

# *2009 CARIS Report Phase 1*

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**Management Committee**

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*Draft – for discussion only*

# ***Topics:***

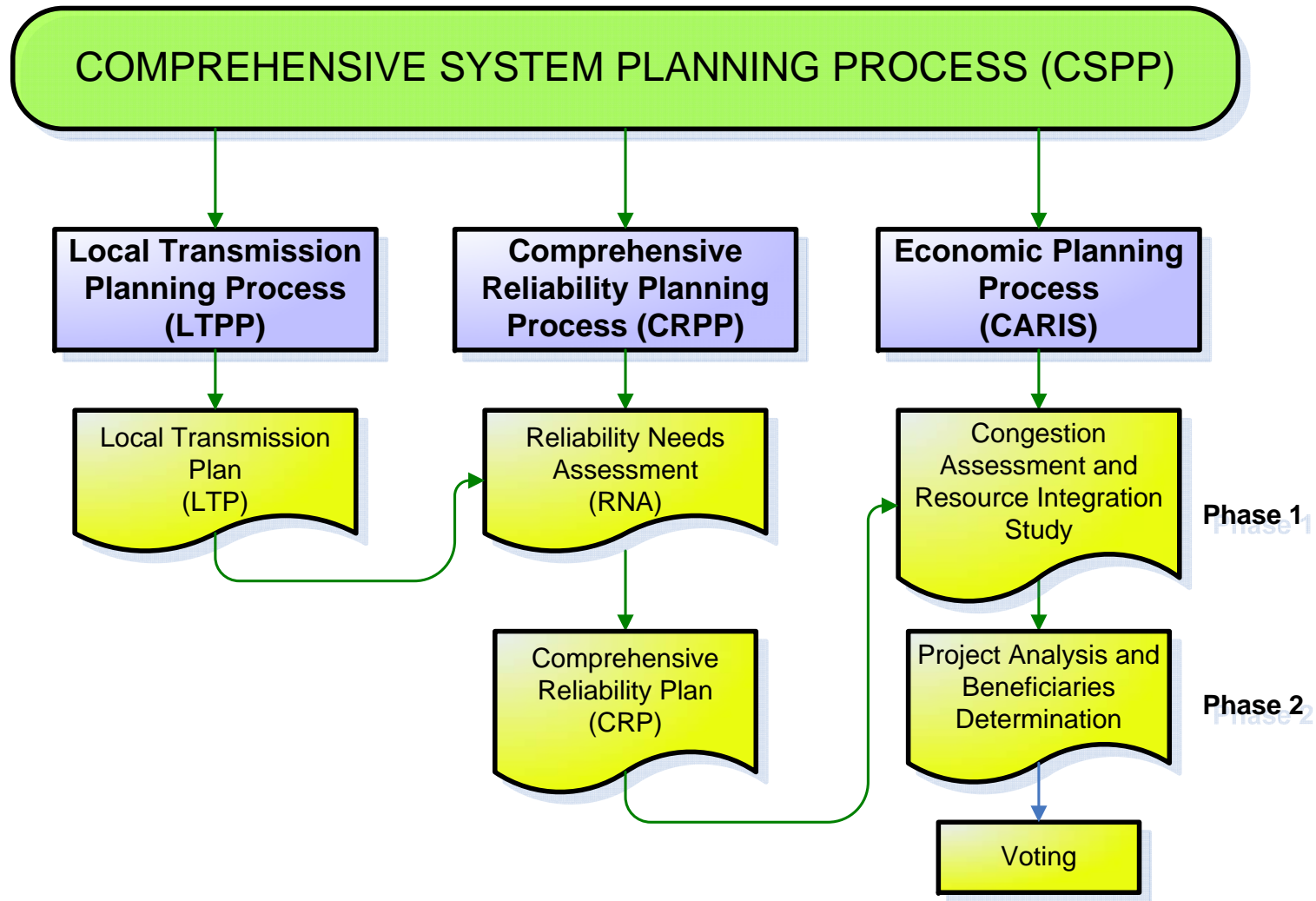
- ◆ ***CARIS Background and Objectives***
- ◆ **CARIS Process**
- ◆ **CARIS Development**
- ◆ **2009 CARIS Phase 1 Report**
- ◆ **Next Steps**

# *CARIS Background*

## ***CARIS - Congestion Assessment and Resource Integration Study***

- ◆ FERC Order No. 890 expanded the NYISO's planning process to include Local Transmission Planning Process (LTPP) and economic planning process called CARIS
- ◆ LTPP, CRPP and CARIS comprise a new 2-year planning process known as CSPP (Comprehensive System Planning Process)
- ◆ Each planning process builds upon each other

# NYISO CSPP



# *CARIS Objectives*

- ◆ **Identify congestion on the New York State bulk power transmission system based on the 5-year historic and 10-year projected congestion assessment**
- ◆ **Select the three CARIS studies**
- ◆ **Develop three generic solutions (transmission, generation, demand response) for each of the three studies to mitigate identified congestion**
  - *Provide an economic analysis of congestion and the potential costs and benefits of relieving that congestion*
  - *Provide scenario analysis to determine the impact of uncertainties on the projected congestion*
- **Intended to provide interested parties information to consider developing transmission, generation or demand response projects to relieve congestion. For transmission projects only, parties are invited to propose specific projects for economic evaluation and potential recovery of costs through the NYISO's Tariff**

# *CARIS Process*

- ◆ CARIS process consists of 2 phases:
  - *Phase 1 – Study Phase*
  - *Phase 2 – Specific Project Phase*

## Congestion Assessment and Resource Integration Study (CARIS)

### Base Case Assumptions:

Most recently approved CRP

### Congestion Assessment: 5-year historic and 10-year forecasted

Identification of the three most congested paths/ elements and selection of the three studies

**Phase I :  
"Study Phase"  
2009**

### Cost/Benefit Analysis

Three studies agreed to by the stakeholders  
Additional studies paid for by requestors

