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Independent System Operator

# Long Island Offshore Wind Export PPTN: Independent Cost Estimates, Scenario Results, Avoided Cost Methodology


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# Agenda

- Metrics Overview
- Independent Capital Cost Estimates
- Barrett – Valley Stream Scenario
- Avoided Cost Methodology
- Results Follow-Up
- Next Steps

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# Evaluation Metrics Overview



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# Long Island Offshore Wind Export PPTN

- **PSC Order for Public Policy Transmission Need (PPTN):**
  - CLCPA constitutes a Public Policy Requirement driving the need for transmission to increase the export capability from Long Island to the rest of New York State to ensure full output of at least 3,000 MW of offshore wind interconnected to Long Island
  - Add at least one bulk transmission intertie cable connecting between Long Island and the rest of the New York Control Area and additional transmission expansion or upgrades, as necessary
- **To pass the Viability & Sufficiency Assessment, each project must provide full output of at least 3,000 MW of offshore wind connected to Long Island under line outage conditions**
  - Also, assuming 6,000 MW of offshore wind connected to New York City to achieve the CLCPA goal of 9,000 MW by 2035

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# Evaluation Metrics

- Transfer Analysis & Cost per MW
- Expandability – Electrical & Physical
- Operability
- Production Cost
- Performance
- Capacity Benefits
- Capital Cost Estimate
- Voluntary Cost Cap
- Property Rights & Routing
- Potential Construction Delays
- Other Considerations: Metrics prescribed in PSC Order, Interconnection Studies, Consequences for Other Regions, Impact on Wholesale Electricity Markets, Integration with Local Transmission Owner Plans

*Results for metrics in red will be discussed today

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# Independent Capital Cost Estimates



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# Independent Capital Cost

- NYISO's consultant, SECO, developed independent cost estimates for each proposed project, considering required material and labor cost by equipment, engineering and design work, permitting, site acquisition, procurement and construction work, and commissioning
- Application of a consistent estimation approach allows for an impartial comparison of the potential costs to build diverse transmission projects
- Primary cost drivers:
  - Terrestrial and submarine cable length
  - HVDC converter systems and PARs
  - Scope of the project (i.e., number/size of transmission facilities)

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# Independent Capital Cost Assumptions

- **Independent cost estimates were applied uniformly to all projects and based:**
  - proposed project design,
  - good utility practice,
  - overnight capital costs using 2022 pricing, and
  - 20% contingency on overnight capital costs.
- **Accuracy range as per AACE Class 4 Estimating Practices (-15% to -30%) and (+20% to +50%)**

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# Independent Capital Cost Assumptions

- Pricing for major equipment (*e.g.*, transformers, circuit breakers, GIS equipment, transmission cables, VSC HVDC Systems) is based on budgetary quotes from equipment suppliers
- Preliminary NUF costs may be updated as System Impact Study results become available during the evaluation
- Detailed project specific assumptions are listed in the detailed cost estimate sheets included with meeting materials

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# Independent Capital Cost Estimates

| Project | Independent Estimate of Capital Costs ($M) |
|---|---|
| T035 - LSPower | $5,998 |
| T036 - NextEra Core 1 | $4,367 |
| T037 - NextEra Core 2 | $4,886 |
| T038 - NextEra Core 3 | $5,461 |
| T039 - NextEra Core 4 | $5,729 |
| T040 - NextEra Core 5 | $4,695 |
| T041 - NextEra Core 6 | $5,585 |
| T042 - NextEra Core 7 | $14,881 |
| T043 - NextEra Enh 1 | $10,051 |
| T044 - NextEra Enh 2 | $17,466 |
| T047 - Propel Base 1 | $2,558 |
| T048 - Propel Base 2 | $2,177 |
| T049 - Propel Base 3 | $2,937 |
| T051 - Propel Alt 5 | $3,332 |
| T052 - Propel Alt 6 | $4,728 |
| T053 - Propel Alt 7 | $5,570 |

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# Barrett – Valley Stream Scenario Results

# Barrett-Valley Stream Scenario

- Empire Wind II is an up to 1,350 MW NYSERDA-awarded OSW project connecting to Barrett – Valley Stream 138 kV lines
- Barrett–Valley Stream, Barrett–Freeport, and East Garden City–Valley Stream 138 kV paths were relaxed in the Baseline and Policy cases under the assumption that the OSW developers would address these constraints as part of their interconnection request
  - Empire Wind II accepted cost for local SUFs and rejected SDUs in CY21, leaving the constraints unresolved
- While proposed transmission projects were not required to address these constraints to satisfy the sufficiency criteria under the Viability and Sufficient Assessment, the NYISO noted that certain constraints could be considered in the evaluation
- A scenario case was developed based on the Policy Case that models with these constraints. The analysis focus on production cost & performance, operability, and avoided cost

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# Production Cost & Performance Results

