NEW YORK INDEPENDENT SYSTEM OPERATOR

2009 Congestion Assessment and Resource Integration Study (CARIS) – Phase 1

Appendices B-H G

6th5th DRAFT REPORT

November 172, 2009

For Discussion Purposes Only

Style Definition: Heading 3: Tabs: 108 pt, List tab

Style Definition: Heading 5: Indent: Left: 0 pt, Hanging: 50.4 pt, Outline numbered + Level: 5 + Numbering Style: 1, 2, 3, … + Start at: 4 + Alignment: Left + Aligned at: 72 pt + Tab after: 111.6 pt + Indent at: 111.6 pt, Tabs: 50.4 pt, List tab

Style Definition: Heading 6: Indent: Left: 0 pt, Hanging: 57.6 pt, Outline numbered + Level: 6 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 90 pt + Tab after: 136.8 pt + Indent at: 136.8 pt, Tabs: 57.6 pt, List tab

Style Definition: Heading 7: Indent: Left: 0 pt, Hanging: 64.8 pt, Outline numbered + Level: 7 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 108 pt + Tab after: 162 pt + Indent at: 162 pt, Tabs: 64.8 pt, List tab

Style Definition: Heading 8: Indent: Left: 0 pt, Hanging: 72 pt, Outline numbered + Level: 8 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 126 pt + Tab after: 187.2 pt + Indent at: 187.2 pt, Tabs: 72 pt, List tab

Style Definition: List Bullet: Indent: Left: 0 pt, Numbered + Level: 1 + Numbering Style: 1, 2, 3, … + Start at: 1 + Alignment: Left + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt

Style Definition: Heading 5 Char: Font: 12 pt, English (U.S.)

Style Definition: Heading 9 Char: Font: (Default) Arial, English (U.S.)

Style Definition: Balloon Text Char: Font: (Default) Tahoma, 8 pt, English (U.S.)

Style Definition: Document Map Char: Font: (Default) Tahoma, 10 pt, English (U.S.)

Style Definition: Footnote Text Char: Font: 8 pt, English (U.S.)

Style Definition: Title Char: Font: (Default) Arial, 12 pt, English (U.S.)

Appendix B – Congestion Assessment and Resource Integration Study (CARIS) Process

CARIS consists of two phases: Phase 1, the Study Phase, and Phase 2, the Project Phase.

B.1. Phase 1 – Study Phase

The purpose of Phase 1 of CARIS, known as the "Study Phase," is to gather, organize, and develop information for stakeholders related to congestion in the NYCA. More specifically, in Phase 1I the NYISO will:

a. Post historic congestion and identify significant causes of historic congestion;

b. Project congestion on the New York State BPTFs over the ten-year planning period;

c. Identify the most congested elements or contingency pairs of elements;

d. Identify, through the development of appropriate scenarios, factors that might mitigate or increase congestion; and

e. Provide information regarding generic projects to reduce congestion.

The Study Phase starts with the gathering of historic congestion data and the projection of future congestion. That information is used to identify significant and reoccurring congestion on the New York BPTFs. The historic congestion information compiles the last six years of congestion data, which the NYISO posted each quarter. The study projects congestion by simulating the NYISO's Security-Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) software. –Projected congestion is calculated once per biennial CARIS cycle.

Based upon the combination of historic and projected congestion metrics, congested elements or contingency pairs of elements are ranked by applying the following formula developed in conjunction with the ESPWG:

Present Value in Year 1 = [(Sum of the Future Value of Congestion from the Prior 5 Historic 12-Month Periods) + (Sum of the Present Value of Congestion from the Future 10 years)]

The rankings are posted for stakeholder review. The rankings are finalized after the stakeholder review and from this final ranking the top three congested elements/contingency pairs of elements are selected and posted for study. Additional information can be found in the Initial CARIS Manual – Criteria for the Selection of CARIS Studies, Appendix F.

During the CARIS process, the NYISO accepts and posts on its website requests for additional studies from stakeholders who want to study congestion on different combinations of elements. –These studies are in addition to the three identified studies noted above. –Any stakeholder may request an additional study at their own expense. Additional details on

Formatted: Don't adjust space between Latin and Asian text, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Font: Italic

requesting studies can be found in the Initial CARIS Manual – Process for Additional Studies, Appendix F.

Once the three studies are selected, the NYISO performs a benefit/cost analysis that compares projected production cost savings to the cost of implementing generic transmission, demand response and generation solutions. The NYISO develops the assumptions for the benefit analysis for the baseline system with the ESPWG. Based on Attachment Y of the Tariff, the baseline system for the CARIS simulations assumes a reliable system throughout the Study Period, using the solutions identified in the most recently completed and approved CRP. The baseline system for the CARIS incorporates sufficient viable market-based solutions to meet the identified Reliability Needs, if any, along with any regulated backstop solutions triggered in prior or current CRPs. If more market based solutions have been proposed than the minimum necessary to meet the identified Reliability Needs, the NYISO applies the procedure developed with stakeholders at ESPWG to scale back the market-based solutions to the minimum amount necessary to meet the identified Reliability Needs[1]. Regulated backstop solutions that have been proposed but not triggered in the most recent CRP will also be used if there are insufficient market-based solutions for the ten-year study period. Additional information can be found in the Initial CARIS Manual – Procedure for Inclusion of Market Based Solutions & Regulated Backstop Solutions in the CARIS Base Case, and Procedure to Scale Back Market Based Solutions, Appendix F.

In conducting the CARIS, the NYISO conducts benefit/cost analysis of each generic solution to the congestion identified. One generic solution is determined by NYISO for each resource type (generation, transmission, and demand response) for each of the three congestion studies. During each cycle, NYISO will develop with ESPWG specific project criteria for each resource type (generation, transmission, and demand response) including block size and construction assumptions. Following the identification of the three studies, each resource type shall be applied in year one of the planning horizon, in sufficient quantities of generic block sizes associated with each resource type and specific locations to alleviate a substantial and comparable portion of the identified congestion over the planning horizon. Additional details can be found in the Initial CARIS Manual – Generic Solutions, Appendix F.

The principal benefit metric for the CARIS analysis will be expressed as the present value of the NYCA wide production cost reduction that would result from each generic solution. Additional benefit metrics calculated include estimates of reduction in losses, changes in LBMP load payments, changes in generator payments, changes in ICAP costs, changes in emission costs, and changes in TCC payments. Additional details can be found in the Initial CARIS Manual – Additional Benefit Metrics for CARIS Studies Methodology and Models to Develop and Implement Additional Metrics, Appendix F.

The costs of generic solutions utilized in the benefit/cost analysis are order of magnitude estimates developed for each resource type. The costs are developed for relevant geographic locations during each CARIS cycle. The order of magnitude costs will be provided to the ESPWG for their review and acceptance during each CARIS cycle as part of the Assumption

---

[1] The manner in which actual capacity sold in the NYISO markets is represented in CARIS modeling, including the potential need for Tariff refinements, will be considered in the stakeholder process during the next CARIS cycle.

Formatted: Font: Italic

Matrix approval process. If a cursory review of the location for the generic solution identifies unusual complexities, a contingency factor may be applied to the costs.

To add information to the benefit/cost analysis, scenario analysis is performed. The scenarios are developed in conjunction with the ESPWG. Variables for consideration in the development of these scenarios include but are not limited to: load forecast uncertainty, fuel price uncertainty, new resources, retirements, emission data, the cost of allowances and potential requirements imposed by proposed environmental and energy efficiency mandates, as well as overall NYISO resource requirements.

The NYISO prepares a draft of the Study Phase report, ~~,~~including a discussion of assumptions, inputs, methodology, and results of the analyses. The draft report is submitted to both TPAS and the ESPWG for review and comment. Following completion of that review, the draft report is sent to the Business Issues Committee and the Management Committee for discussion and action. Following the Management Committee vote, the draft report, with Business Issues Committee and Management Committee input is forwarded to the NYISO Board for review and action. Concurrently, the draft report is provided to the Independent Market Adviser (IMA) for his review and consideration. The Phase 1~~I~~ report and the IMA’~~”~~s comments are then submitted to the NYISO’s Board of Directors. Upon review and approval by the Board, the NYISO issues the Phase 1~~issue sthe Study Phase of the CARIS~~ report to the marketplace by posting it on its website.

Formatted: Font: (Default) TimesNewRomanPSMT

In order to provide ample exposure for the market place to understand the content of the Study Phase of the CARIS, the NYISO will provide various opportunities for Market Participants and other potentially interested parties to discuss the final CARIS. Such opportunities may include presentations at various NYISO Market Participant committees, focused discussions with various industry sectors, and /or presentations in public venues. The CARIS Phase 1~~I~~ process is depicted in the following process flow diagram:

Formatted: Font: Italic

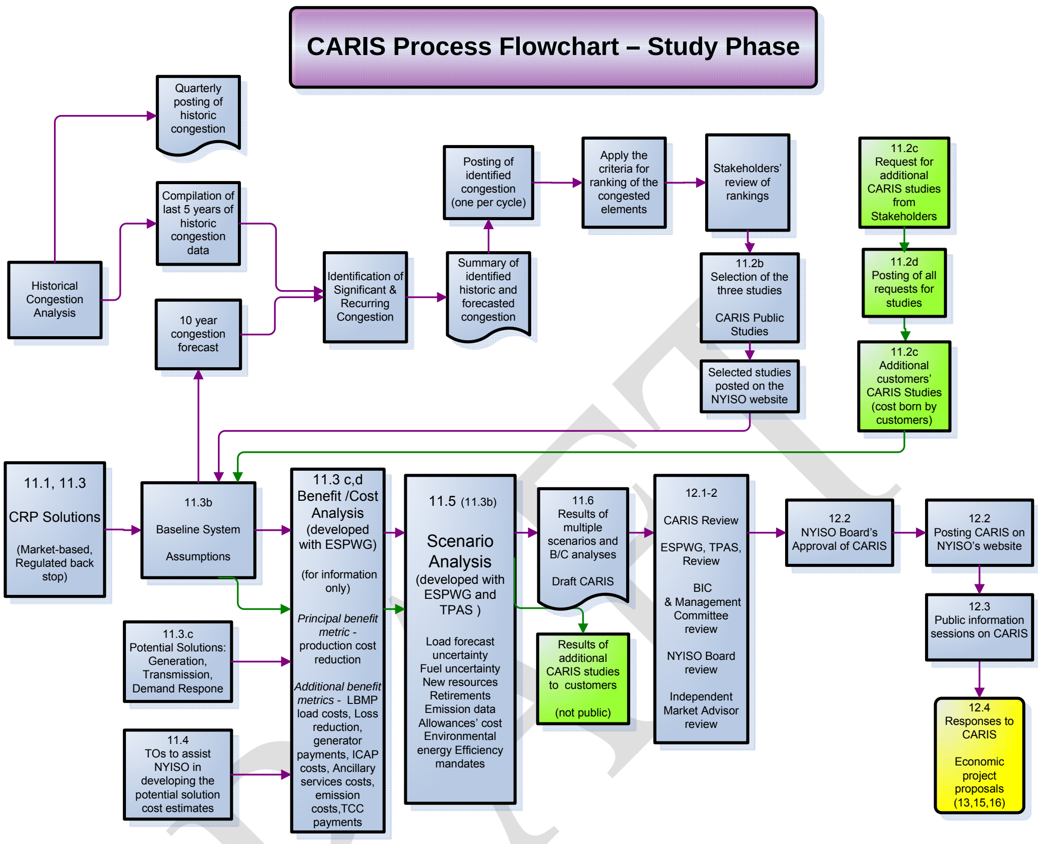


Figure B-1: Phase 1 or Study Phase of the CARIS Process

Formatted: Font: 13 pt

B.2. Phase 2 – Projects Phase

Formatted: Don't adjust space between Latin and Asian text, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

The results of the Phase 1 study report informs stakeholders who may be interested in proposing projects to address specific congestion identified in the CARIS Study Phase report. Any interested developer can propose any type of project, such as a generator or demand response, to congestion identified in the Study Phase, and seek cost recovery through the NYISO's markets. However, Phase 2 of CARIS, known as the "Project Phase," applies only to transmission projects that are proposed in response to congestion identified in the Phase 1 study, or that are regulated backstop reliability solutions that are ~~is~~ accelerated to reduce congestion in earlier years of the study period[2].

Market-based responses to congestion identified in the Study Phase of the CARIS are not eligible for regulated return and therefore are not obligated to follow the requirements of Phase

[2] A procedure on the acceleration of regulated backstop solutions is still under the development

Formatted: Font: Italic

2. The cost of a market-based project shall be the responsibility of the developer of the market based proposal.

In order for a transmission project to be eligible for cost recovery in Phase 2, the benefit of the proposed project for the first ten years from its expected in-service date must exceed the cost of the proposed project measured over the same ten years from the proposed commercial operation date. Additionally, the total capital cost of the project must exceed $25 million. Finally, a super-majority of 80 percent of the weighted vote of the beneficiaries must be cast in favor of the project.

Phase 2 starts with the NYISO evaluating whether a project proposes a transmission facility or upgrade. If so, the NYISO performs a ten-year benefit/cost ~~(b/cBenefit/Cost (B/C)~~ analysis from the proposed in-service date, which is paid for by the developer. The benefit metric will be expressed as the present value of the annual NYCA-wide production cost savings that would result from the implementation of the proposed project, measured for the first ten years from the proposed commercial operation date of the project. The estimated cost of each economic transmission project will be supplied by the developer using a reasonable amortization period. The project cost is expressed as the net present value of the first ten years of the annual total revenue requirement for that project.

If the proposed economic transmission project has a benefit/-costs ratio greater than one~~1~~ over the first ten years from the proposed commercial operation date of the project,,and the total capital cost of the proposed project is greater than $25 million, then the proposed project will be eligible to proceed to the next steps.

In addition to the metrics used in the benefit/costs, for informational purposes only, the NYISO will also calculate the present value and annual total revenue requirement for the project over a 30 year period commencing with the proposed commercial operation date of the project. Also, the NYISO will work with the ESPWG to consider the development of additional metrics for informational purposes only. These additional metrics include changes in: LBMP load costs, generator payments, ICAP costs, emissions costs, losses and TCC revenues. The NYISO will provide analysis of these additional metrics taking into account the overall resource commitments of the NYISO.

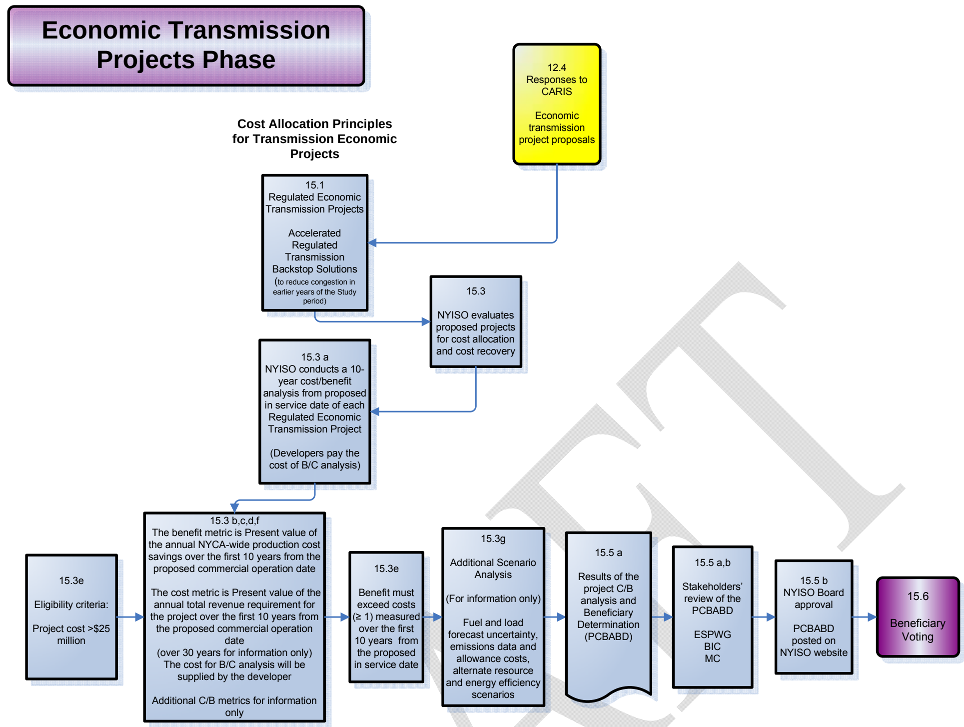
In addition to the benefit/-cost analysis, the NYISO will work with the ESPWG to consider the development and implementation of scenario analyses, for information only, to shed additional light on the costs and benefits of a proposed project. Additional details can be found in the Initial CARIS Manual– NYISO Cost Allocation Procedures for Regulated Economic Transmission Projects, Appendix F.

The results of the benefit/-cost analysis, the additional metrics, the scenario analysis, and the determination of the beneficiaries, will be documented and submitted to the ESPWG for review and comment. Following completion of that review, the NYISO's benefit/-cost analysis shall be forwarded to the Business Issues Committee and to the Management Committee for discussion and action. The beneficiary determination and respective percentages will be provided to the BIC and MIC for review, but not approval. Following the Management Committee vote on the NYISO's project benefit/-cost analysis, the benefit/-cost analysis and

Formatted: Font: Italic

beneficiary determination will be forwarded, with the input of the Business Issues Committee and Management Committee, to the NYISO Board for review and action. -Upon final approval of the Board, project B/C analysis and beneficiary designations shall be posted by the NYISO on its website. Phase 2 of the CARIS is depicted in the following diagram:

Formatted: Font: Italic



Field Code Changed

Formatted: Font: Italic

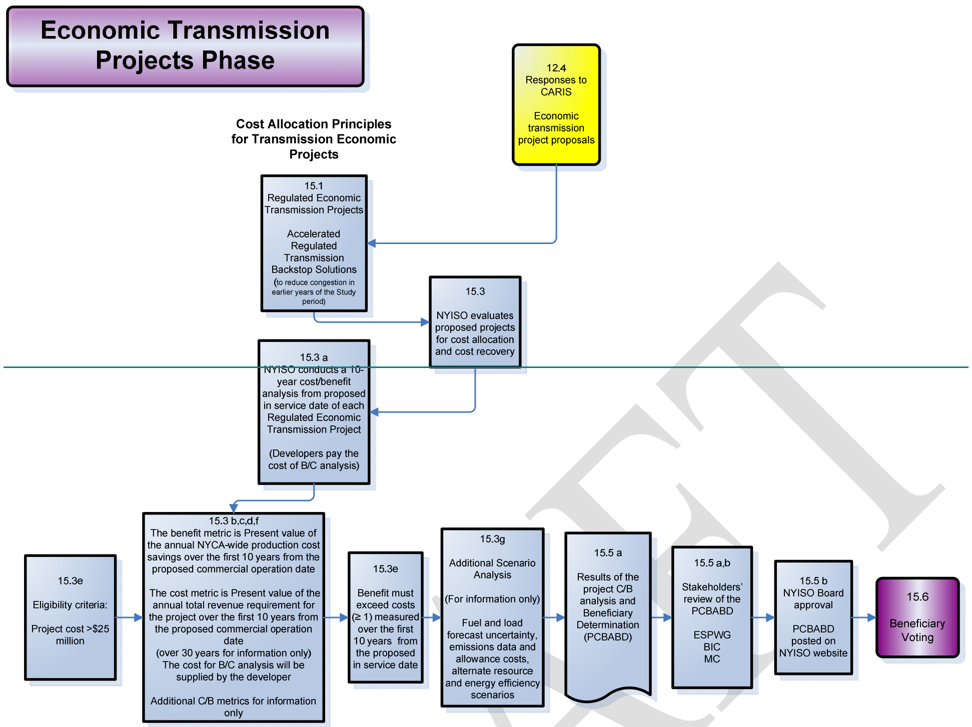


Figure B-2:— Phase 2 – Project Phase of the CARIS process

Voting, Cost Allocation, and Cost Recovery

The CARIS process requires the determination of beneficiaries for voting and cost allocation. The cost of a regulated economic transmission project will be allocated to those load serving entities that would economically benefit from implementation of the proposed project. The NYISO will identify the beneficiaries of the proposed project over a ten-year time period commencing with the proposed commercial operation date for the project.

The NYISO will measure the present value of annual zonal LBMP load savings for all load zones which would have a load savings, net of reductions in TCC payments, and bilateral contracts (based on available information) as a result of the implementation of the proposed project. Additional information can be found in the CARIS Procedure - Procedure to Estimate the TCC Revenues, Appendix F. The beneficiaries will be those load zones who experience net benefits measured over the first ten years from the proposed commercial operation date for the project. For each load zone that would benefit from a proposed project, the NYISO will allocate the cost of the project to load based on the share of total savings. Within zones, costs will be allocated to Load Serving Entities based on MWhs. Load zones not benefiting from a proposed project will not be allocated any of the costs of the project. There will be no “make whole” payments to non-beneficiaries.

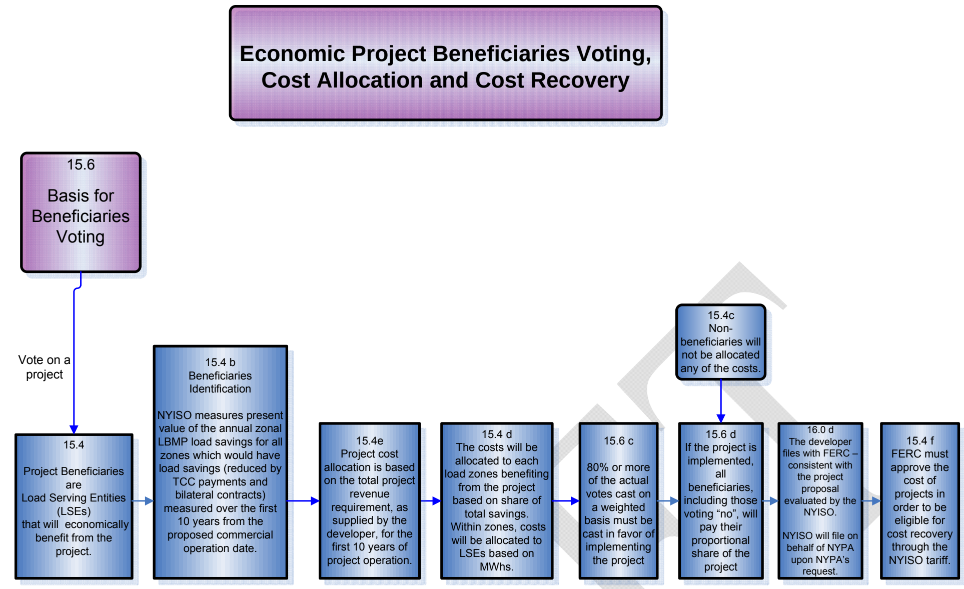
Formatted: Font: Italic

Only Load Serving Entities defined as beneficiaries of a proposed project shall be eligible to vote on a proposed project. -The voting share of each Load Serving Entity shall be weighted in accordance with its share of the total project benefits. -For the proposed project to proceed, eighty (80) percent or more of the actual votes cast on a weighted basis must be cast in favor of implementing the project. -If the project meets the required vote in favor of implementing the project, and the project is implemented, all beneficiaries, including those voting "no," will pay their proportional share of the cost of the project. -Additional information can be found in the Initial CARIS Manual - Voting Procedures (to be finalized), Appendix F.

If the proposed economic transmission project has a benefit/-cost ratio greater than one over the first ten years from the proposed commercial operation date of the project, the total capital cost of the proposed project is greater than $25 million, and -it receives a super-majority (>=80%) of the beneficiaries vote in favor of the project, then the Developer shall have the right to make a filing with FERC, under Section 205 of the Federal Power Act, for approval of its costs associated with implementation of the project. -Also, upon request by NYPA, the NYISO will make a filing on behalf of NYPA. -FERC must approve the cost of a proposed economic transmission project for that cost to be recovered through the NYISO tariff. -The following diagram depicts the process for voting, cost allocation and cost recovery of transmission projects in Phase 2 of CARIS.

