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Revision History

Version	Date	Revisions
1.0	12/06/2012	Initial Release
2.0	05/28/2014	Global ➢ Performed a reorganization of content ➢ Implemented minor stylistic changes ➢ Added additional language clarifying the CARIS process
2.1	02/26/2016	Section 3.2 ➢ New section inserted for Developer Qualifications Appendix H ➢ New appendix incorporating by reference, the "NYISO Qualification Form" in Attachment A of the Reliability Planning Manual
2.2	05/30/2019	Global ➢ Updated description of historic congestion data reporting ➢ Inclusion of a reference to Generation Deactivation process in the Introductory section ➢ Correction to NYISO web links ➢ Ministerial changes such as standardization of tariff references, inappropriate capitalizations, and use of defined terms ➢ Minor language edits for user readability
2.3	11/11/2020	Section 3.1 ➢ Removed methodology for maintaining a representative system ➢ Included generic resource addition process for resource adequacy and transmission security needs identified in the latest Reliability Planning Process
2.4	MM/DD/YYYY	Global ➢ Updated introductory section to align with new tariff ➢ Replaced CARIS Phase 1 process with System & Resource Outlook process ➢ Replaced CARIS Phase 2 process with Economic Transmission Project Evaluation process ➢ Replaced Additional CARIS Study process with Requested Economic Planning Study process ➢ Updated forms and appendices to align with new tariff

1. Overview

1.1. The Comprehensive System Planning Process

This Economic Planning Process Manual (Manual) describes the NYISO's Economic Planning Process (EPP) component of the Comprehensive System Planning Process (CSPP). The CSPP was approved by the Federal Energy Regulatory Commission (FERC) and its requirements are contained in Attachment Y of the NYISO's Open Access Transmission Tariff (OATT). One of the NYISO's responsibilities is to prepare for the impact of expected changes in supply and demand of power on the reliable operation of the New York transmission system. The analyses, evaluations and forecasts produced by the NYISO's system and resource planning activities assist Market Participants, regulators and policy makers as they plan for the future. One way the NYISO accomplishes this responsibility is through the Economic Planning Process component of the CSPP.

The CSPP is comprised of four components:

1. Local Transmission Planning Process (LTPP),
2. Reliability Planning Process (RPP) along with parts of the Short-Term Reliability Process (STRP),
3. Economic Planning Process (EPP), and
4. Public Policy Transmission Planning Process

The first component in the CSPP cycle is the LTPP. Under this process, the local Transmission Owners (TOs) perform transmission studies for their transmission areas according to all applicable criteria. This process produces the Local Transmission Owner Plan (LTP), which feeds into the NYISO's determination of system needs through the CSPP. Details of the LTPP are included in the Reliability Planning Process ("RPP") Manual[1].

The second component in the CSPP cycle is the RPP, covering year 4 through year 10 following the year of starting the study, along with STRP, covering year 1 through year 5 following the STAR Start Date of the study. The RPP and STRP requirements are described in detail in the RPP Manual and Attachments Y and FF to the OATT, respectively. Under the biennial process for conducting the RPP, the reliability of the New

[1] See the *Reliability Planning Process Manual,* which is located in the Manuals>Planning folder on the NYISO Manuals, Technical Bulletins & Guides Web site: https://www.nyiso.com/manuals-tech-bulletins-user-guides.

York Bulk Power Transmission Facilities (BPTF) is assessed, any Reliability Needs are identified, solutions to identified needs are proposed and evaluated for their viability and sufficiency to satisfy the identified needs, and the more efficient or cost-effective transmission solution to the identified needs is selected by the NYISO. The RPP was originally developed and implemented in conjunction with stakeholders, was approved by FERC in December 2004 and was revised in 2014 to conform to FERC Order No. 1000.The RPP consists of two studies:

1. The Reliability Needs Assessment (RNA). The NYISO performs a biennial study in which it evaluates the resource and transmission adequacy and transmission system security of the New York BPTF over its Study Period, encompassing years 4 through 10 following the year in which the RNA is conducted. Through this evaluation, the NYISO identifies Reliability Needs in accordance with applicable Reliability Criteria. This report is reviewed by NYISO stakeholders and approved by the Board of Directors.

2. The Comprehensive Reliability Plan (CRP). After the RNA is complete, the NYISO requests the submission of market-based solutions to satisfy the Reliability Needs. The NYISO also identifies a Responsible TO and requests that the TO submit a regulated backstop solution and that any interested entities submit alternative regulated solutions to address the identified Reliability Needs. The NYISO evaluates the viability and sufficiency of the proposed solutions to satisfy the identified Reliability Needs and evaluates and selects the more efficient or cost-effective transmission solution to the identified need. In the event that market-based solutions do not materialize to meet a Reliability Need in a timely manner, the NYISO triggers regulated solution(s) to satisfy the need. The NYISO develops the CRP for its Study Period that sets forth its findings regarding the proposed solutions. The CRP is reviewed by NYISO stakeholders and approved by the Board of Directors.

The Short-Term Reliability Process (STRP) uses quarterly Short-Term Assessment of Reliability (STAR) studies to assess the reliability impacts of Generator deactivations on both Bulk Power Transmission Facilities (BPTF) and non-BPTF (local) transmission facilities, in coordination with the Responsible Transmission Owner(s). The STAR is also used by the NYISO, in coordination with the Responsible Transmission Owner(s), to assess the reliability impacts on the BPTF of system changes that are not related to a Generator deactivation. These changes may include adjustments to load forecasts, delays in completion of planned upgrades, long duration transmission facility outages and other system topology changes. Section 38 of the NYISO OATT describes the process by which the NYISO, Transmission Owners, Market

Participants, Generator Owners, Developers and other interested parties follow to plan to meet Generator Deactivation Reliability Needs affecting the New York State Transmission System and other Reliability Needs affecting the BPTF (collectively, Short-Term Reliability Needs).

Each STAR will assess a five-year period, with a particular focus on Short-Term Reliability Process Needs ("needs") that are expected to arise in the first three years of the study period. The STRP is the sole venue for addressing Generator Deactivation Reliability Needs on the non-BPTF, and for BPTF needs that arise in the first three years of the assessment period. With one exception[2], needs that arise in years four or five of the assessment period may be addressed in either the STRP or longer-term Reliability Planning Process (RPP).

Each STAR looks out five years from its STAR Start Date. The STRP concludes if a STAR does not identify a need or if the NYISO determines that all identified needs will be addressed in the RPP. Should a STAR identify a need to be addressed in the STRP, the NYISO would request the submission of market-based solutions to satisfy the need along with a Responsible Transmission Owner STRP solution. The NYISO evaluates the viability and sufficiency of the proposed solutions to satisfy the identified needs and selects a solution to address the need. The NYISO reviews the results of the solution or combination of solutions (including an explanation regarding the solution that is selected) with stakeholders and posts a Short-Term Reliability Process Report detailing the determination with stakeholders.

The third component of the CSPP is the Economic Planning Process, which consists of three study processes:

1. The System & Resource Outlook ("The Outlook") is a biennial report by which the NYISO 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. This report is reviewed by NYISO stakeholders and approved by the Board of Directors.
2. If a Developer proposes a Regulated Economic Transmission Project to address constraints on the BPTFs identified in the Economic Planning Process, the NYISO will perform an Economic Transmission Project Evaluation (ETPE) of the proposed Regulated Economic Transmission

[2] Generator Deactivation Reliability Needs that arise on local facilities, not on the BPTF, must always be addressed in the STRP.

Project Regulated Economic Transmission Projects to determine the project's initial eligibility for cost allocation and recovery under the ISO OATT and to identify the beneficiaries that would be allocated the cost of the project. The beneficiaries must approve the project's selection for cost allocation and recovery purposes in accordance with the voting requirements in the ISO OATT.

3. Market Participants and other interested parties may also request that the NYISO perform a Requested Economic Planning Study at the requesting party's expense solely for information purposes, which scope and deliverables will be agreed upon by the NYISO and the requesting entity.

The requirements of the EPP are described in this Manual and Attachment Y of the OATT.