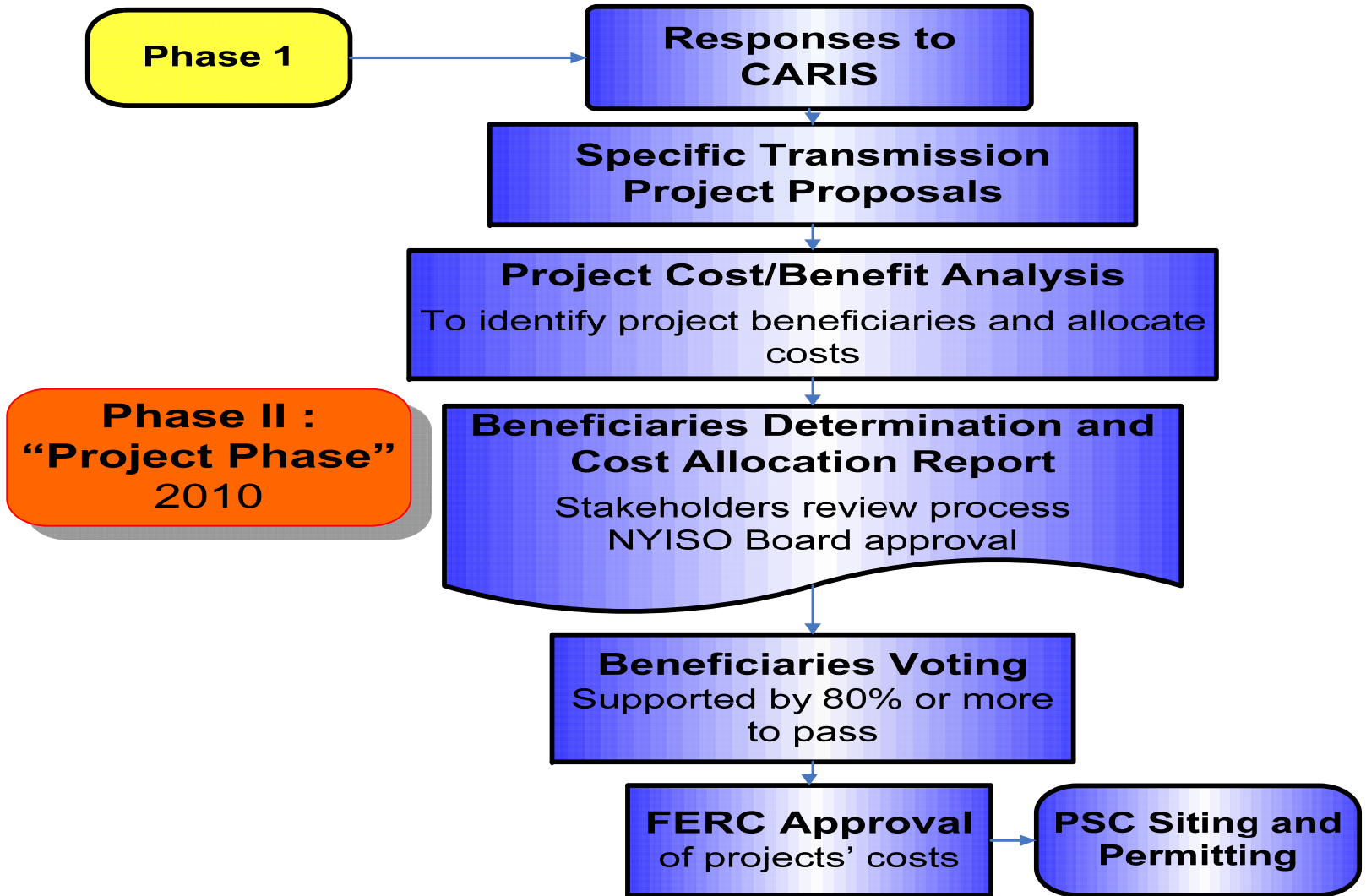
### CARIS Report

Stakeholders review process  
NYISO Board approval

# CARIS Process - Phase 2



## Congestion Assessment and Resource Integration Study (CARIS)





# *CARIS Development*

- ◆ CARIS Data Base was developed based upon the 2009 CRP Baseline System
- ◆ Multiple CARIS Procedures have been developed for Phase 1 and 2 (some of them still under the development) and presented to the BIC
- ◆ Two simulation models – ABB GridView and GE MAPS – were utilized in conducting CARIS analyses
- ◆ CARIS development was in collaboration with the stakeholders

# *2009 CARIS Report*

- ◆ Completes the Phase 1 of the CARIS process
- ◆ Presents the results of the Phase 1 CARIS analyses

# *CARIS Analyses*

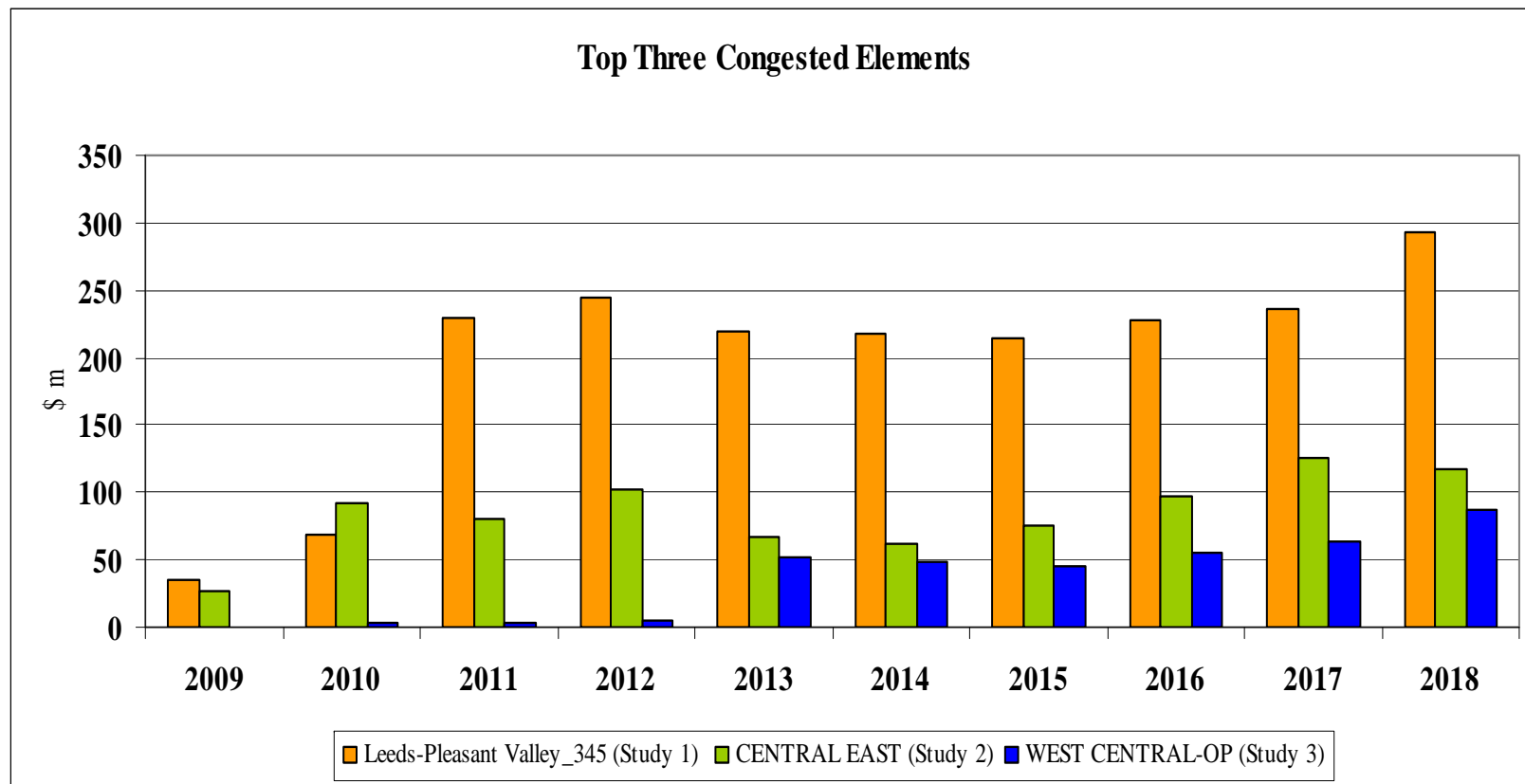
- ◆ CARIS analyses include:
  - *Congestion Assessment* – 5-year historic and 10- year projected
  - *Identification of the top 5 congested elements and selection of the three CARIS studies*
  - *Application of Generic Solutions* (transmission, generation, demand response) for each of the three studies
  - *CARIS metrics* including production costs as the primary metric and 6 additional metrics (load payments, generator payments, losses, emission costs/tons, ICAP MW impact and TCCs)
  - *Benefit/Cost analysis* for each study with respect to High, Medium and Low cost estimates
  - *Scenarios* – 10 scenarios including State Policy, NYISO Update, High Growth, High Fuel Price, High Growth and High Fuel Price, Low Fuel Price, New Resources and HQ Interface, Modified Policy, New Staten Island Generator, and New Astoria Generator

# Congestion Assessment:

*Ranked Elements Based on the Highest Present Value of Congestion over the Fifteen Years*

