

# 2021-2040 System & Resource Outlook Update

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**Electric System Planning Working Group (ESPWG)**

September 22, 2021

# Agenda

- **Background**
- **Model Development**
- **Database Updates**
- **Next Steps**

# Background

# System & Resource Outlook

*“The biennial report that the ISO produces pursuant to Section 31.3.1 of this Attachment Y by which it summarizes the current assessments, evaluations, and plans in the biennial Comprehensive System Planning Process; produces a twenty-year projection of congestion on the New York State Transmission System; identifies, ranks, and groups congested elements; and assesses the potential benefits of addressing the identified congestion.”*

- **OATT Attachment Y §31.3: Tariff Viewer Link**
  - FERC Approved 2/9/2021
- **Economic Planning Manual: Link**
  - BIC Approved 9/14/2021

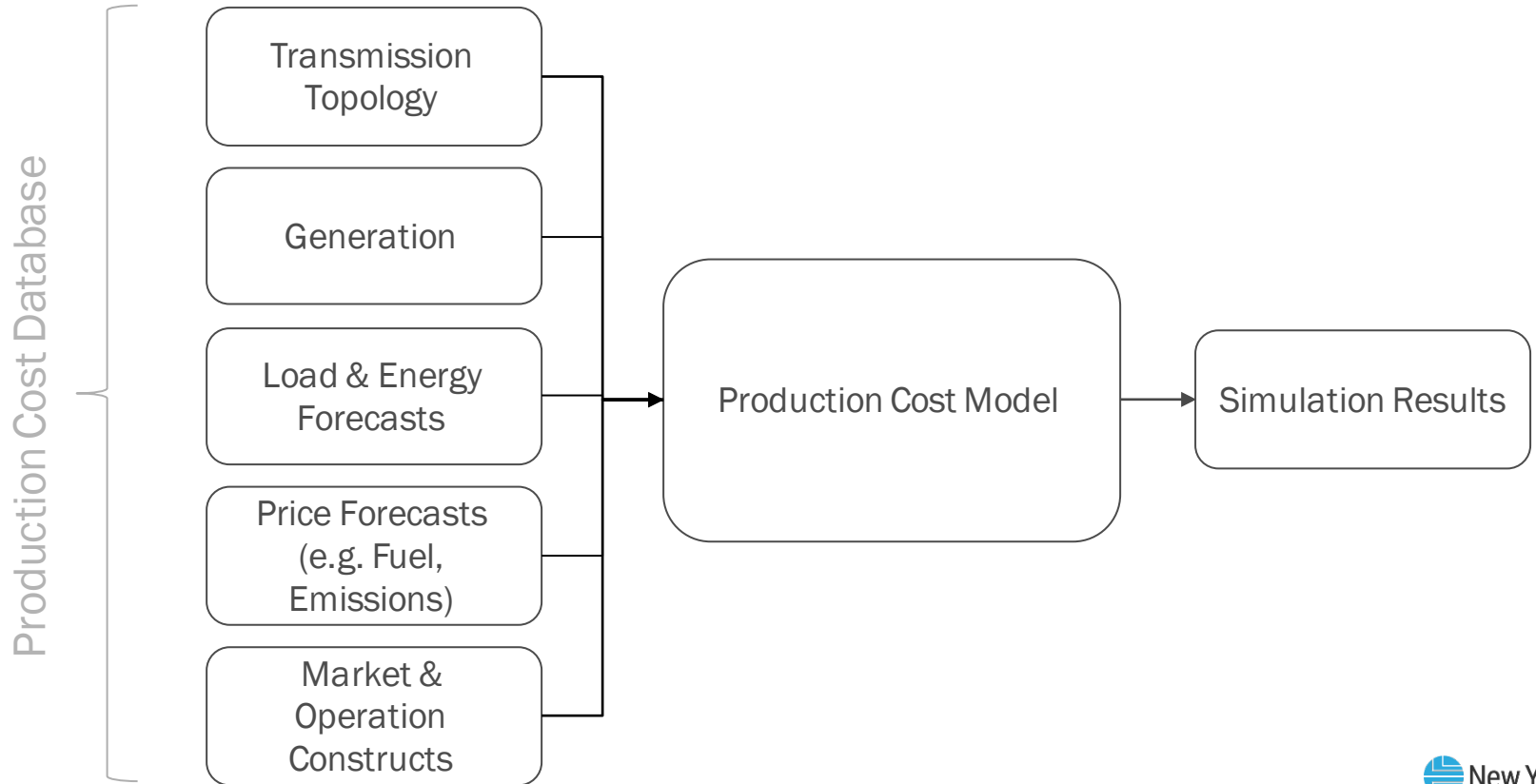
# Target Schedule

- **September– October 2021: Finalize reference case assumptions\***
- **November - December 2021: Conduct simulations and analysis\***
- **January - February 2022 : Complete analysis and finalize draft report\***
- **March 2022: Seek Business Issues Committee review and approval**
- **April 2022: Seek Board of Director review and approval**

\* Collaborate with ESPWG and seek stakeholder input

# Model Development

# Production Cost Model Development



# Model Development Details

- **Production Cost database starting point is 2020 CARIS Phase 1 database**
- **Primary data sources**
  - 2021-2030 Reliability Planning Process
  - 2021 Q3 STAR process
  - 2021 Gold Book