Formatted: Font: Italic

Field Code Changed



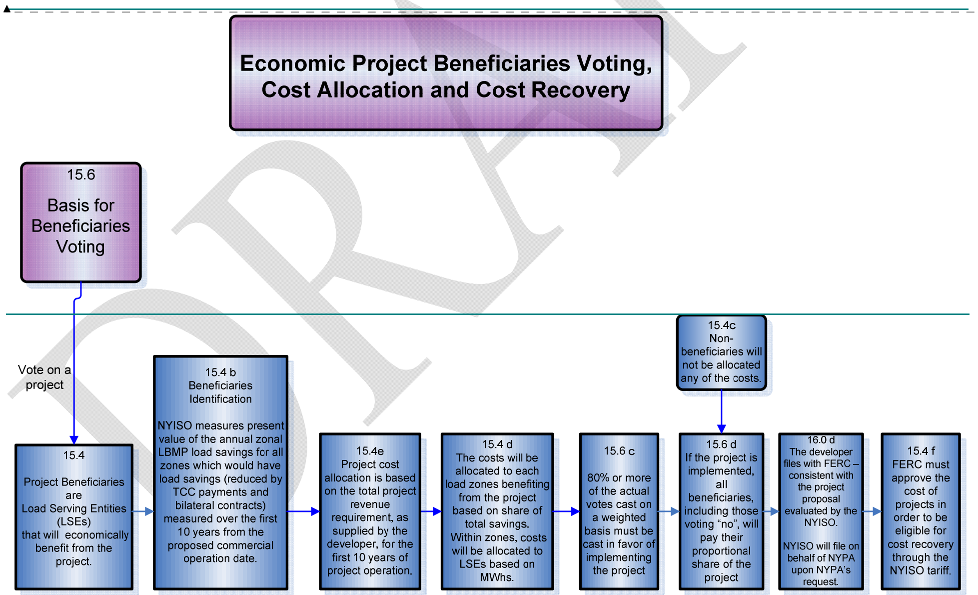


Figure B-3: –Voting, Cost Allocation, and Cost Recovery of the CARIS process

The CARIS procedure to identify beneficiaries of each proposed projects is currently under development. Other Phase 2 procedures under consideration or development include: the methodology to extend database beyond the study period (OATT Attachment Y, § 15.3.a); acceleration of regulated backstop solutions for economic reasons (OATT Attachment Y, §

Formatted: Font: Italic

15.1); and process for specific regulated economic transmission projects proposals (OATT Attachment Y, § 15.3).

Formatted: Font: Italic

Appendix C – Baseline System Assumptions and Methodology

C.1. CARIS Model - Base Case Modeling Assumptions for 2009-2018

Formatted: Font: 13 pt

Formatted: Don't adjust space between Latin and Asian text, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

~~**CARIS Study Phase**~~

Implementing the CARIS requires the understanding of a significant amount of data. As stated in Section 11.1 of AttachmentSchedule Y ~~of the Tariff~~, "*The CARIS for economic planning will align with the reliability planning process. Each CARIS will use a ten-year planning horizon consistent with the reliability planning horizon. Each CARIS will be based on the most recently concluded and approved CRP. The base case for each CARIS will assume a reliable system for the ten-year planning horizon based upon the CRP.*"

The data utilized in the Base Case simulations for CARIS is derived from the 2009 CRP/RNA and CARIS Assumptions Matrix, Table C-1, shown below. Major components of that data include base load flow data, unit heat rates, unit capacities, fuel prices, transmission constraint modeling, load growth and shape representation, both simulated and actual and scheduled interchange values, O&M cost, and environmental cost components. The assumptions matrix was developed with the ESPWG.

Table C-1: CARIS Assumptions Matrix

Parameter	Modeling for CARIS Base Cases	Basis for Recommended Assumptions for CARIS
Peak Load	Forecast as per 2009 RNA Base. Scenarios for other forecasts.	Based on CRP Peak Forecast Use 2009 Base Case Energy Forecast
Load Shape Model Energy Forecast	2002 Load Shape, constant over ten year period. 2009 RNA Base Case Forecast	2002 load shape is an appropriate representation for this analysis. For base year, use 2002 Load Shape. Adjusted for Energy Forecast if needed., Evaluate alternative in future
Load Uncertainty Model	Statewide and zonal model updated to reflect current data., constant over ten year period	Base Level Forecast will be used. Other load uncertainty levels not evaluated.
Generating Unit Capacities	Same as CRP - Per 2009 CRP, updated DMNC test values plus units	Any changes in CRP capacities through time to be represented in CARIS.
New Units	As per the CRP and scaled back according to procedure (Tariff Attachment Y: Section 11.3.b)	N/A
Wind Resource Modeling	Existing units derived from hourly wind data with average Summer Peak Hour capacity factor of approximately 11 %. New units from wind	Typical shape for location as per MARS and wind studies.

Formatted: English (U.S.)

Formatted: English (U.S.)

Formatted: French (France)

Formatted: English (U.S.)

Formatted: English (U.S.)

Formatted: Font: Not Bold, English (U.S.)

Formatted: English (U.S.)

Formatted: English (U.S.)

Formatted Table

Formatted Table

Parameter	Modeling for CARIS Base Cases	Basis for Recommended Assumptions for CARIS
	shapes from wind study.	
Non-NYPA Hydro Capacity Modeling	Pondage Run of River(Hourly)	N/A
Special Case Resources	Those sold for the program, discounted to historic availability and distributed according to zonal performance. Assume 15% growth rate for all zones. Modify load SCR/EOP to proportion available SCR by load amount by zone. See SCR determinations in Attachment G.	N/A
EDRP Resources	Those registered for the program, discounted to historic availability (45 % overall). July & August values calculated from 2008 July and August registrations.	Need to define costs associated, firm modifiers vs. price responsive.
External Capacity – Purchases	Based on NYISO forecast. Sensitivity performed to remove contracts and see the effect on LCR-IRM curve. Results should not impinge on IRM. Sensitivity with 20 MW MISO wheel through Ontario to Zone A).	N/A
Retirements	2008 Gold Book over ten year period.	As per the CRP.
Planned Outages	Per 2009 CRP, based on schedules received by NYISO & adjusted for history., constant over ten year period.	As per the CRP.
Outage Scheduling ~~Planned~~	Continue with approximately 150 MW after reviewing last year's data..	As per the maintenance schedules in long term adequacy studies.
Gas Turbines Ambient Derate	Continue with approximately 150 MW after reviewing last year's data, constant over ten year period.	Reflected only in summer/winter ratings.
Environmental Modeling ~~Adders~~ Externalities Allowances	Included in the Base Case and modified in the~~Studied as~~ scenarios . Built into the development of cost curves of resources. Optimization is cost driven.	Any impacts assumed in CRP carried forward. Limits on emissions done through allowances, not hard limits. Allowance cost from Chicago Climate Futures Exchange.

Formatted Table

Parameter	Modeling for CARIS Base Cases	Basis for Recommended Assumptions for CARIS
Commitment and Dispatch Options Operating Reserves	Each Balancing Authority Commits separately Hurdle Rates are employed for commitment and dispatch.. Operating Reserves as per NYCA requirements.	N/A
Fuel Price Forecast	EIA data obtained quarterly, adjusted for seasonality on monthly basis, monthly volatility based on historical patterns.	NYISO to calibrate forecast based on public information and historical data.
Cost Curve Development	Developed from Heat Rate Curve, Fuel Price forecast, environmental adders, penalty factors.	Allowances from Chicago Climate Futures Exchange, Heat Rate development under discussion.- Unit specific heat rates are confidential and not disclosed.
Heat Rates NYCA External Systems	Developed from vendor supplied data and fuel input data matched with MWhr data for NYCA.	
Local Reliability Rules	List and develop appropriate nomograms.	Fuel burn restrictions, operating restrictions and exceptions, commitment/dispatch limits.
Energy Storage Gilboa PSH Lewiston PSH	Gilboa and Lewiston scheduled against NYCA.	N/A
Transmission System Model		
Power Flow Cases	As per CRP.	N/A
Interface Limits Monitored/contingency pairs Nomograms Joint, Grouping Unit Sensitive Voltage	Transfer limit analysis done in RNA/CRP for critical interfaces. -External system limits from input from neighboring systems.	Based on historical congestion, planning study results, NERC book of flowgates, PROBE/SCUC list of active/potential constraints, Special Protections Systems including Athens SPS in 2009 and 2010.
New Transmission Capability	As per CRP.	N/A
Internal Controllable Lines (PARs,DC,VFT)	Optimized in simulation.	N/A
Neighboring Systems		
Outside World Area	Power flow data from CRP, “production” data	N/A

Parameter	Modeling for CARIS Base Cases	Basis for Recommended Assumptions for CARIS
Models Fuel Forecast	developed by NYISO with vendor and neighbor input. Linked with NYCA forecast.	
External Capacity Load Forecast	Firm and grandfathered are included. Neighboring systems data reviewed and held at required reserve margin.	Neighboring systems modeled consistent with reserve margins in the RNA/CRP analysis.
System representation in Simulation	HQ modeled as load/generation pair. Full Representation/Participation - NYISO - NE-ISO - IESO - PJM Classic & Full Representation: NYISO,NEISO,IESO,PJM (PJM Classic, AP,AEP,CE,DLCO,DAY,VP) Proxy Bus: HQ-NYISO, HQ-NEISO Transmission Only/Zeroed Out: MECS,FE,SPP, MAR, NIPS,OVEC,TVA, FRCC,SERC,ERCOT,WECC	N/A
External -Controllable Lines (PARs,DC,VFT, Radial lines)	A,B,C and J,K "wheel" Both sets set at 600 min, 1200 max, imbalance monitored Ramapo -+/- 1000 MW Norwalk +/- 100 MW L33,34 - +/- 300 MW PV20 – 130, 0 MW Neptune and CSC as per CRP firm X 24 hrs, economy remainder	N/A

Below are descriptions of key data in more detail. The data was developed based on the Tariff and in collaboration with stakeholders.

1. Base Case Load Forecast ~~(from 2009 RNA/CRP)~~

Table~~Tables~~ C-2 present CARIS Base Case~~base case~~ load forecasts from 2009 through 2018 used from the 2009 RNA/CRP~~.~~.

Table C-2: Annual Zonal Demand (GWh)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
~~Demand GWh~~										
~~Area~~	~~2009~~	~~2010~~	~~2011~~	~~2012~~	~~2013~~	~~2014~~	~~2015~~	~~2016~~	~~2017~~	~~2018~~
West	16,011	16,143	16,189	16,211	16,287	16,375	16,436	16,532	16,615	16,68[illegible]
Genesee~~Genessee~~	10,067	10,162	10,154	10,157	10,210	10,323	10,410	10,519	10,615	10,70[illegible]
Central	16,881	16,975	17,039	17,035	17,102	17,219	17,311	17,418	17,464	17,50[illegible]
North	7,014	7,102	7,147	7,153	7,178	7,192	7,176	7,185	7,171	7,18[illegible]
Mohawk	8,020	8,066	8,109	8,117	8,127	8,171	8,202	8,228	8,238	8,24[illegible]

Formatted Table

Formatted: Normal, Centered

Formatted: Font: Not Bold

Formatted Table

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Valley										
Capital	11,907	11,919	11,988	12,074	12,160	12,257	12,355	12,487	12,621	12,757
Hudson Valley	11,007	11,146	11,263	11,302	11,382	11,496	11,566	11,656	11,757	11,827
Millwood	2,748	2,786	2,817	2,830	2,871	2,884	2,903	2,928	2,954	2,985
Dunwoodie	6,478	6,541	6,572	6,564	6,593	6,586	6,595	6,607	6,638	6,680
NY City	54,987	55,905	56,661	57,503	58,358	59,430	60,353	61,628	62,083	62,569
Long Island	23,008	23,002	23,015	22,981	22,888	22,866	22,870	23,062	23,127	23,278
NYISO Total	**168,128**	**169,747**	**170,954**	**171,927**	**173,156**	**174,800**	**176,177**	**178,250**	**179,283**	**180,427**

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold

2.

Power Flow Data

The CARIS uses the network topology, system impedance and transmission line ratings that were developed from the 2009 CRP power flows. -The following power flow cases were developed for the CARIS from the 2008 FERC Form 715 filing Base Cases~~base cases~~:

- Summer 2009 Peak Load
- Summer 2013 Peak Load
- Winter 2013/2014 Peak Load
- Summer 2018 Peak Load

For the intermediate years between 2010 and 2017, the power flow cases were based on data provided in the FERC Form 715 2013 Summer Peak Load case. –PJM system changes modeled in PJM's 2012 Regional Transmission Expansion Plan (RTEP) Study and NYISO system changes described in the 2009 CRP Study required changes to these power flow cases, such as additional generators and transmission lines, to capture the sequencing of these additional resources. -The FERC Form 715 2018 Summer Peak Load case and NYISO system changes described in the 2009 CRP Study were used to develop the 2018 power flow case. –The winter transmission line ratings from the FERC Form 715 Winter 2013/2014 Peak Load case were used for all years assessed in the CARIS.

3. Transmission Model

New York Control Area Model

Figure C-1 below displays the bulk power system for NYCA, which generally consists of facilities 230 kV and above, but also includes certain 138 kV facilities and a small number of 115 kV facilities. -The balance of the facilities 138 kV and lower voltage are considered non-bulk or sub-transmission facilities for purposes of this study. -The figure also displays key transmission interfaces for New York.

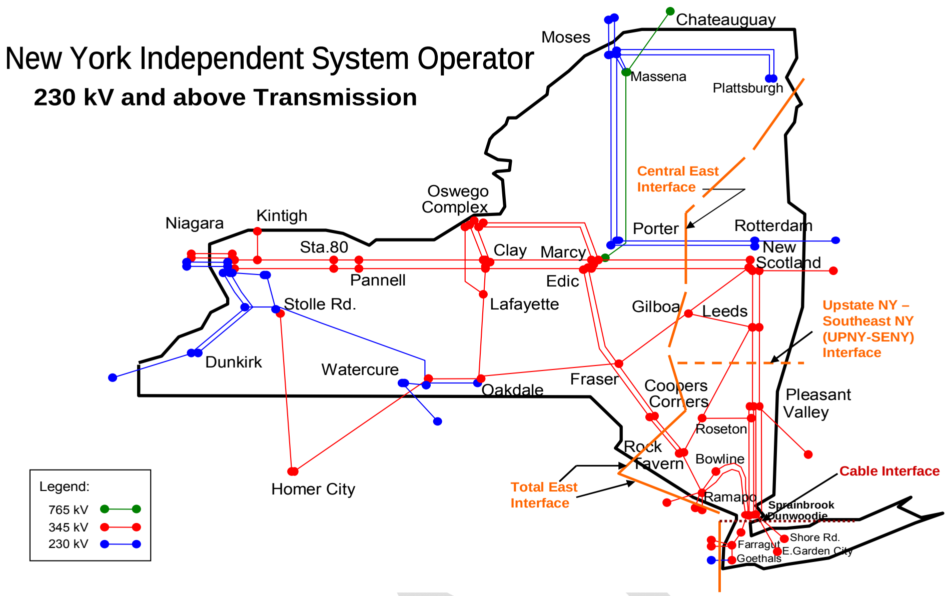


Figure C-1: NYISO 230 kV and above Transmission Map

New York Control Area Changes, Upgrades and Resource Additions

The highlights of year on year model changes are as follows:

a. Caithness Long Island – new 310~~320~~ MW ~~[CFP: CHECK THIS NUMBER, I THINK IS 350 MW NAMEPLATE RATING]~~, Combined Cycle, LIPA, Suffolk, NY, Commercial Operation – 4/2009;

b. BesiCorp – new 660 MW, Combined Cycle, National Grid, Rensselear, NY, proposed Commercial Operation 2/2010;

c. Polleti – 890.7 MW, retirement expected 2/2010;

d. M29 – 345 kV cable~~transmission line~~ from an existing station in Yonkers, NY to a new substation in NYC, with normal, LTE and STE ratings of 521 MW, 748 MW and 1195 MW respectively. Expected~~expected~~ in-service date is Summer 2011;

e. Athens Special Protection System (SPS) is assumed to no longer be in service starting January 2011. When activated, the SPS allows for 184 MW of additional flow on 91/92. ~~; and~~

f. Linden VFT – the VFT facility was set to control flow between 245 MW and 295 MW, not to exceed 300 MW. Proposed~~proposed~~ commercial operation date is December 2009.

External Area Model

The external areas immediately adjacent to the NYCA are also modeled at full representation, except for Hydro Quebec (HQ). Those areas include ISO-NE, IESO, and PJM (PJM Classic, AP, AEP, CE, DLCO, DAY and VP). Since HQ is asynchronously tied to the bulk system, proxy buses representing the direct ties from HQ to NYISO and HQ to ISO-NE are modeled. External areas surrounding the above areas are only modeled to capture the impact of loop flows.

Table C-3 illustrates the external transmission limits used in the CARIS Study.

Table C-3: External Area Transmission Transfer Limits

Area	Interface	2009	2010	2011	2012	2013	2014-2018
IESO	IMO EXPORT	2500	2500	2500	2500	2500	2500
IESO	IMO-MISO	1	1	1	1	1	1
IESO	IMO-NYISO	2000	2000	2000	2000	2000	2000
ISO-NE	Boston	4900	4900	4900	4900	4900	4900
ISO-NE	Connecticut-Export	2200	2200	2200	2200	2200	3600
ISO-NE	East-West (NE-NY)	2100	2100	2100	2100	2100	2100
ISO-NE	ISO-NE EXPORT	4000	4000	4000	4000	4000	4000
ISO-NE	ISO-NE-NYISO	1400	1400	1400	1400	1400	1400
ISO-NE	LI – ISO-NE	450	450	450	450	450	450
ISO-NE	ME – NH	1400	1400	1400	1400	1400	1500
ISO-NE	NB – NEPOOL	500	500	500	500	500	500
ISO-NE	North – South	2700	2700	2700	2700	2700	2700
ISO-NE	Norwalk-Stamford	1300	1300	1300	1300	1300	1300
ISO-NE	Orrington South	1050	1050	1050	1050	1050	1050
ISO-NE	SEMA	1450	1450	1450	1450	1450	1450
ISO-NE	SEMA/RI	2200	2200	2200	2200	2200	2200
ISO-NE	South West CT	2350	2350	2350	2350	2350	3650
ISO-NE	Surowiec South	1150	1150	1150	1150	1150	1150
NYISO	NYISO-HQ	1050	1050	1050	1050	1050	1050
NYISO	NYISO-IESO	2500	2500	2500	2500	2500	2500
NYISO	NYISO-PJM	2500	2500	2500	2500	2500	2500
PJM	APSOUTH	3250	3250	3250	3250	3250	3250
PJM	Central Interface	5200	5200	5200	5200	5200	5200
PJM	Eastern Interface	7000	7000	7000	7000	7000	7000
PJM	PJM East – NYISO	2500	2500	2500	2500	2500	2500
PJM	PJM EXPORT	6000	6000	6000	6000	6000	6000
PJM	PJM West – NYISO	2000	2000	2000	2000	2000	2000
PJM	PJM_Extension Export	1500	1500	1500	1500	1500	1500

Area	Interface	2009	2010	2011	2012	2013	2014-2018
PJM	PJM_HomerCty	531	531	531	531	531	531
PJM	PJM-VAP	500	500	500	500	500	500
PJM	Western Interface	6250	6250	6250	6250	6250	6250

Two major transmission additions in the PJM area are included in the Base Case. The first addition is the TrAIL Line, which is located in PJM and is scheduled to enter commercial operation in 2010. The second addition is the Susquehanna-Roseland 500 kV addition, which is located in PJM and is scheduled to enter commercial operation in 2013. These substantial upgrades to the PJM system will provide additional transfer capability and a lower impedance path from western PJM to eastern PJM. This may allow for cheaper resources to be delivered to eastern PJM by bypassing potential constraints. As a result, these upgrades may impact prices in eastern PJM and New York. With the network impedance change, there will be an impact on the shift factor calculations that may increase or decrease congestion in PJM and New York.

Hurdle Rates and Interchange Models

Hurdle rates set the conditions in which economic~~economy~~ interchange can be transacted between neighboring markets/control areas. They represent a minimum savings level that needs to be achieved before energy will flow across the interchange. Hurdle rates serve two purposes in the CARIS model. First, they are used when preparing the Base Case to help calibrate the production-cost simulation so that it replicates the ~~a~~ historical pattern of internal NYCA generation and imports. ~~dispatch.~~ Second, they are used to find a different (and usually lower-cost) combination of generation resources to meet loads aggregated from the Base Case.

Two independent hurdle rates are used in the CARIS, one for the commitment of generation and a separate one for the dispatch of generation. The commitment hurdle rate sets the level that a unit commitment change will be made and the dispatch hurdle rate sets a level that will allow economic dispatch to be changed to allow scheduled energy to flow between market areas. Hurdle rates are held constant throughout the 2009-2018 study period. Hurdle rates on several closed and open interfaces were used to model regional power imports, exports and wheel-through transactions. These hurdle rates are frequently used in conducting multi-pool production cost simulations and they are used to represent several phenomena such as complex market pricing at the boundary buses, cost mark-ups and market inefficiency. The hurdle rate values in the CARIS databases are consistent with previous NYISO and consultant studies, and are considered standard industry practice. In addition, the annual NYISO imports are consistent with historic import levels, confirming that NYISO's hurdle rate assumptions are reasonable.

Only energy transactions associated with Unforced Capacity Deliverability~~Delivery~~ Rights (UDRs) granted on controllable tie lines were specifically modeled, namely on the NYISO DC tie-lines (Neptune and Cross Sound Cable (CSC)). Flows on those facilities were not subject to hurdle rates and the required firm commitment was modeled in the associated neighboring system. The flow on the CSC line was modeled to allow bi-directional flow (i.e., flow both from and toward ISO-NE) but the Neptune flows was restricted to no more than 660 MW in one direction into Long

Island from PJM. -The reverse flow toward PJM was not allowed to occur in the simulation because exports from Long Island to PJM are not presently permitted operationally on Neptune line.

The ~~Regarding interchange, the~~ hourly interchange flow for each interface connecting the NYISO with neighboring control areas was priced at the LBMP of its corresponding proxy-bus. The summation of all 8760 hours determined the annual cost of the energy for each interface. -Table C-4 lists the proxy bus location for each interface.

Table C-4: Interchange LBMP Proxy Bus

Interface	Proxy-Bus
PJM	Keystone
Ontario	Beck
Quebec	Chateauguay
Neptune	Atlantic 230 kV
New England	Sandy Pd
Cross Sound Cable	New Haven Harbor

Formatted Table

4. Production Cost Model

Production cost~~costing~~ models require input data to develop cost curves for the resources that the model will commit and dispatch to serve the load subject to the constraints given in the model. In conducting the CARIS production cost analysis, the NYISO used two simulation tools: ABB's GridView and GE's MAPS. These tools came with their own data sets which the NYISO checked and verified.

This section discusses how the "production cost data" is~~for these resources were~~ identified and quantified. -The model simulations are driven by incremental production costs of generators. The incremental cost of generation is the product of the incremental heat rate multiplied by the sum of fuel cost, emissions cost, and variable operation and maintenance expenses.

