

Congestion Assessment and Resource Integration Study

A faint background map of New York State is overlaid with a complex network of grey lines representing a power grid. Various nodes in the network are marked with small colored circles in shades of blue, red, and purple.

Henry Chao

*Vice President – System and Resource Planning
New York Independent System Operator*

CARIS Public Forum

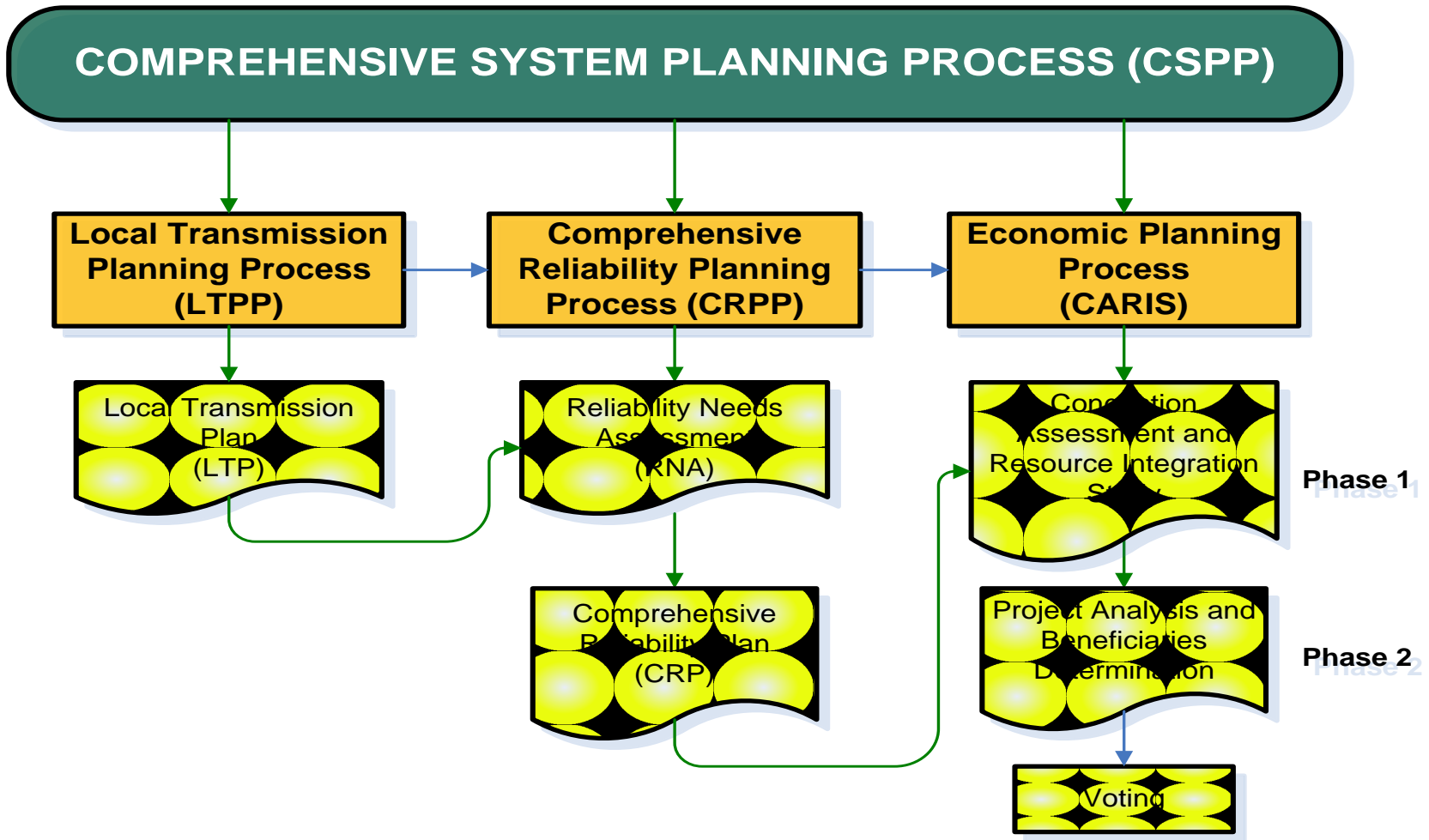
April 30, 2012

Rensselaer, NY

Today's Topics

- ◆ **NYISO Planning**
- ◆ **CARIS Objectives**
- ◆ **CARIS Process**
- ◆ **2011 CARIS Phase 1 Report**
- ◆ **Next Steps - Congestion Relief Solutions**

NYISO Planning



How Various Studies Fit Together

NYISO Ongoing Activities

- *Providing reliability and market information*
- *Proper market design fostering new investment*
- *Tariff: 1) interconnection, 2) planning & 3) transmission cost recovery*