- **Study Period 2021-2040**
- **Lock-Down for Base Case - October 2021**
- **Contract and Policy case lockdown TBD**



# Model Benchmark

- Model benchmark performed in May 2021 in preparation for System & Resource Outlook
- Validated, tested, and tuned production cost model
- Presentation of process and results:

[https://www.nyiso.com/documents/20142/21653207/03%20Economic\\_Planning\\_Benchmark\\_Results.pdf/795df805-486f-7a4f-d86a-f8dd7fc04cf1](https://www.nyiso.com/documents/20142/21653207/03%20Economic_Planning_Benchmark_Results.pdf/795df805-486f-7a4f-d86a-f8dd7fc04cf1)

# Database Updates

# Hurdle Rates

- Calculated in benchmark process
- Used to tune import/export transactions
- Represent inter-market friction and financial transaction costs

Commitment Hurdle Rate	Export (from NYCA)		Import (into NYCA)	
	2020 Database	2021 Database	2020 Database	2021 Database
PJM	\$ 5.00	\$ 4.00	\$ 2.00	\$ 2.00
Linden VFT	\$ 5.00	\$ 5.00	\$ 4.00	\$ 2.50
Neptune	\$ 8.00	\$ 8.00	\$ 1.80	\$ 1.80
HTP	\$ 8.00	\$ 8.00	\$ 9.00	\$ 3.00
ISONE	\$ 2.50	\$ 3.00	\$ 2.50	\$ 2.00
Cross Sound Cable	\$ 2.00	\$ 2.00	\$ 2.00	\$ 1.00
Northport Norwalk Cable	\$ 4.00	\$ 4.00	\$ 3.00	\$ 2.00
IMO	\$ 6.00	\$ 6.00	\$ 3.00	\$ 3.00

Dispatch Hurdle Rate	Export (from NYCA)		Import (into NYCA)	
	2020 Database	2021 Database	2020 Database	2021 Database
PJM	\$ 3.00	\$ 2.00	\$ 1.00	\$ 0.50
Linden VFT	\$ 3.00	\$ 3.00	\$ 2.00	\$ 0.50
Neptune	\$ 6.00	\$ 6.00	\$ 0.80	\$ 0.80
HTP	\$ 6.00	\$ 6.00	\$ 7.00	\$ 1.00
ISONE	\$ 0.80	\$ 1.00	\$ 0.80	-
Cross Sound Cable	\$ -	\$ -	\$ -	\$ -
Northport Norwalk Cable	\$ 2.00	\$ 2.00	\$ 1.00	\$ 1.00
IMO	\$ 4.00	\$ 4.00	\$ 1.00	\$ 1.00