# Production Cost Savings

| | | | Policy Case Estimated 20-Year Results | Updated Barrett-Valley Stream Policy Case Results Estimated 20-Year Results | | | | |
|---|---|---|---|---|---|---|---|---|
| Project Code | Project Developer | Project Name | Production Cost Savings (2022 $M) | Production Cost Savings (2022 $M) | LI OSW Curtailment Reduction (TWh)* | LI OSW Curtailment Reduction (%) | LI Net Import Change (%) | NY CO2 Reduction (mmTons)** |
| T035 | LS Power | Atlantic Gateway | 340 | 906 | 55.4 | 93% | -41% | 2.9 |
| T036 | NextEra | New York Renewable Connect - Core 1 | 303 | 291 | 20.2 | 34% | -9% | -0.1 |
| T037 | NextEra | New York Renewable Connect - Core 2 | 364 | 378 | 21.4 | 36% | -10% | -0.8 |
| T038 | NextEra | New York Renewable Connect - Core 3 | 380 | 402 | 23.6 | 40% | -12% | -0.4 |
| T039 | NextEra | New York Renewable Connect - Core 4 | 305 | 307 | 22.1 | 37% | -10% | -0.3 |
| T040 | NextEra | New York Renewable Connect - Core 5 | 339 | 332 | 21.8 | 37% | -11% | 0.2 |
| T041 | NextEra | New York Renewable Connect - Core 6 | 291 | 308 | 23.3 | 39% | -13% | 1.0 |
| T042 | NextEra | New York Renewable Connect - Core 7 | 291 | 308 | 23.3 | 39% | -13% | 1.0 |
| T043 | NextEra | New York Renewable Connect - Enhanced 1 | 458 | 745 | 41.4 | 70% | -26% | 0.9 |
| T044 | NextEra | New York Renewable Connect - Enhanced 2 | 441 | 582 | 34.0 | 57% | -22% | -1.7 |
| T047 | NYPA/NY Transco | Propel NY Energy - Base Solution 1 | 337 | 568 | 34.7 | 58% | -22% | 0.6 |
| T048 | NYPA/NY Transco | Propel NY Energy - Base Solution 2 | 313 | 513 | 31.3 | 53% | -22% | 1.0 |
| T049 | NYPA/NY Transco | Propel NY Energy - Base Solution 3 | 344 | 902 | 54.3 | 91% | -39% | 2.4 |
| T051 | NYPA/NY Transco | Propel NY Energy - Alternate Solution 5 | 341 | 609 | 38.4 | 64% | -25% | 1.3 |
| T052 | NYPA/NY Transco | Propel NY Energy - Alternate Solution 6 | 352 | 618 | 38.3 | 64% | -25% | 1.1 |
| T053 | NYPA/NY Transco | Propel NY Energy - Alternate Solution 7 | 360 | 622 | 37.7 | 63% | -26% | 1.3 |

**Total pre-project case has 59.5 TWh GWh of LI OSW curtailment, approximatley 3.2 TWh per year*

***2022 electric sector CO2 emissions were approximatley 30 million tons per RGGI values reported to EPA*

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# Why do Production Cost Savings increase?

- Barrett–Valley Stream 138 kV path constraint is one of the most binding constraints in New York under an OSW Policy scenario
- The increase in production cost savings in the Barrett–Valley Stream scenario cases (when compared to the scenario pre-project case) is primarily driven by increased output from OSW resources connecting to Long Island

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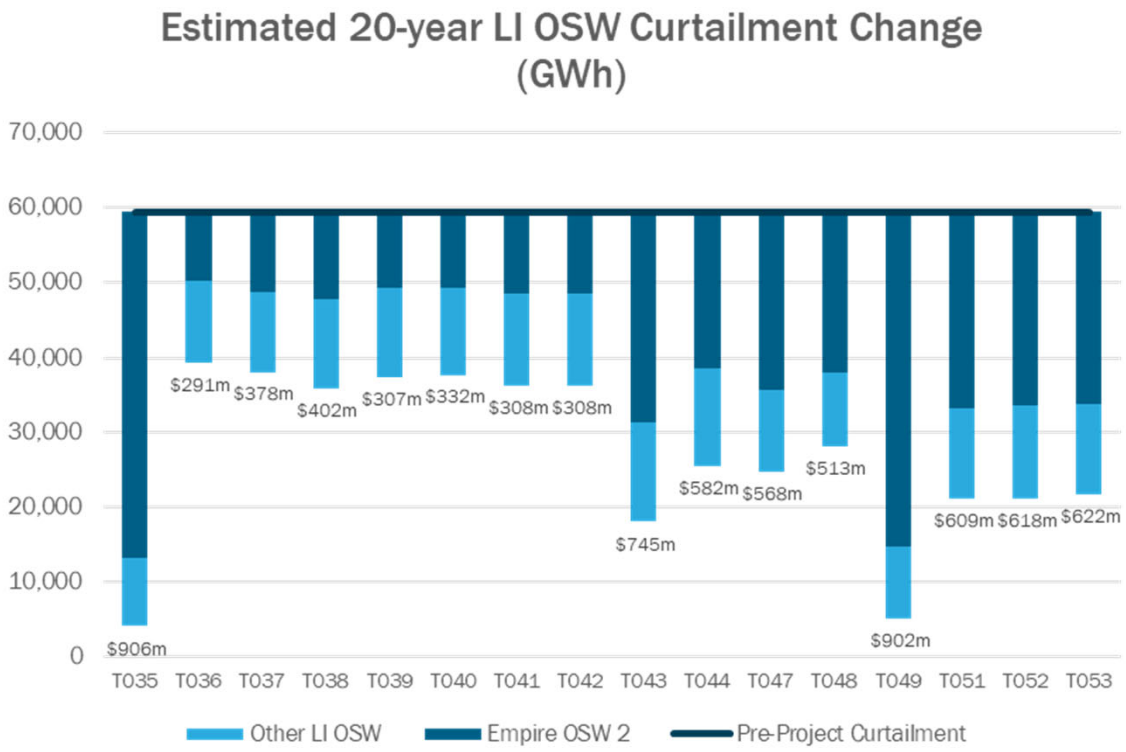
# Long Island OSW Curtailment Change




- Projects with high reduction in curtailment achieve higher production cost savings
- Larger reduction in curtailments occurs in projects that have specific upgrades to Barrett 138 kV bus