Heat Rates

Fuel costs represent the largest incremental expense for fossil fueled generating units. -Fuel costs are the product of fuel prices and incremental heat rates. -Thus, it is critically important to the quality of the CARIS results ~~of CARIS~~ that individual generating unit heat rates used in the simulations be an accurate representation of reality. –Individual unit heat rates are important competitive information and thus are not widely available from generator owners. -Both the ABB GridView and GE MAPS ~~and ABB Gridview (is this correct?)~~ simulation models have databases that represent the model providers' best estimates of heat rates. -When the heat rates from the two models were compared, it was apparent that significant differences existed.

In order to gain additional insight as to which, if either, data set was an accurate representation of actual unit performance, publicly available information reporting heat input was matched with net generator production from NYISO market data to calculate hourly heat rates for 2008. -One vendor has substituted a dataset for which the NYISO did not have a direct license agreement, thus removing that data set from further consideration. UU nit heat input data is available from the U.S. Environmental Protection Agency's (EPA) Clean Air Market Data. Accordingly, this data set was used to calculate unit heat rates and incremental heat rates across each unit's operating range through the use of regression analysis techniques. First, second, and third order polynomials were developed. Generally, third order polynomials resulted in the best fit. A small number of data points were eliminated for a few units to improve curve fit. The eliminated data could be the result of errors in reporting or represent limited operation within a specific hour. These calculated heat rates were compared to the remaining simulation model data for each fossil fueled unit in the NYCA and one heat rate curve was selected for each unit. Several plants have significant steam supply contracts. The steam sales revenues are not captured in the simulation models. In order to simulate the operation of these units, some of them were simulated as must run units.

Consideration was given to using this approach across all of the units in the simulation, however, the relative smaller impact of heat rate inaccuracies for non-NYCA units and the magnitude of the effort to correct heat rates for all units in the simulation lead to the conclusion that vendor-supplied heat rate information should be used for all non-NYCA units.

CARIS simulation models employ power points which are points in each unit's operating range where specific data such as heat rate is tied to the power point. In general there are minimum and maximum points where the unit can be simulated to operate on a sustained basis. There may also be additional intermediary points. Each of these points was tied to a point on the heat rate curve and the incremental heat rate was determined for each unit.

A review of the actual operating performance of NYCA units revealed that the vendor supplied data sets did not accurately capture the point of minimum operation for units that have emission control systems that are sensitive to flue gas exit temperatures for the control of NO_X emissions. The minimum operating points for units with these permit conditions were increased to reflect these operating limits.

Heat Rates of marginal units in all zones display the expected seasonal patterns with summer months having the highest values. Also, there is a progression by which the monthly averages are the lowest in Zone A. The further east a zone is located in the NYCA, the higher is the implied heat rate. The relative magnitudes of differences across zones are consistent with the differences in the generation fuel-mixes as depicted in Figure C-2.

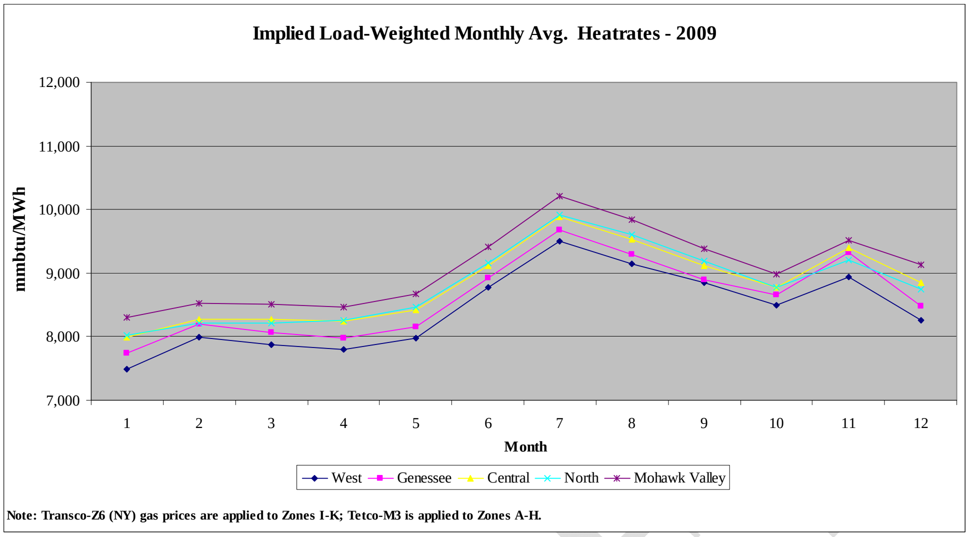
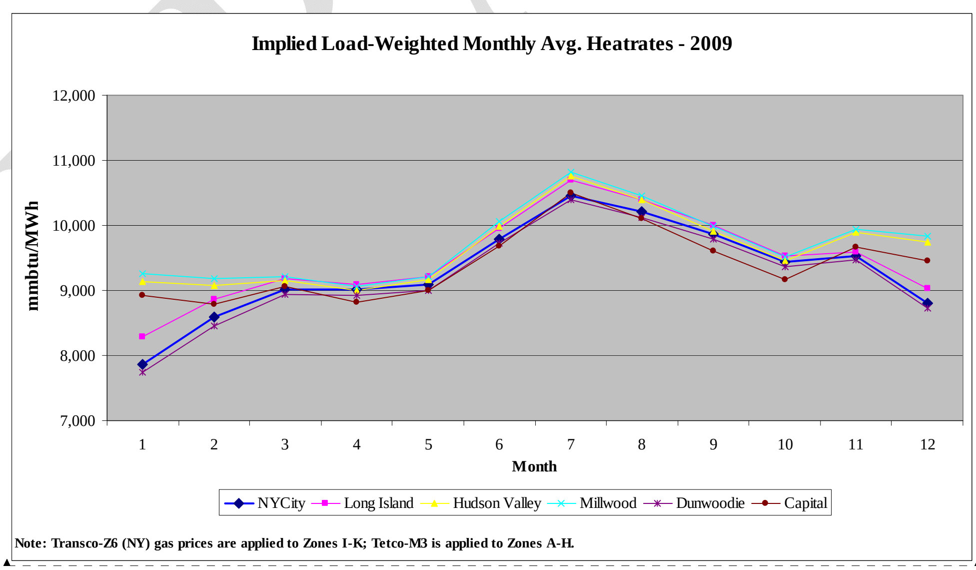


Figure C-2: Implied Load-Weighted Monthly Average Heat Rates for ~~load-weighted monthly average heat rates for~~ Upstate NY (nominal $)

The implied heat rates for all downstate zones, depicted in Figure C-3, display the expected seasonal patterns. -The heat rates of marginal units are highest for Millwood (Zone H), Hudson Valley (Zone G), and Long Island (Zone K). -With respect to Zones G and J, the difference in assumed gas prices explains the relative heat rate parity during non-winter months, and the divergence during the winter months.



Formatted: Not Highlight

Formatted: bodytext

Formatted: Highlight

Figure C-3: Implied Load-Weighted Monthly Average Heat Rates~~load-weighted monthly average heat rates~~
for Downstate NY (nominal $)

Formatted: Indent: First line: 0 pt

5. Fuel forecast

Figures C-4 and C-5 illustrate forecasted oil and natural gas fuel prices for external areas.

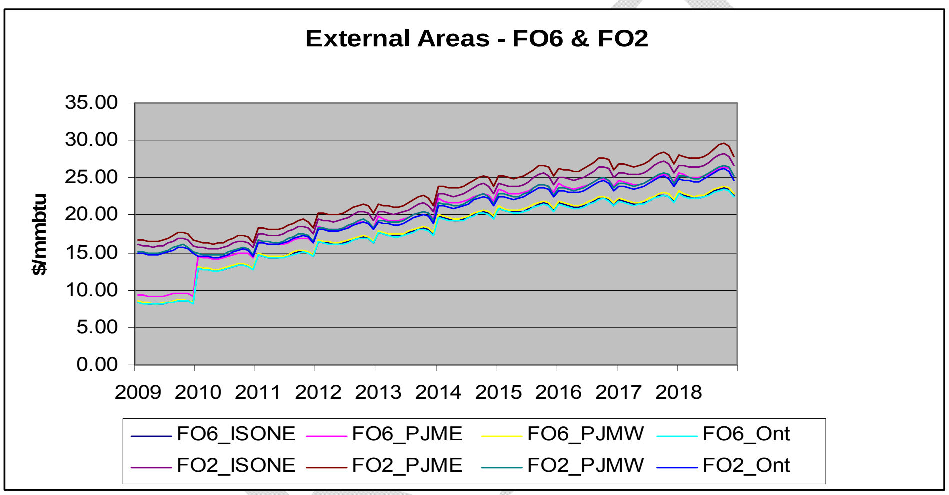


Figure C-4: Forecasted oil fuel prices for ISO-NE, PJM, & Ontario (nominal $)

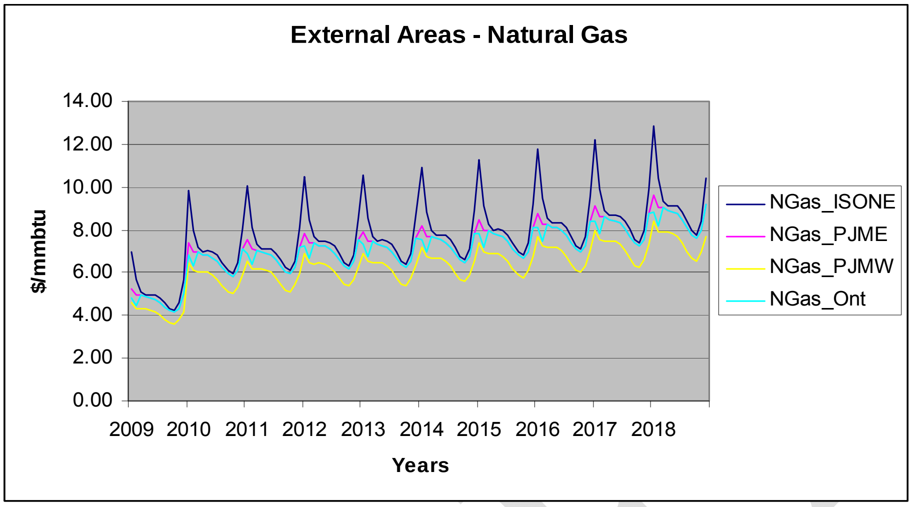


Figure C-5: Forecasted natural gas prices for ISO-NE, PJM, & Ontario (nominal $)

Fuel Switching

Fuel switching capability is widespread within NYCA. In the NYCA, 37% of the 2009 generating capacity, or 14,470 MW, has the ability to burn either oil or gas. There are three reasons that generating facilities would exercise the capability to burn oil: the first reason is that oil would be the economic fuel of choice, the second reason would be to satisfy reliability rules, and the third reason would be an interruption of the gas supply. Historically, significant quantities of oil have been used at the prices illustrated in Figure C-6[3].

[3] The data source for the fuel price history for natural gas is USEIA Sourcekey N3045US3, and for residual fuel oil the data source is USEIA Sourcekey RFO1LNYH5, and NYMEX Central Appalachian. The delivery points of these fuel costs are: Natural Gas NYC; RFO NYH; and Coal Ohio River.

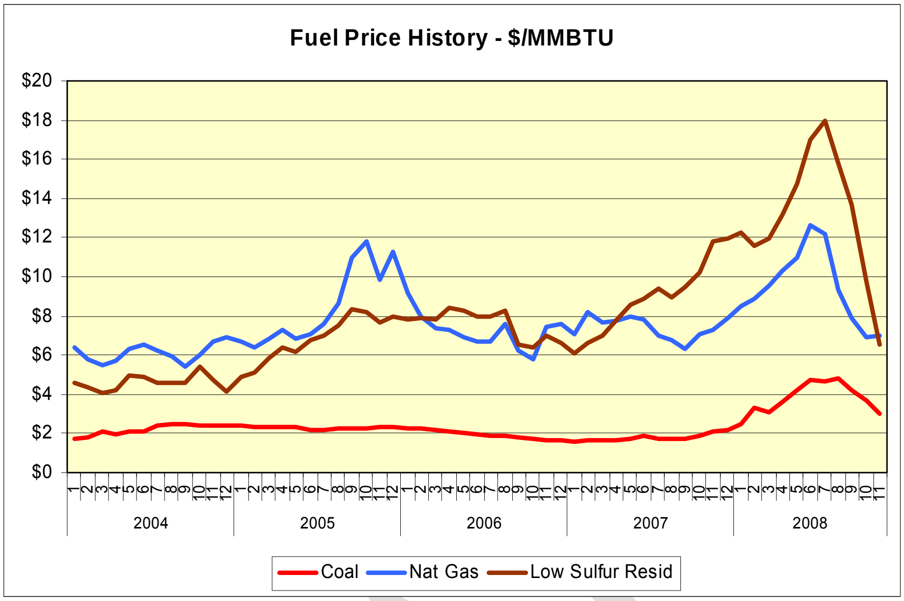


Figure C-6: Historical fuel prices of coal, natural gas, and low sulfur coal (nominal $)

Both simulation models can select the economic fuel based on monthly production costs for units with duel fuel capability. For the planning horizon, the fuel price forecast does not show that low sulfur residual fuel oil will be an economic choice on a monthly basis.

The New York State Reliability Council (NYSRC) establishes rules for the reliable operation of the New York Bulk Power System. Two of those rules guard against the loss of electric load because of the loss of gas supply. Rule I-R3 states "The New York State bulk power system shall be operated so that the loss of a single gas facility does not result in the loss of electric load within the New York City zone." Rule I-R5 similarly states "The New York State bulk power system shall be operated so that the loss of a single gas facility will not result in the uncontrolled loss of electricity within the Long Island zone." To satisfy these criteria, annual studies are performed that update the configurations of the electricity and gas systems and simulate the loss of a various gas supply facilities. The loss of these gas facilities leads to the loss of some generating units. This loss becomes critical because it may result in voltage collapse when load levels are high enough. Therefore, criteria are established whereby certain units that are capable of doing so are required to switch to minimum oil burn levels so that in the event of the worst gas system contingency these units stay on-line at minimum generation levels and support system voltage. This MW deficiency must be made up first through the increased use of imports until oil burning units are able to ramp up their output over a longer timeframe. Some new combined cycle gas turbine units in these zones have the ability to "switch-on-the-fly" from gas-burn to oil-burn with a limited loss of output that can be quickly recovered. However, there is the risk that this live switching may not be successful and the unit may trip. Therefore, in many cases, such units are required to switch to burning oil at lower load levels so there is the ability of recovering from an unsuccessful switching. As the generator fleet in these zones has experienced a shift to increased use of combined cycle units with switch-on-the-fly capability, the amount of oil used in steam units to satisfy minimum oil burn criteria has decreased. In order to simulate the use of oil in steam units to satisfy these reliability criteria, Northport #4 is modeled to burn~~as an~~ oil throughout its operating range during~~only unit in~~ the Summer capability period. ~~three summer months (June-August), and~~ Ravenswood #3 is modeled to burn~~as an~~ oil up to its second dispatch point of 608 MW throughout~~only unit at its minimum load levels. For operation at higher load levels,~~ the year. For the balance of the year for Northport #4 and for the balance of the operating range for Ravenswood #3,~~models simulate these units as dual fuel units that select~~ the most economic fuel was selected~~dispatch~~.

Generation Maintenance

Levels (MW) of generation unavailability were developed based on historic 2007 and 2008 generation unavailability reported in FERC Form 714, which reports 2 types of monthly unavailability:~~:~~ Planned (maintenance outages) and Unplanned (forced outages).~~).~~ Each generating unit was then assigned an unavailability period for each type.~~.~~ Planned or maintenance outage durations are based on established maintenance durations by generating unit technology (i.e. nuclear refueling, steam unit major overhauls, gas turbine inspection).~~).~~ Unplanned or forced outage durations were determined for each generating units based on its most recent 5-year average forced outage rate (EFORd).

Both unavailability periods were then scheduled throughout a calendar year in such a way that the level of unavailability (MW) for each type of outage at the hour of the monthly peak is consistent with the 2007 and 2008 monthly levels of unavailability.~~.~~ The outage duration periods were fixed for each of the study years 2009 through 2018.

Formatted: Indent: First line: 0 pt

5. Generic Solution Cost Matrix

The NYISO defined generic solutions to alleviate~~alleviating~~ congestion by utilizing each resource type (generation, transmission, and demand response), as required by the ~~in~~ Tariff, Attachment ~~attachment~~ Y, Section 11.3c. Estimates included in the Generic Solution Cost Matrix should not be utilized for purposes outside of the CARIS process. No assessment was made concerning the actual feasibility of any generic solution proposed. Also, these estimates should not be assumed as reflective or predictive of actual projects or imply that specific facilities can necessarily be built for these generic solution order of magnitude estimates.

The development of the generic solutions and their costs was ~~were~~ accomplished by using a cost matrix methodology. This methodology was based on utilizing typical MW block size generic solutions, a standard set of assumptions and an order of magnitude costs for each resource type. The block sizes, assumptions and cost estimates were vetted through the stakeholder process at the ESPWG.

Order of magnitude unit pricing cost estimates were developed based on the block sizes and assumptions for each resource type. The NYISO utilized engineering consultants to develop order of magnitude cost estimates based on their experience in the industry and similar existing projects or programs currently being considered within New York. The order of magnitude cost estimates took into account the cost differences between geographical areas within New York. Three sets of costs were developed that are reflective of the differences in labor, land and permitting costs between Upstate, Downstate and Long Island.

All costs were reviewed by the Transmission Owners and Market Participants through the stakeholder process. As part of this process, a range of estimated costs for ~~ranges for the cost for~~ each resource type was ~~element were~~ developed in order to address the wide variability that can occur in a project due to such items as permitting, right of way constraints and existing system conditions.

During the stakeholder review process, it was noted that the cost for new generation in Zone G may be more closely matched to the costs seen Downstate in (Zones H-I) versus costs seen in Upstate (Zones A-F). In reviewing the generation costs for various Zones that were prepared for the ICAP Demand Curve study reported in the *Independent Study to Establish Parameters of the ICAP Demand Curve for the New York Independent System Operator* report with respect to peaking units, the costs for new generation in Zone G falls half way between the costs for Zone F and Zone J. The combined cycle generator plant costs for Zone G (exclusive of interconnection costs) are estimated to be the average of the generation costs for Upstate and Downstate.

The Demand Response resource type costs were based on New York utility EEPS filings for their Demand Side Management programs which consider the potential market value and not actual costs to build or implement DSM[4]. The NYISO will consider developing a customer installed cost approach in future CARIS analysis so that cost estimates for all resource types will be predicting actual cost to implement such a project.

~~Estimates included in the Generic Solution Cost Matrix should not be utilized for purposes outside of the CARIS process. Also, these estimates should not be assumed as reflective or predictive of actual projects or imply that specific facilities can necessarily be built for these generic solution order of magnitude estimates.~~

Generic solutions cost matrix and assumptions for all three types of solutions are presented in Table C-5 through Table C-8 below.

[4] The actual cost estimates for Demand Response solutions will be considered in the next CARIS cycle.

Table C - 5: Transmission Cost Matrix

Base Case Modeling Assumptions for 2009-2018 CARIS Study Phase
Generic Solution
Transmission Cost Matrix
Order of Magnitude Unit Prices

(Estimates should not be assumed reflective or predictive of actual project costs)

		Transmission					Substation	
Item #	**Location**	**Line System Voltage (kV)[5]**	**Block Ampacity (Amp)**	**Block Capacity (MVA)**	**Construction Type**	**Transmission Cost ($M/Mile)**	**Line Terminal Addition per Substation ($M)**	**System Upgrade Facilities ($M)**
T-1 High	Zone A-G	345	1673	1000	Overhead	$5.0	$9.0	$9.0
T-1 Mid	Zone A-G	345	1673	1000	Overhead	$3.5	$6.0	$6.0
T-1 Low	Zone A-G	345	1673	1000	Overhead	$2.0	$3.0	$3.0
T-2 High	Zone H-J	345	1673	1000	Undergrd	$25.0	$40.0	$50.0
T-2 Mid	Zone H-J	345	1673	1000	Undergrd	$20.0	$25.0	$30.0
T-2 Low	Zone H-J	345	1673	1000	Undergrd	$15.0	$10.0	$10.0
T-3 High	Zone K	138	2092	500	Undergrd	$20.0	$20.0	$25.0
T-3 Mid	Zone K	138	2092	500	Undergrd	$15.0	$12.0	$15.0
T-3 Low	Zone K	138	2092	500	Undergrd	$10.0	$4.0	$5.0

Assumptions:

1. Estimates herein should not be utilized for purposes outside of the CARIS process. Also, these estimates should not be assumed as reflective or predictive of actual projects or imply that facilities can necessarily be built for these generic solution order of magnitude estimates. Estimate ranges were identified after Transmission Owner input, a review of recent proposed transmission projects in NY, and reaching consensus at the ESPWG.

2. Lines constructed within Zones A through G will be comprised of single circuit AC overhead construction.

3. Lines constructed within Zones H through K will be comprised of AC underground cable construction.
4. The transmission line will be interconnected into an existing 345kV substation for Zones A-J and 138kV for Zone K.
5. The cost for lines that cross between Zones G and Zones H or I will be pro-rated as overhead or underground based on the mileage of the line included within each Zone.
6. The line can be permitted and constructed utilizing the shortest distance between the two selected substations.

Formatted Table

Formatted: Font: 12 pt

[5] For future CARIS studies, the NYISO will utilize an additional block size of 138kV, 500MVA for Zone J in order to address potential congested load pockets in NYC and at such time develop the respective cost estimates.

7. The existing substation selected as the interconnection point consists of open air construction and has sufficient space within the fenced yard for adding a new breaker and a half bay for the new line terminal. If the selected substation is Gas-Insulated, a factor of 4 times will be applied to the base substation terminal costs.
8. The control house at the existing substations selected as the interconnection point has sufficient space for installing the new protection and communication equipment for the new line terminal.
9. Estimates include costs for material, construction labor, engineering labor, permits, testing and commissioning. The estimates do not include Allowance of Funds During Construction (AFDC).
10. The cost per mile includes a range to account for the variable land and permitting costs associated with a project such as utilizing an existing ROW, expanding an existing ROW or obtaining new ROW.
11. The substation line terminal costs include a range to account for necessary protection and communication equipment.

12. System Upgrade Facilities costs include a range to account for line terminal relay upgrades and replacement of overdutied breakers.
13. If upon a cursory review of the location for the generic solution identifies unusual complexities, a contingency factor will be applied to the costs included in the matrix. -These complexities may include but are not limited to right of way restrictions, terrain and/or permitting difficulties, etc. Field inspections will not be completed as part of the cursory review.