# Transmission

- **LTP updates as presented by Con Edison at the January 25, 2021 ESPWG/TPAS**

- A new 345/138 kV PAR controlled 138 kV Rainey – Corona feeder
- A new 345/138 kV PAR controlled 138 kV Gowanus – Greenwood feeder
- A new 345/138 kV PAR controlled 138 kV Goethals – Fox Hills feeder

- **STRP solution for addressing the 2023 short-term need**

- Series Reactors (SR) status changes, starting summer 2023, through 2030:
  - Placing in service the SR on the following 345 kV cables: 71, 72, M51, M52
  - Bypassing the SR on the following 345 kV cables: 41, 42, Y49

# NYISO Load Forecast

- **This study utilizes the forecast from the 2021 Load and Capacity Data Report (“Gold Book”)**
- **The following new load projects are included in addition to the 2021 Gold Book Forecasts:**
  - Q0580 – WNY STAMP
  - Q0776 – Greenidge Load
  - Q0849 – Somerset Load
  - Q0850 – Cayuga Load
  - Q0979 – North Country Data Center (load increase)

# Large Load Project Zonal Impact

Annual Energy GWh Delta						Summer Peak MW Delta						Winter Peak MW Delta					
Year	A	B	C	D	NYCA	Year	A	B	C	D	NYCA	Year	A	B	C	D	NYCA
2021	0	0	0	0	0	2021	0	0	0	0	0	2021-22	50	0	0	0	50
2022	860	0	160	620	1,640	2022	90	0	10	75	175	2022-23	180	0	40	125	345
2023	2,130	0	570	1,120	3,820	2023	265	0	70	135	470	2023-24	295	0	80	145	520
2024	2,490	0	740	1,280	4,510	2024	325	0	90	155	570	2024-25	355	0	100	165	620
2025	2,840	0	900	1,450	5,190	2025	385	0	110	175	670	2025-26	415	0	110	185	710
2026	3,210	0	900	1,620	5,730	2026	445	0	110	195	750	2026-27	465	0	110	205	780
2027	3,400	0	900	1,780	6,080	2027	485	0	110	215	810	2027-28	485	0	110	215	810
2028	3,400	0	900	1,780	6,080	2028	485	0	110	215	810	2028-29	485	0	110	215	810
2029	3,400	0	900	1,780	6,080	2029	485	0	110	215	810	2029-30	485	0	110	215	810
2030	3,400	0	900	1,780	6,080	2030	485	0	110	215	810	2030-31	485	0	110	215	810
2031	3,400	0	900	1,780	6,080	2031	485	0	110	215	810	2031-32	485	0	110	215	810

Source: *Q3 2021 STAR Assumptions*

# NYISO Generation

## ■ Additions

- Number 3 Wind Energy (Zone E, 105.8 MW, 09/2022)
- New small gens from Q3 STAR (24 projects)
  - See slide 8 of [Q3 STAR Assumptions](#) for reference