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# $CO_2$ Emissions Change

| 20-Year Estimated CO2 Emissions (Million Tons) | | | | |
|---|---|---|---|---|
| Case | LI | NYC | NYISO | Region * |
| Policy Case: Barrett - VS | 24 | 72 | 179 | 8,072 |
| T035 - LS Power | (2) | (0) | (3) | (16) |
| T036 - NextEra Core 1 | (3) | 1 | 0 | (1) |
| T037 - NextEra Core 2 | (3) | 1 | 1 | (3) |
| T038 - NextEra Core 3 | (3) | 1 | 0 | (3) |
| T039 - NextEra Core 4 | (3) | 1 | 0 | (5) |
| T040 - NextEra Core 5 | (3) | 1 | (0) | (2) |
| T041 - NextEra Core 6 | (3) | 0 | (1) | (2) |
| T042 - NextEra Core 7 | (3) | 0 | (1) | (2) |
| T043 - NextEra Enh 1 | (2) | 0 | (1) | (11) |
| T044 - NextEra Enh 2 | (2) | 1 | 2 | (10) |
| T047 - Propel Base 1 | (2) | 1 | (1) | (14) |
| T048 - Propel Base 2 | (2) | 0 | (1) | (9) |
| T049 - Propel Base 3 | (2) | 0 | (2) | (20) |
| T051 - Propel Alt 5 | (2) | 1 | (1) | (9) |
| T052 - Propel Alt 6 | (2) | 1 | (1) | (9) |
| T053 - Propel Alt 7 | (2) | 0 | (1) | (9) |

Change From Policy Case (mmTons)

- In ALL project simulations regional CO2 emissions are reduced.
- The NYISO production cost database includes detailed generation and transmission models for NYISO and adjacent regions (ISO-NE, PJM, IESO, and HQ). Consistent with today's market operation, external generation can dispatch to sell energy in the NYISO market and vice versa.
- In some project simulations, NYISO thermal generation increases dispatch to offset more expensive and higher CO2 producing external generation. This can result in an increase in CO2 emissions within New York but an overall decrease regionally.

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# Long Island Import/Export

## 2040 Total Import/Export

| Case | 2040 Long Island Import/Export (GWh) | |
|---|---|---|
| | Import | Export |
| Policy Case + B-VS | 7,377 | 2,692 |
| T035 - LS Power | 7,520 | 5,920 |
| T036 - NextEra Core 1 | 7,813 | 4,474 |
| T037 - NextEra Core 2 | 7,763 | 4,484 |
| T038 - NextEra Core 3 | 7,732 | 4,670 |
| T039 - NextEra Core 4 | 7,900 | 4,637 |
| T040 - NextEra Core 5 | 7,763 | 4,636 |
| T041 - NextEra Core 6 | 7,702 | 4,713 |
| T042 - NextEra Core 7 | 7,702 | 4,713 |
| T043 - NextEra Enh 1 | 7,826 | 5,461 |
| T044 - NextEra Enh 2 | 7,795 | 4,847 |
| T047 - Propel Base 1 | 7,640 | 4,928 |
| T048 - Propel Base 2 | 7,599 | 4,897 |
| T049 - Propel Base 3 | 7,566 | 5,737 |
| T051 - Propel Alt 5 | 7,645 | 5,224 |
| T052 - Propel Alt 6 | 7,650 | 5,297 |
| T053 - Propel Alt 7 | 7,572 | 5,296 |

## 2040 Delta Import/Export

| Case | 2040 Long Island Import/Export (GWh) | |
|---|---|---|
| | Import | Export |
| Policy Case + B-VS | 7,377 | 2,692 |
| T035 - LS Power | 143 | 3,229 |
| T036 - NextEra Core 1 | 436 | 1,782 |
| T037 - NextEra Core 2 | 385 | 1,792 |
| T038 - NextEra Core 3 | 355 | 1,978 |
| T039 - NextEra Core 4 | 523 | 1,945 |
| T040 - NextEra Core 5 | 385 | 1,944 |
| T041 - NextEra Core 6 | 325 | 2,021 |
| T042 - NextEra Core 7 | 325 | 2,021 |
| T043 - NextEra Enh 1 | 448 | 2,770 |
| T044 - NextEra Enh 2 | 417 | 2,155 |
| T047 - Propel Base 1 | 262 | 2,236 |
| T048 - Propel Base 2 | 222 | 2,206 |
| T049 - Propel Base 3 | 188 | 3,045 |
| T051 - Propel Alt 5 | 268 | 2,532 |
| T052 - Propel Alt 6 | 272 | 2,605 |
| T053 - Propel Alt 7 | 195 | 2,604 |

Change in Import/Export (GWh)

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# NYCA Import/Export by Region

