

# Economic Planning Process

## 2019 CARIS Phase 1 Report

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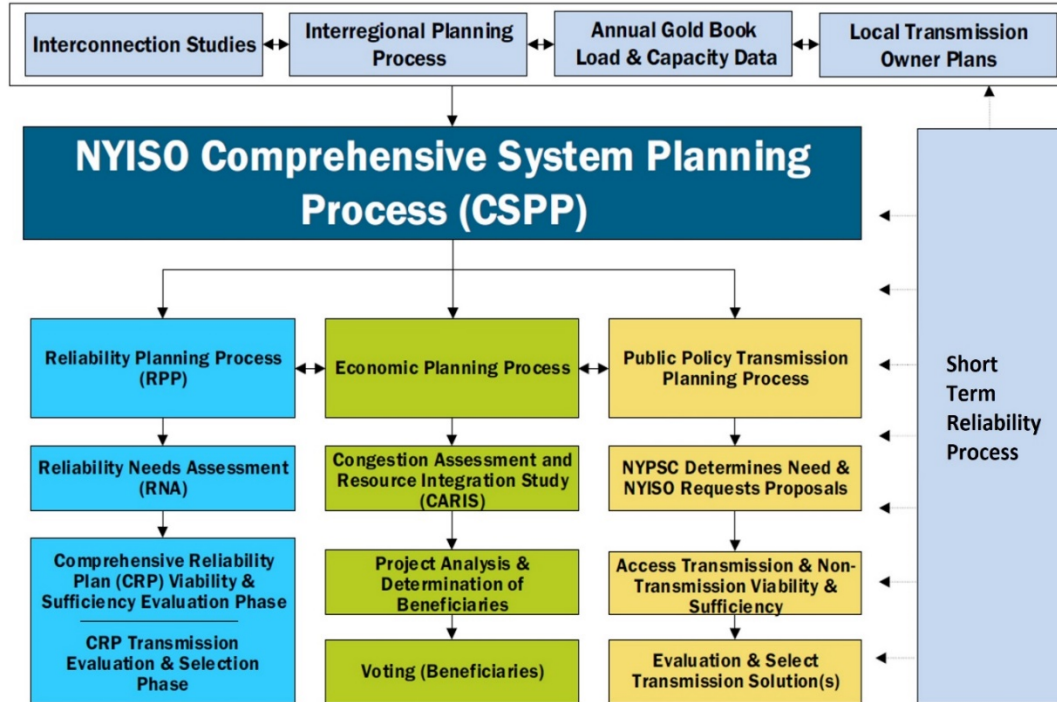
**NYSRC – Executive Committee**

September 11<sup>th</sup>, 2020

# Agenda

- **NYISO Economic Planning Process Overview**
- **CARIS Process Overview**
- **2019 CARIS Phase 1**
  - Base Case
  - “70x30” Scenario

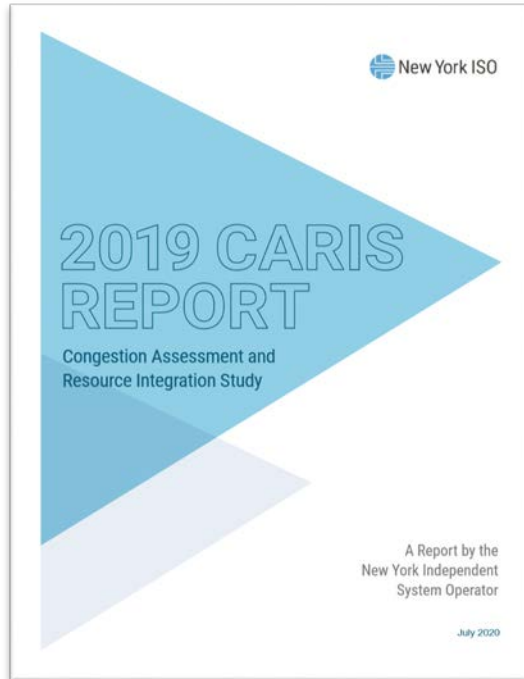
# Economic Planning Process



# What is CARIS?

- **Main Component of the Economic Planning Process**
  - Congestion Assessment and Resource Integration Study
- **In 2007, the Federal Energy Regulatory Commission (FERC) mandated via Order 890 that all ISO/RTO's complete an economic planning study**
- **NYISO OATT Attachment Y Section 31.3 establishes the CARIS to fulfill Order 890 requirements**