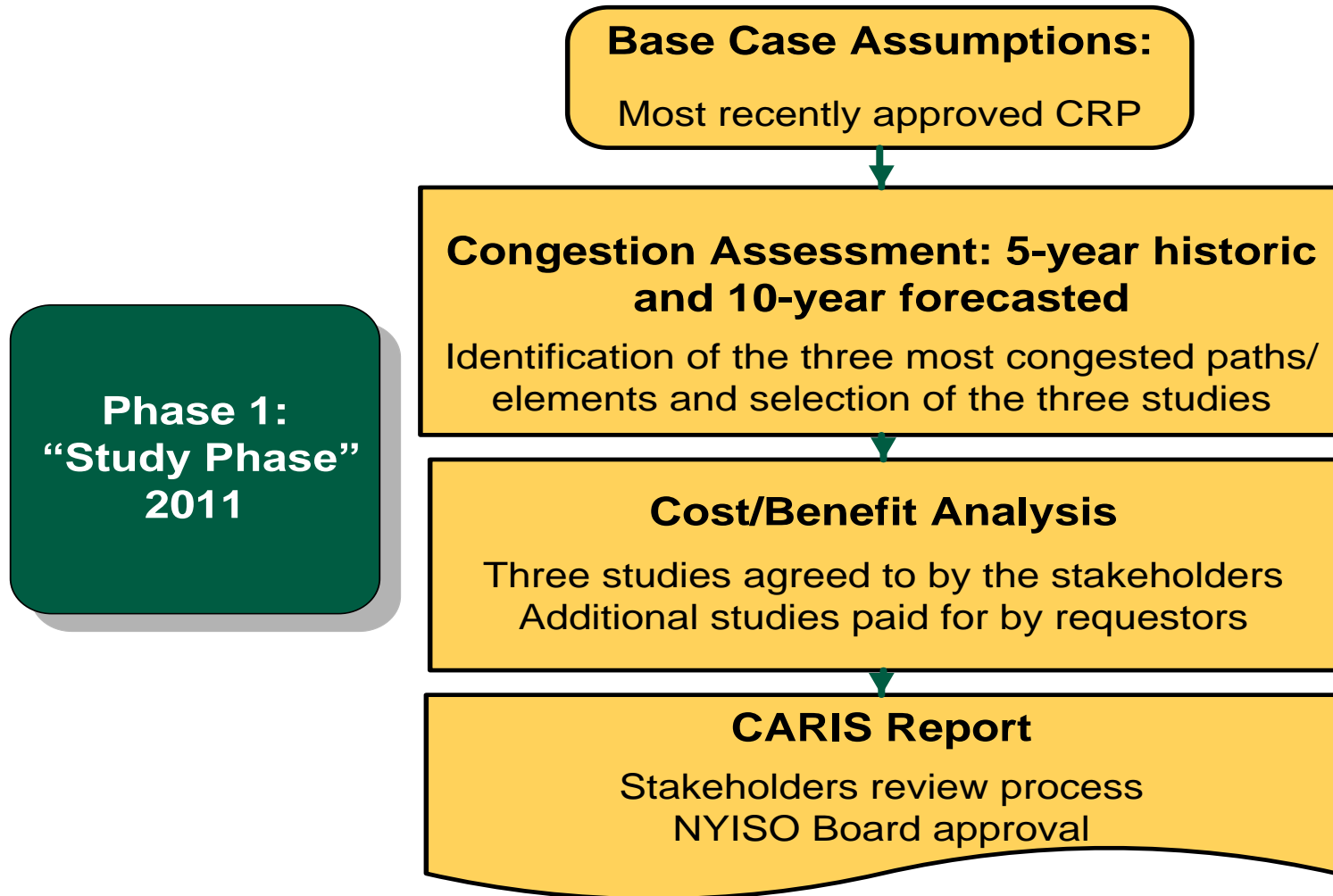
NYISO Project Evaluations

- *System Reliability Impact Studies (SRIS) – 3 Phases*
- *System Impact Studies (SIS) and TCC Allocations*
- *Reliability Planning Studies (CRPP)*
- *Economic Planning Studies (CARIS)*
- *Cost and benefit assessment*
- *Ranking & validation of project benefits*