## 2040 Total Import/Export

| Case | 2040 Export Energy (GWh) | | | | 2040 Import Energy (GWh) | | | |
|---|---|---|---|---|---|---|---|---|
| | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE |
| Policy Case + B-VS | 11 | 6,587 | 4,141 | 3,277 | 16,377 | 1,283 | 15,825 | 8,255 |
| T035 | 11 | 6,675 | 4,418 | 3,829 | 15,946 | 1,222 | 15,634 | 8,032 |
| T036 | 11 | 6,651 | 4,287 | 3,642 | 16,117 | 1,261 | 15,963 | 8,225 |
| T037 | 11 | 6,633 | 4,302 | 3,619 | 16,124 | 1,282 | 15,895 | 8,258 |
| T038 | 11 | 6,651 | 4,307 | 3,616 | 16,111 | 1,271 | 15,863 | 8,187 |
| T039 | 11 | 6,646 | 4,356 | 3,676 | 16,114 | 1,299 | 15,770 | 8,018 |
| T040 | 11 | 6,645 | 4,305 | 3,603 | 16,108 | 1,257 | 15,891 | 8,155 |
| T041 | 11 | 6,646 | 4,323 | 3,627 | 16,085 | 1,259 | 15,882 | 8,190 |
| T042 | 11 | 6,646 | 4,323 | 3,627 | 16,085 | 1,259 | 15,882 | 8,190 |
| T043 | 11 | 6,670 | 4,416 | 3,849 | 16,021 | 1,257 | 15,594 | 8,122 |
| T044 | 11 | 6,684 | 4,411 | 3,778 | 16,172 | 1,283 | 15,543 | 8,139 |
| T047 | 11 | 6,654 | 4,329 | 3,693 | 16,096 | 1,257 | 15,657 | 8,098 |
| T048 | 11 | 6,667 | 4,340 | 3,728 | 16,114 | 1,252 | 15,772 | 8,083 |
| T049 | 11 | 6,661 | 4,392 | 3,826 | 15,991 | 1,247 | 15,512 | 8,005 |
| T051 | 11 | 6,661 | 4,355 | 3,725 | 16,055 | 1,258 | 15,668 | 8,077 |
| T052 | 11 | 6,668 | 4,368 | 3,734 | 16,030 | 1,253 | 15,721 | 8,092 |
| T053 | 11 | 6,665 | 4,365 | 3,742 | 16,040 | 1,235 | 15,753 | 8,094 |

## 2040 Delta Import/Export

| Case | 2040 Export Energy (GWh) | | | | 2040 Import Energy (GWh) | | | |
|---|---|---|---|---|---|---|---|---|
| | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE |
| Policy Case + B-VS | 11 | 6,587 | 4,141 | 3,277 | 16,377 | 1,283 | 15,825 | 8,255 |
| T035 | 0 | 87 | 278 | 553 | (431) | (60) | (192) | (223) |
| T036 | 0 | 64 | 146 | 365 | (260) | (22) | 138 | (30) |
| T037 | (0) | 46 | 161 | 342 | (253) | (0) | 70 | 3 |
| T038 | (0) | 64 | 167 | 339 | (267) | (11) | 38 | (69) |
| T039 | (0) | 59 | 216 | 400 | (263) | 16 | (55) | (237) |
| T040 | 0 | 58 | 164 | 327 | (270) | (26) | 66 | (100) |
| T041 | (0) | 59 | 182 | 350 | (293) | (24) | 57 | (65) |
| T042 | (0) | 59 | 182 | 350 | (293) | (24) | 57 | (65) |
| T043 | 0 | 82 | 275 | 572 | (356) | (26) | (231) | (133) |
| T044 | 0 | 97 | 270 | 502 | (205) | 1 | (282) | (116) |
| T047 | 0 | 67 | 188 | 417 | (281) | (26) | (168) | (157) |
| T048 | 0 | 80 | 199 | 452 | (263) | (31) | (53) | (173) |
| T049 | 0 | 73 | 252 | 550 | (386) | (35) | (313) | (250) |
| T051 | 0 | 73 | 214 | 449 | (322) | (25) | (157) | (178) |
| T052 | 0 | 81 | 227 | 457 | (347) | (30) | (104) | (163) |
| T053 | 0 | 77 | 224 | 465 | (338) | (47) | (72) | (161) |

Change In Import/Export (GWh)

**Key Takeaway:** In 2040, the proposed projects tend to increase exports and decrease imports to/from neighboring regions. For more information, 20-year total and delta results are in slide 39.

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# Key Findings

- Barrett-Valley Stream path will be one of the most congested paths in the system, which causes around 2.3 TWh of curtailment of the Empire II Wind project alone in the pre-project case
- Production cost savings are higher in the Barrett-Valley Stream Scenario compared to the Baseline and Policy Cases due to additional curtailment of OSW injections into Long Island near the Barrett substation
- Projects that propose transmission facilities around the Barrett 138 kV bus (T035, T043 and T049) produce the highest savings in this scenario

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# Operability

# Flexibility for Outages Methodology

- **Mimics Business Management System (BMS) Dispatch in Control Center Operations**
  - Does not include Bid information
  - Assumes identical Bids and all generators available
- **Optimal Transfer Analysis for Long Island import and export capability**
  - Starting point of CY21 ATBA Transfer Summer Peak case
  - All lines 69 kV and above in Zone K, all lines 115 kV and above in Zones F-I, and all NYISO BPTF lines are secured to Normal Ratings
  - Generators are dispatch independently (not proportionally) between their PMin and PMax to facilitate transfers
  - PARs and HVDC may change schedule to facilitate transfers
- **Maintenance Conditions Considered**
  - Single Outage results take one single element out of service and finds maximum transfers (N-1-1 Transfers)
  - Double Outage results take two single elements out of service and finds maximum transfers (N-2-1 Transfers)