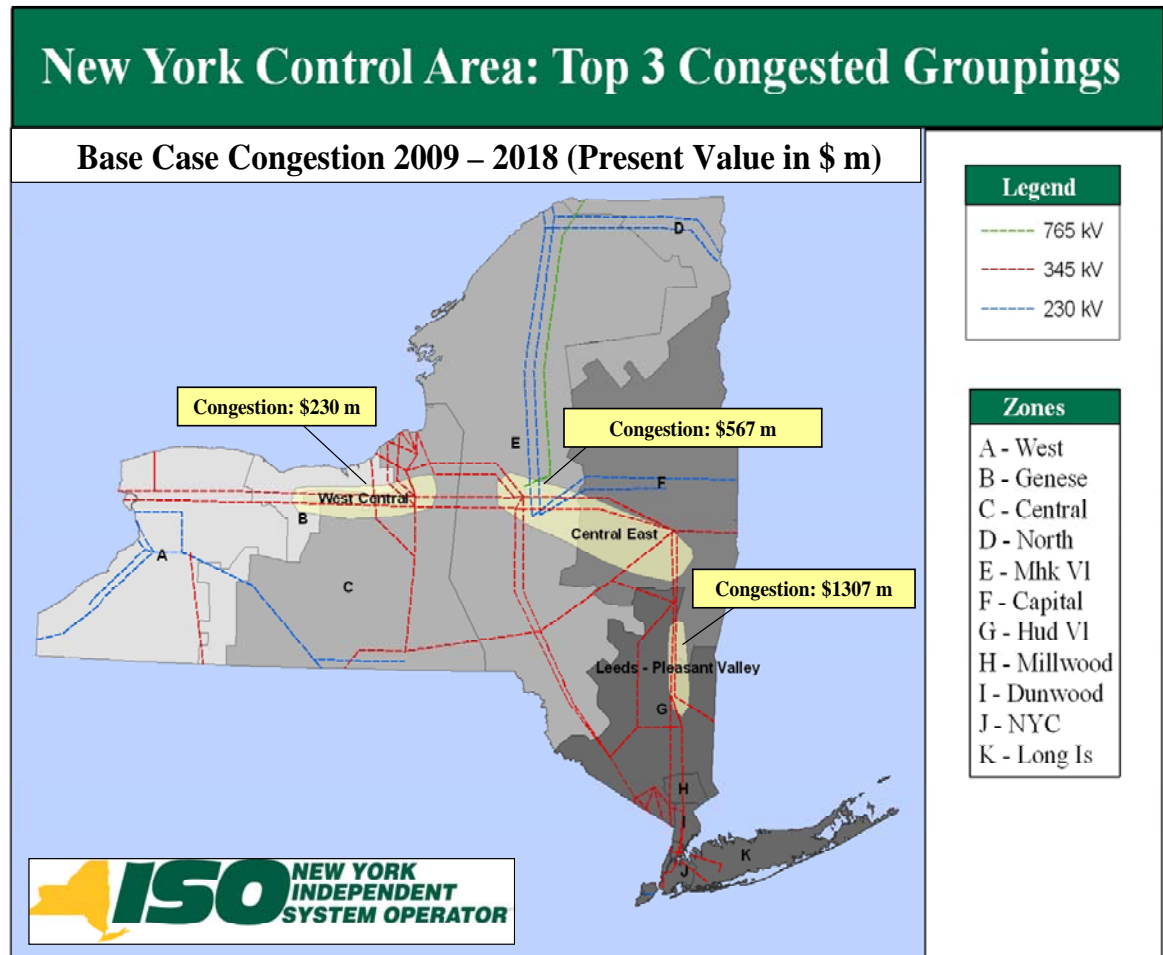
Constraints	Present Value of Congestion in 2009 \$ m		
	Historic	Future	Aggregate
LEEDS-PLEASANT VALLEY 345	\$2,063	\$1,307	\$3,370
CENTRAL EAST	\$2,442	\$567	\$3,009
WEST CENTRAL-OP	(\$120)	(\$230)	(\$350)

## Projected Congestion on the Top Three CARIS Elements, 2009-2018 (nominal \$ m)



# The Three CARIS Studies

1. Leeds-Pleasant Valley
2. Central East
3. West Central

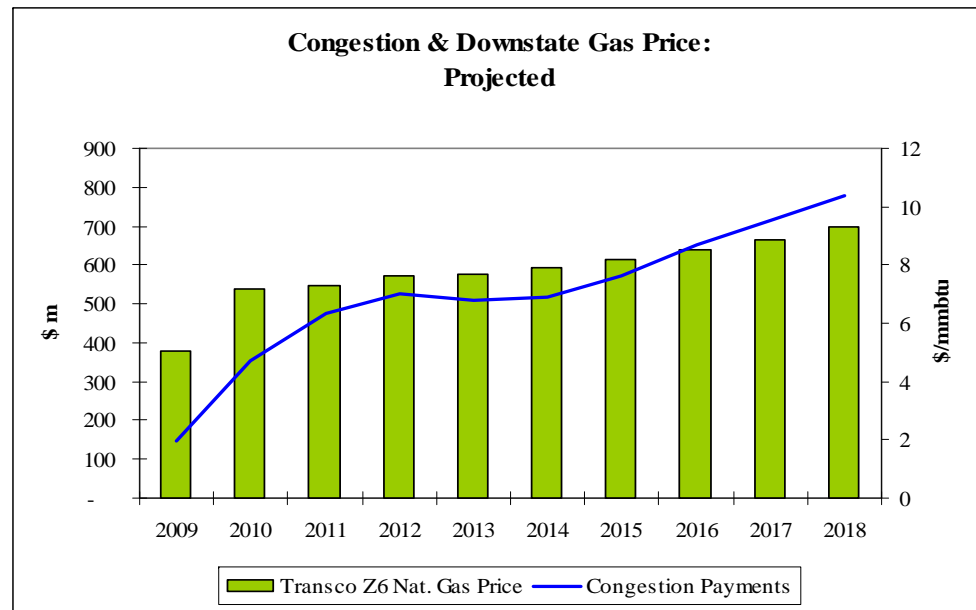
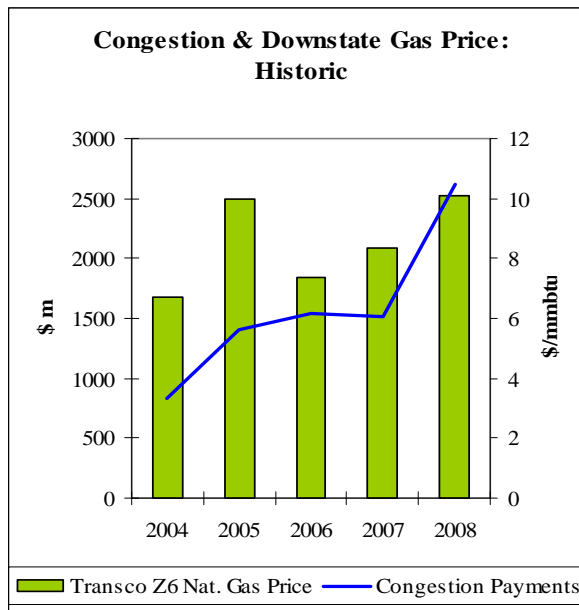


# *Projected Congestion*

- ◆ *The level of projected congestion from the CARIS model is lower than the historic levels (historic levels range from \$833 mill. in 2004 to \$2.6 bill. in 2008 vs. projected from \$146 mill. in 2009 to \$780 mill. in 2018). Actual congestion in Q1 2009 was \$223 mill.*
  - *The difference between the historic and projected congestion values occurs due to:*
    - *certain input assumptions that are not incorporated into the CARIS model, including market bid behavior, virtual transactions, transmission outages, and actual commodity prices/hourly loads.*
  
- ◆ *Actual congestion realized in the future years may be higher or lower because actual system operating conditions, economic conditions, and market behavior may be different from what has been assumed in the study.*

# Correlation Between Congestion Value and Fuel Prices

- ◆ The reduction in natural gas prices represents one reason for the decline of future congestion levels.
- ◆ The strong positive correlation between congestion values and fuel prices is reflected in the figure below.
- ◆ The coefficient of correlation between congestion values and natural gas price during the 2004 – 2008 period was 0.71. The corresponding coefficient for the study period of 2009-2018 was 0.98.