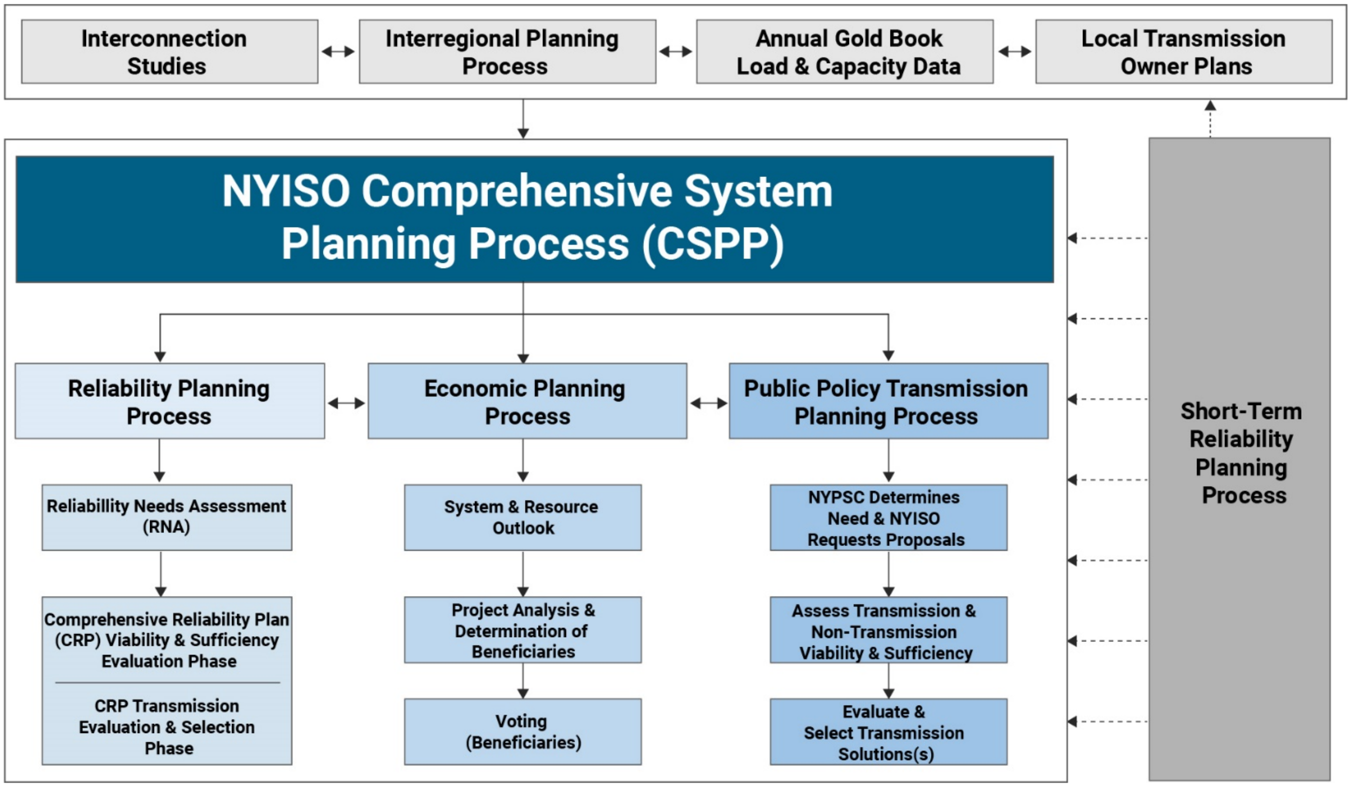
The fourth component of the CSPP is the Public Policy Transmission Planning Process (PPTPP). Under this process interested entities propose, and the New York State Public Service Commission (NYPSC) identifies, transmission needs driven by Public Policy Requirements. The NYISO then requests that interested entities submit proposed solutions to the identified Public Policy Transmission Need. The NYISO evaluates the viability and sufficiency of the proposed solutions to satisfy the identified Public Policy Transmission Need. The NYISO then evaluates and may select the more efficient or cost-effective transmission solution to the identified need. The NYISO develops the Public Policy Transmission Planning Report that sets forth its findings regarding the proposed solutions. This report is reviewed by NYISO stakeholders and approved by the Board of Directors. The requirements of the PPTPP are described in the Public Policy Transmission Planning Manual[3] and Attachment Y of the OATT.

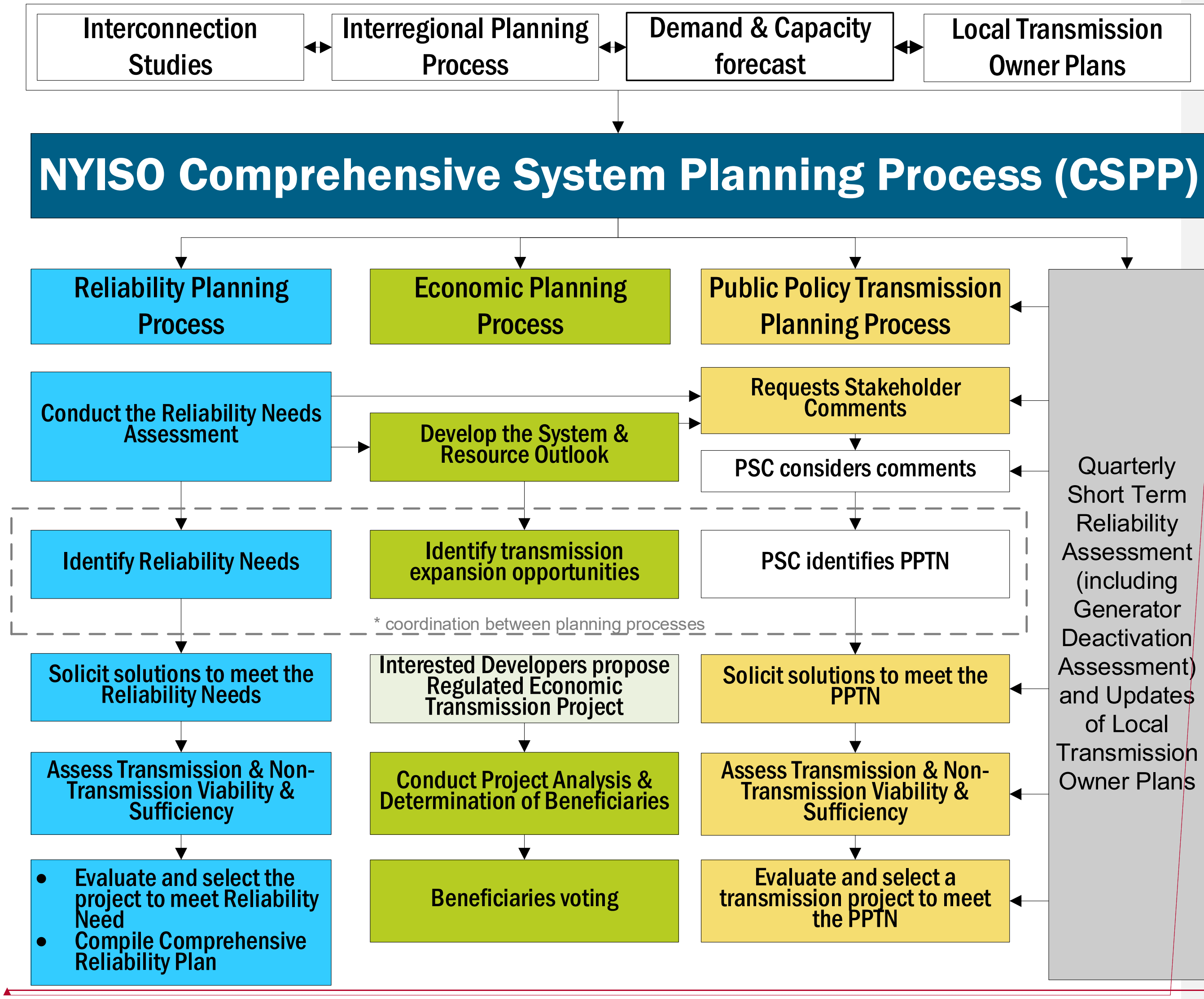
In concert with these four components, interregional planning is conducted with NYISO's neighboring control areas in the United States and Canada under the Northeastern ISO/RTO Planning Coordination Protocol. The NYISO participates in interregional planning and may consider Interregional Transmission Projects in its regional planning processes.