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# Long Island Export

| Project | Long Island Export Limit (MW) Base Results | | | Long Island Export Limit (MW) Barrett/Valley Stream Results | | |
|---|---|---|---|---|---|---|
| | Single Outage | Double Outage | Derate | Single Outage | Double Outage | Derate |
| T035 - LSPower | 2565 | 1355 | 2195 | 2425 | 865 | 1560 |
| T036 - NextEra Core1 | 2440 | 1540 | 1725 | 2150 | 1230 | 920 |
| T037 - NextEra Core 2 | 2540 | 1725 | 1960 | 2365 | 1335 | 1030 |
| T038 - NextEra Core 3 | 2775 | 2385 | 1540 | 2760 | 1615 | 1145 |
| T039 - NextEra Core4 | 2395 | 1510 | 1875 | 2110 | 1185 | 925 |
| T040 - NextEra Core5 | 2425 | 1530 | 1875 | 2135 | 1215 | 920 |
| T041 - NextEra Core 6 | 2510 | 1530 | 2140 | 2505 | 1530 | 975 |
| T042 - NextEra Core 7 | 2500 | 1535 | 2125 | 2500 | 1535 | 965 |
| T043 - NextEra Enh 1 | 3160 | 2510 | 1795 | 3045 | 1900 | 1145 |
| T044 - NextEra Enh 2 | 3130 | 2465 | 1810 | 3095 | 1945 | 1150 |
| T047 - Propel Base 1 | 1300 | 625 | 1505 | 1285 | 615 | 670 |
| T048 - Propel Base 2 | 1270 | 510 | 1530 | 1000 | 285 | 715 |
| T049 - Propel Base 3 | 1310 | 660 | 1485 | 1310 | 635 | 675 |
| T051 - Propel Alt 5 | 1930 | 1190 | 1450 | 1915 | 1175 | 740 |
| T052 - Propel Alt 6 | 3135 | 2400 | 1460 | 3135 | 1880 | 1255 |
| T053 - Propel Alt 7 | 1725 | 905 | 2010 | 1415 | 520 | 895 |

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# Long Island Import

| | Long Island Import Limit (MW) Base & Barrett/Valley Stream Results | | |
|---|---|---|---|
| Project | Single Outage | Double Outage | Derate |
| T035 - LSPower | 2740 | 2540 | 680 |
| T036 - NextEra Core1 | 3055 | 2400 | 1005 |
| T037 - NextEra Core 2 | 3035 | 2535 | 875 |
| T038 - NextEra Core 3 | 3330 | 3035 | 405 |
| T039 - NextEra Core4 | 3155 | 3060 | 355 |
| T040 - NextEra Core5 | 3105 | 3035 | 385 |
| T041 - NextEra Core 6 | 3355 | 3000 | 460 |
| T042 - NextEra Core 7 | 3350 | 3005 | 455 |
| T043 - NextEra Enh 1 | 3450 | 3280 | 475 |
| T044 - NextEra Enh 2 | 3430 | 3275 | 460 |
| T047 - Propel Base 1 | 2310 | 1635 | 1505 |
| T048 - Propel Base 2 | 2455 | 1660 | 1515 |
| T049 - Propel Base 3 | 2325 | 1610 | 1530 |
| T051 - Propel Alt 5 | 3145 | 2320 | 1155 |
| T052 - Propel Alt 6 | 3255 | 2815 | 645 |
| T053 - Propel Alt 7 | 3340 | 3150 | 275 |

* Import results were not affected by the Barrett-Valley Stream constraints

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# Range

| Project | Import - Export Ranges (MW) Base Results | | Import - Export Ranges (MW) Barrett/Valley Stream Results | |
|---|---|---|---|---|
| | Single Outage | Double Outage | Single Outage | Double Outage |
| T035 - LSPower | 5305 | 3895 | 5165 | 3405 |
| T036 - NextEra Core1 | 5495 | 3940 | 5205 | 3630 |
| T037 - NextEra Core 2 | 5575 | 4260 | 5400 | 3870 |
| T038 - NextEra Core 3 | 6105 | 5420 | 6090 | 4650 |
| T039 - NextEra Core4 | 5550 | 4570 | 5265 | 4245 |
| T040 - NextEra Core5 | 5530 | 4565 | 5240 | 4250 |
| T041 - NextEra Core 6 | 5865 | 4530 | 5860 | 4530 |
| T042 - NextEra Core 7 | 5850 | 4540 | 5850 | 4540 |
| T043 - NextEra Enh 1 | 6610 | 5790 | 6495 | 5180 |
| T044 - NextEra Enh 2 | 6560 | 5740 | 6525 | 5220 |
| T047 - Propel Base 1 | 3610 | 2260 | 3595 | 2250 |
| T048 - Propel Base 2 | 3725 | 2170 | 3455 | 1945 |
| T049 - Propel Base 3 | 3635 | 2270 | 3635 | 2245 |
| T051 - Propel Alt 5 | 5075 | 3510 | 5060 | 3495 |
| T052 - Propel Alt 6 | 6390 | 5215 | 6390 | 4695 |
| T053 - Propel Alt 7 | 5065 | 4055 | 4755 | 3670 |