Table C - 6: Generation Cost Matrix

Base Case Modeling Assumptions for 2009-2018 CARIS Study Phase

Generic Solution

Generation Cost Matrix

Order of Magnitude Unit Costs

(Estimates should not be assumed reflective or predictive of actual project costs)

Formatted Table

Item #	Plant Location	Plant Block Size Capacity (MW)	Plant Cost per Block Size ($M)	Electric Unit Transmission Cost ($M/Mile)	Substation Terminal Cost ($M)	System Upgrade Facilities ($M)	Gas Unit Transmission Cost ($M/Mile)	Gas Regulator Station Cost ($M)
G-1 High	Zone A-F	250	$400 .0	$5 .0	$9 .0	$9 .0	$5 .0	$3 .0
G-1 Mid	Zone A-F	250	$330 .0	$3.5	$6 .0	$6 .0	$3.5	$2 .0
G-1 Low	Zone A-F	250	$260 .0	$2 .0	$3 .0	$3 .0	$2 .0	$1 .0
G-1 High	Zone G	250	$440 .0	$5 .0	$9 .0	$9 .0	$5 .0	$3 .0
G-1 Mid	Zone G	250	$365 .0	$3.5	$6 .0	$6 .0	$3.5	$2 .0
G-1 Low	Zone G	250	$290 .0	$2 .0	$3 .0	$3 .0	$2 .0	$1 .0
G-2 High	Zone H-J	250	$480 .0	$25 .0	$40 .0	$50 .0	$20 .0	$3 .0
G-2 Mid	Zone H-J	250	$400 .0	$20 .0	$25 .0	$30 .0	$15 .0	$2 .0
G-2 Low	Zone H-J	250	$320 .0	$15 .0	$10 .0	$10 .0	$10 .0	$1 .0
G-3 High	Zone K	250	$470 .0	$20 .0	$20 .0	$25 .0	$5 .0	$3 .0
G-3 Mid	Zone K	250	$390 .0	$15 .0	$12 .0	$15 .0	$3.5	$2 .0
G-3 Low	Zone K	250	$310 .0	$10 .0	$4 .0	$5 .0	$2 .0	$1 .0

Assumptions

1. ***Estimates herein should not be utilized for purposes outside of the CARIS process. -Also, these estimates should not be assumed as reflective or predictive of actual projects or imply that facilities can necessarily be built for these generic solution order of magnitude estimates.- Estimate ranges were identified after Transmission Owner input, a review of recent proposed generation projects in NY, and reaching consensus at the ESPWG.***
2. It is assumed that the plant will be gas combined cycle type. Configured as a 2 x 1 7EA block with selective catalytic reduction (SCRs), total generation 250MW.
3. The plant cost includes real estate and permitting.
4. The plant cost includes generator step-up transformer and generator substation yard including associated protection and communication equipment.

5. The plant will be interconnected into an existing 345kV substation for Zones A-J and 138kV for Zone K.
6. The generator lead will be rated 345kV, 1673A, 1000MVA for Zones A-J and 138kV, 2092A, 500MVA for Long Island. The generator lead will be built with overhead construction for Zones A-G and underground construction for Zones H-K.
7. It is assumed that the existing substation selected as the interconnection point consists of open-air construction and has sufficient space within the fenced yard for adding a new breaker and a half bay for the new line terminal. If the selected substation is gas-insulated, a factor of 4 times will be applied to the base substation terminal costs.
8. It is assumed that the plant will require a 10in dia. gas line extension to bring a 450 psig gas supply to the plant and a single gas regulator station per block along with gas conditioning, startup gas heaters and metering. It is assumed that an adequate gas supply is available.
9. It is assumed that the existing substation selected as the interconnection point and outgoing transmission lines has adequate rating to interconnect new generation.
10. It is assumed that the control house at the existing substation selected as the interconnection point has sufficient space for installing the new protection and communication equipment for the new line terminal.
11. It is assumed that the generator lead and gas line can be permitted and constructed utilizing the shortest distance.
12. It is assumed that the ROW is generally unobstructed and significant relocation of underground interferences is not required and that rock excavation is not required.
13. It is assumed that the ROW does not require mitigation of environmentally sensitive areas.
14. Estimates include costs for material, construction labor, engineering labor, permits, testing and commissioning. The estimates do not include Allowance of Funds During Construction (AFDC)
15. The plant cost includes a range to account for the variable land and permitting costs associated with a project.
16. The cost per mile includes a range to account for the variable land and permitting costs associated with a project such as utilizing an existing ROW, expanding an existing ROW or obtaining new ROW.
17. The substation line terminal costs include a range to account for necessary protection and communication equipment.
18. System Upgrade Facilities costs include a range to account for line terminal relay upgrades and replacement of overdutied breakers.
19. The transmission and gas transmission unit cost will be applied during the study as necessary dependent on the location of the congestion location to be studied.
20. If upon a cursory review of the location for the generic solution identifies unusual complexities, a contingency factor will be applied to the costs included in the matrix. These complexities may include but are not limited to right of way restrictions, terrain and/or permitting difficulties, etc. Field inspections will not be completed as part of the cursory review.

Note: For future CARIS studies, the NYISO will utilize an additional block size of 138kV, 500MVA for Zone J in order to address potential congested load pockets in NYC and at such time develop the respective cost estimates.

Table C - 7: Generator Cost per Unit - 2009 Price Level

GENERATOR COST PER UNIT - 2009 PRICE LEVEL										
	DESCRIPTION	REFERENCE USED	MATL	LABOR		SUBTOTAL DIRECT COST	PROJECT INDIRECTS	LAND AND PERMITTING	TOTAL WITH PROJECT INDIRECTS	UNIT COST
				GENERIC	ADJUSTED FOR ZONE		20%			$/Kw
UPSTATE	250 MW	GENERIC 2 X 2 X 1 7EA + SCR ($ 938/KW DIR)	$173,000,000	$61,500,000	$99,600,000	$272,600,000	$54,520,000	$200,000	$327,300,000	$1,309
DOWNSTATE	250 MW	GENERIC 2 X 2 X 1 7EA + SCR ($ 938/KW DIR)	$173,000,000	$61,500,000	$150,000,000	$323,000,000	$64,600,000	$12,000,000	$399,600,000	$1,598
LONG ISLAND	250 MW	GENERIC 2 X 2 X 1 7EA + SCR ($ 938/KW DIR)	$173,000,000	$61,500,000	$149,200,000	$322,200,000	$64,440,000	$1,400,000	$388,000,000	$1,552

Formatted: Caption, Left, Indent: First line: 0 pt

Table C - 8: Demand Response Cost Matrix

Formatted Table

Base Case Modeling Assumptions for 2009-2018 CARIS Study Phase
Generic Solution
Demand Response
Order of Magnitude Unit Costs

(Estimates should not be assumed reflective or predictive of actual project costs)

Item #	Demand Response Block Size (MW)	Portfolio Type	Location	Unit Cost ($M/MW)	Total Portfolio Cost ($M)
D-1 High	100	Energy Efficiency	Zone A-G	$4.2	$420
D-1 Mid	100	Energy Efficiency	Zone A-G	$2.8	$280
D-1 Low	100	Energy Efficiency	Zone A-G	$1.4	$140
D-2 High	100	Demand Response	Zone A-G	$1.6	$160~~158~~
D-2 Mid	100	Demand Response	Zone A-G	$1.1	$110~~105~~
D-2 Low	100	Demand Response	Zone A-G	$0.5	$50~~53~~
D-3 High	100	Energy Efficiency	Zone H-J	$5.7	$570
D-3 Mid	100	Energy Efficiency	Zone H-J	$3.8	$380
D-3 Low	100	Energy Efficiency	Zone H-J	$1.9	$190
D-4 High	100	Demand Response	Zone H-J	$2.1	$210
D-4 Mid	100	Demand Response	Zone H-J	$1.4	$140
D-4 Low	100	Demand Response	Zone H-J	$0.7	$70
D-5 High	100	Energy Efficiency	Zone K	$3.9	$390
D-5 Mid	100	Energy Efficiency	Zone K	$2.6	$260

D-5 Low	100	Energy Efficiency	Zone K	$1.3	$130
D-6 High	100	Demand Response	Zone K	$2.7	$270
D-6 Mid	100	Demand Response	Zone K	$1.8	$180
D-6 Low	100	Demand Response	Zone K	$0.9	$90

Assumptions

1. ***Estimates herein should not be utilized for purposes outside of the CARIS process. Also, these estimates should not be assumed as reflective or predictive of actual projects or imply that facilities can necessarily be built for these generic solution order of magnitude estimates. Estimate ranges were identified after Transmission Owner input and reaching consensus at the ESPWG.***
2. Costs are based on representative NY utilities' Demand Side Management filings.
3. Expected peak demand impact was used to scale the present value of the total portfolio budget to produce 100MW peak reduction.
4. Costs from each portfolio are based on 10 years of peak demand reduction.
5. Cost estimation is developed by dividing each year's cost by the peak demand reduction for that year and then calculating the present value of the $/MW over a 10 year period.
6. The range is derived from the utility filings as the "Low" and the "Mid" and "High" represents 2 and 3 times the "Low", respectively.
7. Due to a lack of Demand Response filing data for Upstate, it is assumed that the Upstate costs will be 75% of the Downstate costs. This is representative of the cost difference that exists between the Energy Efficiency programs for the two areas.

Appendix D – Overview of CARIS Modeling

D.1. Model Overview (GridView/MAPS, PROBE)

Formatted: Don't adjust space between Latin and Asian text, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Production cost simulation software is the primary analytical tool utilized in the CARIS process. Production cost simulation tools seek to minimize the cost of dispatching a static fleet of generation assets to serve a deterministic forecast of (typically hourly) loads. In general terms, production cost simulations calculate the hourly production cost of supply resources under security-constrained transmission network and area market conditions.

To estimate the cost of transmission congestion, procedures and protocols were developed by the NYISO. The fundamental idea is to calculate what the day-ahead hourly clearing prices would be if there were no transmission constraints, using the same data and calculation approach as the NYISO's Security Constrained Unit Commitment software (SCUC). The congestion cost is then calculated as the difference between the constrained transmission system and the unconstrained transmission system. Annual congestion cost is the sum of daily costs.

Grid~~Grid ~~View and MAPS

In conducting the CARIS analysis the NYISO utilized both GridView and MAPS as the production cost simulation software tools. Both GridView and MAPS software tools mimic the operation of the NYISO day ahead electricity market by simulating security constrained unit commitment (SCUC) and economic dispatch of the generation and by monitoring transmission system flows under both normal and contingency conditions. This enables calculation of hourly production costs accounting for the constraints imposed by the transmission system on the economic dispatch of generation. Both programs feature the following:

- **Detailed representation of the large scale transmission network.** The transmission system is modeled in terms of individual transmission lines, interfaces (group of lines), phase-angle regulators (PARs), and high voltage direct current (HVDC) lines. Both GridView and MAPS software model voltage and stability considerations through operating nomograms that define how voltage and stability these limits can change hourly as a function of loads, generation, and flows elsewhere on the system.
- **Detailed generation modeling for thermal, hydro, pumped storage, wind, solar, and other renewables~~etc~~.** Generation system data capabilities include multi-step cost curves based on heat rates, emission costs, fuel costs, and unit cycling capabilities. The generation units, along with chronological hourly load profiles, are assigned to individual buses on the system. Hourly load profiles are adjusted to meet peak and energy forecasts, which are input entered into the model on a monthly or annual basis. Information on hourly loads at each bus in the system is required to calculate electrical flows on the transmission system. This parameter is specified by assigning one or a combination of several hourly load profiles to each load bus.

PROBE -– PoRtfolio Ownership and Bid Evaluation

Formatted: Indent: First line: 36 pt, Don't adjust space between Latin and Asian text

PROBE software, developed by PowerGEM LLC ~~LLC~~, is the day-ahead market simulation tool which has been utilized by the NYISO as an analysis tool to conduct the NYISO's historic congestion analysis. The results of this historic congestion analysis, expressed as a change in production cost, along with additional metrics such as generator payments, load payments and congestion payments, have been reported on a quarterly basis on the NYISO's website since 2003. The results of PROBE analysis were also used in the benchmarking process of GridView and MAPS.

PROBE software performs Day-Ahead Market (DAM) simulations by using ~~uses~~ a Linear Programming-based Security Constrained Economic Dispatch (SCED) and Security Constrained Unit Commitment (SCUC) engine. PROBE uses actual submitted generator parameters, hourly bids and network status (including transmission outages) used by the NYISO to clear the day-ahead market. It performs a simulation of the market "as it was," and then removes all transmission constraints (other constraints such as generator ramp rates and minimum run times are still enforced). Unit commitment and dispatch are then recalculated for this unconstrained scenario without any changes in bids from those actually submitted. The constrained and unconstrained results are compared to derive the change in bid production costs, load payments and generation payments. All calculations represent all market segments such as the energy, start-up, and ancillary services bids for generators, import/export bids, virtual bids (virtuals), and fixed and price-capped demand bids.

In contrast to other planning-type software products, PROBE is designed to reproduce the day-ahead market clearing calculation as closely as possible. To accomplish this, PROBE was customized to model the NYISO's market rules, including, but not limited to, rules on co-optimization of energy and ancillary services, market mitigation, and marginal losses.

The major difference between the GridView/MAPS results and PROBE results is that GridView/MAPS did not simulate in this CARIS cycle the following: (a) virtual bidding; (b) transmission outages; (c) fixed load and price-capped load; (d) production costs based on mitigated bids; (e) Bid Production Cost Guarantee (BPCG) payments; (f) co-optimization with ancillary services; and (g) external transactions~~externals~~.

D.2. Modeling Validation

Formatted: Don't adjust space between Latin and Asian text, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Database Verification

To help determine that the CARIS analyses produced accurate results, the NYISO conducted a two-stage data and modeling verification process. This involved a review of all input data and many of the program parameters on two separate occasions prior to the development of the Base Case~~base case~~ analyses. The verification process was conducted by a NYISO System and Resource Planning team that was not involved in database modeling.

The following topics were examined as part of data verification:

- Forecasts of hourly load data for NYISO zones and external areas (externals);
- Hourly import and export schedules;
- Transmission system losses;
- Transmission interface transfer limits, contingencies and nomograms;
- Generator incremental heat rates and emissions rates;
- Modeling of combined cycle units;
- Fuel price forecasts;
- Modeling of pumped storage & and hydro units; and
- Geographical location of generators by size and type.

The verification process involved a direct comparison of data contained in the GridView and MAPS models with the primary data sources from which those inputs were derived. Where modeling choices were made, as in the case of incremental heat rates and combined cycle units, parameters were selected that most closely represented actual unit characteristics.

In several cases, discrepancies were noted by the data verification team. A log of discrepancies was kept, and after the first stage of data verification, the log was presented for review and discussion with the CARIS team. The CARIS team was then directed to remedy the discrepancies in data or modeling choices made. These changes were accomplished before the development of the –Base Case. ~~.base case.~~ Once the Base Case was developed, reviewed, and confirmed, the GridView and MAPS input files used to generate those results were saved as reference cases and used to develop scenarios. This practice made sure that all subsequent scenarios were performed from the same set of standard conditions.

After the development of the ~~base case~~ scenarios, a second stage of data verification, similar to the first, was performed. This practice confirmed that no significant elements of the data inputs or modeling assumptions had been made subsequent to the development of the –Base Case~~base case~~ analyses.

2009 Quarter 1 Results

The degree to which actual congestion is either over-forecasted or under-forecasted by the study will be affected by a number of factors. A review was conducted for the five major constraints in 2009 Q1. In that review, the congestion values for those constraints for the 2009 Q1 from PROBE (DAM tool) and CARIS 2009 database were compared, as shown in Table D-1. Additional changes were implemented to the 2009 CARIS database to align its assumptions with the actual 2009 system conditions utilized by PROBE. Key factors~~Factors~~ to align the inputs in GridView with those in PROBE for Q1 2009 were:

Formatted: Indent: First line: 36 pt

Reducing~~:~~

1. ~~reducing~~ Central East Interface Limit from 2,600 MW to 2,300 MW in order to capture the impact of actual system conditions on the voltage limit of this interface. The 2,300 MW limit was the average experienced over the three-month period;

2. Modifying~~modifying~~ hourly Load profile to include Virtual Supply and Demand bids further increased the congestion on Central East Interface constraint;

3. Switching~~switching~~ out of reactors on M51, M52, 71 and 72 Cables and inserting reactor on the Y49 Cable which, when coupled with the outage of Ravenswood 3 Generator, increased the flows and congestion on those cables;

4. Modifying~~modifying~~ the PAR schedules on the Jamaica LI-NYC ties from [0,350] to [200,350] MW increased congestion on the Y49/Y50 contingency constraint - Dunwoodie-Shore Rd 345kV Cable;

5. Further adjusting for load ~~further aligning~~ forecast ~~load~~ and actual bid load values and other generators and transmission outages so that congestion values in the CARIS model further align with PROBE results ~~[CFP; CHECK TO MAKE SURE I DID NOT CHANGE THE MEANING].~~

Table D-1: Comparison of CARIS and NYISO Day-Ahead Market in $ Million

Constraint	PROBE (DAM)	CARIS BASE	CARIS MODIFIED
CENTRAL EAST	98	14	86
MOTTHAVN - –DUNWODIE 345	45	0	55
DUNWOODIE - –SHORRD –345	29	2	10
PLSNTVLY - –LEEDS 345	2	11	0
NY MTHAVN-RAINY	5	1	0
Total	**179**	**28**	**152**

Formatted Table

PROBE - 2009Q1 Day Ahead Markets Bids for the five constraints listed above
CARIS BASE - 2009Q1 ~~T29~~ with CE Limit 2600MW
CARIS MODIFIED - 2009Q1 with CE Limit 2400MW, Ravenswood3, IndianPt 3 and other OUT, Bypass Reactors on M51, M52, 71 and 72 Cables and insert Reactor on Y49 Cable and Load modified to include Virtual Supply and Demand Bidding

Formatted Table

Database Conversion Certification

The NYISO, in conjunction with the ESPWG, decided that the first CARIS cycle analysis would be performed using both GridView and MAPS simulation tools. To compare the results of both tools, the NYISO converted the NYISO ABB-GridView database to the NYISO GE-MAPS database. To obtain an accurate data conversion, the NYISO developed a converter capable of creating the MAPS input files from the GridView database. To preserve model logic and features consistency, the NYISO worked with GE and ABB to decide which model logic and features to use. The following data was validated: (a~~i~~) load annual peaks and energies; (b~~ii~~)

Comment [A1]: The NYISO does not “ensure” or “guarantee” in studies.

installed capacity; (c~~iii~~) the unit full-load costs; and (d~~iv~~) other data, such as minimum up and down time, start-up costs, spinning reserve allocation, and outages.

To assure~~determine~~ the accuracy~~quality~~ of the conversion, many random checks were performed manually on interface limits, monitored elements and contingencies. ~~-~~Moreover, the generator shift factor (GSF) matrix was compared to verify that the same load flow was used. Finally, GE provided NYISO with the information to balance the initial condition of the MAPS Generation and Transmission (GT) program. I~~ I ~~n conclusion, validation of the conversion process worked well and the conversion process was completed successfully without any major issues remaining.

Appendix E –Detailed Results of 2009 CARIS Phase 1

E.1. Congestion Assessment – Historic and Projected

Formatted: Font: 13 pt

One of the features of a Locational Based Marginal Price (LBMP) based market is the ability to identify grid locations that are difficult to serve with economic generation due to transmission bottlenecks (constraints) and quantify the cost of this congestion. The NYISO calculates and publishes LBMP's with three components:

1. Energy~~energy~~ component – marginal electricity cost without the adjusted cost of congestion and losses;
2. Congestion ~~congestion~~ component – the ~~The~~ cost of out-of merit generation dispatch relative to an assumed unconstrained reference point at Marcy substation; and
3. Losses ~~losses~~ component – the~~The~~ cost for supplying the losses from the accessible marginal generators to a specific point on the grid.

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 90 pt + Tab after: 108 pt + Indent at: 108 pt

E.1.1. Historic Congestion Assessment

Formatted: Indent: Left: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

The NYISO reports historic congestion results on its website on a quarterly basis. The cost of congestion reported is the sum of the day ahead market LBMP congestion component multiplied by the amount of load being affected (positively or negatively) by congestion (later referred to as "congestion payments"). While this congestion cost is relatively simple to calculate, this value is generally regarded as an over-simplified and deceiving congestion impact metric because:

1. This ~~this~~ calculation does not incorporate the effect of supply and demand response when congestion is removed; and
2. The~~the~~ congestion cost is relative to an assumed uncongested reference point. If this reference point is moved, the congestion cost is shifted to the LBMP energy component. The congestion versus energy cost calculation becomes arbitrary depending on the reference point chosen.

Formatted: Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 90 pt + Tab after: 108 pt + Indent at: 108 pt

To better measure the true cost of transmission congestion, the NYISO developed analytical tools and protocols. The fundamental idea is to calculate what the day-ahead hourly clearing prices would be if there were **no** transmission constraints, using the same data and calculation approach as the NYISO Security Constrained Unit Commitment software (SCUC). The congestion cost is the difference between the actual SCUC transmission constrained LBMP's, loads, and bids, and the same calculation with all transmission constraints ignored. Annual cost is the sum of daily costs.

The reported numbers are the result of a simulation of the NYCA market using the hourly bids and network status actually used by NYISO to clear the day-ahead market. ~~T~~he simulation performs a security constrained unit commitment for the market "as it was", then removes all transmission constraints. Other ~~Oother~~ constraints such as desired net interchange (DNI), generator ramp rates and minimum run times are still enforced. Unit commitment and dispatch are then recalculated for this unconstrained scenario without any changes to the bids actually submitted. The constrained and unconstrained results are compared to derive the cost of congestion. The calculations represent all market segments (e.g., fixed load, virtual load and generation, imports and exports), and actual hour-by-hour network status. The unconstrained case fixes the amount of virtual load and generation at their original MW levels.

Historic Congestion Metrics

To explore the impact of congestion, four congestion metrics were developed: Bid Production Cost metric; Congestion Payment metric; Generator Payment metric; and Load Payment metric. All metrics report the difference between a constrained and an unconstrained value.

1. Change in Bid Production Cost (BPC) – This is the primary congestion impact metric set forthchosen for use by the NYISO Operating Committee. The calculation compares the change in total production cost, based on mitigated bids, with and without transmission constraints limiting the unit commitment and dispatch. This metric measures the economic inefficiency introduced by the existence of transmission bottlenecks, and is considered the *societal cost* of transmission congestion. A positive number indicates that transmission congestion increased the total cost to produce the electricity supply in the NYCA.

. [CFP; IS THIS ACCURATE? NEGATIVE NUMBERS IN REFERENCE TO THE REFERENCE BUS ALSO INDICATE INCREASES IN THE TOTAL COST TO PRODUCE ELECTRICITY IN THE NYCA]

Production cost always decrease when constraints are removed. The objective of SCUC is to minimize bid production cost; LBMPs are the result of the commitment and dispatch that result from achieving this objective under generation unit and transmission constrained conditions. Since SCUC does not directly attempt to minimize LBMPs, relieving all or some of the constraints may or may not decrease the market based electricity cost to load. In the LBMP markets, the load in a location pays the marginal price of the supply at that location, not the bid price of the generator. The result of relieving constraints in an LBMP market depends on how much load is affected, where the load is, and the response of supply and demand as those constraints are relieved.

2. Change in Congestion Payments – This calculation, which represents the sum of the LBMP congestion component multiplied by the load affected, does not account for the change in the energy component of the LBMP as constraints are removed. With no simulation truly required to arrive at this congestion impact metric, the congestion cost in an unconstrained market is 0. This is considered to be the *accounting cost* of congestion.

Formatted: Font: Bold

Congestion payments can be hedged with transmission congestion contracts (TCCs). The difference between the total congestion payment and the congestion payment associated with TCCs is the unhedged congestion payment reported in the NYISO's quarterly historic congestion analysis reports. For the historic analysis, it was assumed that all TCCs are owned by load and are available for hedging the congestion payments. A positive number indicate that congestion increases the cost paid by load [CFP; AGAIN, WHAT ABOUT NEGATIVE NUMBERS IN REFERENCE TO THE REFERENCE BUS?].

3. Change in Generation Payments –In addition to the LBMP payments to generation (or other supply sources such as virtual generation, or imports), generators are also paid a Bid Production Cost Guarantee (BPCG) and for Ancillary Services. BPCG compensates generators that are committed for reliability despite the fact their bids are greater than the LBMP at the generator location. This phenomenon can happen if ramp rates, minimum run times or other limits force unit operation, which minimizes overall production cost, even including BPCG payments. A positive number means generation payments went up due to congestion.

