3.0	\$ 2.0	\$ 2.0
Neptune	\$ 6.0	\$ 6.0	\$ 6.0	\$ 3.0	\$ 0.8	\$ 0.8
HTP	\$ 6.0	\$ 6.0	\$ 6.0	\$ 3.0	\$ 7.0	\$ 7.0
ISONE	\$ -	\$ 0.8	\$ 0.8	\$ -	\$ 0.8	\$ 0.8
Cross Sound Cable	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Northport Norwalk Cable	\$ -	\$ 2.0	\$ 2.0	\$ -	\$ 1.0	\$ 1.0
IMO	\$ 4.0	\$ 4.0	\$ 4.0	\$ 2.0	\$ 1.0	\$ 1.0

Load Forecast Updates

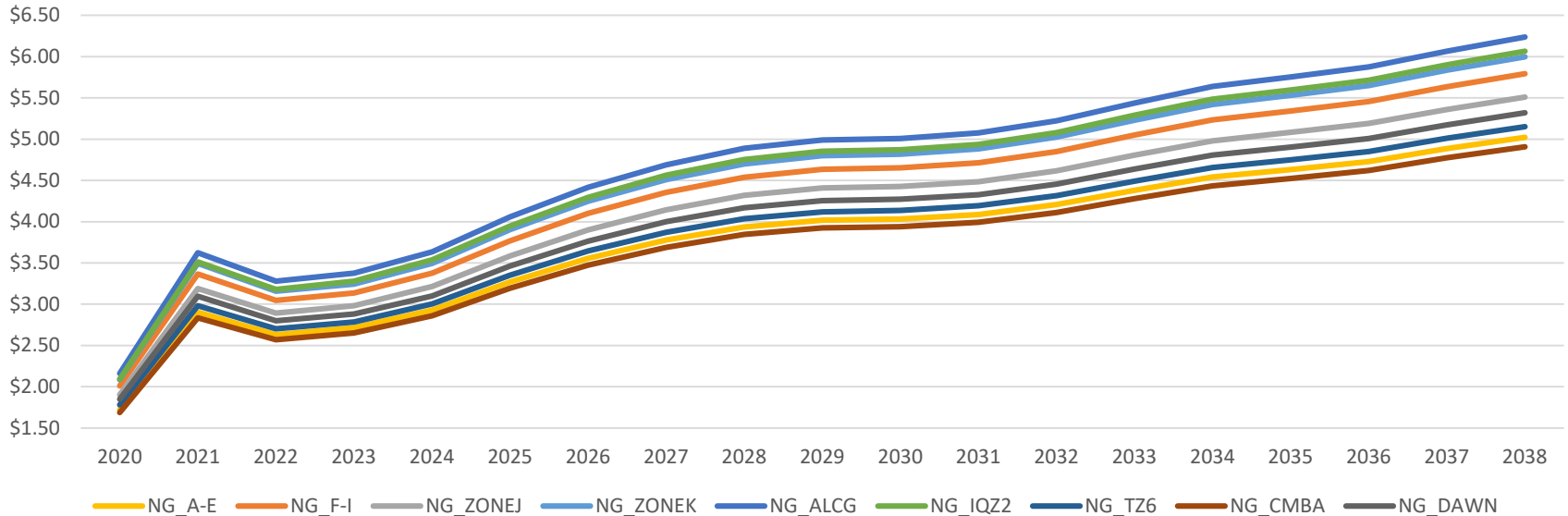


*External loads are kept constant starting 2028, per Economic Planning Process Manual