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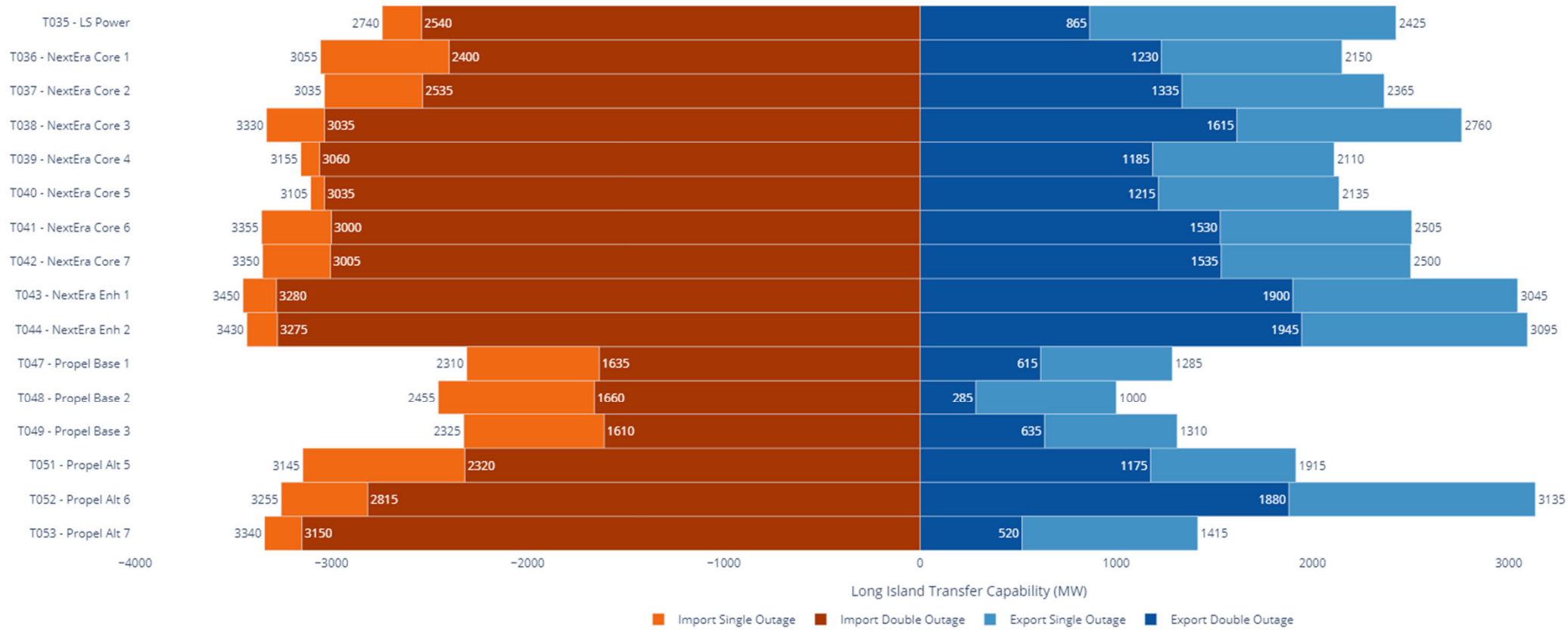
## Single Outage & Double Outage Import & Export Limits w Barrett

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# Avoided Cost Methodology



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# Avoided Cost Assessment

- The NYISO team has investigated a new assessment for the capacity benefit metric for the Long Island PPTN
- All Long Island PPTN projects greatly reduce curtailments of offshore wind energy. Additional energy released into system due to a transmission project could defer and/or reduce generation buildout elsewhere in the state that may otherwise be needed to meet energy demand and policy objectives
- The avoided cost assessment measures the reduction in capital cost to build future generation resources through 2040
- The transmission projects provide varying levels of increased offshore wind energy to the system which displays utility-scale solar, avoiding the need to build that capacity to meet state policy targets

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# Applicability of Avoided Cost Assessment

- Represents the potential capital cost savings associated with either <u>avoiding</u> or <u>deferring</u> new generation projects due to a specific transmission project

$$\sum_{Year\ 1}^{Year\ 20} Capital\ Cost_{Base} - Capital\ Cost_{Project}$$

- Production cost captures **energy production** cost savings
- Capacity benefit (LOLE reliability benefit) captures potential **capacity market** savings due to increased transfer capability
- Avoided cost captures **capacity build** cost savings for generation
  - Can be interpreted as change in renewable project procurement/renewable energy contracts for NYSERDA

**Economic Benefit** = Production cost savings + capacity benefits due to LOLE reduction + capacity benefits due to avoided cost

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# Overview of Methodology

- **Leverage capacity expansion model from 2021-2040 System & Resource Outlook Policy Case S2**
  - Note: study horizon is 2021-2040
- **Update OSW installed capacity to align with Long Island PPTN assumptions for the Policy Case**
- **For each case (pre-project and project):**
  - Leverage production cost simulation results for the Barrett–Valley Stream Policy Case scenario to represent actual output of OSW generators
    - Model "curtailed" OSW energy as the pre-project case
    - Model "un-curtailed" OSW energy for each project case
  - Update transfer limits accordingly for each project case
    - Note: For purposes of this analysis, IRM/LCR requirements were kept consistent with those used in the 2021-2040 System & Resource Outlook. The effects of import limit changes on downstate LCR requirements are not captured in this analysis.
- **Evaluation measures the change in generator build costs**

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# What Should We Expect?

- Curtailment of OSW energy results in an increase in renewable generation capacity builds needed to meet energy demand
- Proposed solutions to the Long Island PPTN reduce curtailment of OSW energy, as shown in production cost simulations
- Additional energy released into system due to a proposed project could defer and/or reduce generation buildout elsewhere in the state that may otherwise be needed to meet energy demand and policy objectives
  - Metric represents the avoided cost of meeting CLCPA 100x40 electric sector requirements due to each proposed project

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# LI OSW Curtailment in Current Simulations

| Values | Baseline | | | | Policy | | | | Policy + Barrett-Valley Stream | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2030 | 2035 | 2040 | 2045 | 2030 | 2035 | 2040 | 2045 | 2030 | 2035 | 2040 | 2045 |
| OSW Capacity (MW) | 2,279 | 3,079 | 3,079 | 3,079 | 2,539 | 3,689 | 5,989 | 5,989 | 2,539 | 3,689 | 5,989 | 5,989 |
| Potential Energy Production (TWh) | 8.9 | 12.2 | 12.2 | 12.1 | 10.0 | 14.6 | 24.0 | 24.0 | 10.0 | 14.6 | 24.0 | 24.0 |
| Curtailment (TWh) | 0.0 | 0.5 | 0.3 | 0.1 | 0.2 | 0.5 | 3.1 | 2.5 | 2.4 | 2.4 | 3.8 | 3.3 |
| Curtailment Rate (%) | 1% | 4% | 3% | 1% | 2% | 4% | 13% | 10% | 24% | 16% | 16% | 14% |

Higher levels of OSW curtailment are driven by increasing OSW capacity levels and transmission constraints on Long Island