# NYISO (Cont...)

## ■ Modified In-Service Dates

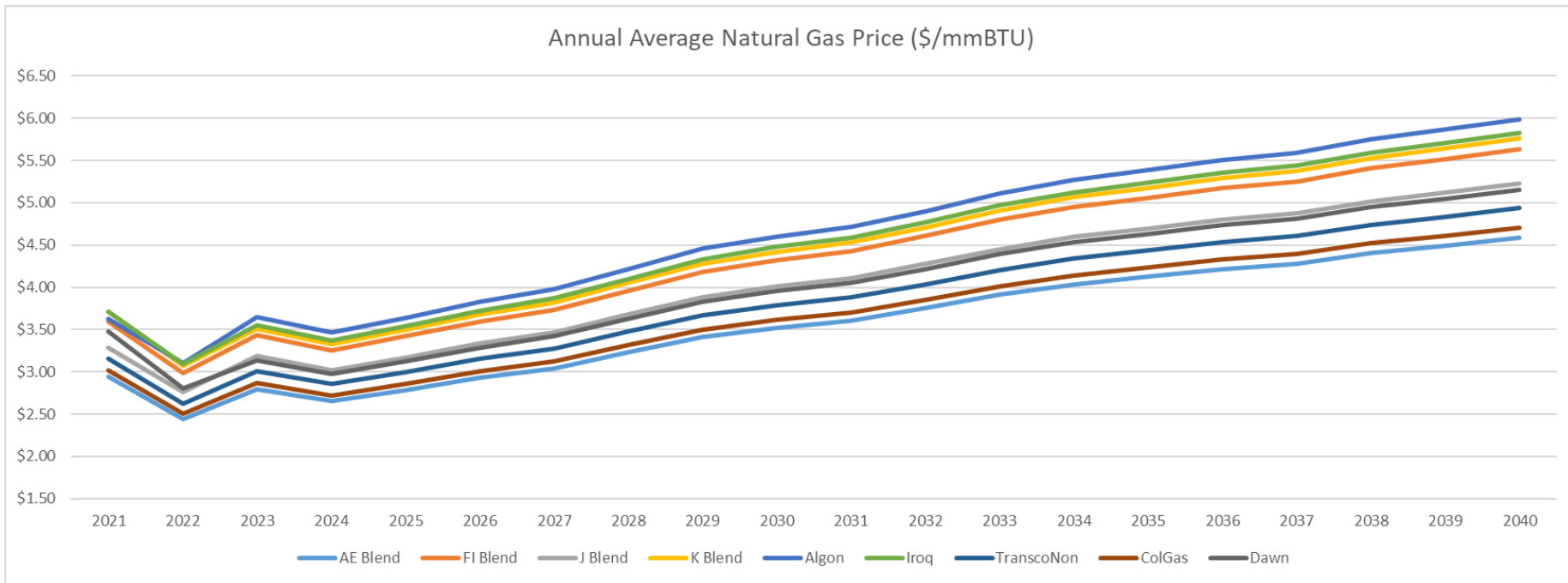
- Cassadaga Wind (from 12/1/2021 to 07/2021)
- Baron Winds (from 12/1/2021 to 07/2023)
- Eight Point Wind (from 12/1/2021 to 09/2022)

## ■ Retirements/Removals

- Taylor Biomass (Zone G, 19 MW)
- Gowanus 1-8 (Zone J, 16 MW, 02/01/2021)
- Glenwood GT 01 (Zone K, 13 MW, 02/28/2021)
- Glenwood GT 03 (Zone K, 53.1 MW, 05/01/2023)
- Shoreham 1&2 (Zone K, 58.4 MW, 05/01/2023)