*Forecast net of behind-the-meter solar

Natural Gas Price Forecasts

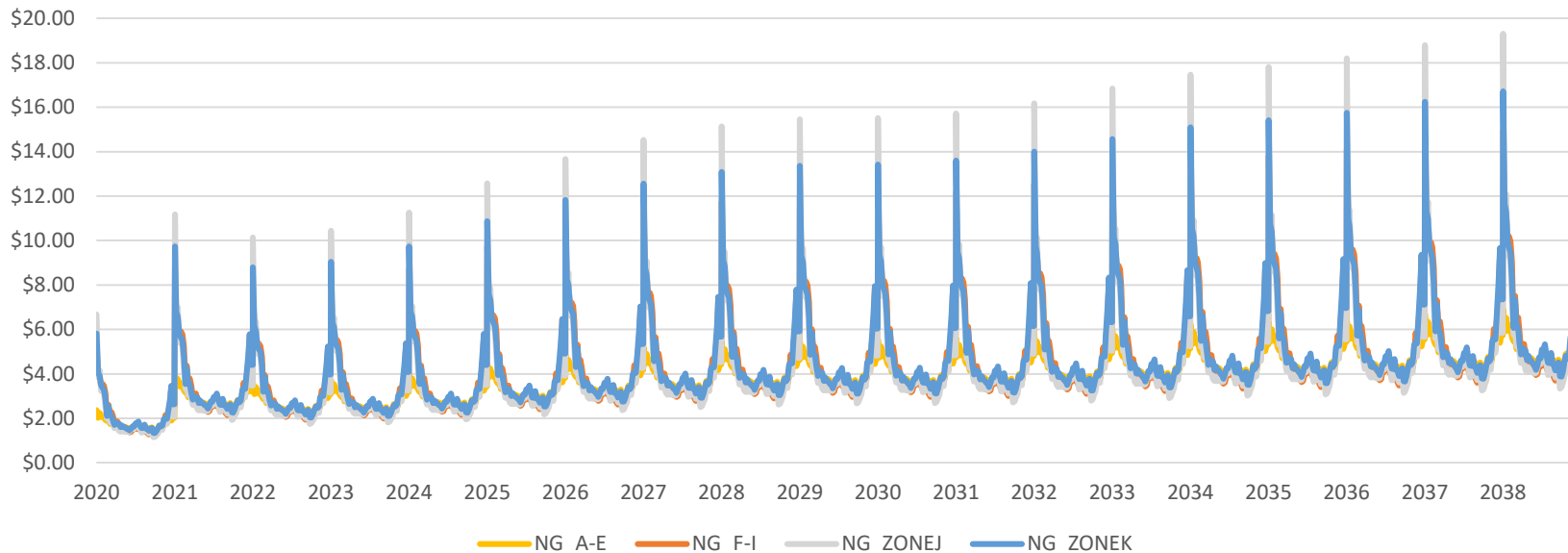
Annual Average Natural Gas Price (\$/mmBTU)



Note: Prices are in nominal dollars

Natural Gas Price Forecasts

NYCA Weekly Natural Gas Price (\$/mmBTU)

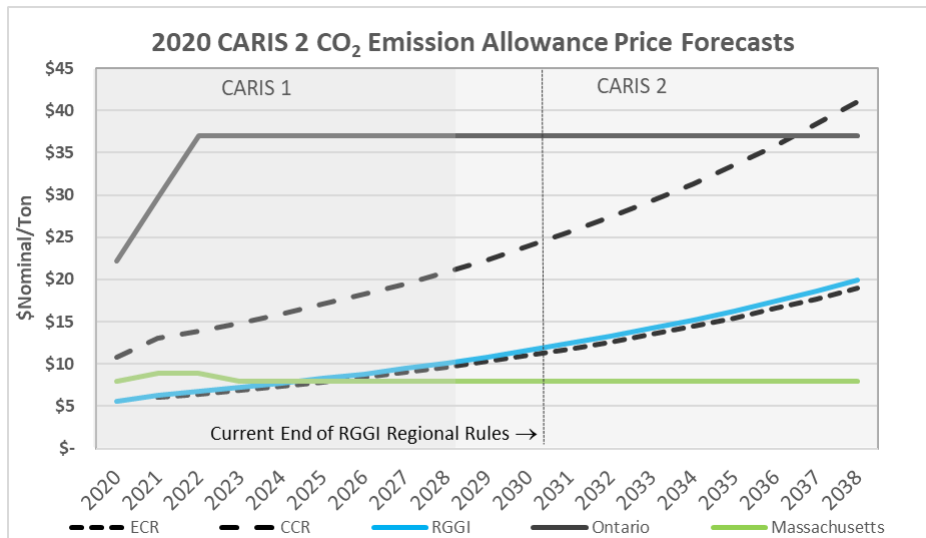


Note: Prices are in nominal dollars

Fuel Price Forecast Methodology Presentation (June 2019, ESPWG)

CO₂ Emission Allowance Price Forecast Updates

- RGGI Prices representative of program design features for 2021-2030 agreed to in 2017 Program Review and assumed to remain near the Emission Containment Reserve (ECR) for the study period
- Virginia modeled as a RGGI state beginning in 2021, New Jersey was added to RGGI in 2020
- Massachusetts and Ontario prices also modeled to represent programs in external jurisdictions