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# Example Calculation

- In study year 2040, ~3 TWh of OSW (equivalent capability to ~1,700 MW of solar or ~1,400 MW of land-based wind) is estimated to be curtailed in the pre-Project case
- After transmission project installed, assume…
  - 1,000 MW solar buildout can be avoided
  - 1,000 MW land-based wind can be deferred 5 years
- Cost calculations:
  - Avoided solar costs = 1,000 MW x $1,076/kW = $1,076M (NPV)
  - Deferred land-based solar costs = 1,000 MW x $78/kW = $78M (NPV)
  - Total = $1.15B (NPV)

New York ISO

# Results Follow-Up



New York ISO

# Baseline Case: NYCA Import/Export

| Case | 20-Year Export Energy (GWh) | | | | 20-Year Import Energy (GWh) | | | | 20-Year Net-Import Energy (GWh) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE |
| Baseline Case | 226 | 82,519 | 18,104 | 164,557 | 230,067 | 11,027 | 230,607 | 22,170 | 229,841 | (71,492) | 212,502 | (142,387) |
| T035 | 0 | 168 | 874 | (5,283) | (432) | (375) | (2,496) | (8,520) | (432) | (543) | (3,370) | (3,237) |
| T036 | 0 | 251 | 1,043 | (6,105) | (600) | (388) | (2,731) | (8,650) | (600) | (639) | (3,774) | (2,545) |
| T037 | 0 | 258 | 990 | (5,823) | (691) | (426) | (2,404) | (8,604) | (691) | (685) | (3,395) | (2,781) |
| T038 | (0) | 170 | 1,094 | (6,041) | (695) | (374) | (2,678) | (8,594) | (695) | (543) | (3,773) | (2,552) |
| T039 | (0) | 307 | 844 | (5,238) | (653) | (419) | (1,805) | (9,930) | (653) | (726) | (2,650) | (4,691) |
| T040 | 0 | 173 | 1,022 | (5,865) | (603) | (360) | (2,866) | (8,548) | (603) | (533) | (3,888) | (2,684) |
| T041 | 0 | 220 | 1,096 | (6,086) | (606) | (384) | (2,913) | (8,556) | (606) | (604) | (4,009) | (2,471) |
| T042 | 0 | 220 | 1,096 | (6,086) | (606) | (384) | (2,913) | (8,556) | (606) | (604) | (4,009) | (2,471) |
| T043 | 0 | 88 | 802 | (6,654) | (664) | (426) | (3,814) | (9,606) | (664) | (514) | (4,616) | (2,952) |
| T044 | 0 | 126 | 873 | (7,544) | (657) | (825) | (8,914) | (8,981) | (657) | (950) | (9,787) | (1,437) |
| T047 | 0 | 182 | 1,022 | (5,801) | (432) | (386) | (3,300) | (8,685) | (432) | (568) | (4,322) | (2,884) |
| T048 | 0 | 153 | 992 | (6,156) | (440) | (430) | (3,404) | (8,704) | (440) | (583) | (4,396) | (2,548) |
| T049 | (0) | 981 | 1,382 | (7,419) | (447) | (619) | (8,053) | (8,656) | (447) | (1,600) | (9,435) | (1,237) |
| T051 | 0 | 187 | 1,029 | (5,854) | (439) | (465) | (3,185) | (8,694) | (439) | (653) | (4,214) | (2,840) |
| T052 | 0 | 188 | 1,004 | (6,136) | (462) | (475) | (3,471) | (8,697) | (462) | (663) | (4,474) | (2,561) |
| T053 | 0 | 233 | 1,004 | (6,302) | (470) | (471) | (3,457) | (8,620) | (470) | (704) | (4,461) | (2,318) |

Change in Import/Export (GWh)

**Key Takeaway:** New York remains a net energy importer through the 20-year study-period and projects reduce total imported energy between 3% and 6%

New York ISO

# Policy Case: NYCA Import/Export

| Case | 20-Year Export Energy (GWh) | | | | 20-Year Import Energy (GWh) | | | | 20-Year Net-Import Energy (GWh) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE |
| Policy Case | 226 | 120,144 | 63,495 | 120,492 | 387,404 | 18,766 | 259,665 | 100,514 | 387,178 | (101,378) | 196,170 | (19,978) |
| T035 | (0) | 654 | 2,230 | 1,052 | (3,936) | (644) | (1,016) | (6,964) | (3,936) | (1,298) | (3,246) | (8,015) |
| T036 | (0) | 812 | 2,130 | 1,190 | (4,607) | (517) | 363 | (7,321) | (4,607) | (1,330) | (1,767) | (8,511) |
| T037 | (0) | 462 | 2,499 | 291 | (3,888) | (457) | (4,178) | (7,228) | (3,888) | (919) | (6,677) | (7,520) |
| T038 | (0) | 581 | 2,480 | 313 | (4,061) | (430) | (4,169) | (7,964) | (4,061) | (1,011) | (6,648) | (8,277) |
| T039 | (0) | 533 | 3,078 | 1,643 | (4,004) | (455) | (5,020) | (9,792) | (4,004) | (988) | (8,098) | (11,436) |
| T040 | (0) | 597 | 2,321 | 1,034 | (4,445) | (509) | (2,440) | (8,160) | (4,445) | (1,106) | (4,761) | (9,193) |
| T041 | (0) | 864 | 2,277 | (498) | (4,695) | (593) | (152) | (7,411) | (4,695) | (1,457) | (2,429) | (6,913) |
| T042 | (0) | 864 | 2,277 | (498) | (4,695) | (593) | (152) | (7,411) | (4,695) | (1,457) | (2,429) | (6,913) |
| T043 | (0) | 614 | 3,635 | 1,077 | (3,702) | (556) | (6,614) | (7,910) | (3,702) | (1,170) | (10,249) | (8,987) |
| T044 | (0) | 853 | 4,482 | 1,411 | (3,061) | (406) | (9,796) | (8,500) | (3,061) | (1,259) | (14,278) | (9,910) |
| T047 | (0) | 1,002 | 2,370 | 137 | (4,252) | (656) | (3,277) | (7,630) | (4,252) | (1,658) | (5,647) | (7,767) |
| T048 | (0) | 657 | 1,842 | 1,249 | (3,500) | (499) | (1,287) | (7,582) | (3,500) | (1,156) | (3,129) | (8,832) |
| T049 | (0) | 1,014 | 2,327 | 756 | (4,361) | (659) | (3,144) | (7,722) | (4,361) | (1,672) | (5,472) | (8,478) |
| T051 | (0) | 392 | 1,018 | (2,304) | (3,891) | (302) | 2,592 | (5,124) | (3,891) | (695) | 1,574 | (2,820) |
| T052 | (0) | 772 | 2,254 | 1,104 | (4,340) | (565) | (2,008) | (7,794) | (4,340) | (1,336) | (4,262) | (8,898) |
| T053 | (0) | 749 | 2,295 | 907 | (4,336) | (591) | (2,076) | (7,674) | (4,336) | (1,340) | (4,372) | (8,582) |