Formatted: Font: Bold

4. Change in Load Payments – This metric is the opposite side of the generation payments calculation. The calculation uses simulation to include the local energy cost response when transmission constraints are removed. Whereas the change in production cost measures efficiency, this metric determines how much more New York load actually pays due to congestion and the market design. This is considered the *bill impact*. The load payment congestion impact includes the effect of all market segments that can change when transmission constraints are relieved. These segments are:

Formatted: Font: Bold

- LBMP Components: The LBMP congestion component will equal zero when there are no transmission constraints, and the unconstrained generation will sell more energy at a price that is higher on the generator's incremental cost curve. The unconstrained generator bid price will be lower than the bid price of the out of merit generator dispatched in the transmission limited case. The result is a likely increase in the LBMP energy component as the LBMP congestion component decreases. The LBMP loss component will also change depending on the location and prices of the generation unbottled when constraints are relieved. Ancillary service costs (e.g., reserves) also affect LBMPs, as generators trade-off between selling ancillary services or energy.

- Load payments due to congestion are hedged with TCCs based on the assumption that all TCCs were credited to load. The TCC auction cost is not accounted for since it is part of the Transmission Service Charge (TSC).

- TCC shortfall – In the event of a TCC shortfall (or surplus), the load pays for the imbalance. As transmission constraints are relieved or removed the imbalance changes. While the shortfall may be compensated for elsewhere in the TSC, from a congestion impact perspective this is considered a load cost. Although the NYISO OATT describes details of the allocation of shortfall by transmission owner, for purposes of this analysis the shortfall is stated for the NYCA only.
- Rate Schedule 1 imbalances – In accordance with the NYISO OATT, imbalances of energy payments and loss payments are a component of the OATT-defined Rate Schedule 1 payments. Relieving or eliminating transmission constraints affects these payments, and is thus considered a congestion impact in this analysis. Like shortfall, this analysis states the Rate Schedule 1 effect for the NYCA only. A positive number indicates that congestion increased the load payments ~~[CFP; AGAIN, DON'T NEGATIVE NUMBERS IN REFERENCE~~

TO THE REFERENCE BUS REPRESENT INCREASED LOAD PAYMENTS?].

Formatted: Justified, Indent: First line: 36 pt

Historic Congestion Results

The historic congestion analysis results for a constrained system (Base Case) are presented in Tables E-1 through E-3 present historic Base Case metrics' results.

Formatted: Justified, Indent: Left: 36 pt, First line: 36 pt, Don't keep with next, Don't keep lines together

Table E-—1: Historic Congestion $Demand$ Payments Payment (2004-2008) by Zone ($ m)

Zone	2004	2005	2006	2007	2008
West	(1)	(5)	1	(14)	(25)
Genesee	1	(1)	2	(14)	(9)
Central	1	(1)	4	9	18
North	0	(1)	(0)	(0)	(2)
Mohawk Valley	0	(0)	2	5	10
Capital	8	19	27	74	143
Hudson Valley	5	20	54	87	176
Millwood	3	12	27	31	78
Dunwoodie	4	24	44	56	124
NY City	582	809	673	700	1403
Long Island	230	508	708	518	624
NYCA Total	**833**	**1400**	**1542**	**1508**	**2613**

The reported values include TCCs.
NYCA totals represent the sum of absolute values.
Historical Congestion Source: PROBE DAM quarterly reports
DAM data include Virtual Bidding & Transmission planned outages

Table E-2: Historic Generator Payments (2004-2008) ($ m)

Zone	2004	2005	2006	2007	2008
West	1,356	1,971	1,530	1,630	1,701
Genesee	314	435	418	491	476
Central	1,493	2,282	1,612	1,753	1,825
North	543	760	633	659	779
Mohawk Valley	150	336	230	206	234
Capital	415	747	704	883	1,175
Hudson Valley	1,093	1,174	533	571	532
Millwood	900	1,371	1,145	1,252	1,725
Dunwoodie	22	88	56	39	39
NY City	1,291	2,308	1,895	2,072	2,405
Long Island	1,036	1,682	1,485	1,282	1,286

Total	8,615	13,153	10,241	10,840	12,178

Historic Generator Payment Source: PROBE DAM quarterly reports
DAM data include Virtual bidding & Transmission planned outages

Table E-3: Historic Load Payments (2004-2008) by Zone ($ m)

Zone	2004	2005	2006	2007	2008
West	855	1,196	868	983	1,061
Genesee	741	874	649	668	754
Central	717	1,097	779	928	1,060
North	288	473	351	413	474
Mohawk Valley	359	551	400	443	469
Capital	735	1,022	720	818	1,008
Hudson Valley	498	883	761	864	1,114
Millwood	207	344	252	263	385
Dunwoodie	452	544	442	494	706
NYCity	3,665	5,739	4,394	4,696	5,919
Long Island	1,540	2,591	2,353	2,261	2,535
Total	10,059	15,314	11,969	12,831	15,485

Historic Load Payment Source: PROBE DAM quarterly reports

Zone	2004	2005	2006	2007	2008
West	1	5	1	14	25
Genesee	1	1	2	14	9
Central	0	1	3	9	18
North	0	1	0	0	2
Mohawk Valley	0	0	2	5	10
Capital	7	19	27	74	143
Hudson Valley	5	20	54	87	175
Millwood	3	12	27	31	78
Dunwoodie	4	24	44	56	124
NYCity	582	809	673	700	1403
Long Island	229	508	708	518	624
Total	831	1382	1542	1451	2540

Historical Congestion Source: PROBE DAM quarterly reports
DAM data include Virtual bidding & Transmission planned outages

Formatted: Font: (Default) Arial, 8 pt

Formatted: Indent: First line: 69.75 pt

Formatted Table

Table E.1.-2. : Historical Generator Payment (2004-2008) – 2009 $ m

Formatted: Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers

Formatted: Font: Bold

Formatted: Font: Bold

Zone	2004	2005	2006	2007	2008
West	1,356	1,971	1,530	1,630	1,701
Genesee	314	435	418	491	476
Central	1,493	2,282	1,612	1,753	1,825
North	543	760	633	659	779
Mohawk Valley	150	336	230	206	234
Capital	415	747	704	883	1,175
Hudson Valley	1,093	1,174	533	571	532
Millwood	900	1,371	1,145	1,252	1,725
Dunwoodie	22	88	56	39	39

NYCity	1,291	2,308	1,895	2,072	2,405
Long Island	1,036	1,682	1,485	1,282	1,286
Total	8,615	13,153	10,241	10,840	12,178

Historical Generator Payment Source: PROBE DAM quarterly reports
DAM data include Virtual bidding & Transmission planned outages

Table E -3: Historical Load Payment (2004-2008) by Zone- 2009 $ m

Zone	2004	2005	2006	2007	2008
West	855	1,196	868	983	1,061
Genesee	741	874	649	668	754
Central	717	1,097	779	928	1,060
North	288	473	351	413	474
Mohawk Valley	359	551	400	443	469
Capital	735	1,022	720	818	1,008
Hudson Valley	498	883	761	864	1,114
Millwood	207	344	252	263	385
Dunwoodie	452	544	442	494	706
NYCity	3,665	5,739	4,394	4,696	5,919
Long Island	1,540	2,591	2,353	2,261	2,535
Total	10,059	15,314	11,969	12,831	15,485

Historical Load Payment Source: PROBE DAM quarterly reports
DAM data include Virtual bidding & Transmission planned outages

Projected Congestion Assessment

CARIS Metrics

In conducting the CARIS analysis, seven metrics are used. The primary metric is the production cost metric and the other six additional metrics are load payments, generator payments, emissions, TCCs, losses, and the ICAP metric. All benefit metrics are determined by measuring the difference (change) between the CARIS Base Case system value and a system value when the generic solution is added. The discount rate used for the present value analysis is the current weighted average cost of capital for the NYTOs.

1. NYCA Production Cost Metric

NYCA production cost is the total generation cost of producing power to serve NYCA load. The total cost includes the following components:

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

Formatted: Indent: Left: 0 pt, First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Indent: Left: 36 pt, First line: 0 pt

Formatted: Indent: First line: 0 pt

Formatted: Bullets and Numbering

Formatted: Indent: Left: 36 pt, Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt, Tabs: 54 pt, List tab + Not at 36 pt

2. Demand$ $–Congestion Payment

The congestion value (Demand$) is calculated as the congestion component of the LBMP paid by NYCA load (sum of the total zonal loads). –It is defined as the shadow price of each constrained element multiplied by the load affected and calculated as follows:

Demand$ $–Congestion by constraint for all areas and all hours– = (ShadowPrice x Zone GSF x Zone Load)).

Total Demand$ $–Congestion = Sum of all constraints' Demand$ $–Congestion.

3. Generator Payment Metric

Generator payment is also referred to as generator revenues. –It represents zonal LBMP based revenues or payment to generators located in a zone. -The hourly revenue or payment to each generator is the determined as the hourly generator MW dispatch multiplied by the generator's LBMP or spot price. -The annual generator payment is then the sum of all 8,760 hourly generator payments.

Annual generator LBMP payment = sum of all hours (generator LBMP x generator MW dispatch).

Zonal generator payment = sum of generator payment located in a zone.

4. LBMP Load Payment Metric

The LBMP Load Payment metric is the hourly load-weighted average LBMP price for each zone multiplied by the zonal load. The annual load payment is then the sum of all 8,760 hourly load payments.

Annual Zonal LBMP payment = sum of all hours (zonal LBMP x zonal load).

Zonal LBMP = zonal average load-weighted LMP.

Note: actual consumer payments will be net of any TCC hedges or bilateral contracts.

5. TCC metric (Congestion Rent)

The TCC payment metric is determined by calculating congestion rents. Hourly congestion rent for a constrained facility is defined as the active power flow (MW) on the constrained facility multiplied by its shadow price. -Shadow price is defined as the incremental production cost saving if the constrained element flow limit is increased by one MW. –Shadow prices on constrained elements are non-zero during hours of congestion.

Congested rent value by constraint = sum of all hours (constrained element MW x Shadow Price $/MW).

Total congestion rent = Sum of all congestion rent values for all system constraints-.

While the importance of fuel prices in shaping Production Cost is obvious, a useful insight is gained by analyzing the relationship between the natural gas price (gas being the dominant fuel used by marginal generators) and three other key metrics. Figures E - 1 shows the historic and projected Base Case values of Congestion Payments and the Transco Zone 6 Natural Gas Price (the proxy gas price for downstate zones). There is a strong positive correlation between the two variables. A changes in gas prices affects the market clearing price via its influence on the congestion element of LBMP, and, hence, affects Congestion Payments.

Formatted: Font: Bold

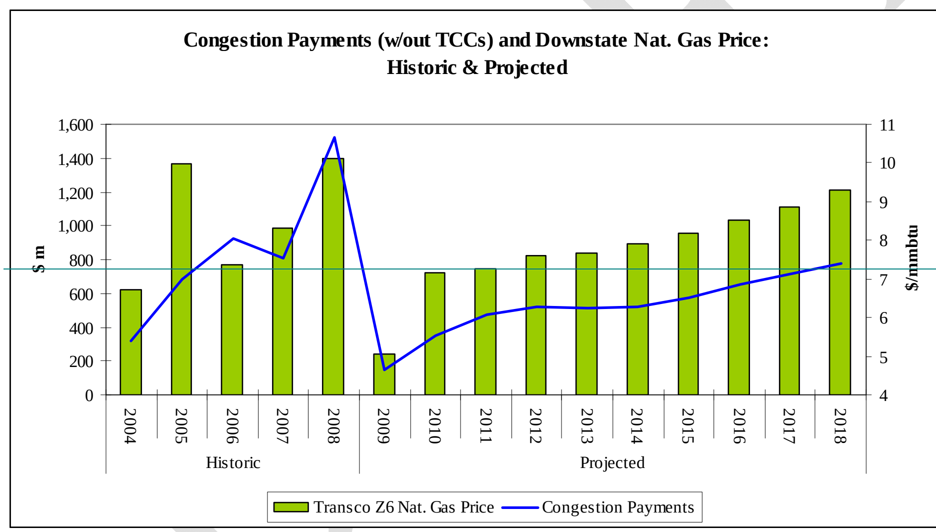


Figure E – 1 – Congestion Payments and Downstate Nat. Gas Price: Historic & Projected

Barring the Katrina episode in 2005, changes in Congestion Payments vary closely with the natural gas price. Over the historic period (2004 – 2008) the correlation coefficient between the two variables was 0.76 and the corresponding coefficient for the study period (2009-2018) is 0.98. These high coefficients reflect the sensitivity of Congestion Payments to changes in fuel prices.

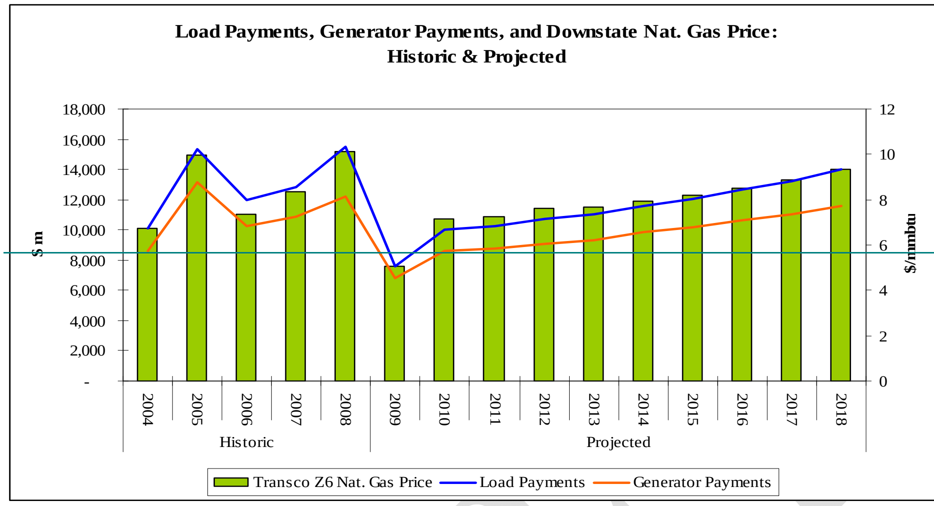


Figure E – 2 - Load Payments, Generator Payments, and Downstate Nat. Gas Price: Historic & Projected

Figure E – 2 also highlights the significance of fuel prices in determining market payments by showing the strong positive correlation with Generator and Load Payments. Over the 2004 – 2018 period, the coefficients of correlation between the downstate gas price and Generator Payments is 0.96 and that between gas price and Load Payments is 0.98. These extremely high coefficients imply that changes in both metrics can be ostensibly explained by changes in fuel prices.

Formatted: Justified

Formatted: Font: Bold

6. ICAP Metric

The MW impact methodology is used in this first CARIS cycle to calculate the ICAP metric. GE's Multi-Area Reliability Simulation program (MARS) was used to determine the impact of each generic solution on the Loss of Load Expectation (LOLE) and the amount of capacity required to bee removed to bring the LOLE back in line with the Base Casebase case. The generation solutions were modeled by creating a new 500 MW combined cycle plant located in the appropriate zone using a two state model and typical NERC EFORdeFORD values for its Transition Rates. The demand response solutions were modeled by reducing the peak for the appropriate zone and increasing the emergency response value. -The transmission solutions were modeled by modifying the transfer limits, as noted in Table E-4.

Table E- 4:- MARS Interface Modifications for ICAP Calculations

Central East Transmission Generic Solution	Leeds-Pleasant Valley Transmission Generic Solution	West Central Transmission Generic Solution
Central East-Fraser-Gilboa Interface increased by 400 MW	Central East-Fraser-Gilboa Interface increased by 50 MW	West Central Interface Increased by 500 MW
Total East Group Increased by 400 MW	Total East Group Increased by 50 MW	Dysinger East Interface Increased by 500 MW

Formatted: Font: Bold

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

Formatted Table

Formatted

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

Formatted

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

Central East Group Increased by 400 MW	Central East Group Increased by 50 MW
	Zone F to Zone G Increased by 800 MW
	UPNY-SENY Interface Increased by 350 MW

Formatted

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

Formatted

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

Formatted

Formatted: None, Space Before: 0 pt, After: 0 pt, Don't keep with next

CARIS Metric Results

Figure E-1 provides some perspective of how historic values (2004 – 2008) of congestion in NYCA compare with the projected values (2009 – 2018) in the CARIS Base Case. The strong positive correlation[6] between Congestion Payments and fuel prices reflected in the figure underscores the key role played by the latter in determining market payments. With natural gas being the fuel of marginal units in the vast majority of the hours, especially during high-load periods, changes in its price has an obvious impact on the congestion element of zonal LBMPs. Note that in this case the projected congestion is lower than the historic actual congestion, with the reduction in natural gas prices representing one reason for the decline. Demand Dollar (Demand$) congestion between 2004 and 2008 ranged from $833 million to $2,613 million while projected congestion is $146 million in 2009 increasing to $780 million in 2018. 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. For example, the projected congestion of $146 million for 2009 is lower than the actual congestion of $194 million observed in the first quarter of 2009.

[6] Despite the anomalous fuel-price volatility in the aftermath of Katrina in 2005, the coefficient of correlation between congestion values and natural gas price during the 2004 – 2008 period was 0.64. The corresponding coefficient for the study period of 2009-2018 was 0.98. The exclusion of 2005 data raises the historic correlation to 0.82.

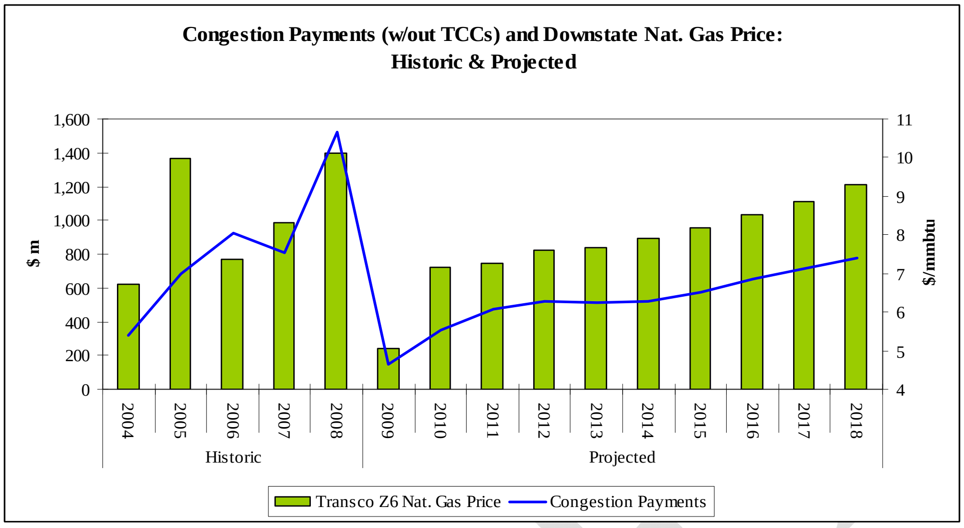


Figure E-1: Congestion Payments and Downstate Natural Gas Price: Historic & Projected

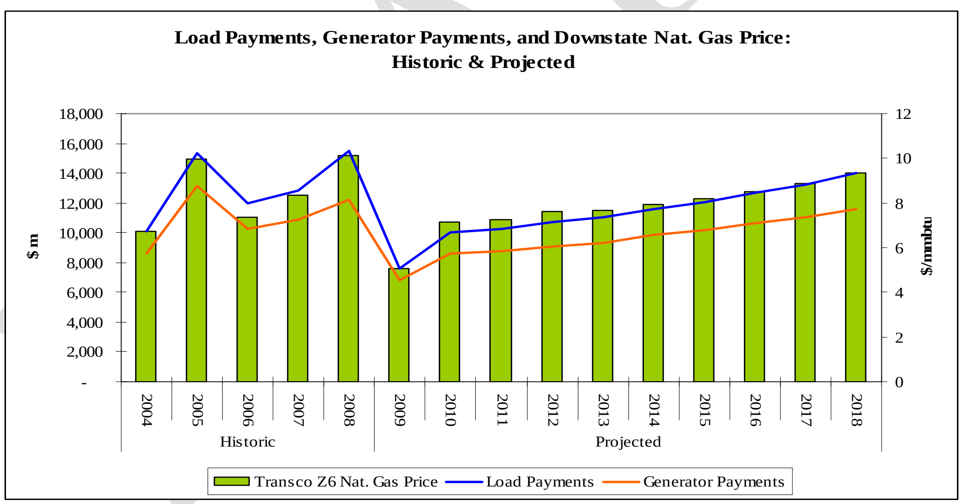


Figure E–2: Load Payments, Generator Payments, and Downstate Natural Gas Price: Historic & Projected

Figure E-2 highlights the significance of fuel prices in determining market payments by showing the strong positive correlation with Generator and Load Payments. Over the 2004 – 2018 period, the coefficients of correlation between the downstate gas price and Generator Payments is 0.96 and that between gas price and Load Payments is 0.98. These high coefficients imply that changes in both metrics can be ostensibly explained by changes in fuel prices.

There are significant differences in assumptions used by the PROBE and CARIS tools when comparing historical congestion values to projected values. -The CARIS tools did not simulate the following: -(a) virtual bidding; (b) transmission outages; (c) fixed load and price-capped load; (d) production costs based on mitigated bids;(-e) Bid Production Cost Guarantee (BPCG) payments; (f) co-optimization with ancillary services; and (g) external transactions~~externals~~.

The detailed information on projected CARIS metrics' Base Case results is presented in Tables E-5 through E-18.