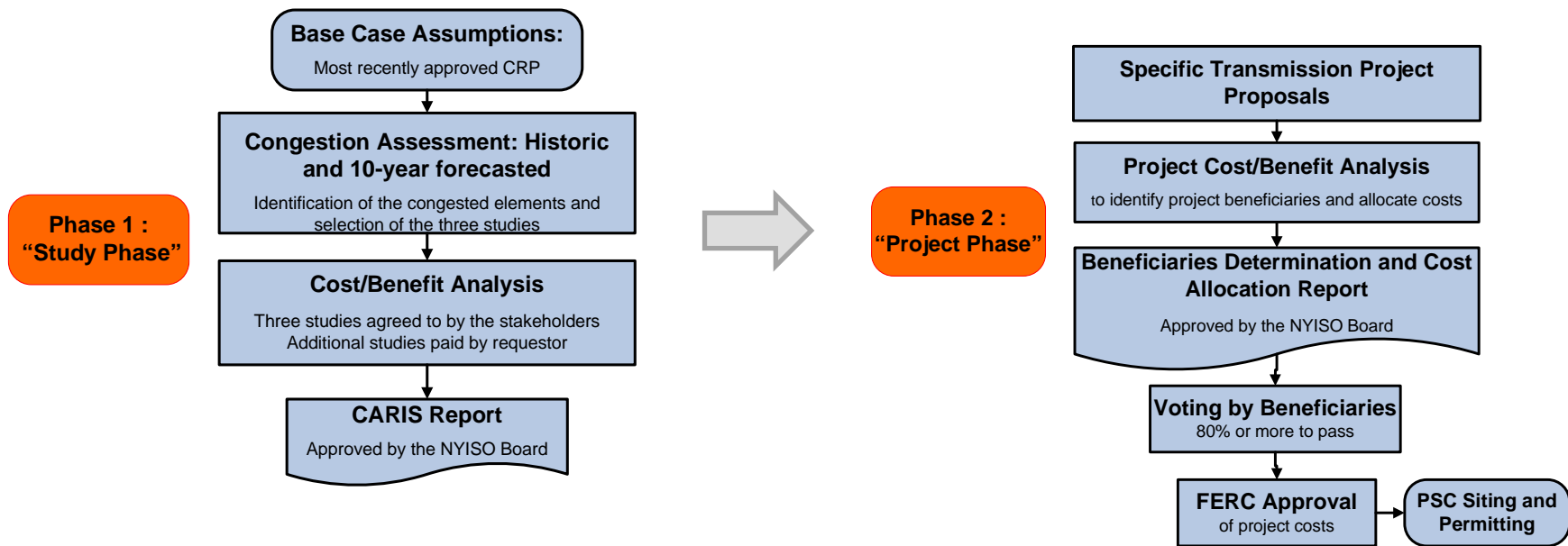
# 2019 CARIS Phase 1 Report Links



*(Click Report to Follow Hyperlink)*

# CARIS Process Overview

# CARIS Process



# CARIS Phase 1 Objectives

- **Identify and report transmission congestion**
  - 5-year “historic”
  - 10-year “projected”
- **Provide information to stakeholders, developers & other interested parties**
  - Select top congested transmission elements
  - Project benefits of relieving the most congested elements or groupings using generic solutions
  - Identify factors that produce or increase congestion



# CARIS Phase 2 Objectives

- **Evaluate specific proposed projects for potential cost allocation and cost recovery through the NYISO tariff**
  - New York Control Area **production costs savings** must exceed project costs over first ten years of operation
  - Sum of LBMP savings (for zones with savings) over first ten years of operation must exceed project costs
  - Qualified transmission projects must receive 80% vote of the identified beneficiaries
- **Perform additional CARIS studies for all interested parties and for all solution types**

# 2019 CARIS Phase 1 Base Case

# Base Case Development

- All assumptions developed pursuant to CARIS procedures and in collaboration with stakeholders at ESPWG
- 10-Year Study Period (2019-2028)
- Based on 2019-2028 Comprehensive Reliability Plan (CRP)
- 2019 Gold Book Load and Capacity Forecasts
- Resource changes pursuant to base case inclusion screening rules
- Assumption lockdown date of August 1, 2019

# Base Case Key Assumptions

- **Fuel & Emission Price Forecasts as of 8/1/2019**
- **2019-2028 CRP transmission model with actual operating limits**
- **Transmission upgrades**
  - Empire State Line Project /Western New York Public Policy project (2022)
  - NYPA rebuild of Moses-Adirondack 230 kV circuits (2023)
  - AC Transmission Public Policy projects Segments A and B (2024)
  - Expanding monitoring and securing of lower voltage system consistent with NYISO operations
- **Resource Assumptions**
  - Cricket Valley Energy center modeled in-service (2020)
  - Indian Point 2 and 3 are retired (2020/2021)
  - Other generation projects that met inclusion rules