# *Application of Generic Solutions*

- ◆ In order to mitigate identified congestion, three resource types of generic solutions were applied to the three studies – transmission, generation, and demand response.
- ◆ No engineering, physical feasibility study, routing study or siting study has been completed for the generic solutions. Therefore, it is unknown if the generic solutions can be physically constructed as proposed.
- ◆ Each generic transmission line solution consists of building a new 345kV transmission line rated at 1,000 MVA connecting the buses upstream and downstream of the congested element.
- ◆ Each generic generation solution consists of building a new 500 MW combined cycle plant connected downstream of the congested element.
- ◆ Each demand response generic solution consists of installing 100 MW of energy efficiency and 100 MW of demand response in the zone located downstream of the congested element.

# Production Cost Saving Metric

- ◆ *Nominal electric production costs in New York range between \$4.1 bill. and \$7.5 bill. annually from 2009-2018.*
- ◆ *The highest savings in production costs would be achieved if the Leeds - Pleasant Valley constraint were to be mitigated, followed by Central East and West Central.*

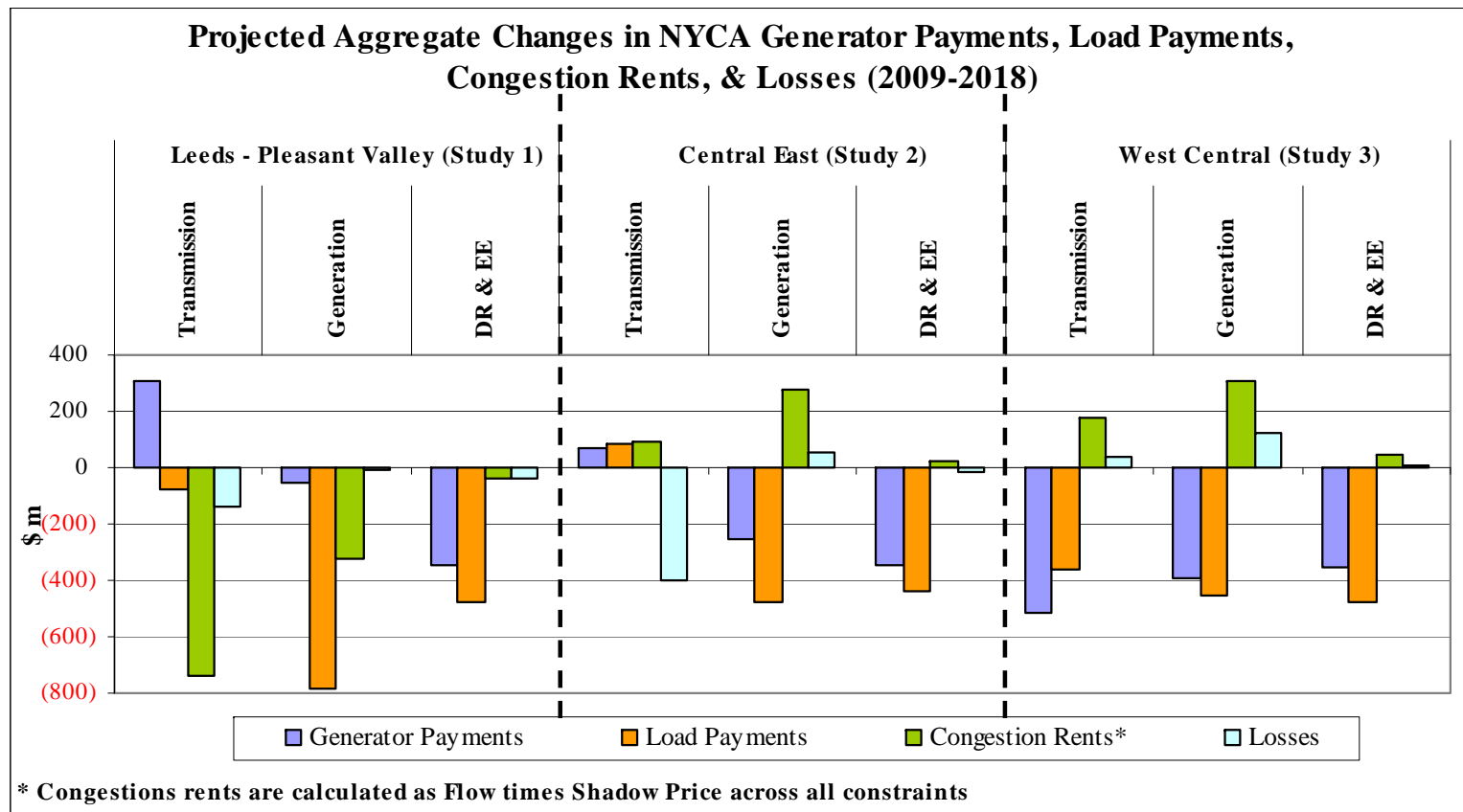
	<b>Leeds to Pleasant Valley</b>	<b>Central East</b>	<b>West Central</b>
Transmission	105	27	92
Generation	346	224	151
Demand Response & EE	247	216	217

**Production Cost Generic Solutions Savings 2009-2018: Present Value in 2009 (\$ m)**

## *Additional Metrics*

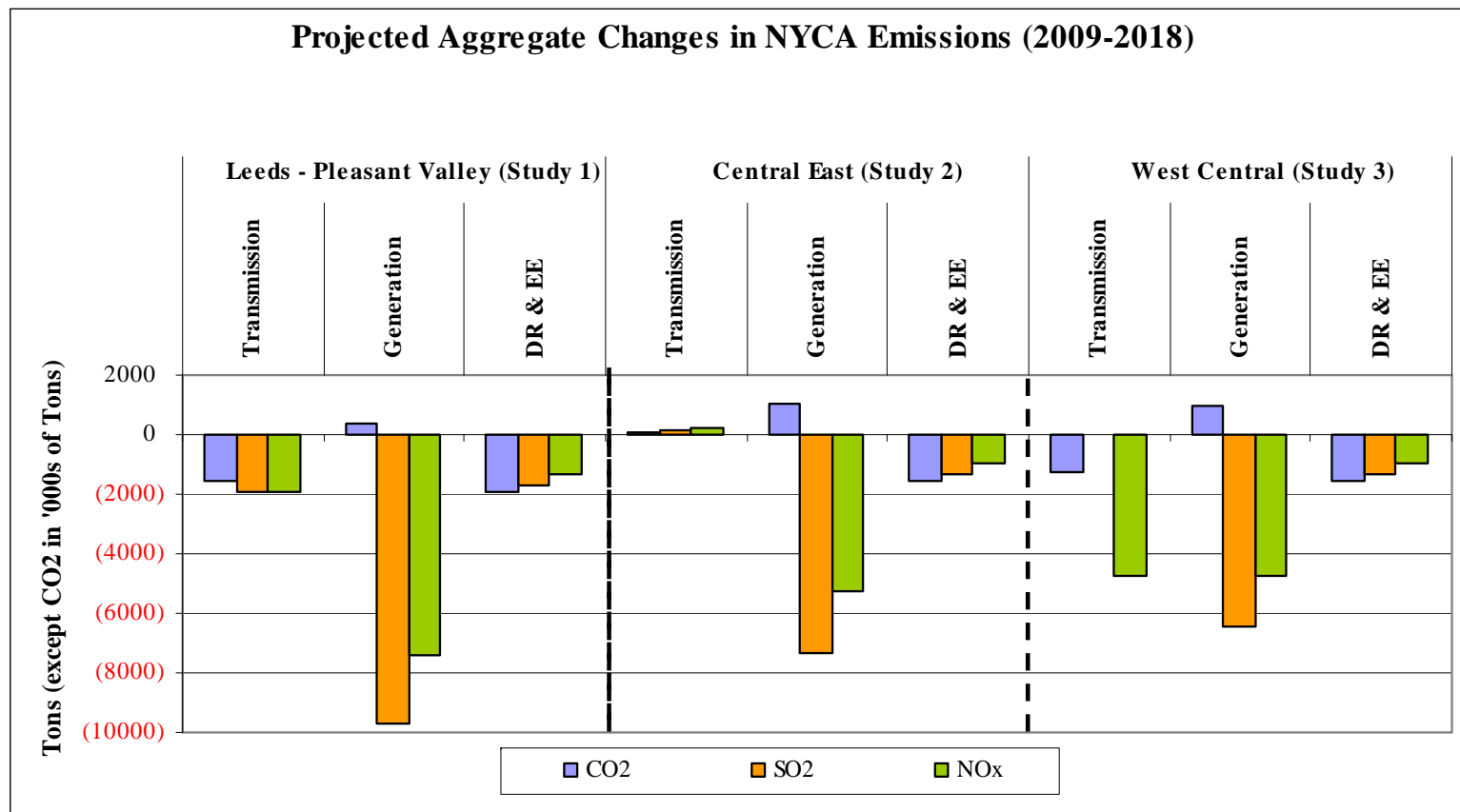
- ◆ Changes in additional metrics are below two percent as compared to the CARIS Base Case, with the exception of slightly higher changes in congestion rents. The largest impact on the congestion rent (TCC metric) is shown in the Leeds-Pleasant Valley study, with a decrease of approximately 10 percent.
- ◆ Of the three studies, Leeds- Pleasant Valley generally shows relatively larger impacts on the additional metrics.