2020 CARIS 2 Emission Allowance Price Forecast (\$/Nominal/ton)			
	Ontario CO ₂	RGGI CO ₂	Mass CO ₂
2020	\$ 22.23	\$ 5.60	\$ 7.90
2021	\$ 29.64	\$ 6.30	\$ 8.89
2022	\$ 37.04	\$ 6.74	\$ 8.89
2023	\$ 37.04	\$ 7.21	\$ 7.90
2024	\$ 37.04	\$ 7.72	\$ 7.90
2025	\$ 37.04	\$ 8.25	\$ 7.90
2026	\$ 37.04	\$ 8.84	\$ 7.90
2027	\$ 37.04	\$ 9.46	\$ 7.90
2028	\$ 37.04	\$ 10.12	\$ 7.90
2029	\$ 37.04	\$ 10.83	\$ 7.90
2030	\$ 37.04	\$ 11.59	\$ 7.90
2031	\$ 37.04	\$ 12.40	\$ 7.90
2032	\$ 37.04	\$ 13.27	\$ 7.90
2033	\$ 37.04	\$ 14.20	\$ 7.90
2034	\$ 37.04	\$ 15.19	\$ 7.90
2035	\$ 37.04	\$ 16.25	\$ 7.90
2036	\$ 37.04	\$ 17.39	\$ 7.90
2037	\$ 37.04	\$ 18.61	\$ 7.90
2038	\$ 37.04	\$ 19.91	\$ 7.90

NO_x and SO₂ Emission Allowance Price Forecast Updates

- **Cross-State Air Pollution Rule (CSAPR) program participation modeled consistent with US EPA state participation**
 - <https://www.epa.gov/csapr/states-are-affected-cross-state-air-pollution-rule-csapr>
- **Oversupply will persist as emissions reduce and current caps remains fixed**
 - Changes in program caps/design would require new rule from US EPA
- **Annual programs representative of current market prices (nominally cover the transaction cost of allowance trades)**
- **Ozone season prices forecast to reduce from current levels over the next 5 years to a nominal value**
 - Total price of NO_x emissions in the ozone season is the sum of the annual and ozone season NO_x allowance price

2020 CARIS 2 Emission Allowance Price Forecast (\$Nominal/ton)			
	SO ₂	Annual NO _x	Ozone Season NO _x
2020	\$ 2.00	\$ 3.00	\$ 75.00
2021	\$ 2.00	\$ 3.00	\$ 45.00
2022	\$ 2.00	\$ 3.00	\$ 30.00
2023	\$ 2.00	\$ 3.00	\$ 20.00
2024	\$ 2.00	\$ 3.00	\$ 10.00
2025	\$ 2.00	\$ 3.00	\$ 5.00
2026	\$ 2.00	\$ 3.00	\$ 5.00
2027	\$ 2.00	\$ 3.00	\$ 5.00
2028	\$ 2.00	\$ 3.00	\$ 5.00
2029	\$ 2.00	\$ 3.00	\$ 5.00
2030	\$ 2.00	\$ 3.00	\$ 5.00
2031	\$ 2.00	\$ 3.00	\$ 5.00
2032	\$ 2.00	\$ 3.00	\$ 5.00
2033	\$ 2.00	\$ 3.00	\$ 5.00
2034	\$ 2.00	\$ 3.00	\$ 5.00
2035	\$ 2.00	\$ 3.00	\$ 5.00
2036	\$ 2.00	\$ 3.00	\$ 5.00
2037	\$ 2.00	\$ 3.00	\$ 5.00
2038	\$ 2.00	\$ 3.00	\$ 5.00

Reliability Needs

- Transmission Security and Resource Adequacy needs identified in draft 2020 RNA
- 2020 CARIS Phase 2 assumptions to address reliability needs to be presented at 10/5 TPAS meeting

Minimum Compensatory (Perfect) MW Needed					
BPTF			non-BPTF <i>(for information only)</i>		
Study year	Resource Adequacy (into/ in Zone J)	Thermal Criteria (N-1-1-0 in Zone J)	ConEdison Astoria East/ Corona 138 kV ¹	ConEdison Greenwood/Fox Hills 138 kV ²	
2020 RNA Study Period	2024	below criterion	below criterion	115	below criterion
	2025	below criterion	700	110	360
	2026	below criterion	760	115	350
	2027	100	820	120	360
	2028	150	900	125	360
	2029	300	990	170	370
	2030	350	1,075	180	370

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



Questions?