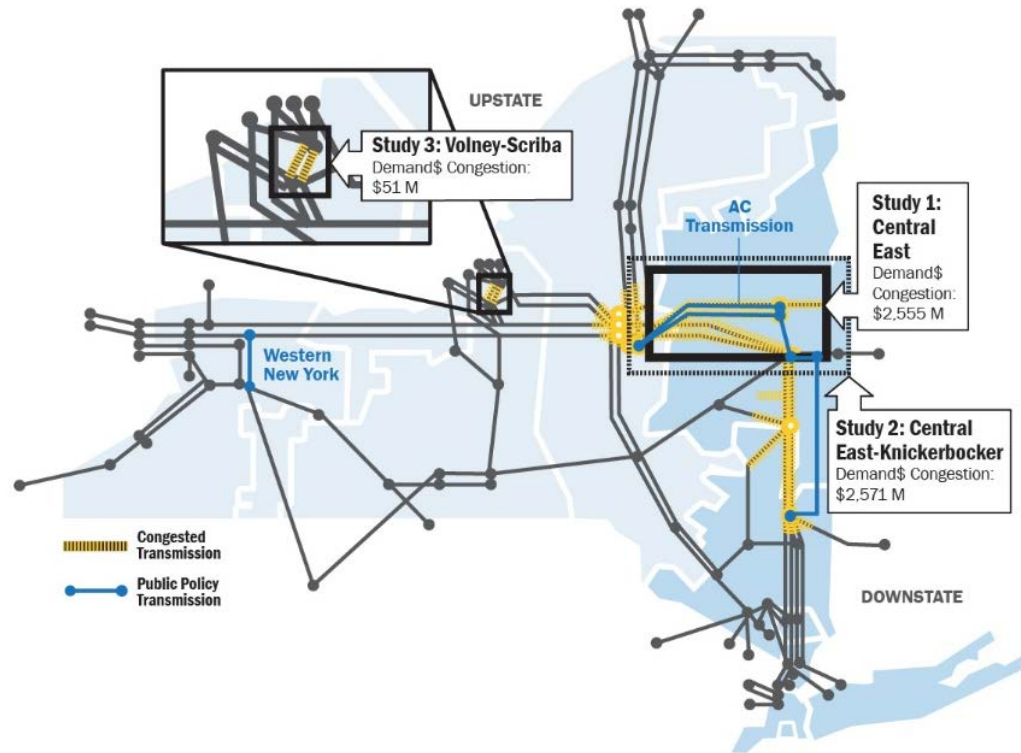
# Selection of Studies

- **Rank and group elements based on five-year historic and 10-year projected Demand\$ Congestion**
  - Historic Demand\$ Congestion data drawn from NYISO's posted congestion reports
  - Forecasted Demand\$ Congestion estimated using General Electric's Multi-Area Production Simulation (MAPS) software
- **Select three study areas based on potential ten-year projected production cost savings**

# Historic and Projected Demand\$ Congestion (\$M)

| Constraint Group (Nominal \$M) | Historic |      |      |      |      | Projected |      |      |      |      |      |      |      |      |      |
|--------------------------------|----------|------|------|------|------|-----------|------|------|------|------|------|------|------|------|------|
|                                | 2014     | 2015 | 2016 | 2017 | 2018 | 2019      | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| CENTRAL EAST                   | 1,136    | 915  | 641  | 598  | 540  | 668       | 508  | 521  | 411  | 183  | 188  | 84   | 84   | 114  | 167  |
| DUNWOODIE TO LONG ISLAND       | 155      | 138  | 164  | 88   | 133  | 41        | 36   | 28   | 25   | 25   | 31   | 25   | 26   | 25   | 28   |
| LEEDS PLEASANT VALLEY          | 42       | 111  | 63   | 101  | 9    | 2         | 1    | 2    | 3    | 3    | -    | -    | -    | -    | -    |
| EDIC MARCY                     | 7        | 0    | 32   | 125  | 107  | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| DUNWOODIE MOTTHAVEN            | 40       | 2    | 2    | 30   | 65   | 8         | 9    | 10   | 7    | 5    | 14   | 13   | 14   | 18   | 15   |
| CHESTR SHOEMAKR                | -        | -    | -    | -    | -    | 9         | 34   | 79   | 68   | 52   | -    | -    | -    | -    | -    |
| GREENWOOD                      | 13       | 19   | 31   | 18   | 62   | 12        | 10   | 6    | 6    | 6    | 8    | 8    | 10   | 11   | 10   |
| PACKARD HUNTLEY                | 7        | 41   | 54   | 30   | 41   | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| PACKARD 115 NIAGBLVD 115       | -        | -    | -    | -    | -    | 85        | 53   | 29   | 0    | 0    | 0    | -    | -    | -    | 0    |
| NIAGARA PACKARD                | 18       | 22   | 44   | 12   | 9    | 19        | 16   | 10   | 0    | -    | 0    | -    | -    | -    | -    |
| EGRDNCTY 138 VALLYSTR 138 1    | 20       | 18   | 8    | 17   | 20   | 6         | 5    | 3    | 2    | 5    | 4    | 5    | 4    | 5    | 4    |
| NEW SCOTLAND LEEDS             | 9        | 32   | 13   | 18   | 5    | 0         | -    | -    | 0    | 0    | -    | -    | -    | -    | -    |
| N.WAV115 LOUNS 115             | -        | -    | -    | -    | -    | 2         | 2    | 3    | 4    | 4    | 13   | 10   | 13   | 12   | 11   |
| VOLNEY SCRIBA                  | 0        | 1    | 0    | 1    | 1    | 6         | 7    | 6    | 7    | 7    | 6    | 5    | 7    | 9    | 9    |
| NORTHPORT PILGRIM              | -        | -    | -    | -    | -    | 6         | 4    | 9    | 10   | 8    | 5    | 4    | 5    | 4    | 4    |