The NYISO CSPP is illustrated in Figure 1.

[3] See the *Public Policy Transmission Planning Process Manual*, which is located in the Manuals>Planning folder on the NYISO Manuals, Technical Bulletins & Guides Web site: https://www.nyiso.com/manuals-tech-bulletins-user-guides.

Figure 1: NYISO Comprehensive System Planning Process





Unless otherwise defined in this document, capitalized terms used herein shall have the meanings ascribed to them in the NYISO OATT.

1.2. The Economic Planning Process (EPP)

1.2.1. Overview of the EPP

The NYISO's EPP was first developed in 2007 in response to FERC Order No. 890 as a biennial complement to the NYISO's established Reliability Planning Process. The ~~Economic Planning Process~~EPP is consistent with the core principles identified in Order Nos. 890 and 1000. The ~~Economic Planning Process~~EPP is also consistent with the NYISO's market-based philosophy~~ in providing~~. The process provides resource neutral, open and transparent information to all Market Participants, stakeholders, and interested parties concerning historic, present, and projected congestion of the New York State

Transmission System using a variety of metrics to aid in informed decision making The Economic Planning Process encourages stakeholders' voluntary participation and provides open and transparent information concerning congestion and to facilitate the development of solutions to reduce congestionidentify transmission expansion opportunities. The process also allows for a qualified Developer to propose a Regulated Economic Transmission Project to seek to allocate and recover the project costs through the OATT of a project to address constraints on the BTPFs, but itthe EPP does not mandate the development, construction, or funding of Regulated Economic Transmission Projects. The NYISO's role is to serve as a neutral provider of information and analyses to aid in the development of potential projects to address congestion in response to Market Participants' requests. Market Participants can use this information to determine whether they want to propose a Regulated Economic Transmission Project. In the event that a New York Transmission Owner or Developer proposesaproposes a Regulated Economic Transmission Project proposal, the EPP provides a process pursuant to which the NYISO would determine the project's initial eligibility for cost allocation and recovery under its OATT, and for the identification of the beneficiaries that would be allocated the costs of the project and that must approve the project's selection for purposes of cost allocation and recovery purposes in accordance with the voting requirements set forth in the OATT.

1.2.2. System & Resource Outlook

The EPP requires that the NYISO biennially performdevelops a System & Resource Outlook, which timing will in alignmentalign with the Reliability Planning Process. as set forth in the OATT. The NYISO actively engages with the Electric System Planning Working Group (ESPWG) in vetting the System & Resource Outlook assumptions, methodologies and results. The NYISO's stakeholder committees must review the System & Resource Outlook before it is forwarded to the NYISO's Board of Directors for approval.

The System & Resource Outlook uses a 20-year planning horizon -and assumes a reliable system throughout, as applicable, the most recent 10-year study period evaluated by the Reliability Planning Process or 5-year study period evaluated underand the Short-Term Reliability Process. As part of the System & Resource Outlook, the NYISO assesses system congestion on the New York State Transmission System over the 20 year Study Period for the Economic Planning Process using the metrics set forth in the NYISO OATT, along with assessing the impact on projected congestion and other metrics of various scenarios (e.g. public policy goals) and sensitivities (e.g., higher fuel costs). The NYISO also conducts a- benefit analysis- addressing identified system congestion. This includes the NYISO's calculation of an energy deliverability metric, using the base case and/or scenarios. Energy deliverability quantifies the impact that transmission constraints have on the ability for generators to inject energy into the transmission system. Among other things, the metric may be used to ~~identify~~aid in the identification of renewable ~~energy~~generation pockets on the transmission system for publication in the System & Resource Outlook report.

The NYISO also develops for the Outlook a summary of the current assessments, evaluations, and plans in the biennial CSPP and the information sources relied upon by the NYISO. Based on these data, analyses, and findings, the System & Resource Outlook provides stakeholders with a wide range of information to assist in making informed decisions, including identifying and developing projects to address transmission congestion.

1.2.3. Economic Transmission Project Evaluation (ETPE)

If a Developer proposes a Regulated Economic Transmission Project to address constraints on the BPTFs identified in the Economic Planning Process, the NYISO will process that project proposal in an Economic Transmission Project Evaluation in accordance with the beneficiary-based cost allocation principles and methodology described below.

The proposed cost allocation mechanism is based on a "beneficiaries pay" approach. Beneficiaries are those entities that economically benefit from the project, and the cost allocation among them will be based upon their relative economic benefit. While the initial eligibility for regulated cost recovery for a Regulated Economic Transmission Project will be determined on the basis of a NYCA-wide production cost benefit, the beneficiary determination will be based upon the Load Serving Entities' relative Locational Based Marginal Pricing ("LBMP") load savings. Both production cost benefits and LBMP load savings will be measured over the first ten years of the proposed project's life. The NYISO analysis of beneficiaries will provide information, where appropriate, regarding future uncertainties (e.g., load forecasts, fuel prices, environmental regulation) and potential benefits (e.g., system operation, environmental effects, and renewable integration).

A Regulated Economic Transmission Project will only be eligible for cost allocation and recovery under the OATT if the NYISO determines the project's satisfies the eligibility requirements for cost allocation and recovery and a super majority of a project's beneficiaries agree that an economic project should proceed. The super-majority required to proceed equals 80% of the beneficiaries associated with the project present at the time of the vote. If the proposed project meets the required vote in favor of implementing the project, and the project is implemented, all designated beneficiaries, including those not voting to implement the project will pay their allocated share of the cost of the project.

1.2.4. Requested Economic Planning Study (REPS)

The EPP also provides for individual Market Participants or other interested parties to request that the NYISO perform a Requested Economic Planning Study separate from and in addition to the System & Resource Outlook. The NYISO uses the most recently approved planning database and agreed upon assumptions to perform the study. The requesting party will be responsible for the actual costs incurred by the NYISO in performing the Requested Economic Planning Study.

1.2.5. Study Replication

An individual Market Participants or other interested parties may also request that the NYISO replicate the System & Resource Outlook or Economic Transmission Project Evaluation studies (with the study costs to be paid for by the requesting party).

2. System & Resource Outlook ("Outlook")

InFor the System & Resource Outlook, the NYISO will perform a study and prepare and publish a report to: (1) summarize the current assessments, evaluations, and plans in the biennial Comprehensive System Planning Process and the information and sources relied upon by the NYISO; (2) project congestion on the New York State Transmission System and system conditions over a twenty-year Study Period; (3) identify, rank, and group the congested elements on the New York State Transmission System based on metrics set forth in Sections 31.3.1.3.4 and 31.3.1.3.5 of Attachment Y of the ISO OATT; and (4) assess the potential benefits of addressing the identified congestion.

The NYISO will develop the scope of the Outlook in accordance with the tariff, in consultation with the Electric System Planning Working Group (ESPWG)ESPWG and Transmission Planning Advisory Subcommittee (TPAS) to incorporate inputs from Market Participants and other interested parties.

2.1. Reference Case Development

The first step in the EPP is the development of a set of reference cases for the GE-MAPS production cost model. ThisAs described in Section 2.1.2, this will first entail the benchmarking of the production cost model utilizing historic actual data and then the development of model inputs for reliability and economic assumptions, such as fuel and emission forecasts for the twenty-year Study Period, as described in Section 2.1.3.

Of the reference cases developed in this process, the NYISO will use the base case for its performance of its analysis for the Outlook and, which base case also will serve as the model for the evaluation and consideration of any Regulated Economic Transmission Projects in the Economic Planning Process.Transmission Project Evaluation. In addition to this base case, the NYISO may develop additional reference cases for informational purposes, including but not limited to a contract case and a policy case. These additional reference cases may be established to provide insights based on different assumptions, such as the impact of renewable procurements and policy drivers. The creation of each reference case will include the development of a GE-MAPS production cost model for each case.