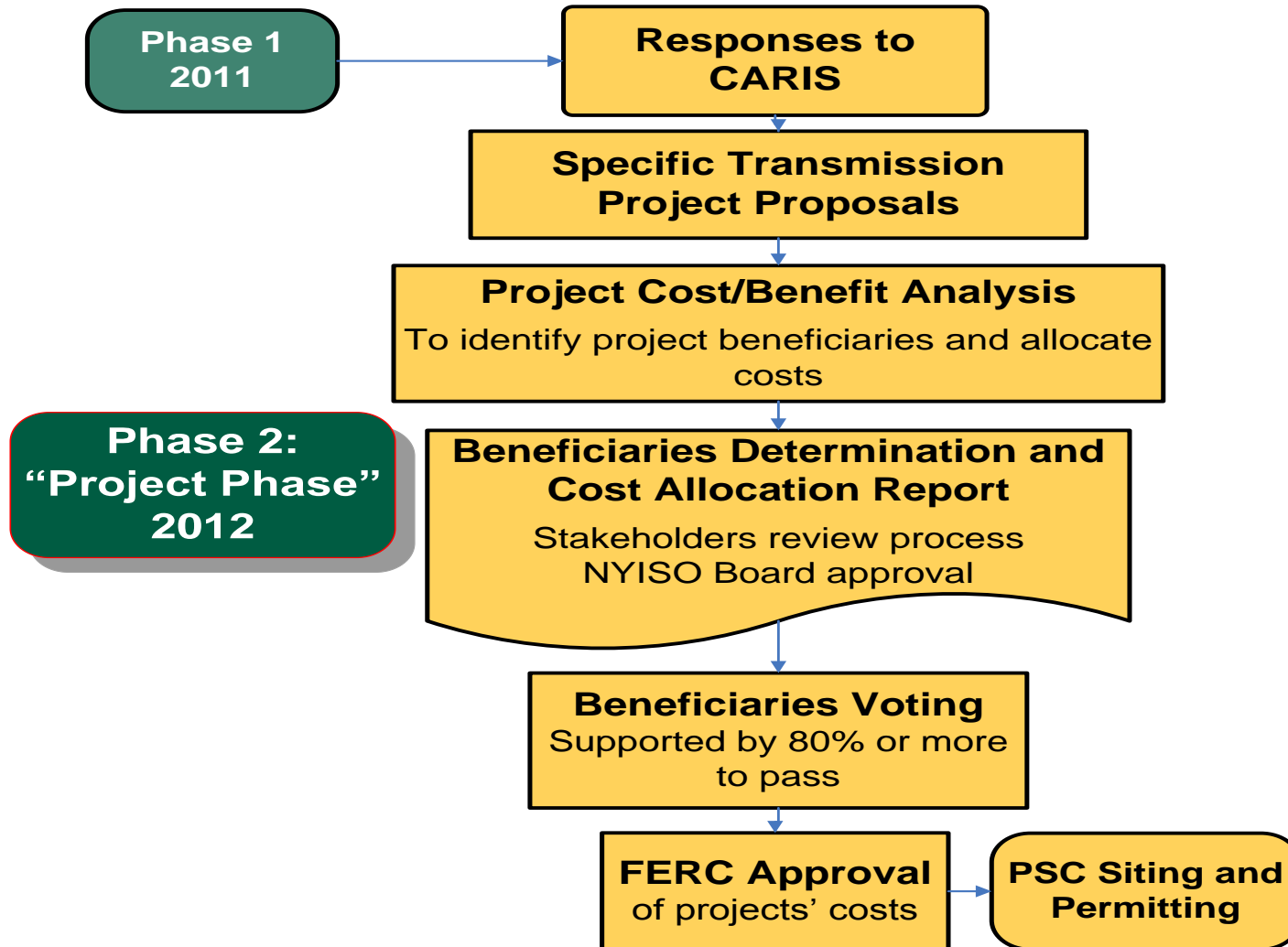
What is CARIS?

- ◆ **Identify congestion on the New York State bulk power system**
 - *Congestion results from physical limits on the transmission system*
 - *Congestion cost is the cost of being unable to dispatch lower priced generation*
- ◆ **Select the congested elements to be studied**
- ◆ **Develop three generic solutions (transmission/generation/demand response) for each of the three studies to mitigate identified congestion**
 - *Provide cost and benefit analysis*
 - *Provide scenario analysis to determine the impact of uncertainties*
- ◆ **Provide study results to interested parties to develop projects (transmission/generation/demand response) to relieve congestion**
- ◆ **For proposed transmission projects, identified beneficiaries vote to approve cost recovery through the NYISO Tariff**

CARIS Process Phase 1



CARIS Process Phase 2



2011 CARIS Phase 1 Report

- ◆ Identification of the most congested elements and selection of the three CARIS studies
 - *5-year historic and 10-year projected*
- ◆ Application of Generic Solutions
 - *transmission, generation, and demand response for each of the three studies*
- ◆ CARIS metrics
 - *production costs as the primary metric and 6 additional metrics*
- ◆ Benefit/Cost analysis
 - *High, Medium, and Low cost estimates for each solution*
- ◆ Scenarios
 - *Eight scenarios analyzed*