# 2019 CARIS Study Groupings



# Project Benefits

- **Implement transmission, generation, demand response and energy efficiency generic solutions**
  - Feasibility of each solution is not evaluated
- **Estimate the potential benefits associated with relieving congestion for each solution type using GE-MAPS production cost simulation software**
- **Per the NYISO's Tariff, benefits are limited to NYCA-wide production cost savings for the purpose of determining the eligibility of a project for cost allocation and recovery**



# Generic Solutions

| <b>Generic Solutions</b> |   |   |                                    |
|--------------------------|---|---|------------------------------------|
| <b>Studies</b>           | <b>Central East (Study 1)</b>                         | <b>Central East-Knickerbocker (Study 2)</b>           | <b>Volney-Scriba (Study 3)</b>     |
| <b>TRANSMISSION</b>      |   |   |                                    |
| <b>Transmission Path</b> | Edic-New Scotland                                     | Edic-New Scotland-Knickerbocker                       | Volney-Scriba                      |
| <b>Voltage</b>           | 345 kV  | 345 kV  | 345 kV                             |
| <b>Miles</b>             | 85  | 100   | 10                                 |
| <b>GENERATION</b>        |   |   |                                    |
| <b>Unit Siting</b>       | New Scotland  | Pleasant Valley                                       | Volney                             |
| <b>Blocks</b>            | 340 MW  | 340 MW  | 340 MW                             |
| <b>DEMAND RESPONSE</b>   |   |   |                                    |
| <b>Blocks</b>            | Zone F : 100 MW<br>Zone G : 100 MW<br>Zone J : 200 MW | Zone F : 100 MW<br>Zone G : 100 MW<br>Zone J : 200 MW | Zone F : 100 MW<br>Zone G : 100 MW |
| <b>ENERGY EFFICIENCY</b> |   |   |                                    |
| <b>Blocks</b>            | Zone F : 100 MW<br>Zone G : 100 MW<br>Zone J : 200 MW | Zone F : 100 MW<br>Zone G : 100 MW<br>Zone J : 200 MW | Zone F : 100 MW<br>Zone G : 100 MW |

# Generic Solution Cost Estimates

- **Low, mid, and high estimates for each solution type**
- **Cost Estimate Sources**
  - **Transmission:** NYSDPS's AC Transmission proceeding and other third-party sources
  - **Generation:** 2016 NYISO Demand Curve Reset study for combined cycle unit
  - **Energy Efficiency:** PSC Comprehensive Energy Efficiency Initiative (Case 18-M-0084)
  - **Demand Response:** PSC Proceeding on Motion of the Commission to Develop Dynamic Load Management Programs (Case 14-E-0423)

# Ten-Year Production Cost Savings for CARIS Studies (\$2019M)

| Study                                      | Ten-Year Production Cost Savings (\$2019M) |                     |                          |                            |
|--|--|---------------------|--------------------------|----------------------------|
|  | Transmission Solution                      | Generation Solution | Demand Response Solution | Energy Efficiency Solution |
| <b>Study 1:</b> Central East               | 115  | 103                 | 17                       | 1,061                      |
| <b>Study 2:</b> Central East-Knickerbocker | 117  | 110                 | 17                       | 1,061                      |
| <b>Study 3:</b> Volney-Scriba              | 22   | 137                 | 9                        | 530                        |

# Benefit/Cost Analysis

- **Benefit/Cost ratios are reported for each solution, based upon ten years of projected NYCA-wide Production Cost Savings (CARIS primary metric) compared to the estimated ten years of project costs**
  - 7.08% Discount Rate
  - 16% Capital Recovery Factor