For each planning cycle for the Outlook, the NYISO will discuss the development of the reference case(s) for that cycle with stakeholders at the ESPWG, including the development of any reference cases in addition to the base case. During the development of the reference case models, Market Participants, Developers, and other parties shall provide, in accordance with the schedule set forth in the ISO Proceduresas described in Section 31.3.1.4 of Attachment Y of the OATT, the data necessary to establish the proper modelling assumptions.

2.1.1. Study Period

Per Section 31.3.1.3.1 of the ISO OATT, the Study Period for the Economic Planning Process shall be twenty years, with year one being the first year or the second year of the current biennial Comprehensive System Planning Process, as determined by the NYISO in consultation with stakeholders.

2.1.2. Benchmarking of the Production Cost Model

The NYISO will commence the Outlook process by benchmarking the NYISO's most recent production cost model against a single year of historic actual data. The NYISO will benchmark the production cost model for the most recent historic year in which data is available. The NYISO will compare select production cost simulation metrics against the NYISO system's actual performance, adjust the model to improve performance, and present the benchmark results to stakeholders at the ESPWG. The NYISO will use the updated production cost model for the reference case(s) for that cycle.

2.1.3. Base Case

The NYISO will develop the base case using the assumptions and process described in this section and present to stakeholders for review and discussion. The assumptions fall into two categories: 1) reliability assumptions concerning security and adequacy; and 2) economic assumptions, such as fuel price and demand forecast.

2.1.3.1. Reliability Assumptions for the Base Case

The NYISO will develop the assumptions related to reliability for the Outlook base case consistent with the case from the most recent Reliability Planning Process ~~or~~and the Short Term Reliability Process, ~~and~~as updated according to base case inclusion rules in Section 3.2 of the Reliability Planning Process Manual, except as described below. The reliability assumptions generally concern either resource adequacy or transmission security:

- The NYISO will use assumptions related to resource adequacy, such as transmission topology, consistent with those used in the Reliability Planning Process and the Short Term Reliability Process. Specifically, resource and facility addition and deactivation assumptions will follow the principles below:
    - Resource and Facility Additions: All new projects that meet the base case inclusion rules in Section 3.2 of the Reliability Planning Process Manual at the time of finalizing the System and Resource Outlook base case will be included in the base case pursuant to their proposed in-service dates.

- Generation Deactivations The NYISO will develop the base case for the Outlook using the most recent Reliability Planning Process and the Short Term Reliability Process, as updated according to base case inclusion rules in Section 3.2 of the Reliability Planning Process Manual except for the following conditions:

  - If a Generator Owner submitted a completed Generator Deactivation Notice to the NYISO and the study assessment is still underway prior to the base case database lockdown date, the base case will retain the unit. If the Short-Term Assessment of Reliability study assessment found no reliability needs prior to the database lockdown date, the unit will be deactivated as requested.

  - ~~If a Generator is operating in accordance with an RMR agreement or RSSA, the Economic Planning base case will retain the unit until a permanent solution is in place to resolve reliability needs.~~

- The NYISO will use assumptions related to transmission security, such as transmission network model and interface limits, consistent with Reliability Planning Process and market and grid operation practices, as expanded to include monitored constraints and contingency pairs either observed in historical market operation or identified in planning and operation studies. In addition, the NYISO will coordinate with the Transmission Owners to incorporate the Transmission Owners' Local Transmission Owner Plans and model the non-BPTF portion of the New York State Transmission System.

2.1.3.2. Treatment of Reliability Needs in Base Case

The Study Period for the Economic Planning Process is 20 years. This Study Period is greater than the Study Period for both the Reliability Planning Process and the Short-Term Reliability Processes, which evaluate 10 years and 5 years, respectively. The base case for the Outlook will assume a reliable system throughout the Study Period covered by the most recent Reliability Planning Process ~~or~~and the Short-Term Reliability Process. If any reliability needs in the Study Period for the Reliability Planning Process ~~or~~and the Short-Term Reliability Process (*i.e.*, a Reliability Need identified in the Reliability Planning Process or a Short-Term Reliability Process Need identified in the Short-Term Reliability Process) remain unresolved at the time the Outlook is conducted, the ~~base case for~~NYISO will take the ~~Outlook will incorporate sufficient compensatory MW~~ actions set forth in Section 2.1.3.2.1 of this Manual to resolve ~~those~~the reliability needs for the Reliability Planning Process ~~or~~and the Short-Term Reliability Process Study Period~~. The NYISO will start with the most recently approved base cases from the Reliability Planning Process orShort-Term~~

Reliability Process and update it in according to base case inclusion rules in Section 3.2 of the Reliability Planning Process Manual if necessary.

The NYISO does not assess reliability needs or compensatory MW for the remainder of the Economic Planning Process Study Period. However, if resource shortage is anticipated in the Economic Planning Process Study Period, the NYISO may adjust load and resources in the remainder of the Economic Planning Process Study Period in the base case and/or scenarios, and will review the adjustment with stakeholders.

2.1.3.2.1 Process for Resolving Reliability Needs for Initial 10 Years of Economic Planning Process Study Period

In the event that a reliability need is identified in the most recent Reliability Planning Process or Short-Term Reliability Process, the NYISO will include in the base case market-based solutions that the NYISO has determined are viable solutions ("MBS"), regulated solutions, and/or generic generation capacity, in the order listed, to resolve the identified needs. Generic generators will be modeled using representative data provided in the most recent NYISO Installed Capacity Demand Curve report.

The four possible outcomes that may result from the Reliability Planning Process orand the Short-Term Reliability Process are as follows:

- More than sufficient MBS to meet any identified reliability needs;
- Sufficient MBS to meet any identified reliability needs;
- Insufficient MBS to meet any identified reliability needs; or
- No reliability needs identified through the applicable 510-year or 10-yearreliabilityreliability Study Period or the NYISO determined not to solicit a solution in the most recently completed reliability study processprocesses

The NYISO will use the following methodologies to address each of the four possible outcomes:

1. More Than Sufficient Viable MBS to meet any identified reliability needsMeet Any Identified Reliability Needs:
   - The NYISO will consider all viable MBS resources from the current Reliability Planning Process orand the Short-Term Reliability Process for inclusion in the base case, unless the NYISO determines, based upon updated information, that such resource is no longer viable.
   - The NYISO will "scale back" MBS resources to a level which is the minimum to meet the reliability need (i.e. to achieve a statewide Loss Of Load Expectation (LOLE) metric of 0.1) by the following methodology:

- The NYISO will sort all MBS by size—from largest to smallest—regardless of resource type.
- The NYISO will sequentially test each MBS, one at a time for potential removal, starting from the largest and ending with the smallest.
- The NYISO will remove an MBS from the base case if:
  - There is a surplus in the actual locational reserve and the removal of the resource would not result in the locational reserve falling below the ~~LCR.~~Locational Capacity Requirement (LCR).
  - If the starting point is below a LCR, MBS resources will not be added to meet that LCR. However, MBS resources will not be removed that causes the locational reserve to fall to even lower levels.
  - Statewide LOLE requirement is still met.
  - Any minimum requirements for a specific interconnection point for MBS resources identified in the Reliability Planning Process ~~or~~and the Short-Term Reliability Process to maintain transmission security requirements is met
- If either the Statewide LOLE or the LCR requirement is not met with the removal of a specific unit, then that unit is retained in the base case, and the removal of the next unit is tested
- If both the Statewide LOLE and the LCR requirements are met with the removal of a unit, that unit is removed from the base case, and subsequent units will be tested sequentially in the same manner
- The initial determination will be made for the horizon year (e.g. – year 10) of the analysis.
- Considering each project's in-service date, the NYISO will verify each year of the study period to assure that both the Statewide LOLE and the LCR reliability criteria will be met (subject to the caveat that resources will not be added to achieve an LCR that is not met at the starting point).
  - If more resources are needed, the NYISO will add back resources starting with the smallest resource removed and adding each next largest resource until the above requirements are met.
- The NYISO will determine the minimum amount of MBS capacity needed to meet both the LCR and the statewide LOLE requirements.