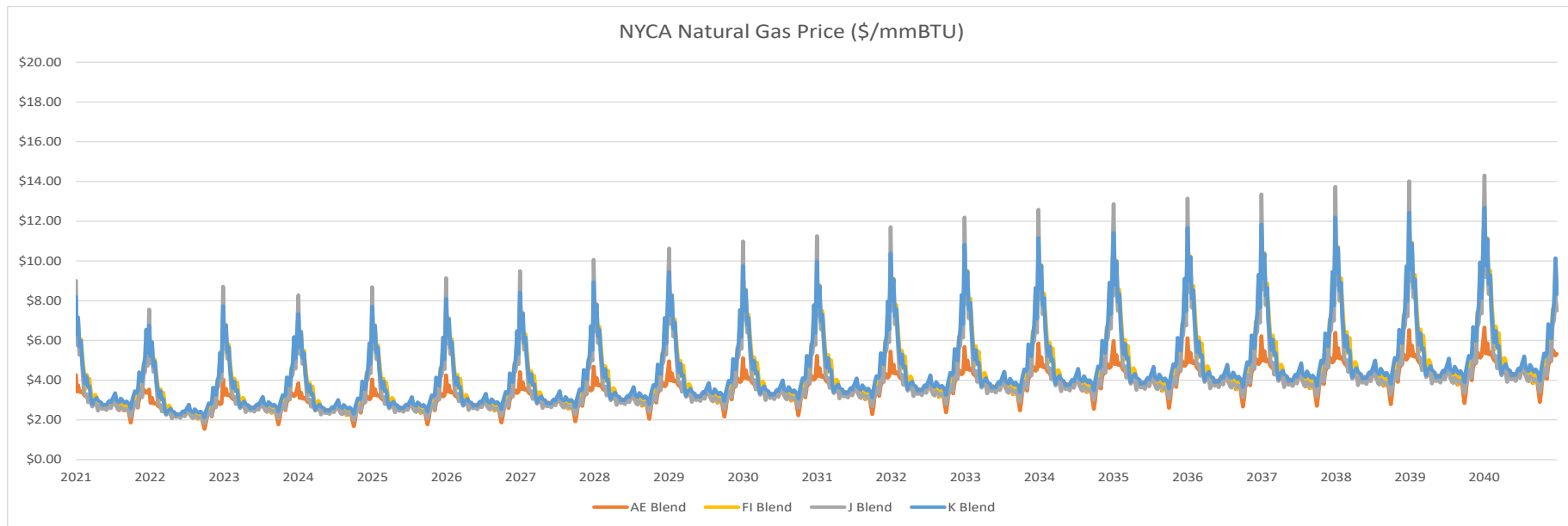


# Natural Gas Price Forecasts



*Note: Prices are in nominal dollars*

# Natural Gas Price Forecasts



*Note: Prices are in nominal dollars*

*Methodology Used to Create Forecast: [Link 1](#) [Link 2](#)*

# RGGI CO2 Emissions Program Update

- **RGGI program design features for 2021-2030 agreed to in 2017 program review in effect**

- Increased to 3% annual cap decline and updated pricing controls: Emission Containment Reserve (ECR) and Cost Containment Reserves (CCR)

- **New York RGGI regulations contain provisions to include certain generators between 15 and 25 MW in the program**

Applies to approximately 1,400 MW (mostly downstate GTs)

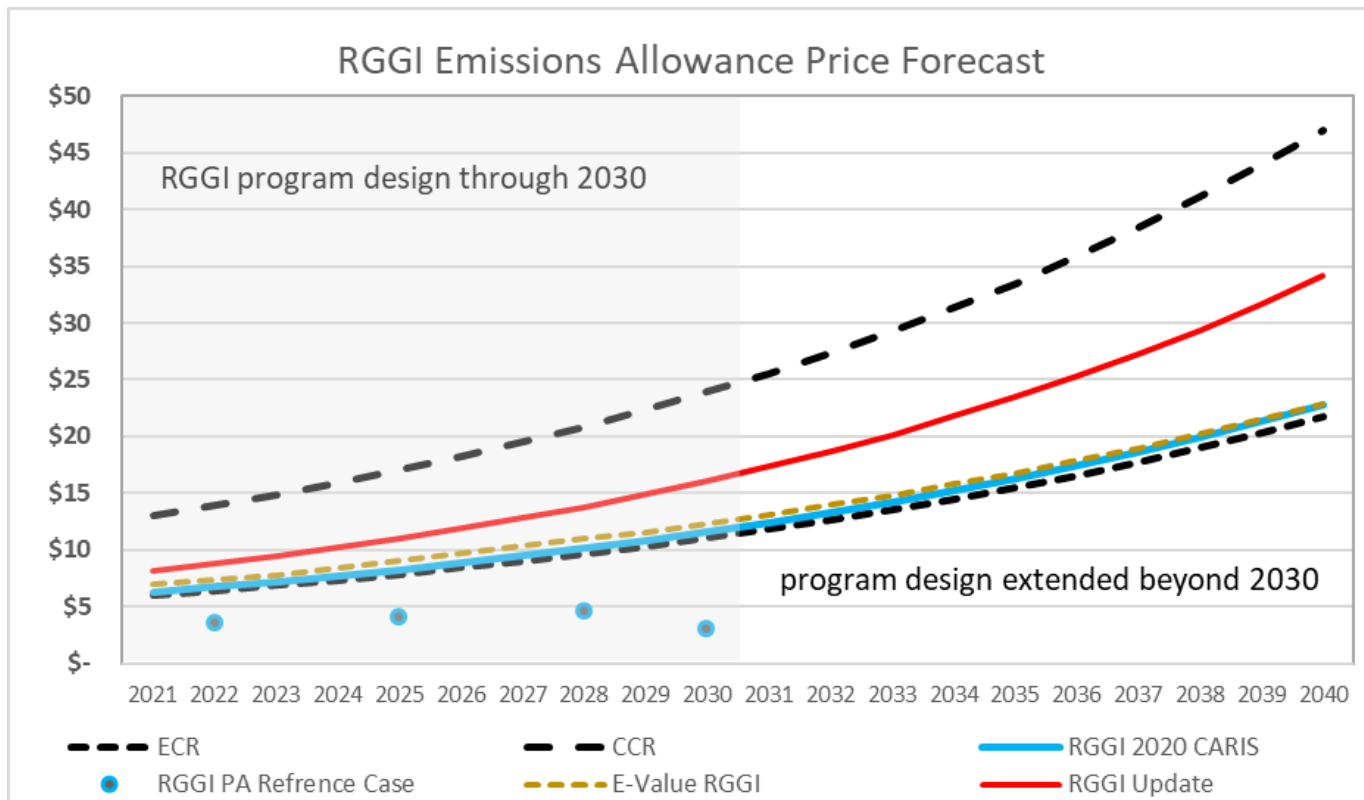
- **New Jersey and Virginia now participating states**