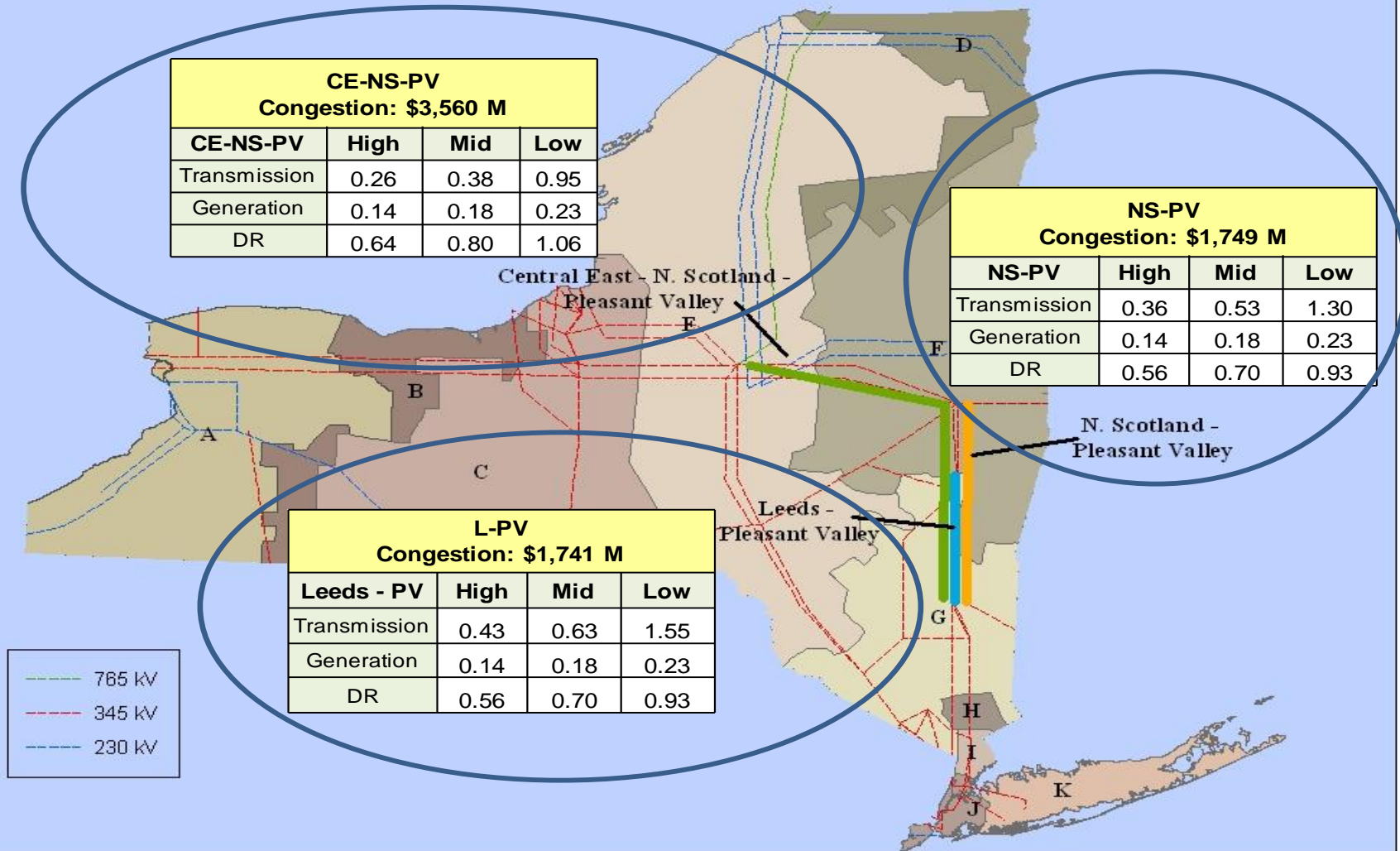
Congested Elements Studied

- ◆ Selection based on largest potential reduction in production costs
 - *Study 1: Central East – New Scotland – Pleasant Valley*
 - *Study 2: New Scotland – Pleasant Valley*
 - *Study 3: Leeds – Pleasant Valley*

Benefit/Cost Analysis

- ◆ **Measured by projected reduction in production costs divided by estimated costs of a solution**
- ◆ **Evaluated Generic Transmission, Generation, and Demand Response solutions at High, Mid, Low cost estimates**
- ◆ **Determined that net benefits can be found for certain cases of low-cost estimates of generic transmission and generic demand response**

Generic Solutions: Benefit-Cost Ratios



Additional Metrics and Benefits

- ◆ **Other benefits are provided for informational purposes -- but are not included in the B/C ratio.**
- ◆ **Other potential benefits include reduced ICAP costs, lower emissions, value of TCCs created, reduced losses, generator payments, and load payments.**
- ◆ **Solutions could enable enhanced use of upstate resources, as well as renewable resources in NYS and Canada -- however these additional resources are not modeled in the 2011 CARIS base case.**

Next Steps

- ◆ **Prepare model and database for CARIS Phase 2 and CARIS Additional Studies**
- ◆ **Perform Additional CARIS Studies**
- ◆ **Perform Project-Specific CARIS Phase 2 studies**

Appendix for Public Forum: 2011 CARIS Phase 1 Report

A faint, light-colored map of New York State is overlaid with a complex network of lines and nodes, representing the state's transmission system. The nodes are marked with small colored dots in red, blue, and purple, and the lines represent transmission lines connecting these nodes across the state.

*Howard Tarler
Manager, Long Term Planning
New York Independent System Operator*

Management Committee
*February 23, 2012
Rensselaer, New York*

Topics

- ◆ **Objectives of NYISO's Economic Planning Process (CARIS)**
- ◆ **2011 CARIS Phase 1 Development**
- ◆ **CARIS Phase 1 Results**
- ◆ **Next Steps**

CARIS Phase 1 Objectives

- ◆ Identify and report congestion
 - *5-year “historic” congestion*
 - *10-year “projected” congestion*
- ◆ Provide information to stakeholders, developers & other interested parties
 - *Select top congested transmission elements*
 - *Project benefits of relieving the top 3 congested elements or groupings using generic solutions*
 - *Identify factors that produce or increase congestion*

CARIS Phase 2 Objectives

- ◆ **Provide a process to evaluate specific projects designed to reduce congestion identified in CARIS Phase 1**
 - *Additional CARIS Studies are available to all interested parties and for all solution types*
 - *Actual Project Studies for regulated economic transmission projects*
 - Only qualified transmission projects may be evaluated
 - Cost allocation and cost recovery proceeds through the NYISO tariff for qualified transmission projects that receive 80 % vote of the identified beneficiaries

CARIS Phase 1 Development

- ◆ **Base case assumptions are developed for the 10-year study period (2011-2020) pursuant to CARIS procedures and in collaboration with stakeholders at ESPWG & TPAS**
- ◆ **Changes from 2009 CARIS included**
 - *Updated forecasts of load, fuel cost, and emissions allowance costs*
 - *Additional resources*
 - *Modeling changes such as Central-East Interface Transfer Limit, Ramapo PARS, flat hurdle rates*