2. Sufficient Viable MBS to meet any identified reliability needs and no regulated solution is requiredMeet Any Identified Reliability Needs:
   - In the case that there are sufficient MBS to just meet the statewide LOLE of 0.1, the NYISO will include in the base case all of the MBS resources consistent with the current Reliability Planning Process orand the Short-Term Reliability Process.
   - The NYISO will make this determination based on whether the removal of any single MBS will cause the statewide LOLE to exceed 0.1.
3. Insufficient Viable MBS to Meet Any Identified Reliability Needs and Regulated Solutions or Generic Generator Capacity Are Required:

3. If there are insufficient viable MBS to meet any identified reliability needs and regulated solutions are required:
   - In this situation, the NYISO will include in the base case the combination ofin the order listed: (i) any viable MBS resource(s) and), (ii) regulated solutions [selected by the ISONYISO in the most recent Reliability Planning Process orand the Short-Term Reliability Process] (whether or not yet triggered) as), and (iii) generic generation capacity, as the solutions are necessary for a reliable system over the applicable 10-year or 5-year planning horizon. Generic generators will be modeled using representative data provided in the most recent NYISO Installed Capacity Demand Curve report.
4. No Reliability Needs or NYISO Elects Not to Solicit Solution in Planning Process:
   - If the current Reliability Planning Process orand the Short-Term Reliability Process finds no reliability needs throughout the applicable 10-year or 5-year study period or the NYISO determined not to solicit a solution in the most recently completed reliability study process, the NYISO will include in the base case all resources included in the current Reliability Planning Process orand the Short-Term Reliability Process base case, unless the NYISO determines, based upon updated information, that such resource is no longer viable.

2.1.3.3. Economic Assumptions for the Base Case

The economic assumptions for the base case will be developed based on publicly available data, and may be calibrated by incorporate Market Participant confidential data to improve the database accuracy. The economic assumptions include, but not limited to, the following categories:

- Load & Energy Forecasts: Forecasts for New York Control Area will be consistent with the most recent NYISO issued Load and Capacity Data Report.

- Fuel Forecast: Regional natural gas price forecast will be based on recently published national annual forecasts with regional and weekly adjustments applied.

- External area assumptions: assumptions such as demand, energy, resource addition and retirement of neighboring control area will be based on recent publicly available data, such as the interconnection queues, or results from the forward capacity market auctions.

- Carbon Policies/Emission Forecast: The allowance price forecasts will be consistent with the projected environmental program compliance costs attributed to current state or federal regulations, such as CO_2 emissions reduction program (e.g., Regional Greenhouse Gas Initiative, New York Department of Environmental Conservation guidance, Massachusetts, and Ontario compliance costs), and SO_2 and NO_X emission reduction programs (e.g., CSAPR markets).

2.1.4. Contract Case

If the Outlook includes the contract case, the NYISO will extend the inclusion rules for generation and transmission resources beyond what is assumed in the base case. This is intended to capture high probability projects that did not meet the base case inclusion rule requirements within the NYCA and in directly neighboring systems. These projects typically have been selected through a procurement process and may have a financial contract in place., including awards announced in solicitations pursuant to State-supported programs. The reliability and economic assumptions for the contract case may be updated accordingly in coordination with NYISO stakeholders.

2.1.5. Policy Case

If the Outlook includes the policy case, the NYISO will build off of the contract case assumptions and include additional assumptions pertaining to policies that impact the power system, electricity markets, and grid operations in New York. The reliability and economic assumptions for the policy case may be updated accordingly in coordination with NYISO stakeholders.

2.2. Scenario & Sensitivity Development

The NYISO will, time permitting, identify additional scenarios and sensitivities to be simulated based on the reference case(s) in accordance with Section 31.3.1.5 of Attachment Y of the ISO OATT. The NYISO will work with stakeholders through ESPWG to identify potential sensitivities and/or scenarios and will determine which to perform based on stakeholder interest level and time requirements.

2.3. Benefit Metrics for System & Resource Outlook Studies

The NYISO performs production cost simulations for the reference cases, scenarios, and sensitivities. Each simulation produces a set of benefit metrics that detail for stakeholders key information on the various outputs of the production cost model. These metrics can be utilized by stakeholders in estimating the potential benefits of projects ~~across~~through multiple ~~dimensions,~~variables such as ~~temporal~~time, geographic location, and across scenarios.

The NYISO Tariff defines ~~the~~ system production cost as the primary metric in the Economic Planning Process ~~and the~~, which metric is also utilized in determining the benefit-cost ratios for a Regulated Economic Transmission Project~~.~~ in the Economic Transmission Project Evaluation. The NYISO calculates a "NYCA-wide" production cost through its production cost simulations to identify changes in system cost, which incorporates the total generation cost of producing power to serve NYCA load. The total production cost includes the following components:

1. Fuel cost (fuel consumption mmBtu multiplied by fuel cost $/mmBtu);
2. Variable O&M cost (VOM adder $/MWh);
3. Emission cost (emission allowance price multiplied by total allowance);
4. Start-up Costs (number of starts multiplied by start-up cost); and
5. NYCA Imports and Exports evaluated at the solution case proxy bus LBMP values.

~~When~~For purposes of determining the present value of the NYCA-wide production cost over the Study Period, the ~~calculation~~NYISO will ~~be determined in accordance with~~use the following formula:

$$Present\ Value_{Total} = \sum_{y=1}^{20} Present\ Value_{Year\ y}$$

The discount rate to be used for the present value analysis shall be the current after-tax weighted average cost of capital for the Transmission Owners.

Additional metrics are also calculated in the production cost ~~simulation~~simulations for the reference cases and represented for stakeholder information. These metrics~~, while they are not utilized in the benefit-cost ratio, do~~ provide stakeholders with ~~a wider view of~~important insights concerning the ~~potential impacts of a project~~New York State Transmission System, which metrics are reported in the Outlook. .

Section 31.3.1.3.5 in Attachment Y to the OATT provides a detailed discussion of each of the additional metrics. The energy deliverability metric is described further in Section 2.7 below. These additional metrics are not used in the benefit-cost ratio for the Economic Transmission Project Evaluation.

2.4. Historic & FutureProjected Transmission System Congestion

As part of the System & Resource Outlook, the NYISO develops estimates of historic and projected transmission system congestion. Transmission congestion limits the economic transfer of energy between generation resources and demand, creates inefficient generation commitment and dispatch, causes generation curtailment, and increases the cost of electricity when lower variable cost resources cannot be delivered to consumers. It is important to understand and quantifySuch information provides key insights for understanding and quantifying: existing system resources, the expected buildout of renewable generation to comply with State mandates, including awards announced in solicitations pursuant to State-supported programs, other generation resources, and, as a result, the past historic, existing, and projected transmission congestion patterns, including the identification of specific congested paths, impacting the New York Control Area.

As part of the System & Resource Outlook, the NYISO develops estimates of historic and projected transmission system congestion, which concerns the following congestion:

- Historic Transmission System Congestion – the historic transmission system congestion concerns congestion for the prior five year period. The historic actual transmission congestion metrics for constraints that were active in the NYISO's market are currently posted publicly on a quarterly basis to the NYISO website.[4] This data serves as the basis for the historic transmission system congestion analysis.

- Projected Transmission System Congestion – the projected transmission system congestion concerns congestion identified over the forward-looking, 20-year Economic Planning Process Study Period, which congestion is identified through the NYISO's production cost simulations.

The NYISO will use two metrics used to quantify the impact of specific congested transmission elements are : for both historic transmission system congestion and projected transmission system congestion (i) demand congestion and (ii) constrained hour count.

[4] See https://www.nyiso.com/ny-power-system-information-outlook/ > Congested Elements Report.