Ongoing processes in Pennsylvania and North Carolina to join in the next few years.

- **RGGI states have announced the third program review will begin later in 2021**

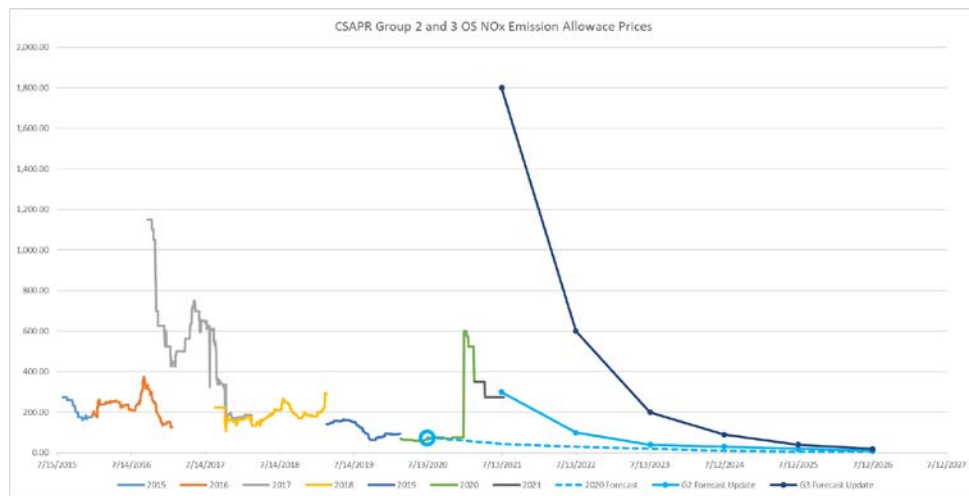
The Regional Greenhouse Gas Initiative (RGGI) participating states are committed to comprehensive, periodic review of their CO<sub>2</sub> budget trading programs to consider, allowance market results, impacts, and design elements. In line with this commitment, the states have initiated the Third Program Review and have published a preliminary Program Review timeline on the RGGI website. <https://www.rggi.org/program-overview-and-design/program-review>

# RGGI CO2 Emissions Price Forecast



# CSAPR Market Price Update

- Historically prices for NO<sub>x</sub> emissions trade under the Cross-State Air Pollution Rule have increased in advance of additional reduction requirements. However, the market prices have declined as emission sources adjusted to the rule
- 8:1 G2:G3 allowance surrender redistribution started July 2021; the, compliance deadline moved from March to July following a control period.
- Total cost of NO<sub>x</sub> emissions in the ozone season is the sum of the annual and ozone season NO<sub>x</sub> allowance costs.