# Generic Solution Benefit/Cost Results

| Study                               | 2019-2023 |      |      | 2024-2028 |      |      |
|-------------------------------------|-----------|------|------|-----------|------|------|
|                                     | Low       | Mid  | High | Low       | Mid  | High |
| <b>Transmission Solution</b>        |           |      |      |           |      |      |
| Study 1: Central East               | 0.37      | 0.25 | 0.20 | 0.18      | 0.12 | 0.09 |
| Study 2: Central East-Knickerbocker | 0.37      | 0.25 | 0.20 | 0.16      | 0.11 | 0.09 |
| Study 3: Volney-Scriba              | 0.44      | 0.30 | 0.24 | 0.52      | 0.35 | 0.28 |
| <b>Generaton Solution</b>           |           |      |      |           |      |      |
| Study 1: Central East               | 0.15      | 0.11 | 0.09 | 0.26      | 0.20 | 0.16 |
| Study 2: Central East-Knickerbocker | 0.15      | 0.11 | 0.09 | 0.24      | 0.18 | 0.15 |
| Study 3: Volney-Scriba              | 0.20      | 0.15 | 0.12 | 0.44      | 0.33 | 0.26 |
| <b>Demand Response Solution</b>     |           |      |      |           |      |      |
| Study 1: Central East               | 0.08      | 0.06 | 0.05 | 0.11      | 0.08 | 0.06 |
| Study 2: Central East-Knickerbocker | 0.08      | 0.06 | 0.05 | 0.11      | 0.08 | 0.06 |
| Study 3: Volney-Scriba              | 0.17      | 0.13 | 0.11 | 0.25      | 0.19 | 0.15 |
| <b>Energy Efficiency Solution</b>   |           |      |      |           |      |      |
| Study 1: Central East               | 0.32      | 0.24 | 0.19 | 0.43      | 0.32 | 0.26 |
| Study 2: Central East-Knickerbocker | 0.32      | 0.24 | 0.19 | 0.43      | 0.32 | 0.26 |
| Study 3: Volney-Scriba              | 0.41      | 0.31 | 0.25 | 0.55      | 0.41 | 0.33 |

# Additional Benefit Metrics

- **Additional benefit metrics report the change between the generic solution-case value and the base case value over the ten-year study period**
  - For 2019 CARIS Phase 1, these include changes to generator payments, load payments, TCC payments, electric loss costs, ICAP costs and emissions
  - For information only

# Additional Benefit Metrics

10-Year NYCA Change\*

| Study                               | Solution                        | LOAD PAYMENT | NYCA LOAD PAYMENT | EXPORT PAYMENT | GENERATOR PAYMENT | NYCA GENERATOR PAYMENT | IMPORT PAYMENT | TCC PAYMENT | LOSSES COSTS |
|-------------------------------------|---------------------------------|--------------|-------------------|----------------|-------------------|------------------------|----------------|-------------|--------------|
| <b>TRANSMISSION SOLUTIONS</b>       |                                 |              |                   |                |                   |                        |                |             |              |
| Study 1: Central East               | Edic-New Scotland               | \$215        | \$112             | \$103          | \$233             | \$214                  | \$20           | (\$212)     | (\$25)       |
| Study 2: Central East-Knickerbocker | Edic-New Scotland-Knickerbocker | \$264        | \$141             | \$123          | \$271             | \$251                  | \$20           | (\$206)     | (\$16)       |
| Study 3: Volney Scriba              | Volney-Scriba                   | (\$54)       | (\$72)            | \$18           | \$384             | \$398                  | (\$15)         | (\$432)     | \$13         |
| <b>GENERATION SOLUTIONS</b>         |                                 |              |                   |                |                   |                        |                |             |              |
| Study 1: Central East               | New Scotland                    | (\$117)      | (\$176)           | \$59           | (\$88)            | (\$11)                 | (\$77)         | (\$26)      | \$17         |
| Study 2: Central East-Knickerbocker | Pleasant Valley                 | (\$109)      | (\$163)           | \$55           | (\$61)            | \$13                   | (\$74)         | (\$38)      | (\$17)       |
| Study 3: Volney Scriba              | Volney                          | (\$228)      | (\$313)           | \$85           | \$122             | \$234                  | (\$111)        | (\$319)     | \$55         |
| <b>DEMAND RESPONSE SOLUTIONS</b>    |                                 |              |                   |                |                   |                        |                |             |              |
| Study 1: Central East               | F(100) G(100) J(200)            | (\$69)       | (\$70)            | \$1            | (\$51)            | (\$47)                 | (\$4)          | (\$15)      | (\$3)        |
| Study 2: Central East-Knickerbocker | F(100) G(100) J(200)            | (\$69)       | (\$70)            | \$1            | (\$51)            | (\$47)                 | (\$4)          | (\$15)      | (\$3)        |
| Study 3: Volney Scriba              | F(100) G(100)                   | (\$29)       | (\$30)            | \$1            | (\$23)            | (\$21)                 | (\$2)          | (\$5)       | (\$1)        |
| <b>ENERGY EFFICIENCY SOLUTIONS</b>  |                                 |              |                   |                |                   |                        |                |             |              |
| Study 1: Central East               | F(100) G(100) J(200)            | (\$1,316)    | (\$1,497)         | \$182          | (\$1,165)         | (\$1,002)              | (\$163)        | (\$99)      | (\$64)       |
| Study 2: Central East-Knickerbocker | F(100) G(100) J(200)            | (\$1,316)    | (\$1,497)         | \$182          | (\$1,165)         | (\$1,002)              | (\$163)        | (\$99)      | (\$64)       |
| Study 3: Volney Scriba              | F(100) G(100)                   | (\$612)      | (\$715)           | \$103          | (\$562)           | (\$475)                | (\$87)         | (\$43)      | (\$12)       |