- The demand congestion value of a transmission constraint represents the congestion component of the LBMP paid by NYCA load (sum of the total zonal loads) and is defined as the shadow price[5] of each constrained element multiplied by the load affected with consideration for zonal Generator Shift Factors (GSF). The formula used to calculate the demand congestion value of a transmission constraints is as follows:

$$\textbf{Constraint Demand Congestion} = \sum_{Hour\ h}^{8760} \sum_{Zone\ i}^{Zone\ K} Shadow\ Price_{i,h} \times Zone\ GSF_{i,h} \times Zone\ Load_{i,h}$$

- The constrained hour count metric represents the annual number of hours that a specific transmission constraint is active.

Historic actual transmission congestion metrics for constraints that were active in the NYISO's market are currently posted publicly on a quarterly basis to the NYISO website[6]. This data serves as the basis for the historic transmission congestion analysis.

For the historic five year period, the NYISO will compile individual transmission constraints are compiled and reportedwill report them in descending order according to their demand congestion value. The NYISO assesses and identifies transmission constraint groupings based on the individual rankings and proximity of congested elements.

Using the simulation results from each of the reference cases (base, contract, and policy), the NYISO will also compile, rank, and group the 20-year projected transmission constraints. ProjectedThe projected transmission system congestion is then combined with congestion data from the historic analysis. The congested elements for the full twenty-five year period (both historic (5 years) and projected (20 years)) are ranked in descending order based on trends in the calculated present value of demand congestion for further assessment. The ranking is then adjusted to exclude any element when future system changes produce a significant declining trend in congestion over such congested element in later years of the study period. Likewise, elements with significant increasing trend in congestion could also be evaluated.

[5] Shadow price is a term used in economic theory to describe the monetary value of goods or services that are difficult to calculate and lack a clear market signal. In power markets where optimization engines determine security constrained economic dispatch, shadow prices are defined for transmission constraints and represent the production cost savings achieved by relaxing the constraint limit by 1 MW. Shadow prices are an indicator of the economic impact that binding transmission constraints have on a power market. For the demand congestion metric, by multiply the shadow price by zonal GSF and zonal load, the economic impact of transmission constraints can be separated into the impact on specific NYISO zones.

[6] See https://www.nyiso.com/ny-power-system-information-outlook/ > Congested Elements Report

2.5. Congestion Relief Analysis

The operational and economic impact of transmission congestion on the New York State Transmission System can be quantified through congestion relief analyses. ~~With~~Using the projected potential future constraints and groupings initially identified for the reference case simulations, as described in Section 2.4 above, the NYISO will perform additional simulations to further analyze transmission paths as warranted to identify the change in benefit metrics, and review with ESPWG to identify the reference cases and specific constraints for study.

To perform the constraint relief analysis, selected individual or groups of congested elements are iteratively relieved independently by relaxing their respective limits. For each binding constraint that has been relaxed, the production cost model ~~is re-run~~will be re-run for the base case, and may be re-run for other reference cases, to produce results that reflect the system conditions that would occur were that transmission element not congested. By comparing this information with the ~~associated~~information determined for the same reference case when the production cost model was initially run, the economic and operational impact of the constraint can be determined. The metrics used to evaluate the impact may include production cost, demand congestion, LBMP, and energy deliverability.

Another part of the constraint relief analysis will determine if any of the congested elements must be grouped with other elements, depending on whether new elements appear as limiting with significant congestion when a primary element is relieved.

The findings from the congestion relief analysis will assist the NYISO in determining transmission flow behaviors during the energy deliverability analysis, as described in Section 2.7. In addition, the congestion relief analysis will also assist Market Participants, stakeholders, and other interested parties in identifying potential transmission projects so as to avoid future constraints prospectively.

2.6. Renewable Generation Pocket Formation

When specific areas of the New York State Transmission System contain one or more constrained transmission elements, preventing renewable energy resources from dispatching based on their availability, a renewable generation pocket exists. As part of the System & Resource Outlook, the NYISO will use the metrics and results ~~from~~concerning the ~~future~~projected system transmission congestion ~~projection~~ in the reference case(s~~)~~), as described in Section 2.4, to identify, define, quantify, and visualize the potential renewable pockets formed. In consultation with the stakeholders in the ESPWG, the NYISO will identify the reference case(s) simulation year(s) and the potential need for seasonal assessments for renewable pocket determination in each Outlook study.

To define a renewable generation pocket, the NYISO will first identify the specific renewable generators that experience curtailment throughout the study period being analyzed. Where needed, the NYISO will conduct a seasonal analysis ~~well be conducted~~ to account for factors specific to certain resource technologies. The NYISO will use the GE-MAPS generation shift factor report (YRGSF) ~~will be used~~ to identify the specific transmission constraints directly contributing to the curtailment of renewable generation resources. This can include multiple lines and multiple impacted generators from each congested transmission line. The NYISO will qualitatively and, if warranted by the degree of the constraint, quantitatively collect transmission constraints causing curtailed generation and other electrically similar transmission paths into a grouping to form a renewable generation pocket. When reporting the findings of this analysis the NYISO will identify specific transmission paths comprising each renewable generation pocket, such as interface(s) or circuit(s), and the NYISO will consider other measures to help stakeholders understand the results, such as providing a graphical representation of the identified renewable pockets.

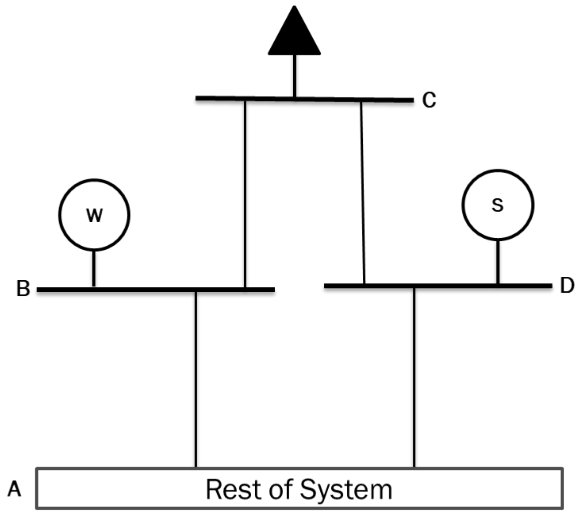
2.7. Energy Deliverability Analysis

The NYISO will evaluate the relationship between transmission congestion and the operation of resources throughout the system utilizing an energy deliverability metric. This metric will consider potential seasonal factors and account for the respective fuel availability of each ~~Resource~~resource type, including wind, solar, and water~~, and~~. In addition, the metric will quantify the energy projected to be produced by such ~~Resource~~resource considering the impact of applicable local, statewide, and interregional transmission constraints as compared to the total amount of energy it would otherwise produce absent transmission constraints. The NYISO will use the following formulation ~~used~~ to determine energy deliverability for each resource on the system ~~is as follows~~:

$$Energy\ Deliverability\ (\%) = \frac{Energy\ Production}{Energy\ Production\ Capability}\ x\ 100$$

~~Data~~The NYISO will use data from production cost simulations ~~will be used~~ to quantify the collective impact of resources on energy deliverability at locations on the system that are identified as being constrained. ~~Generation~~ The NYISO will use generation shift factors~~,~~ (GSF), which quantify the incremental impact of generation on the flow of transmission facilities, ~~will be used~~ to identify groupings of generators with similar energy deliverability impacts. ~~Information~~The NYISO will provide information on the collective impact of transmission congestion on resource groupings ~~will be provided~~.

~~Shown below~~Below is an illustrative example system with a load, wind generator, and solar generator interconnected by four transmission lines and 3 buses. The example network is assumed to connect to a larger bulk power system.