Calculating NYCA-wide Production Cost

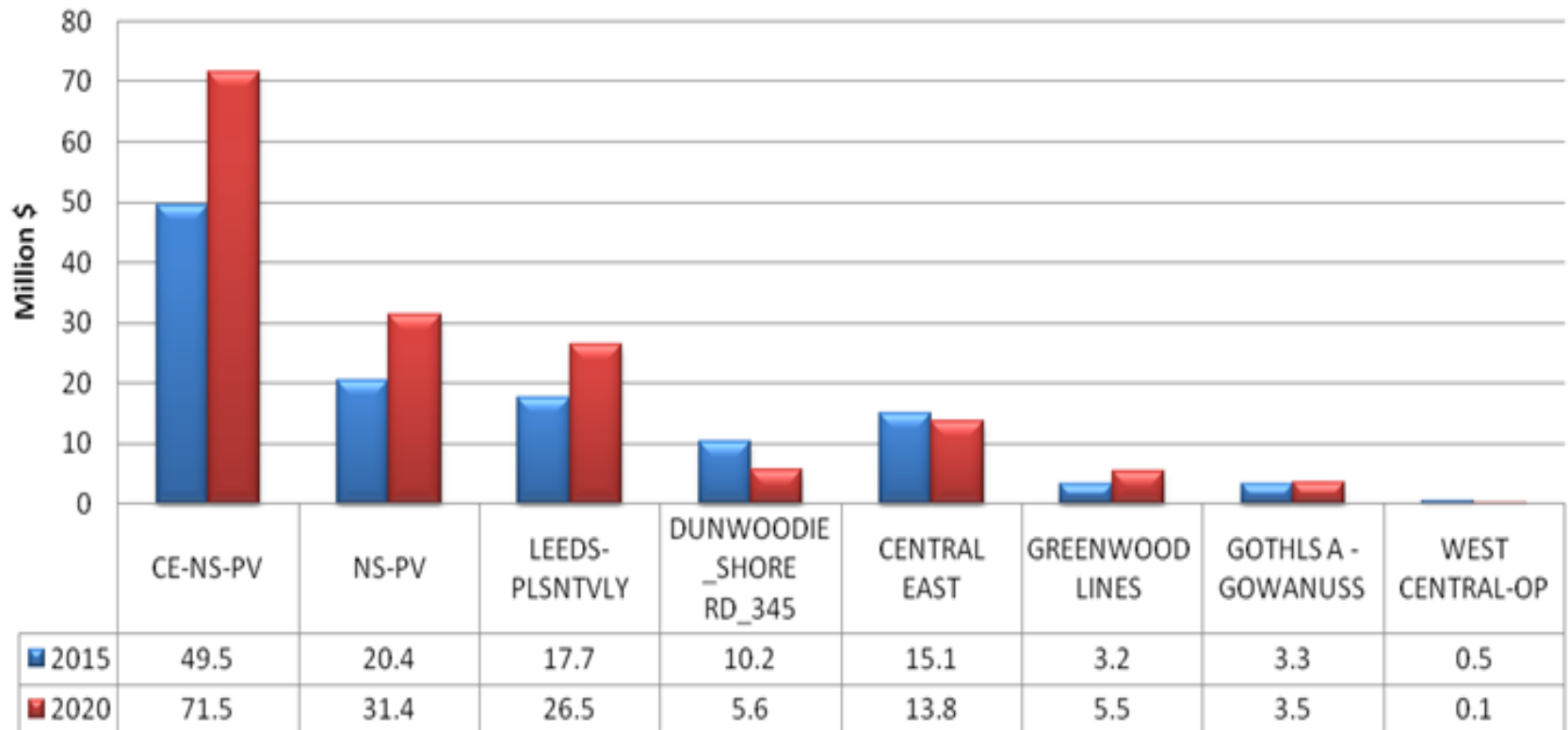
- ◆ **2011 Methodology calculates changes in NYCA generation costs and the costs of incremental imports/exports priced at external generator proxy buses of the solution case.**
- ◆ **2009 Methodology calculates changes in NYCA generation costs and the change in the net imports priced at the respective external proxy generator buses with and without the solution.**

Rank and Group Elements

- ◆ **Initially rank elements based upon combined 15-years of historic and projected congestion values**
- ◆ **Relaxation and grouping process follows**
 - *Top seven elements are relaxed to identify potential grouping of elements for the three CARIS studies*
- ◆ **Groupings are ranked in order of potential production cost savings**

Ranking of Grouped Elements

Ranking of Grouped Elements Based on Production Costs Savings (\$M)