Table E-5 below presents the summation of the CARIS metrics Base Case ~~base case~~ values over the ten-year study period. Costs are expressed in nominal $ m.~~$.~~

Table E - -5: NYCA Projected CARIS Base Case Metrics (nominal $ m~~2009 $ Millions~~)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NYCA Production~~Prodn.~~ Cost* ($m)	4,095	5,134	5,296	5,560	5,729	6,047	6,345	6,707	7,026	7,456
Load Payments ($m)	7,620	10,015	10,239	10,739	11,019	11,600	12,066	12,696	13,239	13,972
Generator LBMP Pmt ($m)	6,842	8,593	8,727	9,107	9,335	9,826	10,156	10,606	11,012	11,547
Load Pmts Losses($m)	494	668	668	705	723	754	778	823	856	897
SO_2 Costs ($m)	5	3	3	3	3	2	1	1	1	1
SO_2 Emissions (Tons)	68,497	71,252	71,390	71,606	71,517	71,943	71,936	72,360	72,341	72,659
CO_2 Costs ($m)	194	208	232	251	268	288	304	321	335	351
CO_2 Emissions ('000s Tons)	55,435	53,782	54,196	54,350	54,775	55,502	55,685	56,237	56,533	56,797
NO_x Costs ($m)	47	44	18	10	18	10	14	13	12	12
NO_x Emissions (Tons)	37,468	38,281	38,687	38,927	39,045	39,517	39,567	39,972	40,377	40,602
LBMP ($/MWh)	45	58	59	61	62	65	67	70	72	76

* NYCA Production Cost equals Generator Production Costs plus ~~Value of~~ Interchange Value. ~~energy~~

~~The projected Base Case congestion metrics in nominal 2009 $ are shown in Tables E-6 through E-16.~~

Table E - 6: Projected Production Costs (2004-2008) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	311	327	334	346	354	369	382	390	411	415
Genesee~~Genesse~~	56	56	56	57	59	61	66	68	69	74
Central	674	733	734	759	785	817	858	887	915	959
North	88	118	121	128	130	136	141	148	155	164
Mohawk Valley	22	27	30	32	34	37	40	43	42	51
Capital	597	1,018	1,032	1,088	1,108	1,156	1,200	1,257	1,303	1,387
Hudson Valley	114	149	157	172	173	187	194	205	216	233
Millwood	205	201	199	205	210	215	230	236	241	249
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1,344	1,479	1,543	1,609	1,658	1,770	1,858	1,977	2,082	2,171
Long Island	483	611	648	680	696	741	764	806	846	902
NYCA Production~~NYCA Generator Prodn.~~ Costs	**3,895**	**4,718**	**4,855**	**5,075**	**5,208**	**5,489**	**5,732**	**6,017**	**6,279**	**6,607**
Interchange ~~Energyface~~ Value (Net Imports)	200	417	441	485	520	559	615	690	748	849

Formatted: Font: (Default) Arial
Formatted Table
Formatted ... [1]
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted ... [2]
Formatted: Indent: First line: 0 pt
Formatted: Font: 9 pt
Formatted: Centered
Formatted Table
Formatted: Font: (Default) Arial, Bold
Formatted: Font: (Default) Arial
Formatted ... [3]
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted ... [4]
Formatted ... [5]
Formatted ... [6]
Formatted ... [7]
Formatted ... [8]
Formatted ... [9]
Formatted ... [10]
Formatted ... [11]
Formatted ... [12]
Formatted: Font: (Default) Arial
Formatted ... [13]
Formatted: Font: (Default) Arial

Total NYCA Production Costs	4,095	5,135	5,297	5,560	5,729	6,048	6,346	6,707	7,026	7,456

Table E - 7: Projected Load Payments (2009-2018) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	645	800	806	836	852	898	929	963	998	1050
Genesee~~Genesse~~	416	531	532	553	555	589	613	639	666	695
Central	695	890	898	933	965	1014	1049	1094	1136	1202
North	288	369	374	389	402	421	433	448	463	491
Mohawk Valley	317	413	417	435	448	470	486	505	524	541
Capital	515	672	677	713	733	770	801	842	884	935
Hudson Valley	504	669	692	725	743	781	810	849	888	940
Millwood	126	168	175	184	189	198	205	215	225	240
Dunwoodie	305	405	419	437	446	464	478	498	519	552
NY City	2692	3627	3744	3966	4100	4350	4565	4864	5088	5377
Long Island	1117	1473	1505	1569	1585	1645	1696	1779	1849	1950
NYISO Total	**7,620**	**10,015**	**10,239**	**10,739**	**11,019**	**11,600**	**12,066**	**12,696**	**13,239**	**13,972**

Table E - 8: Projected Generator Payments (2009-2018) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1083	1369	1374	1425	1440	1516	1565	1615	1666	1733
Genesee~~Genessee~~	193	243	244	254	253	266	275	285	291	290
Central	1357	1705	1710	1782	1842	1928	1985	2062	2129	2247
North	395	511	514	536	553	580	598	621	644	664
Mohawk Valley	141	182	183	191	198	209	216	225	231	248
Capital	780	1189	1177	1236	1274	1337	1385	1447	1501	1585
Hudson Valley	191	265	279	299	303	322	331	349	369	394
Millwood	796	1037	1065	1115	1131	1176	1212	1263	1306	1380
Dunwoodie	0	0	0	0	0	0	0	0	0	1
NY City	1374	1436	1484	1541	1594	1698	1773	1882	1975	2055
Long Island	533	656	695	726	747	794	815	855	899	950
NYISO Total	**6,842**	**8,593**	**8,727**	**9,107**	**9,335**	**9,826**	**10,156**	**10,606**	**11,012**	**11,547**

Table E - 9: Projected Generator GWh ~~Losses Payment (2009-2018) by Zone~~

	Load Payments Losses (M$)									
Zone	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
West	(18.5)	(43.5)	(44.7)	(47.9)	(44.0)	(45.3)	(44.8)	(47.7)	(50.8)	(56.7)
Genessee	(4.2)	(8.8)	(9.1)	(10.0)	(8.8)	(8.4)	(7.6)	(8.0)	(8.2)	(9.8)
Central	3.4	1.3	1.2	0.9	2.9	3.0	3.6	3.9	4.1	5.7
North	(2.3)	(4.6)	(4.7)	(5.1)	(4.8)	(4.4)	(4.3)	(4.8)	(5.2)	(3.5)
Mohawk Valley	10.7	12.3	12.4	12.9	13.4	14.2	14.7	15.2	16.0	16.1
Capital	28.0	36.1	36.7	38.9	39.2	40.7	41.8	44.1	46.6	50.8
Hudson Valley	41.5	57.7	58.4	61.5	62.0	64.4	65.7	69.2	72.1	75.8
Millwood	11.3	16.0	16.2	17.0	17.3	17.9	18.3	19.2	20.1	21.6
Dunwoodie	28.6	40.3	40.3	42.2	42.6	43.7	44.4	46.5	48.2	51.1
NYCity	272.3	387.3	390.0	415.1	425.1	445.6	459.9	490.2	510.9	540.2
Long Island	123.5	173.6	171.7	179.4	178.5	182.6	185.8	195.4	201.8	205.3
NYISO Total	**494.3**	**667.7**	**668.4**	**704.9**	**723.4**	**754.0**	**777.6**	**823.2**	**855.6**	**896.7**

Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Centered
Formatted Table
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Bold
Formatted: Font: (Default) Arial
Formatted: Don't keep with next, Don't keep lines together
Formatted: Centered
Formatted Table
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Bold
Formatted: Font: (Default) Arial

~~Table E - 10: Projected SO_2 Emission Costs $ ‘000s (2009-2018) by Zone~~

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	27,275	27,665	27,668	27,719	27,695	27,757	27,763	27,815	27,857	27,867
Genesee	4,765	4,753	4,755	4,769	4,764	4,768	4,775	4,795	4,749	4,805
Central	33,688	32,938	32,878	32,915	33,055	33,184	33,196	33,303	33,258	33,289
North	9,588	9,790	9,803	9,830	9,850	9,871	9,885	9,910	9,934	9,717
Mohawk Valley	3,413	3,441	3,456	3,470	3,484	3,505	3,518	3,537	3,518	3,589
Capital	17,457	20,668	20,576	20,721	20,869	21,012	21,094	21,230	21,184	21,318
Hudson Valley	4,003	4,236	4,320	4,426	4,404	4,492	4,491	4,547	4,620	4,662
Millwood	17,149	17,149	17,149	17,200	17,149	17,150	17,150	17,200	17,150	17,150
Dunwoodie	6	6	6	6	6	6	6	6	6	6
NY City	28,792	22,736	23,063	22,933	23,349	23,920	24,149	24,584	24,820	24,530
Long Island	10,906	9,927	10,280	10,297	10,447	10,708	10,653	10,757	10,898	10,891
NYISO Total	**157,042**	**153,309**	**153,953**	**154,284**	**155,072**	**156,372**	**156,681**	**157,684**	**157,993**	**157,823**

Table E -10: Projected Losses Payments (2009-2018) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(19)	(43)	(45)	(48)	(44)	(45)	(45)	(48)	(51)	(57)
Genesee	(4)	(9)	(9)	(10)	(9)	(8)	(8)	(8)	(8)	(10)
Central	3	1	1	1	3	3	4	4	4	6
North	(2)	(5)	(5)	(5)	(5)	(4)	(4)	(5)	(5)	(3)
Mohawk Valley	11	12	12	13	13	14	15	15	16	16
Capital	28	36	37	39	39	41	42	44	47	51
Hudson Valley	41	58	58	61	62	64	66	69	72	76
Millwood	11	16	16	17	17	18	18	19	20	22
Dunwoodie	29	40	40	42	43	44	44	46	48	51
NY City	272	387	390	415	425	446	460	490	511	540
Long Island	123	174	172	179	178	183	186	195	202	205
NYISO Total	**494**	**668**	**668**	**705**	**723**	**754**	**778**	**823**	**856**	**897**

Table E - 11: Projected SO_2 Emission Costs (2009-2018) by Zone (nominal $ ’000)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1,570	1,229	1,012	1,017	1,017	828	508	458	446	439
Genesee	0	0	0	0	0	0	0	0	0	0
Central	1,179	1,013	828	827	831	674	416	375	363	362
North	125	73	60	61	65	54	34	30	31	29
Mohawk Valley	132	100	83	83	83	68	42	37	36	36
Capital	5	4	3	3	3	3	2	2	1	1
Hudson Valley	941	690	568	573	573	466	287	259	253	250
Millwood	1	1	1	1	1	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	52	25	22	20	20	16	10	10	10	11
Long Island	516	299	258	261	268	222	135	123	121	119
NYISO Total	**4,521**	**3,434**	**2,836**	**2,846**	**2,861**	**2,331**	**1,433**	**1,294**	**1,263**	**1,247**

Formatted: Centered, Don't keep with next, Don't keep lines together
Formatted: Font: (Default) Arial, 9 pt
Formatted Table
Formatted: Font: (Default) Arial, 9 pt
Formatted: Right, Don't keep with next, Don't keep lines together
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted Table
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial

Table E - 12: Projected SO_2 Emission Tons (2009-2018) by Zone

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	23,790	25,490	25,475	25,594	25,415	25,544	25,482	25,596	25,572	25,559
Genesee	0	0	0	0	0	0	0	0	0	1
Central	17,870	21,015	20,855	20,808	20,769	20,805	20,880	20,956	20,797	21,093
North	1,896	1,525	1,518	1,534	1,629	1,676	1,700	1,703	1,760	1,700
Mohawk Valley	1,999	2,085	2,085	2,092	2,085	2,086	2,087	2,093	2,081	2,087
Capital	68	81	81	81	82	83	84	85	84	87
Hudson Valley	14,257	14,321	14,309	14,409	14,335	14,386	14,405	14,502	14,504	14,567
Millwood	12	12	12	12	12	12	12	12	12	12
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	785	527	554	507	491	508	522	549	584	621
Long Island	7,819	6,196	6,500	6,569	6,697	6,841	6,764	6,864	6,945	6,932
NYISO Total	**68,497**	**71,252**	**71,390**	**71,606**	**71,517**	**71,943**	**71,936**	**72,360**	**72,341**	**72,659**

Table E - 13: Projected CO_2 Emission Costs (2009-2018) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	45	52	57	62	66	70	74	77	80	84
Genesee	0	0	0	0	0	0	0	0	0	0
Central	30	34	37	40	43	46	48	51	53	55
North	4	4	4	5	5	5	6	6	7	7
Mohawk Valley	2	3	3	3	4	4	4	4	5	5
Capital	25	33	37	40	43	46	49	51	53	56
Hudson Valley	12	14	16	18	19	20	21	22	24	25
Millwood	2	2	2	2	2	2	2	3	3	3
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	53	45	51	54	58	63	67	72	75	78
Long Island	21	21	24	26	28	31	32	34	36	38
NYISO Total	**194**	**208**	**232**	**251**	**268**	**288**	**304**	**321**	**335**	**351**

Table E - 14: Projected CO_2 Emission '000's Tons (2009-2018) by Zone

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	12,850	13,432	13,431	13,482	13,436	13,494	13,486	13,537	13,559	13,561
Genesee	57	50	51	51	56	59	63	66	48	80
Central	8,642	8,703	8,670	8,664	8,753	8,817	8,829	8,861	8,865	8,895
North	1,043	1,000	1,007	1,025	1,040	1,057	1,070	1,093	1,115	1,151
Mohawk Valley	654	689	701	715	726	745	756	772	768	823
Capital	7,076	8,676	8,638	8,708	8,784	8,858	8,905	8,973	8,949	9,068

Hudson Valley	3,566	3,738	3,781	3,853	3,834	3,891	3,894	3,940	3,981	4,014
Millwood	440	440	440	442	440	440	440	442	440	441
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	15,161	11,661	11,853	11,743	11,928	12,205	12,322	12,561	12,716	12,678
Long Island	5,945	5,392	5,622	5,666	5,778	5,937	5,921	5,993	6,093	6,085
NYISO Total	**55,435**	**53,782**	**54,196**	**54,350**	**54,775**	**55,502**	**55,685**	**56,237**	**56,533**	**56,797**

Table E - 15~~14~~: Projected NOx Emission Costs 2009-2018) by Zone (nominal $ m)

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017
West	13.9	13.2	5.3	3.1	5.4	2.8	4.0	3.9	3.6
Genesee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	10.4	11.0	4.4	2.6	4.5	2.4	3.3	3.3	3.0
North	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mohawk Valley	0.1	0.2	0.1	0.0	0.1	0.0	0.1	0.1	0.1
Capital	2.1	2.3	0.9	0.6	1.0	0.5	0.7	0.7	0.7
Hudson Valley	5.9	5.7	2.3	1.4	2.4	1.3	1.8	1.8	1.7
Millwood	1.3	1.2	0.5	0.3	0.5	0.3	0.4	0.3	0.3
Dunwoodie	-	-	-	-	-	-	-	-	-
NY City	4.1	2.6	1.1	0.6	1.1	0.6	0.8	0.8	0.8
Long Island	8.7	7.1	2.9	1.8	3.1	1.6	2.3	2.3	2.1
NYISO Total	**46.8**	**43.6**	**17.6**	**10.5**	**18.2**	**9.6**	**13.5**	**13.3**	**12.4**

Table E -16: Projected NOx in Tons~~'000s $~~ (2009-2018) by Zone

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
~~West~~	~~13,890~~	~~13,157~~	~~5,261~~	~~3,123~~	~~5,383~~	~~2,824~~	~~3,968~~	~~3,883~~	~~3,598~~	~~3,511~~
~~Genesee~~	~~28~~	~~26~~	~~11~~	~~6~~	~~12~~	~~6~~	~~10~~	~~10~~	~~7~~	~~11~~
~~Central~~	~~10,377~~	~~11,042~~	~~4,408~~	~~2,610~~	~~4,515~~	~~2,368~~	~~3,334~~	~~3,262~~	~~3,007~~	~~2,952~~
~~North~~	~~290~~	~~254~~	~~104~~	~~67~~	~~123~~	~~70~~	~~105~~	~~114~~	~~114~~	~~134~~
~~Mohawk Valley~~	~~148~~	~~151~~	~~66~~	~~43~~	~~81~~	~~48~~	~~71~~	~~77~~	~~73~~	~~92~~
~~Capital~~	~~2,120~~	~~2,344~~	~~931~~	~~556~~	~~972~~	~~513~~	~~724~~	~~711~~	~~653~~	~~649~~
~~Hudson Valley~~	~~5,884~~	~~5,682~~	~~2,334~~	~~1,415~~	~~2,435~~	~~1,300~~	~~1,824~~	~~1,812~~	~~1,719~~	~~1,682~~
~~Millwood~~	~~1,309~~	~~1,193~~	~~477~~	~~283~~	~~487~~	~~255~~	~~358~~	~~350~~	~~321~~	~~314~~
~~Dunwoodie~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~NYCity~~	~~4,067~~	~~2,643~~	~~1,078~~	~~626~~	~~1,096~~	~~590~~	~~839~~	~~842~~	~~801~~	~~788~~
~~Long Island~~	~~8,721~~	~~7,110~~	~~2,942~~	~~1,754~~	~~3,070~~	~~1,636~~	~~2,289~~	~~2,256~~	~~2,098~~	~~2,060~~
~~NYISO Total~~	~~46,835~~	~~43,601~~	~~17,612~~	~~10,483~~	~~18,173~~	~~9,610~~	~~13,523~~	~~13,317~~	~~12,391~~	~~12,193~~

~~Table E - 15: Projected NOx Tons (2009-2018) by Zone~~

~~-~~	~~2009~~	~~2010~~	~~2011~~	~~2012~~	~~2013~~	~~2014~~	~~2015~~	~~2016~~	~~2017~~	~~2018~~
West	11,112	11,552	11,557	11,596	11,566	11,614	11,611	11,656	11,725	11,693
Genesee	23	23	23	23	25	27	28	30	23	36
Central	8,302	9,694	9,682	9,691	9,701	9,737	9,756	9,791	9,798	9,829
North	232	223	229	248	263	286	306	342	371	447

Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, 9 pt
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, 9 pt
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, 9 pt
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, 9 pt
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, 9 pt
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, 9 pt
Formatted: Caption, Indent: First line: 0 pt
Formatted Table
Formatted: Font: (Default) Arial
Formatted: Centered
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted Table
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mohawk Valley	119	132	145	161	174	195	209	230	236	305
Capital	1,696	2,058	2,045	2,064	2,087	2,111	2,120	2,135	2,128	2,160
Hudson Valley	4,707	4,989	5,127	5,254	5,231	5,346	5,336	5,439	5,601	5,601
Millwood	1,047	1,047	1,047	1,050	1,047	1,047	1,047	1,050	1,047	1,047
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	3,253	2,320	2,368	2,324	2,354	2,425	2,456	2,528	2,610	2,624
Long Island	6,977	6,242	6,463	6,515	6,596	6,730	6,698	6,771	6,836	6,860
NYISO Total	**37,468**	**38,281**	**38,687**	**38,927**	**39,045**	**39,517**	**39,567**	**39,972**	**40,377**	**40,602**

Table E-17 – 16: Projected TCC Payments (nominal $ m)Zonal LBMP $/MWh (2009-2018) by Zone

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Congestion	314	604	692	745	729	758	785	867	926	975
Rent West	41.12	50.72	51.04	52.84	53.59	56.13	57.83	59.58	61.42	63.88

Note: TCC payments in Phase 1 are calculated as congestion rents.

Table E-18: Projected Zonal LBMP $/MWh (2009-2018) by Zone

Zone	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.1	50.7	51.0	52.8	53.6	56.1	57.8	59.6	61.4	63.9
Genesee	41.9	52.9	53.2	55.2	55.2	57.9	59.7	61.6	63.5	66.1
Central	42.7	54.1	54.5	56.6	58.3	60.9	62.6	64.8	67.1	70.8
North	42.1	53.4	53.8	55.9	57.5	60.2	62.0	64.1	66.4	70.2
Mohawk Valley	44.0	55.8	56.2	58.4	60.1	62.7	64.6	66.9	69.3	72.9
Capital	45.2	58.3	58.6	61.2	62.4	65.0	67.1	69.7	72.5	76.3
Hudson Valley	46.8	60.7	62.1	64.8	66.0	68.7	70.8	73.5	76.3	80.4
Millwood	47.1	61.4	63.1	65.9	67.0	69.7	71.8	74.6	77.4	81.8
Dunwoodie	47.4	61.8	63.5	66.3	67.4	70.1	72.3	75.1	77.9	82.3
NYCity	48.3	63.6	64.8	67.7	69.0	71.9	74.3	77.5	80.6	84.4
Long Island	48.6	64.1	65.4	68.2	69.3	71.9	74.1	77.1	80.0	84.1
NYISO Load Weighted Average	**46.0**	**59.5**	**60.4**	**63.0**	**64.2**	**66.9**	**69.1**	**71.8**	**74.4**	**78.1**

E.2. Selection of Three Studies

Genesee	41.85	52.91	53.21	55.20	55.16	57.90	59.74	61.58	63.53	66.07
Central	42.70	54.14	54.50	56.63	58.29	60.86	62.61	64.83	67.14	70.79
North	42.14	53.44	53.80	55.91	57.54	60.19	61.99	64.14	66.36	70.16
Mohawk Valley	44.01	55.80	56.22	58.45	60.08	62.74	64.60	66.90	69.28	72.87
Capital	45.23	58.31	58.59	61.18	62.41	65.04	67.11	69.74	72.51	76.28
Hudson Valley	46.76	60.71	62.11	64.82	65.98	68.66	70.76	73.51	76.29	80.43
Millwood	47.13	61.37	63.08	65.86	66.98	69.67	71.80	74.61	77.43	81.83
Dunwoodie	47.42	61.77	63.49	66.28	67.41	70.11	72.26	75.10	77.92	82.30
NYCity	48.34	63.64	64.83	67.71	69.00	71.93	74.33	77.52	80.57	84.43
Long Island	48.62	64.10	65.38	68.20	69.25	71.93	74.14	77.07	79.99	84.12
NYISO Total	**45.03**	**57.90**	**58.75**	**61.19**	**62.33**	**65.01**	**67.02**	**69.51**	**72.04**	**75.74**

Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial, Not Bold
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted Table
Formatted: Font: (Default) Arial
Formatted: Left
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial
Formatted: Font: (Default) Arial

~~Selection of Three Studies~~

The process for selecting the three CARIS studies occurs in two steps, as described below.

In Step 1, both historic and projected congestion elements for a fifteen-~~a15~~ year period are ranked in ascending order based on the calculated present value of Demand$ Congestion. Initially, the top five positive and top two negative congested elements are identified for further consideration. This initial list is then revised to include any orphaned elements (elements for which there is no historic congestion data) if their projected congestion is higher than other elements' projected congestion. If the projected congestion for a specific element is declining in the future years (~~project congestion. The elements are removed from the list until a significant decline in the benefit of reducing congestion is revealed,~~ thus indicating a diminishing return), then that element is removed from the list and is no longer considered for further analysis. The remaining top ~~five~~ congested elements (up to five) are then further considered as primary elements for inclusion in Step 2.

In Step 2, the top ~~five~~ congested elements from Step 1 are relieved independently to determine if any need to be ~~identify the~~ grouped with other elements that show significant congestion when a primary element is relieved.~~elements and to calculate the production cost savings for each group.~~ The top congested elements are relieved by increasing their limit to 9999 MW for a mid and horizon year. The primary constraint will be assessed for grouping with a new element if the new element is electrically adjacent to the primary element and in the top five of congested elements based on Demand$ Congestion. If the new element meets these criteria, the process is repeated with the new element's limit also increased to 9999 to identify any additional electrically adjacent elements that become significantly congested. The elements are grouped if the production cost savings are increased by 50% or more. If, after the initial grouping the production cost savings is not more than $3 Million, the primary element is eliminated from the list. If more than three grouped elements meet all the criteria, the three with the most production cost savings are selected as the three studies. The production cost savings based on modifying an existing element's limit will be different than that achieved when applying a transmission solution since an impedance value for a line is not being introduced.

Table E-19~~17~~ shows the Demand$ congestion for the Base Case and the relaxation cases for year 2013 and 2017. None of the relaxation tests resulted in an increase in congestion on an electrically adjacent line except for Leeds-Pleasant Valley. The relaxation of the Leeds-Pleasant Valley line did result in an increase in congestion on the Leeds-New Scotland line. However, the increased congestion is not enough to place Leeds-New Scotland in the top five congested elements. Therefore, it is not grouped with the Leeds-Pleasant Valley line for the study.

Table E-19~~17~~: Demand~~-~~$ Congestion Results for Relaxation of Top Congested Elements

Total Congestion Demand Payment (M$)	Type	2013 BASE CASE	2013 Relax Central East	2013 Relax Leeds-Pleasant Valley	2013 Relax Mott Haven-Rainy	2013 Relax West Central	2017 BASE CASE	2017 Relax Central East	2017 Relax Leeds-Pleasant Valley	2017 Relax Mott Haven-Rainy	2017 Relax West Central
LEEDS-PLEASANT VALLEY 345	Contingency	220	223	-	224	237	236	243	-	247	255
CENTRAL EAST	Interface	67	-	81	67	108	126	-	149	124	181
WEST CENTRAL-OP	Interface	(53)	(59)	(66)	(52)	-	(64)	(75)	(75)	(63)	-
MOTT HAVN-RAINY 345	Contingency	6	5	11	-	5	15	14	23	-	15
DUNWOODIE_SHORE RD_345	Contingency	7	7	12	6	7	8	7	14	6	9
ASTORIA W 138-HELLGATE5_138	Contingency	2	2	2	2	2	5	5	5	5	5
LEEDS3_NEW SCOTLAND_345	Contingency	1	1	8	1	1	0	1	7	0	1

Table E-20~~18~~ shows the change in production cost when the top elements are relieved. Leeds to Pleasant Valley, Central East and West Central have the highest production cost savings, and are therefore selected as the three studies.