\*Values in red indicate a reduction or savings

# Additional Benefit Metrics

10-Year NYCA Emissions Change\*

| Study                                      | Solution                        | SO <sub>2</sub> |                | CO <sub>2</sub> |                | NO <sub>x</sub> |                |
|--|---------------------------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|
|  |                                 | Tons            | Cost (\$2019M) | 1000 Tons       | Cost (\$2019M) | Tons            | Cost (\$2019M) |
| <b>TRANSMISSION SOLUTIONS</b>              |                                 |                 |                |                 |                |                 |                |
| <b>Study 1:</b> Central East               | Edic-New Scotland               | 2,071           | \$0            | 455             | \$3            | 381             | (\$0)          |
| <b>Study 2:</b> Central East-Knickerbocker | Edic-New Scotland-Knickerbocker | 2,189           | \$0            | 650             | \$4            | 465             | (\$0)          |
| <b>Study 3:</b> Volney Scriba              | Volney-Scriba                   | 203             | \$0            | 163             | \$1            | (387)           | (\$0)          |
| <b>GENERATION SOLUTIONS</b>                |                                 |                 |                |                 |                |                 |                |
| <b>Study 1:</b> Central East               | New Scotland                    | 615             | \$0            | 1,319           | \$8            | 738             | \$0            |
| <b>Study 2:</b> Central East-Knickerbocker | Pleasant Valley                 | 563             | \$0            | 1,149           | \$7            | 462             | \$0            |
| <b>Study 3:</b> Volney Scriba              | Volney                          | (303)           | (\$0)          | 1,718           | \$10           | 632             | (\$0)          |
| <b>DEMAND RESPONSE SOLUTIONS</b>           |                                 |                 |                |                 |                |                 |                |
| <b>Study 1:</b> Central East               | F(100) G(100) J(200)            | 6               | \$0            | (173)           | (\$1)          | (221)           | (\$0)          |
| <b>Study 2:</b> Central East-Knickerbocker | F(100) G(100) J(200)            | 6               | \$0            | (173)           | (\$1)          | (221)           | (\$0)          |
| <b>Study 3:</b> Volney Scriba              | F(100) G(100)                   | (52)            | (\$0)          | (77)            | (\$0)          | (66)            | (\$0)          |
| <b>ENERGY EFFICIENCY SOLUTIONS</b>         |                                 |                 |                |                 |                |                 |                |
| <b>Study 1:</b> Central East               | F(100) G(100) J(200)            | (153)           | (\$0)          | (11,177)        | (\$61)         | (4,043)         | (\$0)          |
| <b>Study 2:</b> Central East-Knickerbocker | F(100) G(100) J(200)            | (153)           | (\$0)          | (11,177)        | (\$61)         | (4,043)         | (\$0)          |
| <b>Study 3:</b> Volney Scriba              | F(100) G(100)                   | (14)            | (\$0)          | (5,234)         | (\$29)         | (1,567)         | (\$0)          |