# Emissions Allowance Price Forecasts

Preliminary

	2021 System and Resource Outlook Emission Allowance Price Forecast (\$Nominal/ton)						
	SO <sub>2</sub>	Annual NO <sub>x</sub>	Ozone Season NO <sub>x</sub> Group 2	Ozone Season NO <sub>x</sub> Group 3	Ontario CO <sub>2</sub>	RGGI CO <sub>2</sub>	Mass CO <sub>2</sub>
2020							
2021	\$ 2.00	\$ 3.00	\$ 300.00	\$ 1,800.00	\$ 29.03	\$ 8.10	\$ 8.89
2022	\$ 2.00	\$ 3.00	\$ 100.00	\$ 600.00	\$ 36.29	\$ 8.74	\$ 8.89
2023	\$ 2.00	\$ 3.00	\$ 40.00	\$ 200.00	\$ 47.17	\$ 9.44	\$ 7.90
2024	\$ 2.00	\$ 3.00	\$ 30.00	\$ 90.00	\$ 58.06	\$ 10.19	\$ 7.90
2025	\$ 2.00	\$ 3.00	\$ 20.00	\$ 40.00	\$ 68.95	\$ 10.99	\$ 7.90
2026	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 79.83	\$ 11.86	\$ 7.90
2027	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 90.72	\$ 12.80	\$ 7.90
2028	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 101.60	\$ 13.81	\$ 7.90
2029	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 112.49	\$ 14.90	\$ 7.90
2030	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 16.07	\$ 7.90
2031	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 17.33	\$ 7.90
2032	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 18.70	\$ 7.90
2033	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 20.17	\$ 7.90
2034	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 21.75	\$ 7.90
2035	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 23.46	\$ 7.90
2036	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 25.30	\$ 7.90
2037	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 27.28	\$ 7.90
2038	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 29.41	\$ 7.90
2039	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 31.71	\$ 7.90
2040	\$ 2.00	\$ 3.00	\$ 10.00	\$ 20.00	\$ 123.38	\$ 34.19	\$ 7.90

	2020 CARIS 2 Emission Allowance Price Forecast (\$Nominal/ton)					
	SO <sub>2</sub>	Annual NO <sub>x</sub>	Ozone Season NO <sub>x</sub>	Ontario CO <sub>2</sub>	RGGI CO <sub>2</sub>	Mass CO <sub>2</sub>
2020	\$ 2.00	\$ 3.00	\$ 75.00	\$ 22.23	\$ 5.60	\$ 7.90
2021	\$ 2.00	\$ 3.00	\$ 45.00	\$ 29.64	\$ 6.30	\$ 8.89
2022	\$ 2.00	\$ 3.00	\$ 30.00	\$ 37.04	\$ 6.74	\$ 8.89
2023	\$ 2.00	\$ 3.00	\$ 20.00	\$ 37.04	\$ 7.21	\$ 7.90
2024	\$ 2.00	\$ 3.00	\$ 10.00	\$ 37.04	\$ 7.72	\$ 7.90
2025	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 8.25	\$ 7.90
2026	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 8.84	\$ 7.90
2027	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 9.46	\$ 7.90
2028	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 10.12	\$ 7.90
2029	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 10.83	\$ 7.90
2030	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 11.59	\$ 7.90
2031	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 12.40	\$ 7.90
2032	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 13.27	\$ 7.90
2033	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 14.20	\$ 7.90
2034	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 15.19	\$ 7.90
2035	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 16.25	\$ 7.90
2036	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 17.39	\$ 7.90
2037	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 18.61	\$ 7.90
2038	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 19.91	\$ 7.90
2039	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 21.31	\$ 7.90
2040	\$ 2.00	\$ 3.00	\$ 5.00	\$ 37.04	\$ 22.80	\$ 7.90

# External Area Model: PJM

## ■ Generation

- 5,584 MW of new additions over the study timeframe by fuel:
  - 3,146 MW natural gas
  - 1,473 MW solar
  - 965 MW wind
- 2,257 MW of newly retired units over the study timeframe
  - 2,100 MW coal
  - 132 MW natural gas
  - 25 MW oil