Table E-20~~18~~: Production Cost Savings (nominal $ m~~Nominal $M~~) Due to Relaxation of Primary Elements

Elements	**2013**	**2017**
Leeds -Pleasant Valley~~LEEDS - PLEASANT VALLEY~~	13	15
Central East~~CENTRAL EAST~~	3	5
West Central-Op~~WEST CENTRAL-OP~~	9	10
Motthaven-Rainey ~~MRHAVN-RAINY~~	(-0.1)	6

E.3. —Generic Solutions

Modeling Modifications

The NYISO selected generic solutions for each of the three resource types in each of the three studies. The generic solutions are each modeled in the Base Case in order to determine its impact on congestion of the grouped elements in each study. It is assumed that the generic solution is installed in the first study year (2009). This assumption allows for the calculation of the full ten-year production cost and additional metrics resulting from the generic solution. The Base Case~~base case~~ transfer limits for the appropriate interfaces are recalculated for the mid-year and horizon year with all facilities in-service.

Initially, one single "block" size for each resource type is modeled. If a majority of the congestion of the grouped elements being studied is not relieved, the installation of an additional block is considered. However, if adding the additional block results in diminishing returns on reducing congestion, or is not feasible, it is not included.

Disclaimers:

- Other solutions may exist which will alleviate the congestion on the studied elements.
- No attempt has been made to determine the optimum solution for alleviating the congestion.
- 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.
- ~~The costs of the System Upgrade Facilities to maintain reliability are not included in the cost /benefit analysis.~~

Grouped Congested Elements Solutions

One block of each resource type was applied to each congested grouping. The installation of a transmission solution for each study relieved the majority of the congestion. Installing one

Formatted: Font: (Default) Arial, 10 pt

Formatted: Font: (Default) Times New Roman, Bold

Formatted: Font: (Default) Times New Roman

Formatted: Centered

Formatted Table

Formatted: Font: (Default) Times New Roman

Formatted: Font: (Default) Times New Roman

Formatted: Font: (Default) Times New Roman

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font: (Default) Times New Roman, Font color: Red

Formatted: Font: (Default) Times New Roman

Formatted: Font: (Default) Times New Roman

Formatted: Centered

Formatted: Indent: First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Bullets and Numbering

block of generation did not result in a significant reduction of congestion for all congested elements being studied. -Therefore, a second block of generation was installed for each study. -Installing the second block of generation still did not result in a significant congestion relief. -Nevertheless, a third block of generation was not installed due to diminishing returns in reducing congestion. Installing one block of demand respond response resulted in minimal congestion ~~congested~~ relief on the studied groupings~~ and even caused an increase in the congestion associated with the Central East interface. This is due to the demand response solution being applied throughout the zonal area and not to the bus located downstream of the congestion~~. The implementation of demand response resulted~~, however, does result~~ in a reduction in production cost because load is reduced. -Adding a second block of demand response was not tested because such a generic solution would exceed 10% of the zonal load and is not likely to be achieved. -The following sections outline the specific solutions developed for each congested grouping being studied.

Study#1 – Leeds - Pleasant Valley

The generic solutions for relieving the Leeds to Pleasant Valley congestion for each resource types are as follows:

- Transmission : A new 345 kV line from Leeds to Pleasant Valley- 39 Miles
- Generation: Install a new 500 MW Plant at Pleasant Valley
- Demand Response: Install 100 MW Demand Response and 100 MW Energy Efficiency in Zone G -(200 MW is less than 10% of Zone G's peak load)

Table E-21~~19~~ shows the comparison of the resulting Demand$ congestion between the Base Case~~base case~~ and generic solution for the block size determination for years 2013 and 2017.

Table E-21~~19~~: Demand$ Congestion Comparison for Leeds – Pleasant Valley Study (nominal $ m)

~~for Block Size Determination~~

~~**Leeds Pleasant Valley- Congestion $ Demand**~~

	2013			2017		
Resource Type	**Solution** ~~Base Case~~	**Base**~~Solution~~ **Case**	**% Change**	**Solution** ~~Base Case~~	**Base**~~Solution~~ **Case**	**% Change**
Transmission	~~220.~~0	2200~~.0~~	-100%	~~236.~~0	2360~~.0~~	-100%
Generation- 1 Block	191~~220.0~~	220~~191.0~~	-13%	204~~236.0~~	236~~204.0~~	-14%
Generation – 2 Blocks	157~~220.0~~	220~~157.4~~	-28%	166~~236.0~~	236~~165.8~~	-30%
Demand Response	214~~220.0~~	220~~213.5~~	-3%	228~~236.0~~	236~~227.7~~	-4%

- **Formatted:** Font: 11 pt
- **Formatted:** Don't keep with next, Don't keep lines together
- **Formatted Table**
- **Formatted:** Font: 11 pt
- **Formatted:** Don't keep with next, Don't keep lines together
- **Formatted:** Font: 11 pt, Bold
- **Formatted:** Font: 11 pt, Bold
- **Formatted:** Font: 11 pt, Bold
- **Formatted:** Font: 11 pt, Bold
- **Formatted:** Font: 11 pt, Bold
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt
- **Formatted:** Font: 11 pt

The percentage changes are with respect to Base Case figures.

Formatted: Left, Indent: First line: 36 pt

Table E-2220 presents the change in the number of congested hours by constraint after each of the three generic solutions has been applied. -Negative values imply a reduction in congested hours.

Table E-2220: Change in Number of Congested Hours

Formatted Table

Study #1 – Leeds - Pleasant Valley

	Change in # of Congested Hours: Transmission Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	198	65	365	372	202	208	167	171	174	121
LEEDS _PLTVLLEY	(681)	(860)	(2289)	(2381)	(2154)	(2148)	(2087)	(2123)	(2017)	(2094)
NY MOTTHAVEN-RAINEY	124	140	322	362	300	312	275	304	256	336
DUNWOODIE_SHORE RD	232	84	607	694	614	549	506	516	518	474
WEST CENTRAL-OP	(1)	32	36	59	412	354	278	306	326	342

	Change in # of Congested Hours: Generation Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	(196)	(120)	(21)	23	2	(16)	(21)	(17)	(43)	(45)
LEEDS_PLTVLLEY	(197)	(342)	(482)	(535)	(440)	(494)	(517)	(503)	(475)	(466)
NY MOTTHAVEN-RAINEY	386	535	396	491	439	494	521	531	541	590
DUNWOODIE_SHORE RD	698	635	707	830	752	830	805	817	727	770
WEST CENTRAL-OP	0	(4)	5	19	10	32	(33)	(23)	(27)	(7)

	Change in # of Congested Hours: DR & EE Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	(19)	(1)	0	(9)	0	(6)	4	(5)	4	(13)
LEEDS_PLTVLLEY	(19)	(6)	7	(20)	(21)	(30)	(14)	(25)	(16)	(7)
NY MOTTHAVEN-RAINEY	49	46	44	80	59	60	55	50	44	82
DUNWOODIE_SHORE RD	128	53	89	98	97	74	105	99	83	88
WEST CENTRAL-OP	(1)	2	7	4	(16)	2	(39)	(18)	(11)	(18)

Note: Negative values imply a reduction.

Formatted: Heading 4

Study #2 - Central East

In order to determine the upstream and downstream locations associated with the generic solutions to relieve the congestion on the Central East Interface, all the elements that comprise this interface were examined as shown in Table E-23.21. Two lines of this interface met the guideline of tying into an existing 345 kV substation: Edic to New Scotland and Marcy to New Scotland. Edic to New Scotland line was selected as the generic solution because of the shorter distance between the terminal endpoints.

Table E-23:21 Elements which Comprise the Central East Interface

Interface	From Bus Number	From Bus Name	From Bus Voltage (KV)	To Bus Number	To Bus Name	To Bus Voltage (kV)
CENTRAL EAST	100511	GRAND IS	115	147852	PLAT T#3	115
CENTRAL EAST	130797	E.SPR115	115	137886	INGHAM-E	115
CENTRAL EAST	137200	EDIC	345	137452	N.SCOT77	345
CENTRAL EAST	137210	PORTER 2	230	137730	ROTRDM.2	230
CENTRAL EAST	137210	PORTER 2	230	137730	ROTRDM.2	230
CENTRAL EAST	137228	INGMS-CD	115	137886	INGHAM-E	115
CENTRAL EAST	137228	INGMS-CD	115	137302	INGHAMS	46
CENTRAL EAST	137453	N.SCOT99	345	147833	MARCY T1	345

Generic solutions for relieving the Central East Interface for each resource types are as follows:

- Transmission: A new 345 kV line from Edic to New Scotland, 90 Miles
- Generation: Install a new 500 MW Plant at New Scotland
- Demand Response: Install 100 MW Demand Response and 100 MW Energy Efficiency in Zone F -(200 MW is less than 10% of Zone F's peak load)

Table E-2422 shows the comparison of the resulting Demand$ congestion between the Base Case and generic solution for the block size determination for years 2013 and 2017.

Table E-2422: Demand$ Congestion Comparison for Central East Study (nominal $ m)for Block Size Determination

Central East- Congestion Demand$

	2013			2017		
Resource Type	Solution	Base Case	% Change	Solution	Base Case	% Change
Transmission-	19Base Case	67Solution Case	-71%% Change	50Base Case	126Solution Case	-61%% Change
Generation- 1 BlockTransmission	5367.0	6719.2	-21%71%	108125.6	12649.5	-14%61%

Formatted: Do not check spelling or grammar
Formatted: Font: Not Bold
Formatted: appendix head, Indent: Left: 72 pt
Formatted: Caption, Left, Keep lines together
Formatted: Font: 11 pt
Formatted Table
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted Table
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Left
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt

Generation – 2 Blocks~~– 1 Block~~	40~~67.0~~	67~~53.0~~	-41%~~21%~~	86~~125.6~~	126~~108.0~~	-32%~~14%~~
Demand Response~~Generation – 2 Blocks~~	57~~67.0~~	67~~39.6~~	-15%~~41%~~	115~~125.6~~	126~~85.8~~	-8%~~32%~~
The percentage changes are with respect to Base Case figures. ~~Demand Response~~	~~67.0~~	~~57.1~~	~~15%~~	~~125.6~~	~~115.2~~	~~8%~~

Table E-25~~23~~ presents the change in the number of congested hours by constraints after each of the three generic solutions has been applied. Negative values imply a reduction in congested hours.

Table E-25~~23~~: Change in Number of Congested Hours

Study #2 - Central East										
~~Study #2 - Central East~~										
	Change in # of Congested Hours: Transmission Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	(647)	(799)	(721)	(753)	(680)	(667)	(696)	(686)	(679)	(753)
LEEDS_PLTVLLEY	245	390	476	414	387	375	431	402	396	441
NY MOTTHAVEN-RAINEY	12	(30)	(4)	6	(5)	(47)	(44)	(25)	(46)	(20)
DUNWOODIE_SHORE RD	(41)	(76)	(119)	(138)	(99)	(136)	(57)	(74)	(161)	(118)
WEST CENTRAL-OP	(2)	95	96	103	135	126	144	195	171	119
	Change in # of Congested Hours: Generation Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	(469)	(373)	(384)	(362)	(320)	(342)	(376)	(348)	(343)	(328)
LEEDS_PLTVLLEY	418	437	616	612	638	663	661	671	728	728
NY MOTTHAVEN-RAINEY	211	213	137	141	155	148	151	145	200	265
DUNWOODIE_SHORE RD	347	257	116	206	172	211	202	231	156	221
WEST CENTRAL-OP	0	6	3	(23)	(194)	(160)	(164)	(161)	(159)	(186)
	Change in # of Congested Hours: DR & EE Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	(94)	(82)	(83)	(89)	(73)	(71)	(88)	(90)	(87)	(82)
LEEDS_PLTVLLEY	34	62	101	75	85	76	104	109	86	93
NY MOTTHAVEN-RAINEY	16	34	26	34	18	29	21	34	26	35

Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Justified
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: (Default) Times New Roman
Formatted: Caption, Indent: First line: 0 pt, Keep lines together
Formatted Table

DUNWOODIE_SHORE RD	53	40	46	94	37	31	59	103	40	42
WEST CENTRAL-OP	(2)	4	2	(2)	(26)	(2)	(39)	(29)	(40)	(45)
Note: Negative values imply a reduction.										

Study #3 - West Central

To determine the upstream and downstream locations associated with the generic solutions for relieving the congestion on the West Central Interface, the elements that make up this interface were examined, as shown in Table E-26.~~24.~~ This interface includes two lines which meet the guideline of tying into an existing 345 kV substation, namely the Pannell to Clay 345 kV lines. Upon testing the impact of a new generic line between Pannell and Clay, no improvement in voltage performance was observed. Recognizing that the voltage problem may be a function of local system problems and recognizing that West Central is tightly coupled with the Dysinger East interface, a new circuit from Niagara to Clay was inserted. The voltage limit improved by over 500 MW. This solution meets the criteria for the design of a generic solution, although it is recognized that other bulk and non-bulk power system solutions may exist as well.

Table E-26~~24~~: Elements Comprising~~which Comprise~~ the West Central Interface

Interface-Name	From Bus Number	From Bus Name	From Bus kV	To Bus Num	To Bus Name	To Bus kV	Branch Circuit
WEST CENTRAL-OP	130764	MEYER230	230	130767	STOLE230	230	1
WEST CENTRAL-OP	130926	WOLCOT34	34.5	149122	C708 LD	34.5	1
WEST CENTRAL-OP	131242	MACDN115	115	149026	QUAKER (Sta #121)	115	1
WEST CENTRAL-OP	131243	SLEIG115	115	149004	S121 B#2	115	1
WEST CENTRAL-OP	131243	SLEIG115	115	149005	CLYDE199 (Sta #199)	115	1
WEST CENTRAL-OP	131251	BROWNS C	34.5	131252	CLYDE 34	34.5	1
WEST CENTRAL-OP	131344	PALMT115	115	135260	ANDOVER1	115	1
WEST CENTRAL-OP	131345	S.PER115	115	149010	STA 162	115	1
WEST CENTRAL-OP	135860	LAWLER-1	115	135861	MORTIMER (sta #82)	115	1
WEST CENTRAL-OP	135861	MORTIMER (Sta #82)	115	136213	LAWLER-2	115	1
WEST CENTRAL-OP	136150	CLAY	345	149001	PANNELL3 (Sta #122)	345	1
WEST CENTRAL-OP	136150	CLAY	345	149001	PANNELL3 (Sta #122)	345	2
WEST CENTRAL-OP	136167	HOOKRD	115	149074	STA127	34.5	1
WEST CENTRAL-OP	136183	CLTNCORN	115	149005	CLYDE199	115	1
WEST CENTRAL-OP	136194	FARMGTN1	115	149075	FARMNGTN	34.5	1
WEST CENTRAL-OP	136197	FRMGTN-4	115	149146	S168	12	1
WEST CENTRAL-OP	136197	FRMGTN-4	115	149025	PANNELLI (Sta #122)	115	1
WEST CENTRAL-OP	149118	CLYDE 34	34.5	149005	CLYDE199 (Sta #199)	115	1
WEST CENTRAL-OP	149141	FRMNGT2	34.5	136197	FRMGTN-4	115	1

This interface includes only one line which meets the guideline of tying into an existing 345kV substation. This is the Pannell to Clay 345kV line. T~~T~~herefore, the generic solutions for relieving the West Central Interface for each resource types are as follows:

- Transmission: A new 345kV line from Niagara to Pannell to Clay: 149 Miles
- Generation: Install a new 5000 MW Plant at Clay

- Demand Response: Install 100 MW Demand Response and 100 MW Energy Efficiency in Zone C -(200 MW is less than 10% of Zone C's peak load)

Table E-2725 shows the comparison of the resulting Demand$dollar demand congestion between the Base Casebase case and generic solution for the block size determination for years 2013 and 2017.

Table E-27:25: Dollar Demand$ Congestion Comparison for West Central Study (nominal $ m)for Block Size Determination

West Central- Congestion Demand$

	2013			2017		
Resource Type	**Solution**	**Base Case**	**% Change**	**Solution**	**Base Case**	**% Change**
Transmission-	10Base Case	53Solution Case	-80%% Change	14Base Case	64Solution Case	-78%% Change
Generation- 1 BlockTransmission	4752.6	5310.4	-11%80%	5663.6	6413.7	-12%78%
Generation – 2 Blocks– 1 Block	4052.6	5347.0	-23%11%	4763.6	6456.0	-27%12%
Demand ResponseGeneration 2 Blocks	5052.6	5340.3	-6%23%	5963.6	6446.7	-8%27%
Demand Response	52.6	49.5	6%	63.6	58.6	8%

The percentage changes are with respect to Base Case figures.

Table E-2826 presents the change in the number of congested hours by constraints after each of the three generic solutions has been applied. -Negative values imply a reduction in congested hours.

Table E-2826: Change in Number of Congested Hours

Study #3 - West Central										
	Change in # of Congested Hours: Transmission Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	164	431	361	415	665	625	559	583	560	657
LEEDS_PLTVLLEY	37	56	114	102	269	238	204	239	211	235
NY MOTTHAVEN-RAINEY	71	46	10	80	47	31	49	34	47	109
DUNWOODIE_SHORE RD	(33)	19	(10)	37	70	104	59	86	76	172
WEST CENTRAL-OP	(5)	(266)	(312)	(387)	(1800)	(1718)	(1577)	(1613)	(1568)	(1840)
-										-
	Change in # of Congested Hours: Generation Solution									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CENTRAL EAST	514	448	343	369	436	475	474	451	387	457

Formatted: Normal, Justified, Don't keep lines together
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted Table
Formatted Table
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Left
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Justified
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Font: 11 pt
Formatted: Caption, Indent: First line: 0 pt
Formatted Table
Formatted Table

LEEDS_PLTVLLEY	102	88	201	169	221	239	283	273	279	268
NY MOTTHAVEN-RAINEY	102	142	94	144	115	106	146	155	176	221
DUNWOODIE_SHORE RD	274	214	104	162	154	209	187	199	169	224
WEST CENTRAL-OP	(4)	(97)	(107)	(138)	(398)	(286)	(326)	(368)	(354)	(370)

	Change in # of Congested Hours: DR & EE Solution									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CENTRAL EAST	85	113	69	80	107	106	123	95	100	106
LEEDS_PLTVLLEY	13	27	59	22	53	38	72	67	59	50
NY MOTTHAVEN-RAINEY	(7)	24	28	32	18	35	36	25	31	35
DUNWOODIE_SHORE RD	54	20	38	45	53	27	55	63	29	51
WEST CENTRAL-OP	(1)	(30)	(20)	(31)	(86)	(68)	(104)	(86)	(114)	(82)

Note: Negative values imply a reduction.

E.4. Benefit/Cost Analysis (including additional metrics)

Disclaimers

- No verification was conducted to determine if the generic solution can be built within the generic cost estimate ranges.
- The generic solutions analysis is performed to provide a rough estimate of the benefit to cost opportunity based upon the assumptions contained in this report.
- The NYISO makes no representations regarding the adequacy or accuracy of the benefit/cost ratios.

Tables E-29~~27~~ through E-32~~30~~ present generic solutions overnight installation costs associated with each study. On-going operation and maintenance costs are not included.

Table E-29~~27~~: Generic Solution Costs for Each Study ($ m)

Generic Solution Cost Summary ($ m)

Studies	Study 1: Leeds - Pleasant Valley	Study 2: Central East	Study 3: West Central
Transmission			

Formatted Table

Formatted: Indent: First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Indent: First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Indent: First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

Formatted: Bulleted + Level: 1 + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt

Formatted: Bulleted + Level: 1 + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt

Formatted: Bulleted + Level: 1 + Aligned at: 18 pt + Tab after: 36 pt + Indent at: 36 pt

Formatted: Caption, Indent: First line: 0 pt, Keep with next, Keep lines together

Substation Terminals

	~~Leeds – Pleasant Valley (Study 1)~~	~~Central East (Study 2)~~	~~West Central (Study 3)~~
	~~Transmission~~		
~~Line~~	~~Leeds to Pleasant Valley~~	~~Edic to New Scotland~~	~~Niagara to Clay~~
~~Mileage~~	Leeds to Pleasant Valley~~90 miles~~	Edic to New Scotland~~39 miles~~	Niagara to Pannell to Clay~~149 miles~~
Miles~~High~~	39~~222~~	90~~477~~	149~~790~~
High~~Med~~	$222~~155~~	$477~~333~~	$790~~552~~
Mid~~Low~~	$155~~87~~	$333~~189~~	$552~~313~~
Low	$87	$189	$313
	~~Generation~~		
~~Substation Terminals~~	~~Pleasant Valley~~	~~New Scotland~~	~~Clay~~

Generation

Substation Terminal~~# of 250 MW blocks~~	~~2 blocks~~	~~2 blocks~~	~~2 blocks~~
~~High~~	Pleasant Valley~~911~~	New Scotland~~831~~	Clay~~831~~
# of 250MW Blocks~~Med~~	2~~751~~	2~~681~~	2~~681~~
High~~Low~~	$911~~591~~	$831~~531~~	$831~~531~~
Mid-	$751-	$681-	$681-
Low	$591	$531	$531

Demand Response

~~Demand Response & Energy Efficiency~~

Zone	G	F	C
# of Blocks~~DR + EE~~	1~~200 MW~~	1~~200 MW~~	1~~200 MW~~
High	$580	$580	$580
Mid~~Med~~	$390	$390	$390
Low	$190	$190	$190

Formatted ... [78]
Formatted ... [79]
Formatted ... [80]
Formatted Table ... [81]
Formatted ... [82]
Formatted ... [83]
Formatted ... [84]
Formatted ... [85]
Formatted ... [86]
Formatted ... [87]
Formatted ... [88]
Formatted ... [89]
Formatted ... [90]
Formatted ... [91]
Formatted ... [92]
Formatted Table ... [93]
Formatted ... [94]
Formatted ... [95]
Formatted ... [96]
Formatted Table ... [97]
Formatted ... [98]
Formatted ... [99]
Formatted ... [100]
Formatted ... [101]
Formatted ... [102]
Formatted ... [103]
Formatted ... [104]
Formatted ... [105]
Formatted ... [106]
Formatted ... [107]
Formatted Table ... [108]
Formatted ... [109]
Formatted ... [110]
Formatted ... [111]
Formatted ... [112]
Formatted ... [113]
Formatted ... [114]
Formatted ... [115]
Formatted ... [116]
Formatted ... [117]
Formatted ... [118]
Formatted ... [119]
Formatted ... [120]
Formatted ... [121]
Formatted ... [122]
Formatted ... [123]
Formatted ... [124]
Formatted ... [125]

Table E-30~~28~~: Generic Solutions for Study #1 - Leeds to Pleasant Valley

Generic Solution for Study #1 - Leeds to Pleasant Valley

(Estimates should not be assumed reflective or predictive of actual project costs)

Transmission Solution: Leeds to Pleasant Valley

Item #	Quantity	Unit Pricing ($M)	Total ($M)
T-1 High			
Transmission Line (Miles)	39	$5~~.0~~	$195~~.0~~
Substation Line Terminal	2	$9~~.0~~	$18~~.0~~
System Upgrade	1	$9~~.0~~	$9~~.0~~
Total High Transmission Solution Cost			***$222~~.0~~***
T-1 Mid			
Transmission Line (Miles)	39	$3.5	$136.5
Substation Line Terminal	2	$6~~.0~~	$12~~.0~~
System Upgrade	1	$6~~.0~~	$6~~.0~~
Total Mid Transmission Solution Cost			***$154.5***
T-1 Low			
Transmission Line (Miles)	39	$2~~.0~~	$78~~.0~~
Substation Line Terminal	2	$3~~.0~~	$6~~.0~~
System Upgrade	1	$3~~.0~~	$3~~.0~~
Total Low Transmission Solution Cost			***$87~~.0~~***