Change in Import/Export (GWh)

**Key Takeaway:** New York remains a net energy importer through the 20-year study-period and projects reduce total imported energy between 1% and 6%

New York ISO

# Barrett-VS Scenario: NYCA Import/Export

| Case | 20-Year Export Energy (GWh) | | | | 20-Year Import Energy (GWh) | | | | 20-Year Net-Import Energy (GWh) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE | HQ | IESO | PJM | ISONE |
| Policy Case + B-VS | 226 | 119,872 | 61,465 | 117,646 | 388,171 | 18,906 | 267,788 | 102,041 | 387,945 | (100,966) | 206,323 | (15,605) |
| T035 | (0) | 999 | 4,338 | 3,994 | (4,813) | (819) | (9,084) | (8,675) | (4,813) | (1,818) | (13,422) | (12,669) |
| T036 | (0) | 525 | 1,044 | 538 | (2,590) | (390) | 980 | (6,724) | (2,590) | (915) | (64) | (7,261) |
| T037 | (0) | 142 | 1,399 | (175) | (1,849) | (272) | (3,723) | (6,767) | (1,849) | (414) | (5,122) | (6,592) |
| T038 | (0) | 424 | 1,501 | (420) | (2,058) | (419) | (3,318) | (7,522) | (2,058) | (843) | (4,819) | (7,102) |
| T039 | (0) | 553 | 2,072 | 677 | (1,978) | (312) | (2,092) | (9,354) | (1,978) | (865) | (4,163) | (10,031) |
| T040 | (0) | 627 | 1,343 | (130) | (2,331) | (469) | 375 | (7,697) | (2,331) | (1,096) | (968) | (7,567) |
| T041 | (0) | 696 | 1,534 | (1,913) | (2,735) | (481) | 1,825 | (6,995) | (2,735) | (1,177) | 291 | (5,082) |
| T042 | (0) | 696 | 1,534 | (1,913) | (2,735) | (481) | 1,825 | (6,995) | (2,735) | (1,177) | 291 | (5,082) |
| T043 | (0) | 625 | 3,842 | 2,167 | (3,073) | (524) | (9,922) | (8,276) | (3,073) | (1,149) | (13,764) | (10,443) |
| T044 | 0 | 749 | 4,334 | 1,737 | (1,740) | (428) | (12,303) | (9,267) | (1,740) | (1,177) | (16,636) | (11,004) |
| T047 | (0) | 819 | 2,325 | 626 | (2,956) | (586) | (7,496) | (8,006) | (2,956) | (1,405) | (9,821) | (8,632) |
| T048 | (0) | 849 | 2,291 | 1,788 | (2,714) | (593) | (3,690) | (8,214) | (2,714) | (1,442) | (5,981) | (10,003) |
| T049 | (0) | 1,132 | 4,100 | 3,382 | (4,511) | (785) | (11,641) | (9,391) | (4,511) | (1,917) | (15,741) | (12,773) |
| T051 | (0) | 735 | 2,537 | 1,439 | (3,170) | (511) | (5,226) | (8,374) | (3,170) | (1,246) | (7,763) | (9,813) |
| T052 | (0) | 736 | 2,542 | 1,937 | (3,371) | (578) | (5,191) | (8,258) | (3,371) | (1,314) | (7,732) | (10,195) |
| T053 | 0 | 913 | 2,697 | 1,592 | (3,316) | (712) | (4,535) | (8,265) | (3,316) | (1,625) | (7,231) | (9,857) |

Change in Import/Export (GWh)

**Key Takeaway:** New York remains a net energy importer through the 20-year study-period and projects reduce total imported energy between 2% and 7%

New York ISO

# Next Steps



New York ISO

# Results Review Schedule

- March 24 TPAS/ESPWG: Independent capital cost estimates, scenario results, and avoided cost methodology
- April 3 TPAS/ESPWG: Draft report review, including voluntary cost containment measures
- April 18 Board Meeting: Developer presentations to NYISO Board of Directors

New York ISO

# Comments

- **Further questions and comments regarding these results can be sent to PublicPolicyPlanningMailbox@nyiso.com**
  - Comments are requested as soon as they are available, but no later than March 31, 2023
- **Comments will be posted for stakeholder consideration**

New York ISO

# Questions?



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