# Change in NYCA Generator Payments, Load Payments, Congestion Rents, and Losses (nominal \$ m)



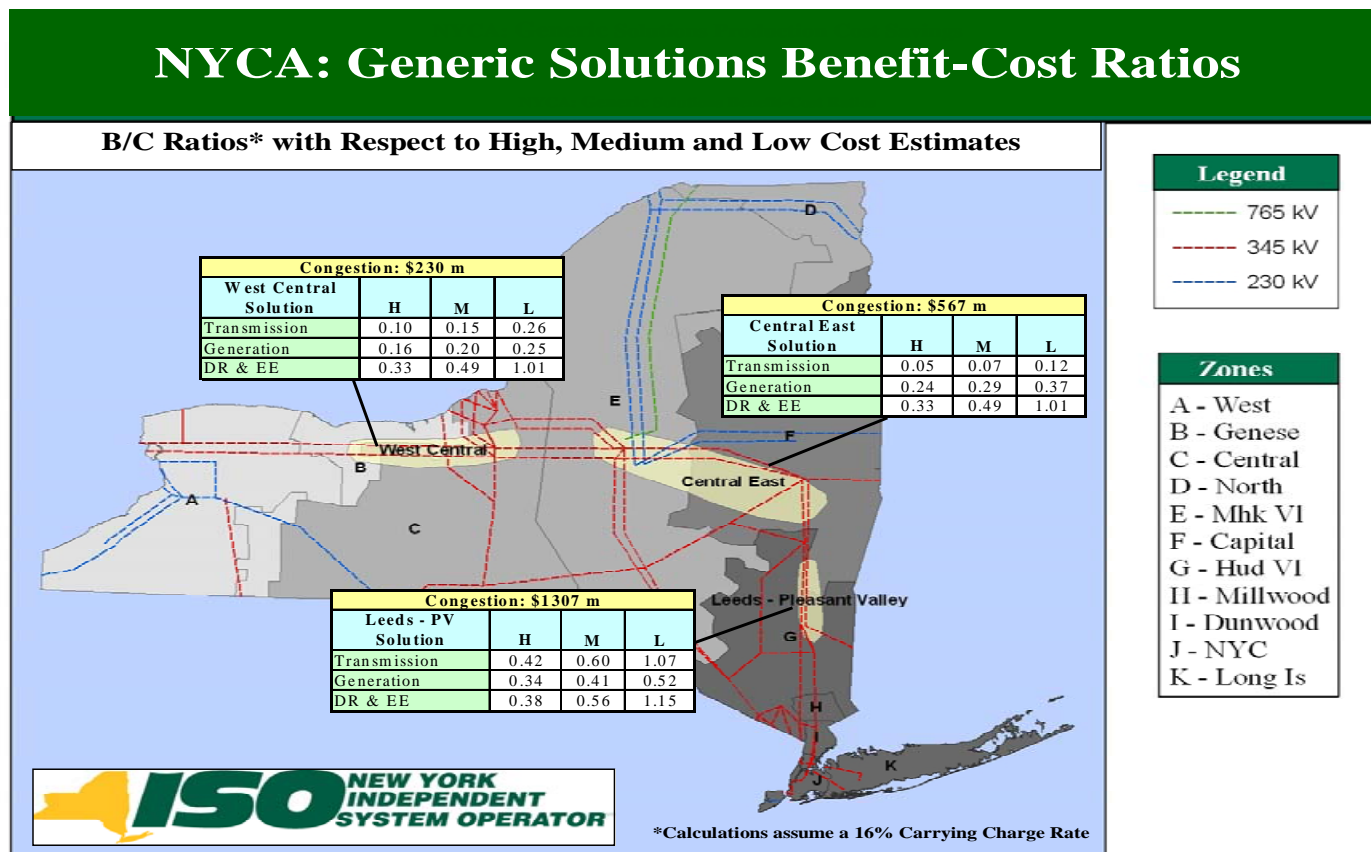
# Change in CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> Emissions

- The application of generic solutions tends to reduce emissions. The reductions are under two percent, compared to the Base Case emissions.