\*Values in red indicate a reduction or savings



# Additional Benefit Metrics

## Capacity Market Impacts

| Study                               | Solution          | MW Impact (MW) |     |    |      |
|-------------------------------------|-------------------|----------------|-----|----|------|
|                                     |                   | J              | G-J | K  | NYCA |
| Study 1: Central East               | Transmission      | 0              | 0   | 0  | 0    |
|                                     | Generation        | 54             | 81  | 29 | 220  |
|                                     | Energy Efficiency | 142            | 212 | 77 | 574  |
|                                     | Demand Response   | 122            | 182 | 66 | 493  |
| Study 2: Central East-Knickerbocker | Transmission      | 0              | 0   | 0  | 0    |
|                                     | Generation        | 54             | 81  | 29 | 220  |
|                                     | Energy Efficiency | 142            | 212 | 77 | 574  |
|                                     | Demand Response   | 122            | 182 | 66 | 493  |
| Study 3: Volney Scriba              | Transmission      | 0              | 0   | 0  | 0    |
|                                     | Generation        | 54             | 81  | 29 | 220  |
|                                     | Energy Efficiency | 36             | 54  | 19 | 145  |
|                                     | Demand Response   | 30             | 44  | 16 | 120  |

| Study                               | Solution          | ICAP Saving (\$2019M) |       |
|-------------------------------------|-------------------|-----------------------|-------|
|                                     |                   | V1                    | V2    |
| Study 1: Central East               | Transmission      | 0                     | 0     |
|                                     | Generation        | 66                    | 524   |
|                                     | Energy Efficiency | 173                   | 1,345 |
|                                     | Demand Response   | 149                   | 1,158 |
| Study 2: Central East-Knickerbocker | Transmission      | 0                     | 0     |
|                                     | Generation        | 66                    | 524   |
|                                     | Energy Efficiency | 173                   | 1,345 |
|                                     | Demand Response   | 149                   | 1,158 |
| Study 3: Volney Scriba              | Transmission      | 0                     | 0     |
|                                     | Generation        | 66                    | 524   |
|                                     | Energy Efficiency | 44                    | 347   |
|                                     | Demand Response   | 36                    | 288   |

# 2019 CARIS 1 Scenarios

| Scenario                  | Description   |
|---------------------------|---|
| High Load Forecast        | Higher penetration of electric vehicles and electric heat pumps |
| Low Load Forecast         | Higher energy efficiency levels achieved                        |
| Higher Natural Gas Prices | Derived from 2019 EIA Annual Energy Outlook High Forecast       |
| Lower Natural Gas Prices  | Derived from 2019 EIA Annual Energy Outlook Low Forecast        |

# Key Findings: Base Case

- Generic solutions offered a measure of congestion relief and production cost savings
- Transmission projects studied did not result in Benefit/Cost ratios in excess of 1.0, based on generic cost estimates and production cost savings only
- With the inclusion of the AC Transmission Public Policy Projects starting in year 2024, congestion levels decreased substantially compared with prior study years
- Central East is still, however, the most congested transmission corridor over the ten-year study period (2019-2028) because of high congestion during the five-year period preceding the AC Transmission projects (2019-2023)

# 2019 CARIS Phase 1 “70x30” Scenario

# 70x30 Scenario Description

- **The Climate Leadership and Community Protection Act (CLCPA) mandates that 70% of New York’s end-use energy consumption be served by renewable energy by 2030 (“70x30”)**
  - Distributed solar goal of 6,000 MW by 2025
  - Energy storage goal of 3,000 MW by 2030
  - Offshore wind goal of 9,000 MW by 2035
- **The 70x30 Scenario is not intended as a roadmap for compliance with the mandates of the CLCPA, but does provide insights into renewable generation pockets that are likely to form due to limited transmission capability in the areas where wind and solar resources are likely to be constructed**

# 70x30 Scenario Description

- The 70x30 Scenario models these targets through 2030 for two potential load forecasts and identifies system constraints, renewable generation curtailments, and other potential operational limitations
- Renewable capacity build-out assumptions were developed in collaboration with stakeholders utilizing the NYISO interconnection queue as a reference point

# 70x30 Scenario Key Assumptions

- All coal plants retired by 2021
- “Peaker” rule replacements corresponding to local Compensatory MW additions identified in 2019-2028 CRP
- Renewable resource modeling
  - Includes hydro, utility-scale solar, behind-the-meter solar, land-based wind, and offshore wind total capacity
  - Additional HQ import into NYC via HVDC
- Approximately 1,000 new transmission contingencies were added as identified in the MAPS/TARA contingency screening process