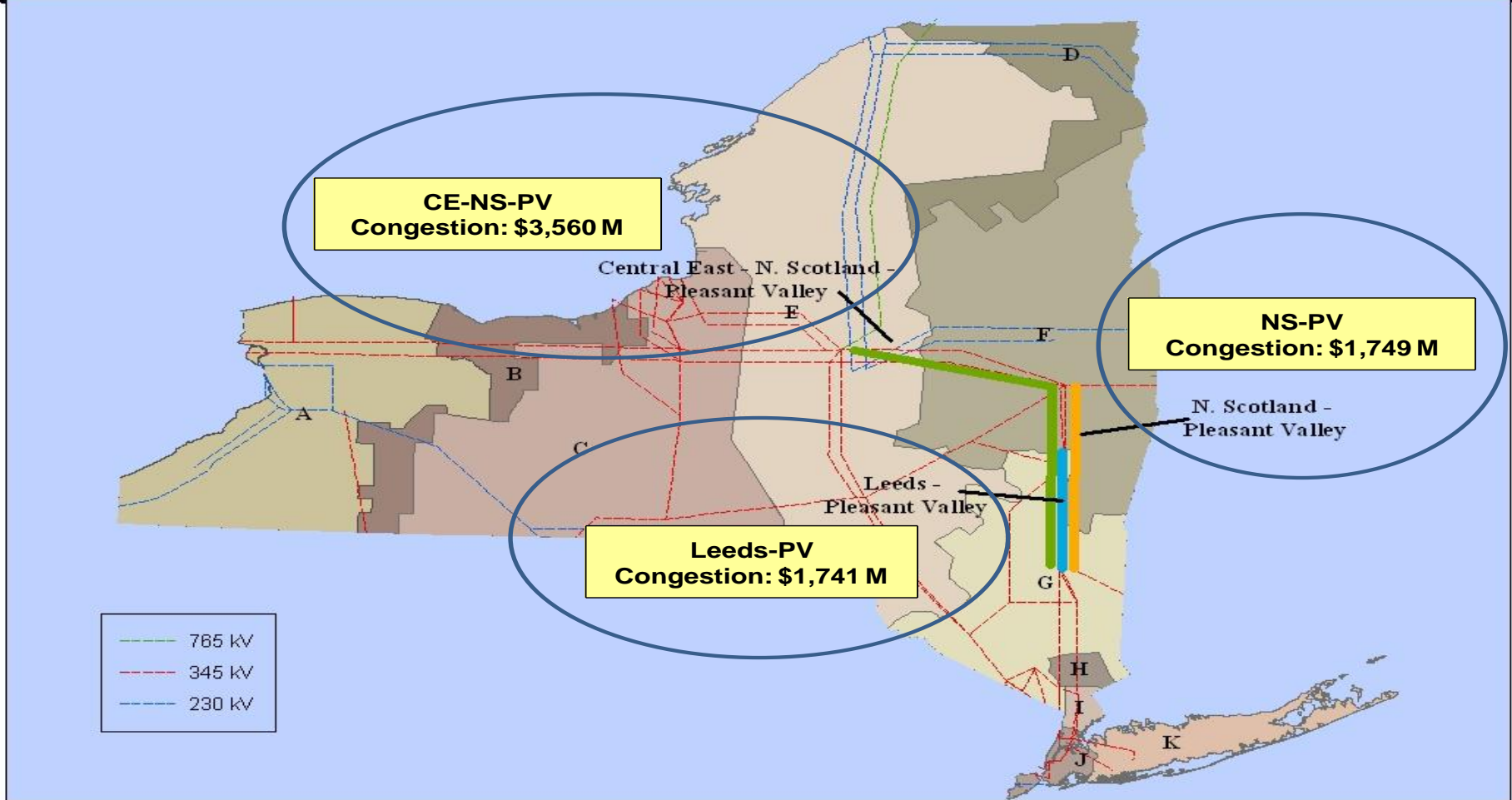
Selection of 3 Studies

- ◆ Selected Based upon largest change in production costs
 - *Study 1: Central East – New Scotland – Pleasant Valley*
 - *Study 2: New Scotland – Pleasant Valley*
 - *Study 3: Leeds – Pleasant Valley*

Congestion of the Top Three CARIS Studies (nominal \$M)

Study	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Central East-New Scotland-Pleasant Valley (Study 1)	495	425	436	398	419	474	507	603	667	708
New Scotland-Pleasant Valley (Study 2)	228	200	207	189	207	231	250	308	349	379
Leeds-Pleasant Valley (Study 3)	228	199	206	187	205	231	250	307	346	377