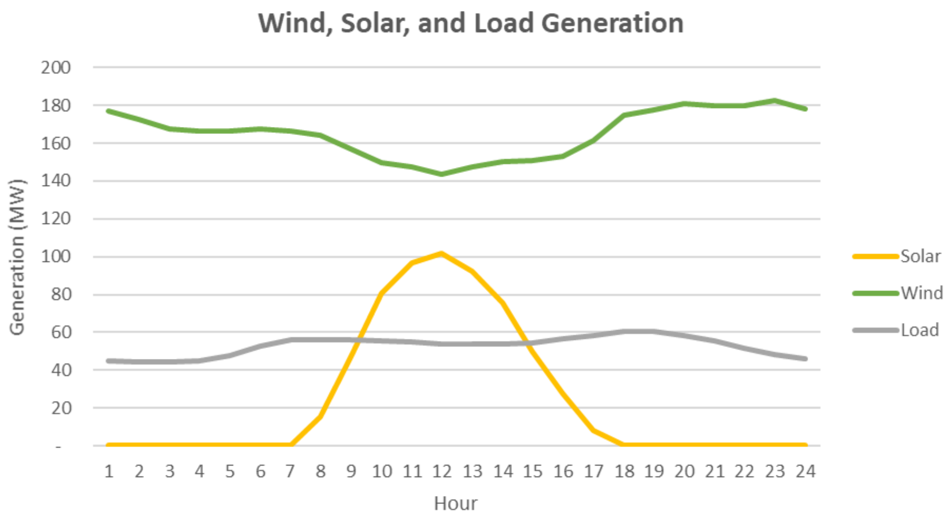
Parameter	Value
Wind “W” Capacity	500 MW
Solar “S” Capacity	250 MW
Load	100 MW
Line Limits	100 MW

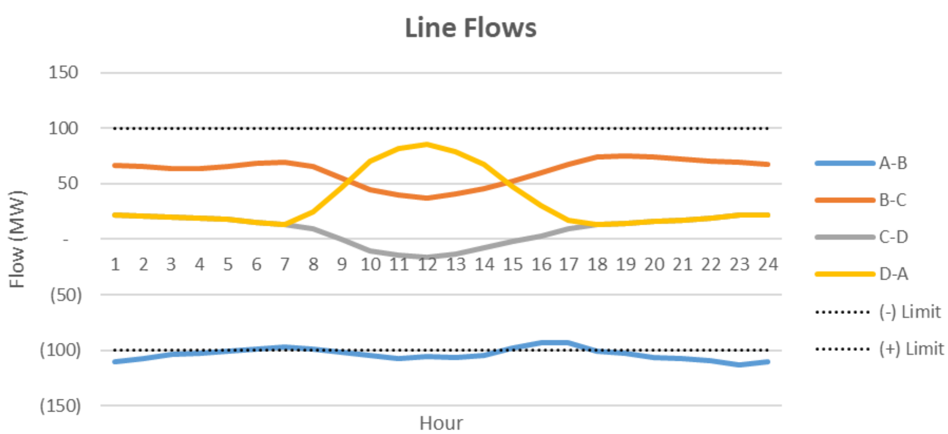
Transmission line flows on the example system are dictated by the electrical impedances of the transmission lines, which are assumed to be equal in this example. In this example, assuming that bus “A” acts as the reference point, if the wind generator at bus “B” produced 1 MW, 0.75 MW would flow on line “B-A” and 0.25 MW would flow on lines “B-C”, “C-D”, and “D-A”. The full set of relationships between generators and the transmission system can be captured through a generation shift factor matrix. The GSF matrix for this example system is show below:

GSF Matrix	A-B	B-C	C-D	D-A
Wind	-0.75	0.25	0.25	0.25
Solar	-0.25	-0.25	-0.25	0.75
Load	0.5	0.5	-0.5	-0.5

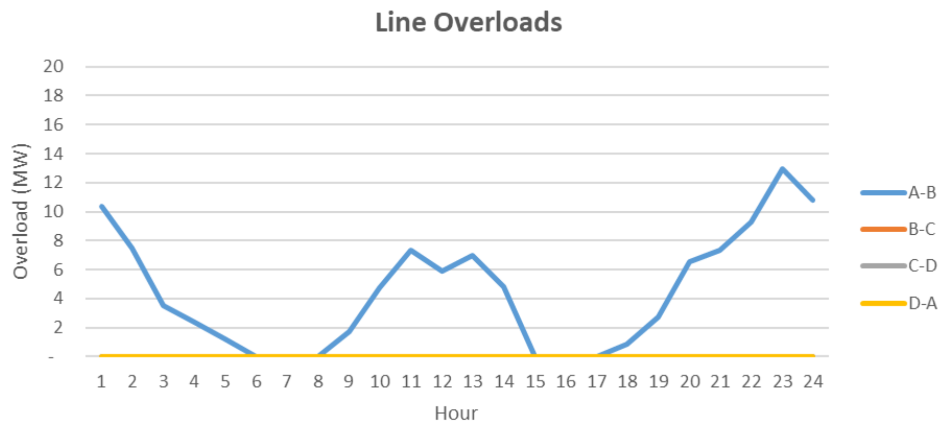
~~Note that~~ GSF values must be between the values of 0 and 1, positive or negative, depending on the defined direction of the transmission line.

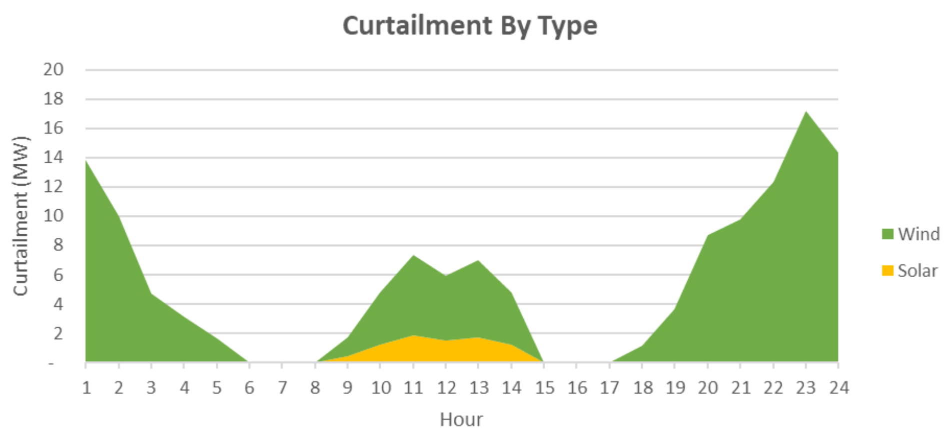
With the example system defined, a representative day of generator and load dispatch values can be applied to evaluate the transmission flows compared to their limits. This allows transmission constraints and generator curtailments to be identified. The charts below show an example 24 hour period of generator dispatch and transmission line flows.





The charts show the interaction between the transmission system and the varying dispatch patterns of these generators~~.~~. For the “A-B” transmission line, ~~it can be noted that~~ the flow exceeds the line limit of 100 MW. As a result, absent upgrades, the generators contributing to the line limit violation must be curtailed to reduce the flows to fall within operating limits. The charts below quantify line “A-B” overload levels and the required curtailment levels of the wind and solar generators where the current infrastructure would be sufficient to keep the transmission system within its limits.





~~Note that, for~~For this example system, if only one of the technology types is producing energy at the time of line overloads, the amount of curtailment necessary to remedy line overloads will exceed the overload amount. This is due to a particular ~~generators~~generator's shift factor relationship to the overloaded line. The interrelationship between the specific unit or units operating in a given period and the required level of curtailment to bring the system within criteria will be captured.

Using the 24-hour period from this example, the energy deliverability metric can be calculated for each of the technology types. The table below shows the potential energy, curtailed energy, actual energy, and energy deliverability metrics relevant to this example.