# Key Findings: 70x30 Scenario

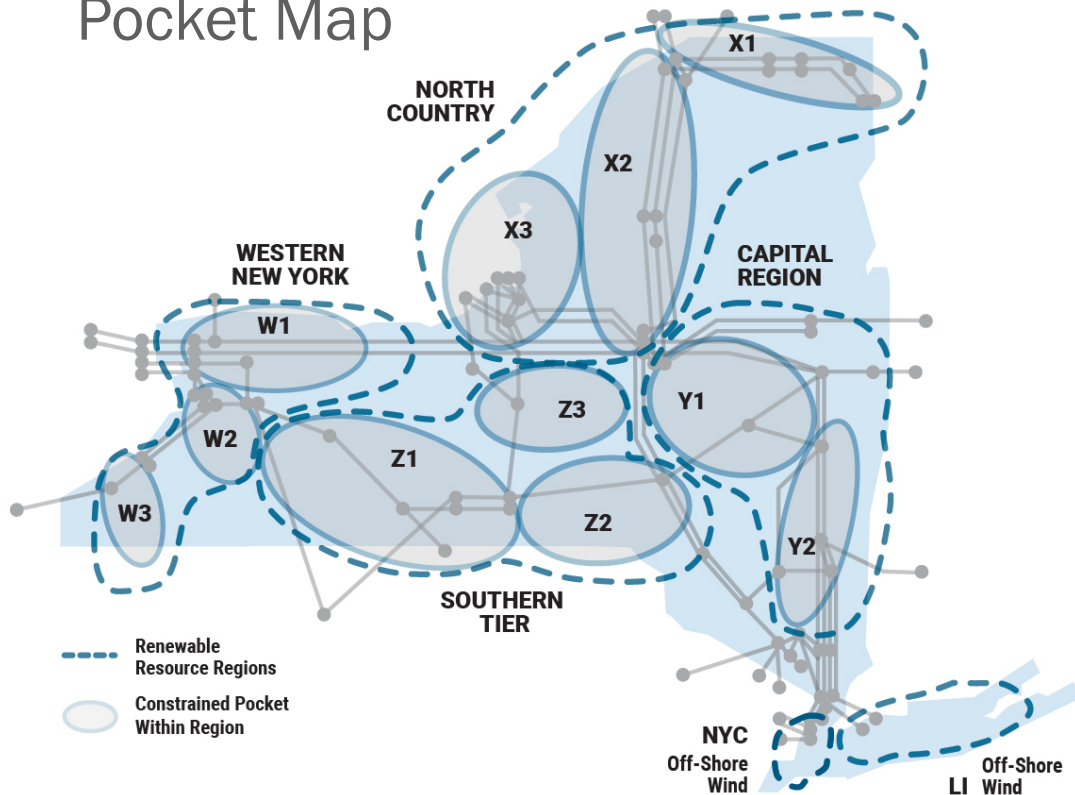
## Constrained Pockets

- **Renewable generation pockets are likely to develop throughout the state as the existing transmission grid would be overwhelmed by the significant renewable capacity additions**
- **In each of the five major pockets observed, renewable generation is curtailed due to the lack of sufficient bulk and local transmission capability to deliver the power**
  - 11% of annual renewable energy production curtailed
- **Additional transmission expansion, at both bulk and local levels, will be necessary to efficiently deliver renewable power to New York consumers**



# Key Findings: 70x30 Scenario

## Pocket Map



- **Western New York (Pocket W)**
  - Mainly 115 kV in Buffalo and Rochester
  - Up to 18% Solar Curtailment
- **North Country (Pocket X)**
  - 115 kV & 230 kV in Northern NY
  - Up to 63% Wind Curtailment
- **Capital Region (Pocket Y)**
  - Mainly 115 kV in the Capital Region
  - Up to 54% Solar Curtailment
- **Southern Tier (Pocket Z)**
  - Mainly 115 kV in the Finger Lakes
  - Up to 37% Wind Curtailment
- **Offshore Wind**
  - New York City and Long Island
  - Up to 9% OSW Curtailment

# Key Findings: 70x30 Scenario

## Load Impacts

- **Two scenarios with varying energy forecasts and associated renewable build-outs were simulated**
- **The level of renewable generation investment necessary to achieve 70% renewable end-use energy by 2030 could vary greatly as energy efficiency and electrification adoption unfolds**
  - Base Load - 37,600 MW of renewable resources
  - Scenario Load - 31,000 MW of renewable resources
- **In both scenarios significant transmission constraints exist when adding the necessary volume of renewable generation to achieve the 70% target**

# Key Findings: 70x30 Scenario

## Fossil Fleet Impacts

- **The large amount of renewable energy additions to achieve the CLCPA goals would change the operations of the fossil fuel fleet**
  - Decrease in annual energy output of the fossil fleet
  - Flexible generators are dispatched more often while inflexible units are dispatched less or not at all
- **Sensitivity analysis indicates that if the statewide nuclear generation fleet retired, emissions from the fossil fuel fleet would likely increase; the degree of that impact is dependent on the timing of nuclear retirements and the pace of renewable resource additions**

# Key Findings: 70x30 Scenario

## Energy Storage

- **Sensitivity analysis performed including energy storage resources**
- **Results indicate that energy storage could decrease congestion, and when dispatched effectively, would help to increase the utilization of the renewable generation, particularly the solar generation tested**
- **The targeted analysis showed that energy storage likely cannot by itself completely resolve the transmission limitations in the pockets analyzed**

# 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