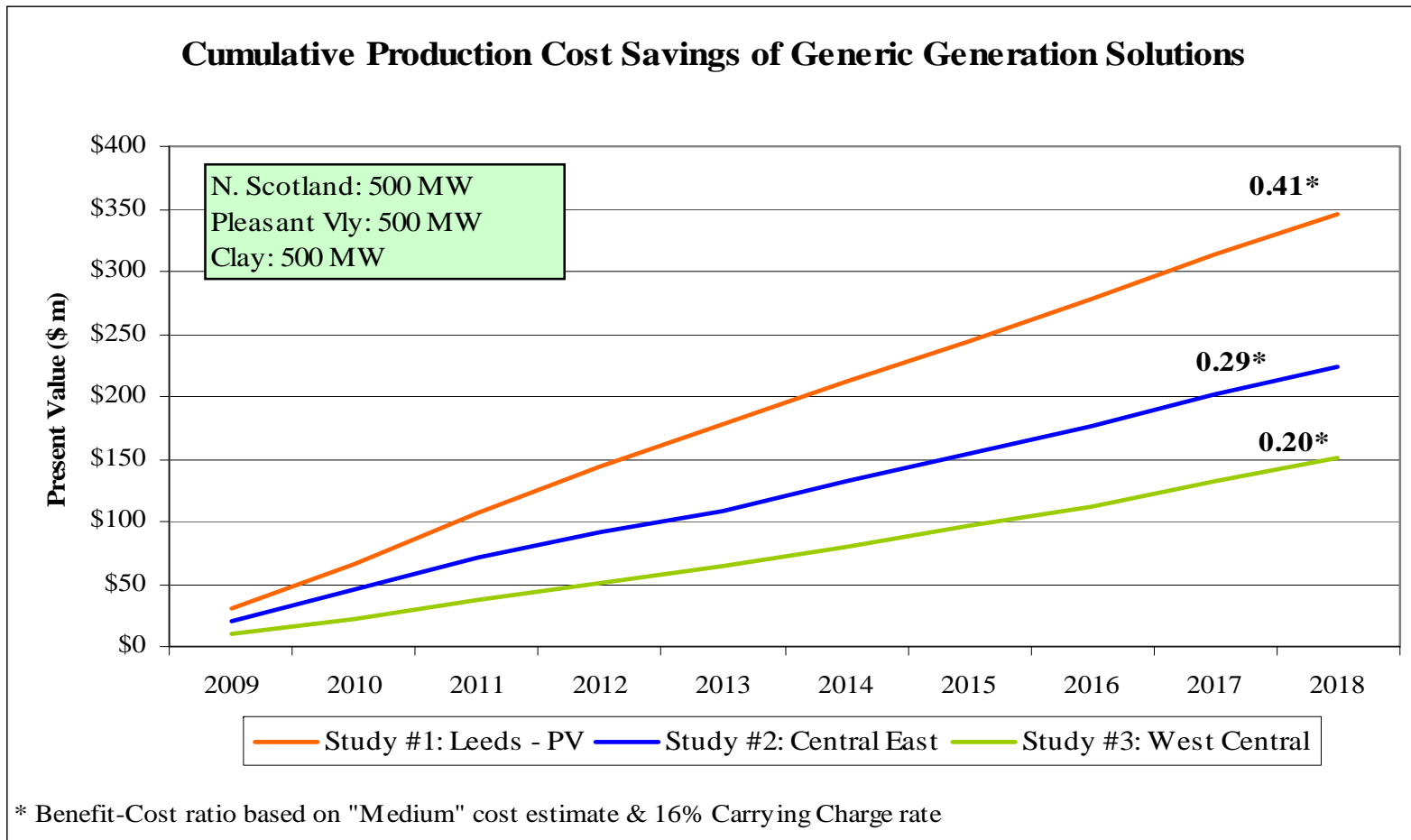


# Benefit/Cost Analysis

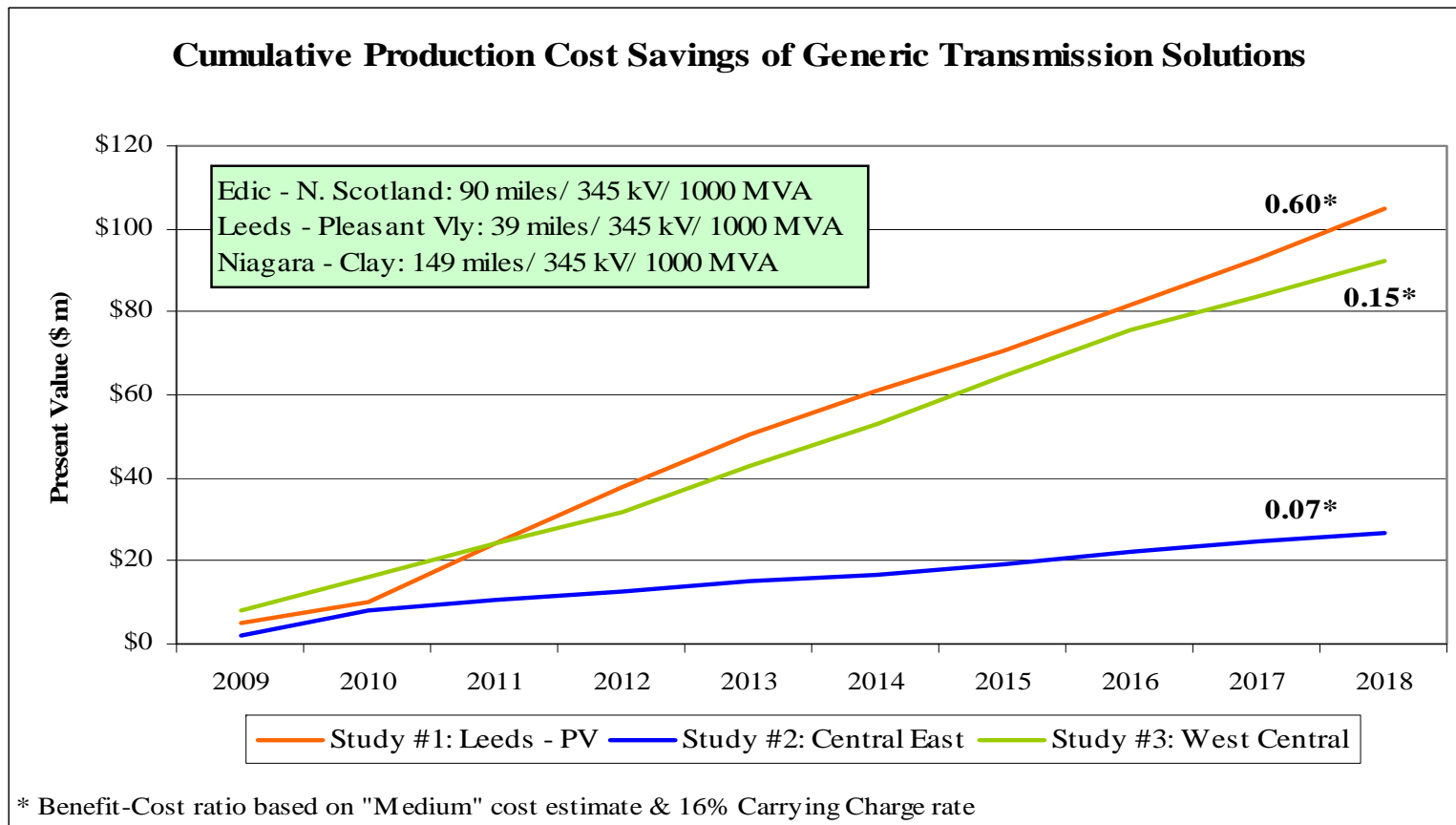
- Transmission solution for Leeds-Pleasant Valley shows the benefit/cost ratio above one (low cost estimates), as well as the DR/EE solutions for all three studies.