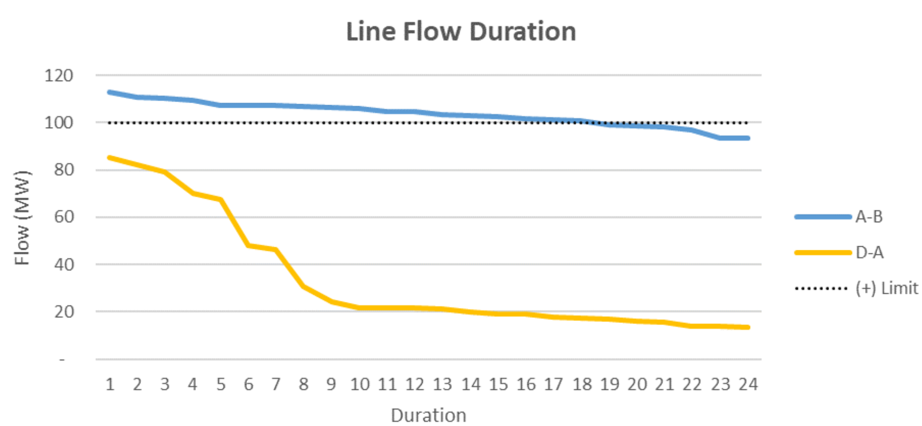
Energy (MWh)	Potential	Curtailment	Actual	Energy Deliverability (%)
Solar	595	8	587	99%
Wind	3,963	124	3,839	97%

The potential energy deliverability metric shows the total amount of energy that each resource could produce absent transmission constraints. The actual energy metric projects the energy -each resource will produce considering the curtailed energy metric, which will be impacted by applicable local, control area-wide, and interregional transmission constraints. Where warranted, seasonal impacts will be quantified.

Where applicable, the energy deliverability metric ~~may~~will also include quantification of the collective impact of ~~Resources~~resources at locations on the system that are identified as being constrained, in whole or in part. For example, if the sample system presented were identified as a renewable generation pocket, these metrics can be calculated and presented to produce the overall impact on -the resources taken together. The table below shows the calculation for a renewable generation pocket encapsulating the example system.

Energy (MWh)	Potential	Curtailment	Actual	Energy Deliverability (%)
Pocket	4,558	132	4,426	97%

Where available, resource areas that have been identified will also include such additional information resulting from the study analysis concerning capability remaining on the transmission system to support energy deliverability. The metric may be expressed as a percentage of such total amount of energy or as the amount of curtailed energy. As an example, the hourly flows for line "A-B" and "D-A" can be quantified and compared to the line limit to determine the capability of the line to support additional flows. A flow duration curve for both of these lines during the sample time period is shown below.



In the chart, the area below each curve represents the energy transferred throughout the day over the line. The area above the curve but below the line limit represents the unused capability of the line to transact energy, sometimes known as energy headroom. Any area below a curve but above the line limit represents the transmission line overload, which results in curtailed energy. Calculation of this quantity requires simulations from the congestion relief analysis. These values are quantified in the table below.

Energy (MWh)	Max Flow	Actual Flow	Overload	Headroom	Headroom (%)
Line A-B	2,400	2,487	107	20	1%
Line D-A	2,400	803	0	1,597	67%

While it is not possible to calculate the energy headroom on each line on the system, the NYISO will collaborate with stakeholders to identify a subset of lines that should be considered based on the NYISO's expertise and experience andawards made in State solicitation processes, relevant studies and other updated information concerning system developments that affect energy deliverability. The NYISO will provide the associated energy headroom information respectively.

Energy (MWh)	Max Flow	Actual Flow	Overload	Headroom	Headroom (%)
Line A-B	2,400	2,487	107	20	1%
Line D-A	2,400	803	0	1,597	67%

As part of the analysis, results from simulations may be analyzed to identify electrical, geographic, and/or temporal patterns in energy deliverability.

2.8. System & Resource Outlook Report

The System & Resource Outlook report informs NYISO stakeholders, including its regulators and, Market Participants as well as, and prospective project developers, of the findings of the System & Resource Outlook. In particular, the identification of potential transmission constraints may be used to guide the Public Policy Transmission Planning Process. Additionally, the Reportreport provides potential transmission developers information upon which to decide whether to pursue cost recovery for a Regulated Economic Transmission Project under the NYISO's Tariff.

2.8.1. State of NYISO System & Resource Planning

The Outlook will include a summary of the current assessments, evaluations, and plans in the biennial CSPP and the information and sources relied upon by the NYISO, including, among other things, the following.

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2.8.1.1. Demand ~~Forecasting~~Forecast & Analysis Summary

The NYISO produces the Load & Capacity Data Report ("Gold Book") on an annual basis. The Gold Book details: (i) historical and forecast seasonal peak demand and energy usage, and energy efficiency, electrification, and other distributed energy resources and load-modifying impacts; (ii) existing and proposed generation and other capacity resources; and (iii) existing and proposed transmission facilities. The Outlook will summarize, as applicable, trends concerning energy demand, behind-the-meter resources, and electrification derived from the Gold Book.

2.8.1.2. Public Policy Transmission Planning Process Summary

The NYISO solicits transmission needs driven by Public Policy Requirements on a biennial basis. If the New York Public Service Commission has identified a Public Policy Transmission Need and/or an ongoing solicitation and evaluation of solutions to address a Public Policy Transmission Need is underway, the Outlook will describe any Public Policy Transmission Need and the state of the solicitation and evaluation of proposed solutions in the NYISO's Public Policy Transmission Planning Process.

2.8.1.3. ~~Summary of~~ Reliability Planning Processes Summary

The Short-Term Reliability Process establishes the process by which the NYISO identifies and addresses Short-Term Reliability Process Needs that would result from a Generator's deactivation or other Reliability Needs that cannot be timely addressed in the Reliability Planning Process. The Reliability Planning Process establishes the identification of any Reliability Needs in the Reliability Needs Assessment (RNA), which needs are addressed in a Comprehensive Reliability Plan (CRP). The Outlook will describe the evaluations performed in the Short-Term Reliability Process, the RNA, and the CRP.

2.8.1.4. Interconnection Studies Summary

The NYISO evaluates the proposed interconnection of generators and transmission facilities to the NYISO system. The NYISO maintains an interconnection queue list, which details developer-proposed projects by type, size, location, etc. The Outlook will include a summary of this information.

2.8.2. Report Contents

~~2.8.3.~~ The Outlook may include the following components as described in Section 2 of this Manual, and provides additional information as necessary: State of NYISO System & Resource Planning, Reference

Case Development, Economic Planning Model Development, Historic & Future Transmission Congestion, Congestion Relief Analysis, Renewable Generation Pocket Formation, Energy Deliverability Analysis, Projected Operations & Market Impact Analysis, and Scenarios and Sensitivities. Stakeholder Review and Board Approval of System & Resource Outlook Report

Form
Form

2.9. Stakeholder Review

Form

The NYISO will develop the draft Outlook in accordance with Section 31.3.1.7 of Attachment Y. The requirements for Market Participants' review of the draft Outlook are set forth in Section 31.3.1.8.1 of Attachment Y.

2.10. Market Monitoring Unit's Review

The requirements for the Market Monitoring Unit's review of the draft Outlook are set forth in Section 31.3.1.8.2 of Attachment Y.

2.11. Board Review and Action of System & Resource Outlook Report

The requirements for the NYISO Board of Directors' review and actionactionl on the Outlook are set forth in Section 31.3.1.8.2 of Attachment Y.

2.9.2.12. Public Information Session

Following the BOD's approval of the Outlook, the NYISO is to report on the System & Resource Outlook in an open forum for all interested parties. as set forth in Section 31.3.1.9 of Attachment Y. The NYISO's presentation provides background on the Outlook process as well as a high-level discussion of the study methodology and findings. There is an opportunity for forum participants to ask questions and to engage in a dialogue with NYISO leadership on any aspect of the study.

~~3.~~1. Economic Transmission Project Evaluation (ETPE)

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~~4.~~2. Requested Economic Planning Study (REPS)

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~~5.~~3. Procedure for Study Replication

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Appendix A Typical Reference Case Assumptions Matrix

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Appendix B Requested Economic Planning Study (REPS) Request Form

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Appendix C Requested Economic Planning Study (REPS) Agreement Form

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Appendix D Economic Transmission Project Evaluation (ETPE) Request Form

[Placeholder]

Appendix E Economic Transmission Project Evaluation (ETPE) Agreement Form

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Appendix F Study Replication Request Form

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Appendix G Study Replication Agreement Form

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Appendix H NYISO Developer Qualification Form

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