New York Control Area: Top 3 Congested Groupings

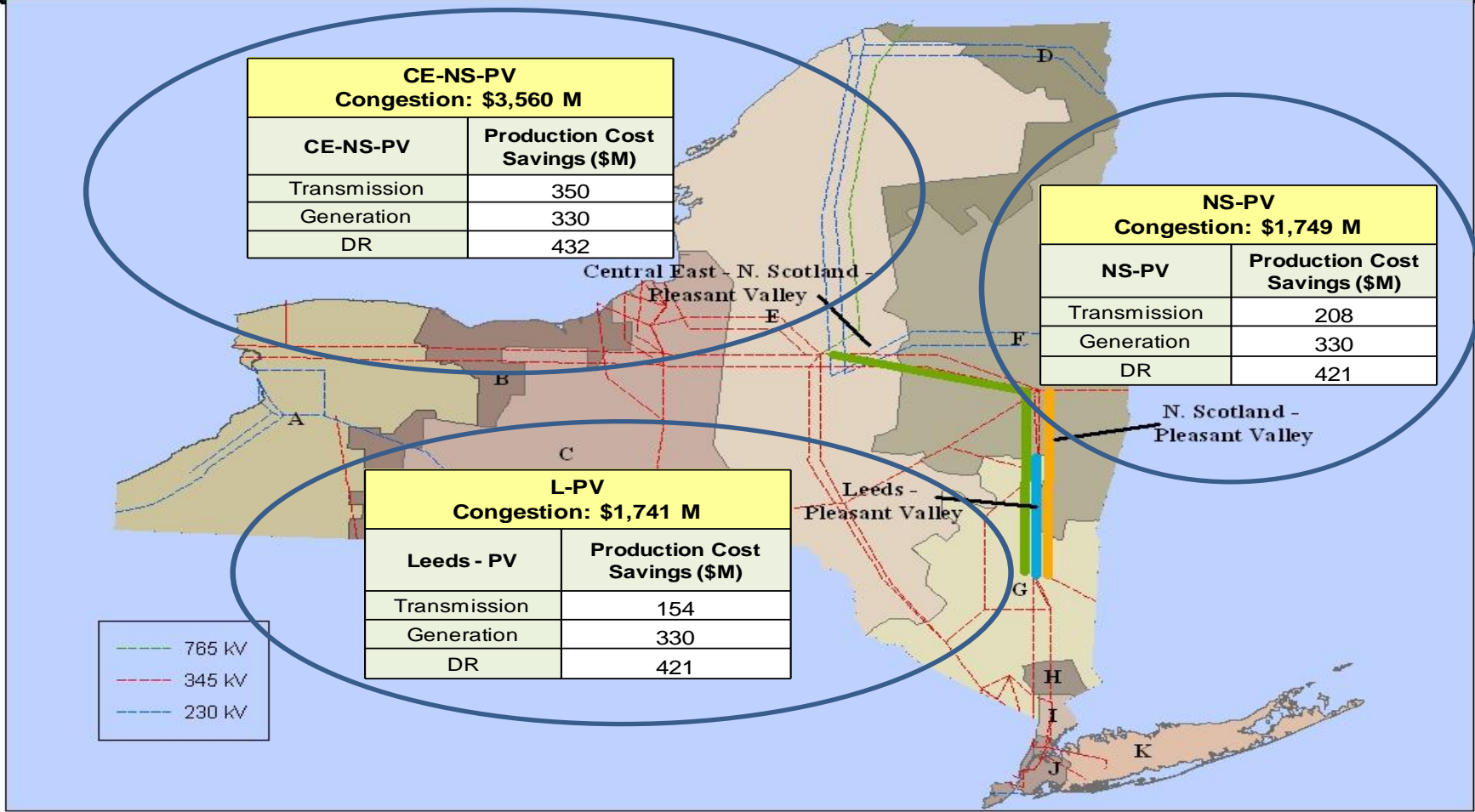


Congestion on the Top Three CARIS Studies (Present Value in 2011 \$M)

Applying Generic Solutions

- ◆ Implement transmission, generation and demand response generic solutions for all 3 studies
 - *Projects the potential benefits in terms of NYCA-wide production costs savings associated with relieving congestion with each solution type*
 - *Benefit/Cost Ratios are reported for each solution*
 - **Based upon the 10 years of projected NYCA-wide Production Cost Savings (CARIS's primary metric) compared to the estimated 10 years of project costs for each solution**

Generic Solutions: Production Cost Savings



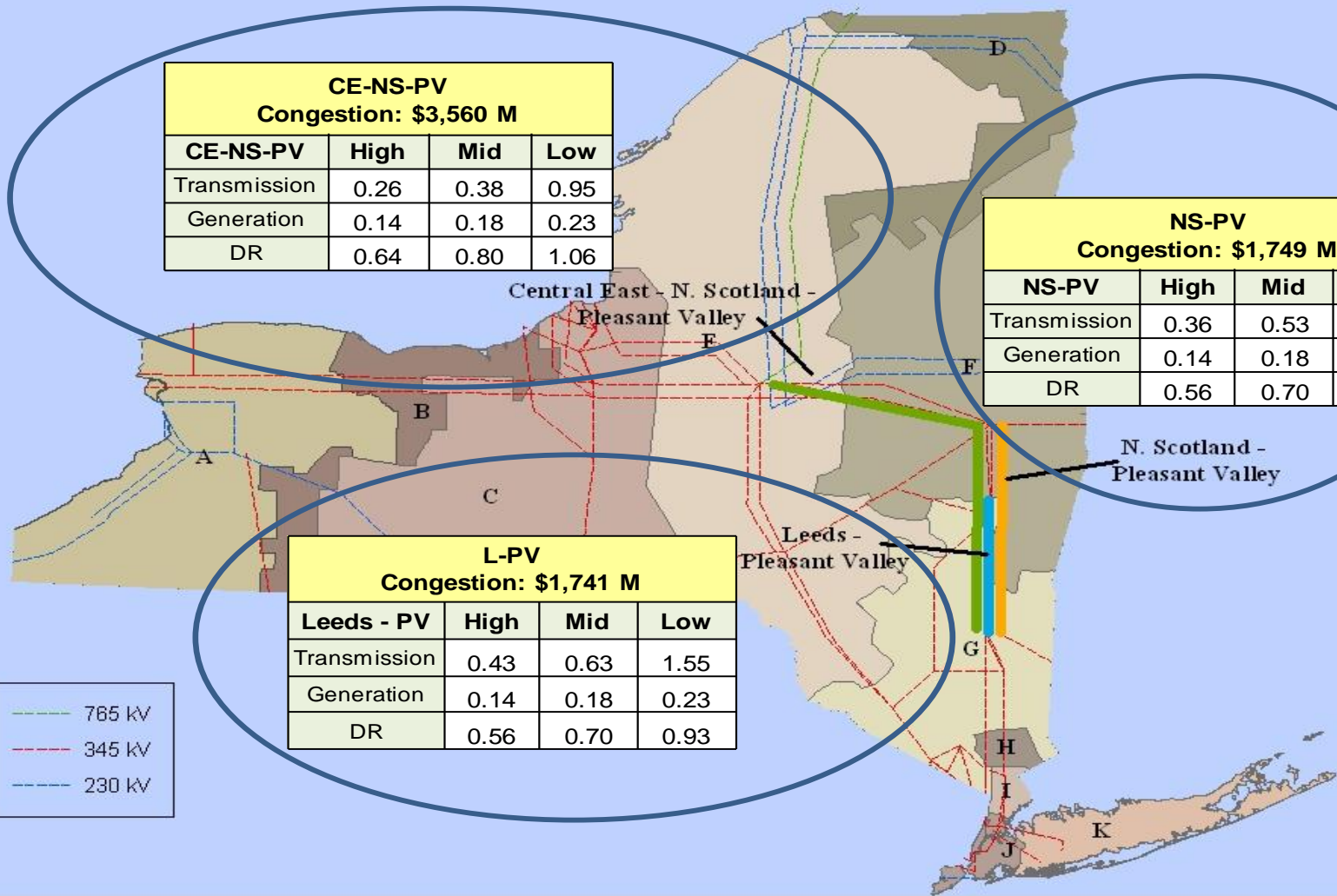
Production cost savings (Present Value in 2011 \$M)