## ■ Load

- Load forecast for PJM can be found [here](#)

# External Area Model: ISO-NE

## ■ Generation

- 147 MW of new additions over the study timeframe
  - all solar
- 225 MW of new retirements over the study timeframe
  - 217 MW of oil and natural gas
  - 8 MW landfill gas

## ■ Load

- Load forecast for ISO-NE can be found [here](#)



# External Area Model: IESO

- **Generation**
  - No new additions
  - 169 MW retirements
    - 131 MW hydro
    - 38 MW biomass
- **Pickering Nuclear retirement moved from 2022 to 2024 for reactors 1 and 4, and from 2024 to 2025 for reactors 5-8**
- **Working w/ IESO for load update**

# Next Steps

# Next Steps

- Continued database development by NYISO
- Next presentation - October TPAS/ESPWG

# Appendix

# 2021 Outlook Data Catalog

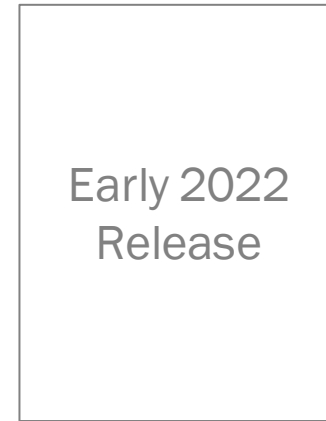
May 20, 2021

Model Benchmark Results

September 22, 2021

System & Resource Outlook Update

Final Reports



September 22, 2021

TBD

Data Posted to ESPWG

ESPWG/TPAS Presentations

# 2019 CARIS Data Catalog

September 11, 2019

[Base Case](#) | [CARIS Preliminary 70 x 30 Scenario Development](#)

October 4, 2019

[Base Case Update](#) | [Scenario Load Forecast Development](#) | [70x30 Scenario ESR Modeling](#)

October 23, 2019

[Load Forecast Details](#) | [70x30 Scenario Assumptions and Calculation](#)

November 18, 2019

[Preliminary Base Case Results](#) | [Preliminary Gas/Load Scenario Results](#)

February 27, 2020

[Review of Assumptions and Resource Mix](#)

March 16, 2020

[Preliminary Scenario Load Constraint Modeling, Nuclear Sensitivity and Additional Results](#)

April 6, 2020

[Preliminary Base Load Constraint Modeling, Nuclear Sensitivity and Additional Results](#)

April 23, 2020

[Constraint Modeling, Energy Storage Sensitivity and Additional Case Results](#)

May 4, 2020

[2019 CARIS Draft Report - 70x30 Section](#)

May 22, 2020

[CARIS Draft Report, Appendix Review & Data Tutorial](#)

June 4, 2020

[Draft CARIS Report and Appendix Review](#)

June 24, 2020 (Business Issues Committee)

[Draft CARIS Report and Appendix Review](#)

July 1, 2020 (Management Committee)

[Draft CARIS Report and Appendix Review](#)

August 13, 2020 (Public Information Session)

[Economic Planning Overview & CARIS Final Report](#)

Final Reports



March 16, 2020

[Monthly Case Energy Output MWh - Updated](#)  
[70x30 Build Out Scenario Load](#)

April 6, 2020

[Case Output By Type and By Zone](#)  
[Monthly Case Type Energy MWh](#)  
[70x30 RE Buildout Base Load](#)  
[Preliminary 70x30 Scenario Pocket Map](#)

April 23, 2020

[Case Output By Type and By Zone](#)  
[Case Output By Type and By Pocket](#)  
[Monthly Case Type Energy MWh](#)  
[Monthly Average Zonal LBMP](#)  
[Hourly Information By Pocket](#)

May 22, 2020

[Hourly Wind Solar Curtailments By Pocket](#)  
[Hourly Zonal Net Load](#)  
[Fuel Forecast](#)  
[Base Case Hourly Zonal LBMP](#)

Data Posted to ESPWG

Presentations Provided at ESPWG

# 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