# Cumulative Benefits of Generic Generation Solutions (Present Value \$m)

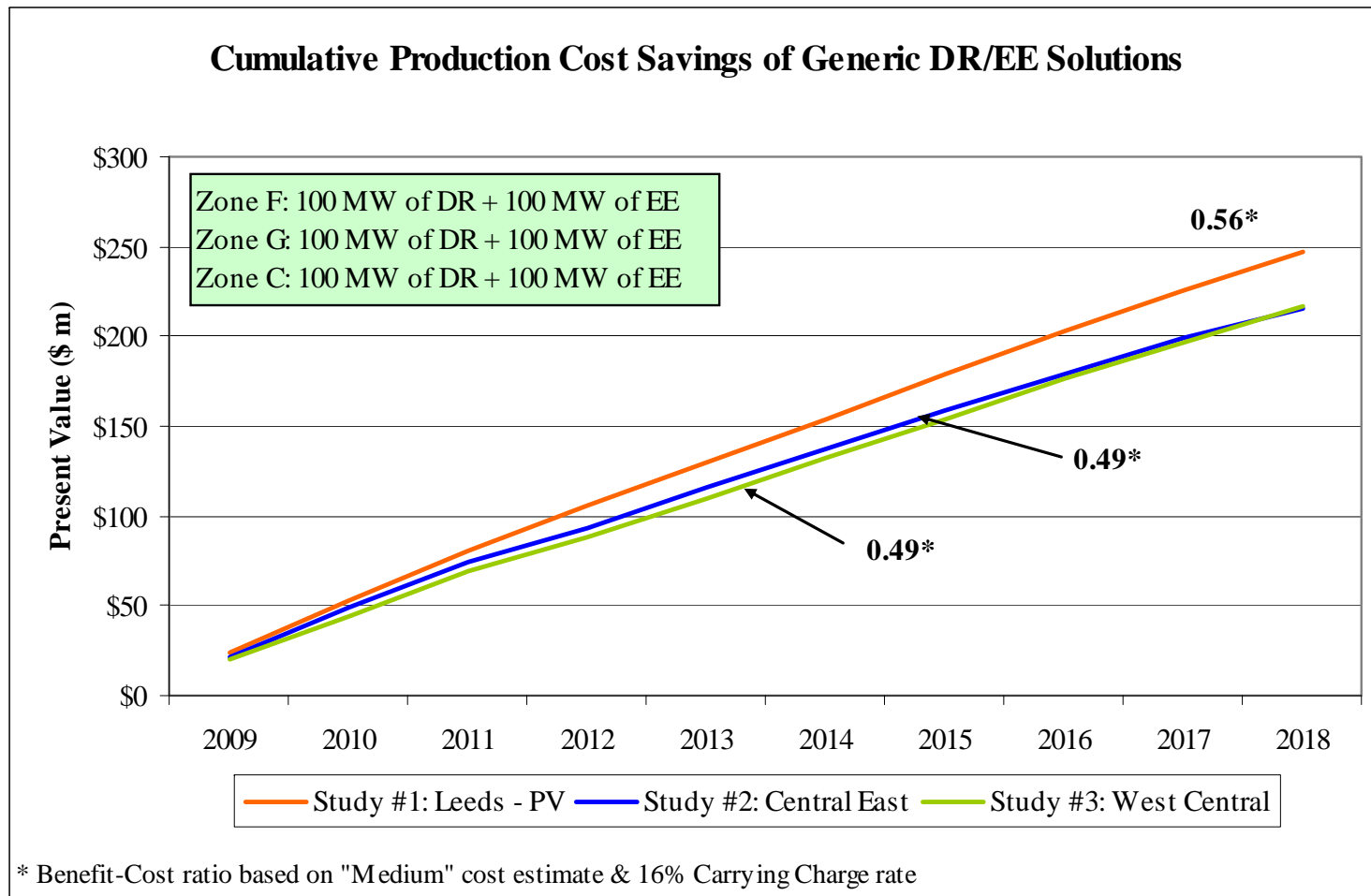


# Cumulative Benefits of Generic Transmission Solutions (Present Value \$m)





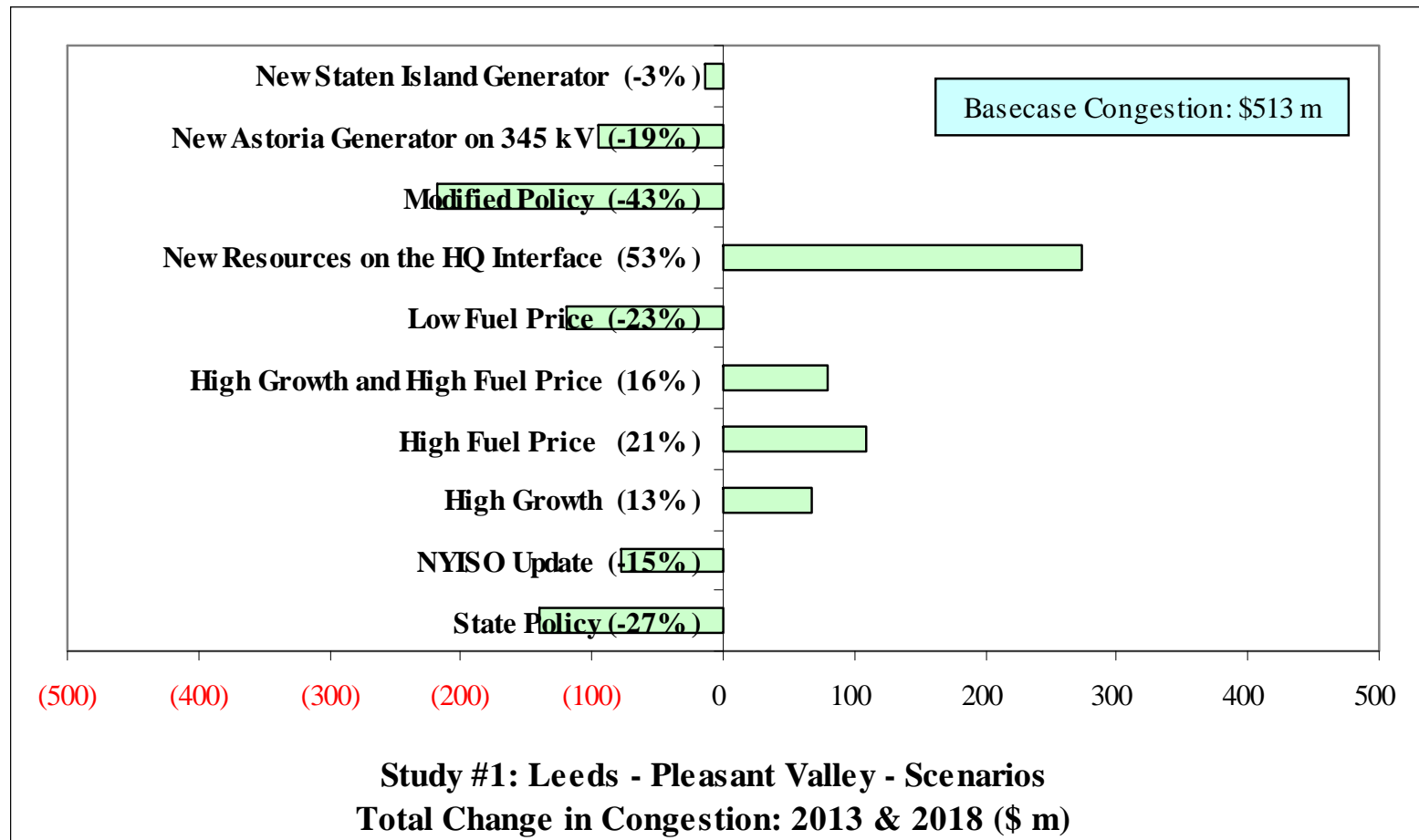
# Cumulative Benefits of Generic Demand Response/Energy Efficiency Solutions (Present Value \$m)