Benefit/Cost Analysis

◆ Benefit/Cost ratio

- ***Present Value of Production Cost Savings divided by Overnight Costs and Capital Recovery Factor (CRF)***
- ***Generic Solution Costs are simplified estimates developed using low, mid and high unit cost estimates for each solution type***
 - Feasibility of the solution is not evaluated
 - On-going fixed operation and maintenance costs are captured by the CRF

Generic Solutions: Benefit-Cost Ratios



Additional Benefit Metrics

- ◆ **Estimate other benefits, for informational purposes, associated with the generic solutions**
 - *For 2011 CARIS Phase 1 these include changes to generator and import payments, load payments, TCC payments, losses costs, ICAP costs, and emissions*
 - *Additional benefit metrics report the present value of the change between the generic solution-case value and the base case value over ten years*

2011 CARIS Phase 1 Scenarios

- ◆ **Select scenarios in consultation with ESPWG and TPAS to:**
 - *Identify factors that might produce or increase congestion*
 - *Address effects of changes in variables used in base case assumptions*
 - *Simulations performed to show change in congestion for years 2015 & 2020*

- ◆ **Eight Scenarios were studied and results presented in 2011 CARIS Phase 1 Report**

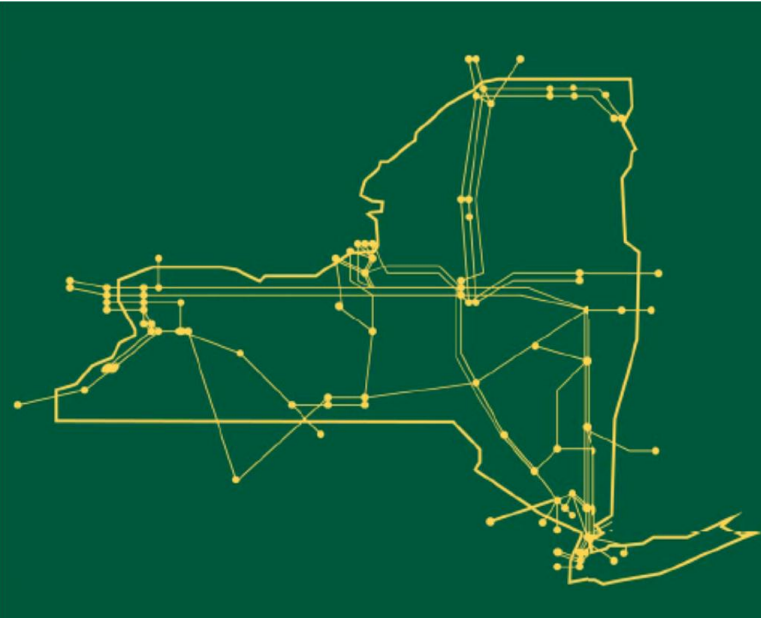
Scenario Matrix

Scenario	Variables
EPA Projected NOx and SO2 Costs	Increases in SO2 and Ozone Season NOx costs; decreases in annual NOx cost as projected by EPA
Higher Load Forecast	6% increase
Lower Load Forecast	9% decrease
Full RPS and Full EEPS Goals Achievement	Add renewables from Interconnection Queue to achieve 9870 GWh goal and reduce 2015 load to 32147 MW
Athens SPS Continued In Service	2011-2020
Higher Natural Gas Prices	One standard deviation
Lower Natural Gas Prices	One standard deviation
Lower CO2 Emission Costs	Flat \$5/ton ceiling

Next Steps

- ◆ **Present 2011 CARIS Phase 1 Report to NYISO Board**
- ◆ **Post Board-approved Report on NYISO Website**
- ◆ **Conduct public information sessions**
- ◆ **Continue CARIS improvements through 2012 Lessons Learned Process**
- ◆ **Prepare for CARIS 2 Studies**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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