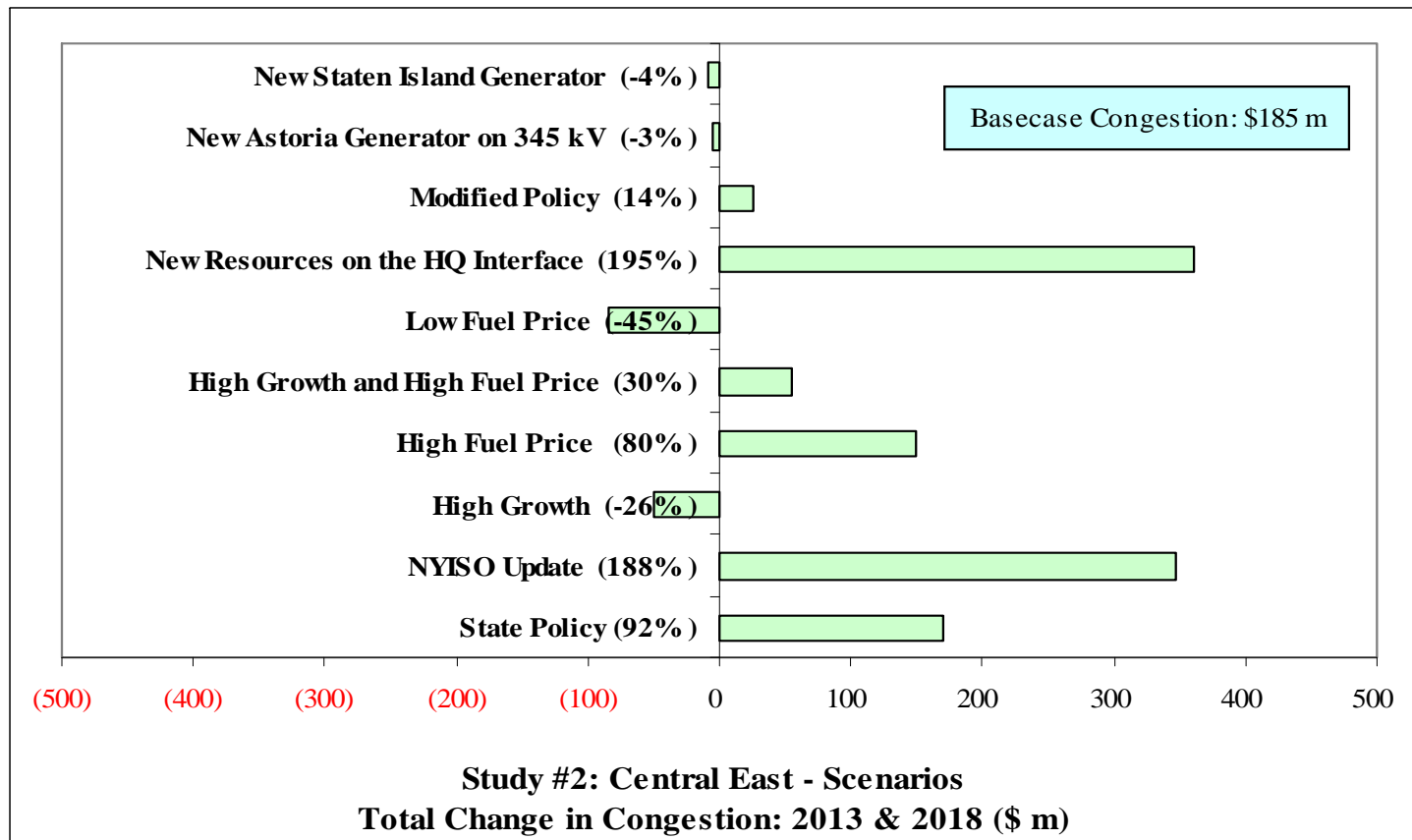
# Scenario Analysis

Scenario	Case #	Major Assumptions
State Policy	1	Governor’s “45x15”, coal retirements, high emissions cost
NYISO Update	2	Updated fuel and load forecasts, resources
High Growth	3	2008 Econometric load forecast
High Fuel	4	Higher fuel prices
High Load and Fuel	5	Cases 3 & 4
Low Fuel	6	Lower fuel prices
1000 MW on HQ Border	7	2 Generic 500 MW on HQ border
Modified State Policy	8	Case 1 with lower fuel prices
New 500 MW Astoria 345 kV	9	Generic 500 MW on Astoria 345 kV
New 500MW Staten Island	10	Generic 500 MW on Staten Island

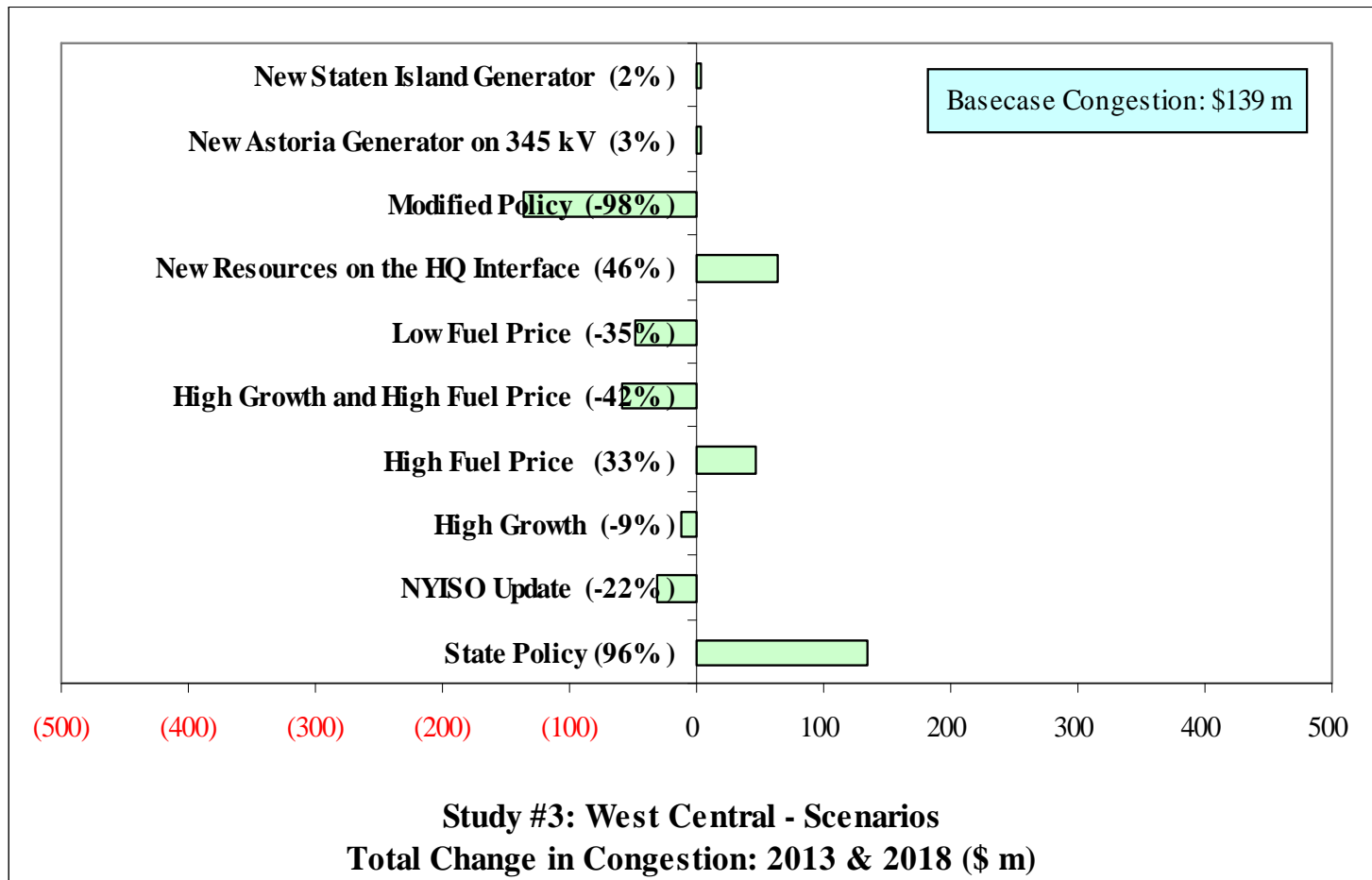
# Scenarios Impact on Congestion in Leeds-Pleasant Valley Study (nominal \$ m)



# Scenarios Impact on Congestion in Central East Study (nominal \$ m)



# Scenarios Impact on Congestion in West Central Study (nominal \$ m)



# Next Steps

- ◆ Additional studies can be requested by any interested parties. *(Studies for top three congested elements were required by Tariff.)*
- ◆ CARIS Phase 2 – Specific Transmission Project Phase
  - *Upon the approval of the Phase 1 study results by the BIC, MC and NYISO Board, the NYISO staff will conduct Phase 2 of the CARIS process*
  - *Developers who seek regulated cost recovery under the NYISO Tariff may submit economic transmission project proposals*
  - *The process for specific project submittals is explained in the Regulated Economic Projects - Specific Projects Submittals Procedure, currently under the ESPWG review*



The New York Independent System Operator (NYISO) is a not-for-profit corporation that began operations in 1999. The NYISO operates New York's bulk electricity grid, administers the state's wholesale electricity markets, and provides comprehensive reliability planning for state's bulk electricity system.

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