Generation Solution: Pleasant Valley

Item #	Quantity	Unit Pricing ($M)	Total ($M)
G-1 High			
Plant (250 MW Blocks)	2	$440~~.0~~	$880~~.0~~
Electric Transmission Line (Miles)	1	$5~~.0~~	$5~~.0~~
Substation Terminal	1	$9~~.0~~	$9~~.0~~
System Upgrade Facilities	1	$9~~.0~~	$9~~.0~~
Gas Transmission Line (Miles)	1	$5~~.0~~	$5~~.0~~
Gas Regulator Station	1	$3~~.0~~	$3~~.0~~
Total High Generation Solution Cost			***$911~~.0~~***
G-1 Mid			
Plant (250 MW Blocks)	2	$365~~.0~~	$730~~.0~~
Electric Transmission Line (Miles)	1	$3.5	$3.5
Substation Terminal	1	$6~~.0~~	$6~~.0~~
System Upgrade Facilities	1	$6~~.0~~	$6~~.0~~
Gas Transmission Line (Miles)	1	$3.5	$3.5

Formatted Table

Formatted: Keep with next, Keep lines together

Formatted Table

Gas Regulator Station	1	$2 ~~.0~~	$2 ~~.0~~
Total Mid Generation Solution Cost			***$751 ~~.0~~***
G-1 Low			
Plant (250 MW Blocks)	2	$290 ~~.0~~	$580 ~~.0~~
Electric Transmission Line (Miles)	1	$2 ~~.0~~	$2 ~~.0~~
Substation Terminal	1	$3 ~~.0~~	$3 ~~.0~~
System Upgrade Facilities	1	$3 ~~.0~~	$3 ~~.0~~
Gas Transmission Line (Miles)	1	$2 ~~.0~~	$2 ~~.0~~
Gas Regulator Station	1	$1 ~~.0~~	$1 ~~.0~~
Total Low Generation Solution Cost			***$591 ~~.0~~***

Demand Response~~Demanda Réponse~~ Solution: Zone G

Item #	Quantity	Unit Pricing ($M)	Total ($M)
D-1 High			
Energy Efficiency (100 MW Blocks)	1	$420 ~~.0~~	***$420 ~~.0~~***
D-2 High			
Demand Response (100 MW Blocks)	1	$160 ~~.0~~	***$160 ~~.0~~***
Total High Demand Response Solution Costs			***$580 ~~.0~~***
D-1 Mid			
Energy Efficiency (100 MW Blocks)	1	$280 ~~.0~~	***$280 ~~.0~~***
D-2 Mid			
Demand Response (100 MW Blocks)	1	$110 ~~.0~~	***$110 ~~.0~~***
Total Mid Demand Response Solution Costs			***$390 ~~.0~~***
D-1 Low			
Energy Efficiency (100 MW Blocks)	1	$140 ~~.0~~	***$140 ~~.0~~***
D-2 Low			
Demand Response (100 MW Blocks)	1	$50 ~~.0~~	***$50 ~~.0~~***
Total Low Demand Response Solution Costs			***$190 ~~.0~~***

Table E-3129: Generic Solutions for Study #2 – Central East

Generic Solution
Central East
(Estimates should not be assumed reflective or predictive of actual project costs)

Transmission Solution: Edic to New Scotland

Item #	Quantity	Unit Pricing ($M)	Total ($M)
T-1 High			
Transmission Line (Miles)	90	$5.0	$450.0
Substation Line Terminal	2	$9.0	$18.0
System Upgrade	1	$9.0	$9.0
Total High Transmission Solution Cost			***$477.0***
T-1 Mid			
Transmission Line (Miles)	90	$3.5	$315.0
Substation Line Terminal	2	$6.0	$12.0
System Upgrade	1	$6.0	$6.0
Total Mid Transmission Solution Cost			***$333.0***
T-1 Low			
Transmission Line (Miles)	90	$2.0	$180.0
Substation Line Terminal	2	$3.0	$6.0
System Upgrade	1	$3.0	$3.0
Total Low Transmission Solution Cost			***$189.0***

Generation Solution: New Scotland

Item #	Quantity	Unit Pricing ($M)	Total ($M)
G-1 High			
Plant (250 MW Blocks)	2	$400.0	$800.0
Electric Transmission Line (Miles)	1	$5.0	$5.0
Substation Terminal	1	$9.0	$9.0
System Upgrade Facilities	1	$9.0	$9.0
Gas Transmission Line (Miles)	1	$5.0	$5.0
Gas Regulator Station	1	$3.0	$3.0
Total High Generation Solution Cost			***$831.0***
G-1 Mid			
Plant (250 MW Blocks)	2	$330.0	$660.0
Electric Transmission Line (Miles)	1	$3.5	$3.5
Substation Terminal	1	$6.0	$6.0
System Upgrade Facilities	1	$6.0	$6.0
Gas Transmission Line (Miles)	1	$3.5	$3.5

Formatted Table

Formatted: Keep with next, Keep lines together

Formatted Table

Gas Regulator Station	1	$2 ~~.0~~	$2 ~~.0~~
Total Mid Generation Solution Cost			***$681 ~~.0~~***
G-1 Low			
Plant (250 MW Blocks)	2	$260 ~~.0~~	$520 ~~.0~~
Electric Transmission Line (Miles)	1	$2 ~~.0~~	$2 ~~.0~~
Substation Terminal	1	$3 ~~.0~~	$3 ~~.0~~
System Upgrade Facilities	1	$3 ~~.0~~	$3 ~~.0~~
Gas Transmission Line (Miles)	1	$2 ~~.0~~	$2 ~~.0~~
Gas Regulator Station	1	$1 ~~.0~~	$1 ~~.0~~
Total Low Generation Solution Cost			***$531 ~~.0~~***

Formatted Table

Demand Response Solution: Zone F

Item #	Quantity	Unit Pricing ($M)	Total ($M)
D-1 High			
Energy Efficiency (100 MW Blocks)	1	$420 ~~.0~~	***$420 ~~.0~~***
D-2 High			
Demand Response (100 MW Blocks)	1	$160 ~~.0~~	***$160 ~~.0~~***
Total High Demand Response Solution Costs			***$580 ~~.0~~***
D-1 Mid			
Energy Efficiency (100 MW Blocks)	1	$280 ~~.0~~	***$280 ~~.0~~***
D-2 Mid			
Demand Response (100 MW Blocks)	1	$110 ~~.0~~	***$110 ~~.0~~***
Total Mid Demand Response Solution Costs			***$390 ~~.0~~***
D-1 Low			
Energy Efficiency (100 MW Blocks)	1	$140 ~~.0~~	***$140 ~~.0~~***
D-2 Low			
Demand Response (100 MW Blocks)	1	$50 ~~.0~~	***$50 ~~.0~~***
Total Low Demand Response Solution Costs			***$190 ~~.0~~***

Table E-32~~30~~: Generic Solutions for Study #3 – West Central

Formatted Table

Generic Solution
West Central

(Estimates should not be assumed reflective or predictive of actual project costs)

Transmission Solution: Niagara to Pannell to Clay

Item #	Quantity	Unit Pricing ($M)	Total ($M)
T-1 High			
Transmission Line (Miles)	149	$5~~.0~~	$745~~.0~~
Substation Line Terminal	4	$9~~.0~~	$36~~.0~~
System Upgrade	1	$9~~.0~~	$9~~.0~~
Total High Transmission Solution Cost			***$790~~.0~~***
T-1 Mid			
Transmission Line (Miles)	149	$3.5	$521.5
Substation Line Terminal	4	$6~~.0~~	$24~~.0~~
System Upgrade	1	$6~~.0~~	$6~~.0~~
Total Mid Transmission Solution Cost			***$551.5***
T-1 Low			
Transmission Line (Miles)	149	$2~~.0~~	$298~~.0~~
Substation Line Terminal	4	$3~~.0~~	$12~~.0~~
System Upgrade	1	$3~~.0~~	$3~~.0~~
Total Low Transmission Solution Cost			***$313~~.0~~***

Formatted Table

Generation Solution: Clay

Item #	Quantity	Unit Pricing ($M)	Total ($M)
G-1 High			
Plant (250 MW Blocks)	2	$400~~.0~~	$800~~.0~~
Electric Transmission Line (Miles)	1	$5~~.0~~	$5~~.0~~
Substation Terminal	1	$9~~.0~~	$9~~.0~~
System Upgrade Facilities	1	$9~~.0~~	$9~~.0~~
Gas Transmission Line (Miles)	1	$5~~.0~~	$5~~.0~~
Gas Regulator Station	1	$3~~.0~~	$3~~.0~~
Total High Generation Solution Cost			***$831~~.0~~***
G-1 Mid			
Plant (250 MW Blocks)	2	$330~~.0~~	$660~~.0~~
Electric Transmission Line (Miles)	1	$3.5	$3.5
Substation Terminal	1	$6~~.0~~	$6~~.0~~
System Upgrade Facilities	1	$6~~.0~~	$6~~.0~~
Gas Transmission Line (Miles)	1	$3.5	$3.5
Gas Regulator Station	1	$2~~.0~~	$2~~.0~~

Total Mid Generation Solution Cost			***$681.0***
G-1 Low			
Plant (250 MW Blocks)	2	$260.0	$520.0
Electric Transmission Line (Miles)	1	$2.0	$2.0
Substation Terminal	1	$3.0	$3.0
System Upgrade Facilities	1	$3.0	$3.0
Gas Transmission Line (Miles)	1	$2.0	$2.0
Gas Regulator Station	1	$1.0	$1.0
Total Low Generation Solution Cost			***$531.0***

Demand Response Solution: Zone C

Item #	Quantity	Unit Pricing ($M)	Total ($M)
D-1 High			
Energy Efficiency (100 MW Blocks)	1	$420.0	***$420.0***
D-2 High			
Demand Response (100 MW Blocks)	1	$160.0	***$160.0***
Total High Demand Response Solution Costs			***$580.0***
D-1 Mid			
Energy Efficiency (100 MW Blocks)	1	$280.0	***$280.0***
D-2 Mid			
Demand Response (100 MW Blocks)	1	$110.0	***$110.0***
Total Mid Demand Response Solution Costs			***$390.0***
D-1 Low			
Energy Efficiency (100 MW Blocks)	1	$140.0	***$140.0***
D-2 Low			
Demand Response (100 MW Blocks)	1	$50.0	***$50.0***
Total Low Demand Response Solution Costs			***$190.0***

E.5.4. Additional Metrics

Formatted: Indent: First line: 0 pt, Border: Bottom: (Single solid line, Auto, 0.5 pt Line width)

The relationship among the metrics is explained below. Moreover, the calculation of change in the values of the additional metrics is also demonstrated and a reference is included to where these metrics are discussed in the report.

The equation below describes the relationship between the additional metrics:

Load Payment = Generation Payment + Congestion Rent + Residual Losses

Load Payments, as calculated in the CARIS model, represent the total annual amount collected by the NYISO from load. These annual values cover the three types of charges passed on to the load, i.e. energy, congestion and losses.

The generator LBMP payments (or generator revenues) equal the annual amount paid to generators for providing electricity for energy, congestion and losses. However, generator payments inThe Load and Generation Payment and the congestion Rent values above are the global or system values from the simulation model. For the CARIS model do not include Bid Production Cost Guarantees (BPCG) and other payments made pursuant to the NYISO Tariff.

The load payments, generation payments and losses represent the NYCA values while the congestion rents represent the "system" values. The "system" in the CARIS model includes NYISO, include PJM, IESO-Ontario, NYISO and ISO-NE. In the Day-Ahead Market, interchange with the neighboring markets is modeled at the proxy buses, as described in Appendix C. a simple PROXY bus and many of the interchange or PROXY metrics cannot be easily determined.

Load Payment as calculated in the CARIS model represents the total annual amount collected by the NYISO from load. These annual values cover the three types of charges passed on to the load, i.e. energy, congestion and losses.

A similar breakdown also applies to the Generator LBMP Payments (Generator Revenues) and, accordingly, equals the annual amount paid to generators for providing electricity for energy, congestion and losses. However, generator payments do not include Bid Production Cost Guarantees (BPCG) and other payments made pursuant to the NYISO tariffs. .

The calculation of the change in additional metrics reported for the Base Case and the Leeds-Pleasant Valley transmission solution are shown in Table E-33.31. The values in the third table represent the change in these values.

Total load payments are consistently higher than the sum of generator payments and congestion rents each year. The difference represents the payment due to residual lossesResidual Losses, which is then returned to the loads and/or transmission owners depending on the market settlements structure. Also, the values in the load congestion paymens –and the load losses payments"Load Congestion Pay" and the "Load Losses Pay" columns are both components of the value listed in the load payment"Load Pay" column. They are shown separately because one of the two is identified in Attachment Y as an additional metric, known as "load losses payment".Load Losses Pay". The other metric, known as "load congestion payment", "Load Congestion Pay",was used to identify the highest ranked congestion elements.

The congestion rent values are also listed for the Base Case and the Leeds-Pleasant Valley solution case. The change in this value is listed in the third table below. The change in the congestion rent values was substituted for the TCC metric as called for in the CARIS Manual for the Phase 1 Study.

Table E-3331: Base Case Additional Metrics (in nominal $ mMillions)

CARIS Base Case - Additional Metrics Values - NYCA based					
M$	Gen Revenue [2]	Load Pay [3]	Congestion Rent [4]	Load Losses Pay [5]	Load Congestion Pay [6]
2009	6,842	7,620	314	494	130
2010	8,593	10,015	604	668	319
2011	8,727	10,239	692	668	443
2012	9,107	10,739	745	705	488
2013	9,335	11,019	729	723	396
2014	9,826	11,600	758	754	410
2015	10,156	12,066	785	778	452
2016	10,606	12,696	867	823	513
2017	11,012	13,239	926	856	563
2018	11,547	13,972	975	897	593
Total	**95,750**	**113,204**	**7,395**	**7,366**	**4,307**
CARIS Study 1 Leeds-Pleasant Valley Solution - Additional Metrics Values - NYCA based					
M$	Gen Revenue	Load Pay	Congestion Rent	Load Losses Pay	Load Congestion Pay
2009	6,850	7,621	301	478	108
2010	8,613	10,020	584	645	289
2011	8,762	10,233	605	660	280
2012	9,144	10,734	654	696	323
2013	9,370	11,006	643	713	206
2014	9,856	11,587	678	741	231
2015	10,186	12,052	704	763	275
2016	10,636	12,682	783	807	331
2017	11,045	13,227	841	839	374
2018	11,596	13,968	864	884	344
Total	**96,056**	**113,128**	**6,657**	**7,226**	**2,760**
CARIS Study 1 Leeds-Pleasant Valley Solution - Change in Additional Metrics Values - NYCA based					
M$	Gen Revenue	Load Pay	Congestion Rent	Load Losses Pay	Load Congestion Pay
2009	7	1	(13)	(17)	(21)
2010	19	5	(20)	(23)	(30)
2011	34	(6)	(87)	(8)	(163)
2012	37	(5)	(91)	(9)	(165)
2013	35	(13)	(86)	(10)	(191)
2014	30	(13)	(80)	(13)	(179)
2015	30	(13)	(81)	(14)	(178)
2016	30	(14)	(83)	(16)	(182)
2017	33	(12)	(85)	(16)	(189)
2018	49	(5)	(111)	(12)	(249)
Total [1]	**306**	**(76)**	**(738)**	**(139)**	**(1,547)**
Notes	1	Total change in the Additional Metrics values for 2009-2019 are listed in Table 5-14 on Page 44			
	2	Annual Load Payment values for CARIS Base Case are listed in Table E-7 on Page E-9			
	3	Annual Generator Payment values for CARIS Base Case are listed in Table E-6 on Page E-8			
	4	Congestion Rent is the sum of Congestion Rent on all binding constraints. Only changres in Congestion Rent for each solution is listed in Table 5-14			
	5	Annual Load Losses Payment values for CARIS Base Case are listed in Table E-8 on Page E-9			
	6	Annual Load Congestion Payment values for CARIS Base Case are listed in Table 5-4 on Page 33			

Appendix F – Initial CARIS Manual (link)

http://www.nyiso.com/public/webdocs/services/planning/initial_caris_manual_bic_approved/CARISmanual.pdf

Field Code Changed

Appendix G - 2009 RNA and CRP Reports (link)

The 2009 RNA and CRP reports can be found through the following links:

http://www.nyiso.com/public/webdocs/services/planning/reliability_assessments/RNA_2009_Final_1_13_09.pdf

http://www.nyiso.com/public/webdocs/newsroom/press_releases/2009~~services/planning/reliability_assessments~~/CRP__FINAL_5-19-09.pdf

Formatted: Hyperlink, Font: Times New Roman, 12 pt

Formatted: Hyperlink, Font: Times New Roman, 12 pt

Appendix H - Generic Solution Results – Additional Details

Tables below present changes (deltas) in CARIS metrics between the Base Case values and the values after the all three generic solutions have been applied for each of the three studies. The values are expressed in nominal $ and are calculated as Solution – Base Case. Negative values represent a reduction in costs/payments.

H.1. Study 1: Leeds – Pleasant Valley

Generic Transmission Solution

Projected Changes in Production Cost ($ m) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	2	2	7	7	5	5	6	6	6	6
Genesee	2	3	9	9	4	4	5	5	5	6
Central	3	6	15	16	17	16	16	17	17	20
North	1	2	5	5	6	6	6	6	6	8
Mohawk Valley	2	2	7	7	8	8	8	8	8	10
Capital	4	5	15	17	14	14	14	15	16	19
Hudson Valley	(1)	(2)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(7)
Millwood	(1)	(1)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
Dunwoodie	(2)	(3)	(7)	(7)	(7)	(7)	(7)	(7)	(8)	(9)
NY City	(7)	(6)	(36)	(37)	(39)	(36)	(37)	(39)	(37)	(34)
Long Island	(2)	(3)	(14)	(14)	(14)	(15)	(15)	(15)	(16)	(19)
NYISO Total	**1**	**5**	**(6)**	**(5)**	**(13)**	**(13)**	**(13)**	**(14)**	**(13)**	**(5)**

Projected Changes in Generator LBMP Payment ($ m) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	4	4	14	14	11	11	11	11	12	12
Genesee	1	2	4	4	2	2	2	2	2	2
Central	9	12	31	33	36	35	34	34	36	45
North	2	3	9	9	10	10	10	10	10	13
Mohawk Valley	1	2	4	4	5	5	5	5	5	7
Capital	14	25	63	67	61	57	58	61	65	74
Hudson Valley	(3)	(3)	(9)	(11)	(12)	(10)	(11)	(13)	(13)	(14)
Millwood	(3)	(6)	(14)	(14)	(14)	(14)	(14)	(15)	(16)	(18)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(12)	(12)	(44)	(43)	(37)	(39)	(37)	(37)	(39)	(39)
Long Island	(6)	(6)	(25)	(26)	(26)	(26)	(27)	(27)	(29)	(33)
NYISO Total	**7**	**19**	**34**	**37**	**35**	**30**	**30**	**30**	**33**	**49**

Formatted: Header

Projected Changes in Congestion Demand ($ m) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	(1)	(5)	(6)	(9)	(8)	(8)	(8)	(9)	(14)
Genesee	0	0	(0)	(0)	(6)	(5)	(5)	(5)	(6)	(8)
Central	0	0	(0)	(0)	(1)	(1)	(1)	(0)	(0)	(4)
North	(0)	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(0)	(1)	(1)
Capital	1	(0)	3	4	(0)	0	0	1	1	(1)
Hudson Valley	(2)	(4)	(15)	(15)	(17)	(16)	(16)	(17)	(18)	(23)
Millwood	(1)	(1)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(8)
Dunwoodie	(2)	(3)	(13)	(13)	(14)	(13)	(13)	(13)	(14)	(19)
NY City	(12)	(15)	(90)	(92)	(99)	(92)	(92)	(95)	(96)	(119)
Long Island	(5)	(6)	(36)	(36)	(39)	(37)	(37)	(38)	(40)	(53)
NYISO Total	**(21)**	**(30)**	**(163)**	**(165)**	**(191)**	**(179)**	**(178)**	**(182)**	**(190)**	**(249)**

Projected Changes in CO2 Cost ($ 000s) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	48	28	30	53	28	48	36	62	55	27
Genesee	4	4	8	14	8	10	11	11	7	5
Central	240	112	276	313	356	399	352	336	349	407
North	11	16	58	48	44	54	44	72	70	58
Mohawk Valley	18	16	39	37	38	42	53	60	39	66
Capital	120	218	509	520	559	465	490	487	625	541
Hudson Valley	(86)	(85)	(201)	(273)	(328)	(242)	(285)	(382)	(365)	(349)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(341)	(305)	(1001)	(1052)	(868)	(958)	(950)	(969)	(1067)	(1169)
Long Island	(188)	(167)	(574)	(643)	(672)	(662)	(714)	(699)	(774)	(729)
NYISO Total	**(175)**	**(164)**	**(856)**	**(983)**	**(835)**	**(845)**	**(962)**	**(1022)**	**(1061)**	**(1143)**

Projected Changes in CO2 Emissions (%) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.1%	0.1%	0.0%
Genesee	2.0%	1.8%	3.6%	6.1%	2.9%	3.4%	3.1%	2.9%	2.3%	0.9%
Central	0.8%	0.3%	0.7%	0.8%	0.8%	0.9%	0.7%	0.7%	0.7%	0.7%
North	0.3%	0.4%	1.3%	1.0%	0.9%	1.0%	0.8%	1.2%	1.1%	0.8%
Mohawk Valley	0.8%	0.6%	1.3%	1.1%	1.1%	1.1%	1.3%	1.4%	0.9%	1.3%
Capital	0.5%	0.6%	1.4%	1.3%	1.3%	1.0%	1.0%	1.0%	1.2%	1.0%
Hudson Valley	-0.7%	-0.6%	-1.2%	-1.5%	-1.7%	-1.2%	-1.3%	-1.7%	-1.5%	-1.4%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.6%	-0.7%	-2.0%	-1.9%	-1.5%	-1.5%	-1.4%	-1.4%	-1.4%	-1.5%
Long Island	-0.9%	-0.8%	-2.4%	-2.5%	-2.4%	-2.2%	-2.2%	-2.0%	-2.1%	-1.9%
NYISO Total	**-0.1%**	**-0.1%**	**-0.4%**	**-0.4%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in SO2 Cost ($ 000s) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1	1	0	0	0	0	0	0	0	(0)
Genesee	0	(0)	0	0	0	0	0	0	0	(0)
Central	6	0	1	2	(1)	1	0	0	(0)	0
North	1	1	3	2	1	1	1	1	1	1
Mohawk Valley	1	0	0	0	0	0	0	0	0	0
Capital	0	0	0	0	0	0	0	0	0	0
Hudson Valley	(2)	(1)	(2)	(2)	(3)	(1)	(1)	(1)	(1)	(1)
Millwood	0	0	(0)	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	(0)	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)
Long Island	(6)	(4)	(10)	(11)	(10)	(7)	(4)	(4)	(4)	(4)
NYISO Total	**2**	**(2)**	**(7)**	**(9)**	**(13)**	**(6)**	**(4)**	**(4)**	**(5)**	**(4)**

Projected Changes in SO2 Emissions (%) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Genesee	1.2%	0.8%	3.1%	6.2%	2.5%	3.8%	3.6%	2.7%	2.4%	0.3%
Central	0.5%	0.0%	0.1%	0.3%	-0.1%	0.2%	0.0%	0.1%	0.0%	0.1%
North	1.1%	1.8%	5.2%	3.1%	1.9%	2.3%	2.3%	3.5%	1.8%	3.7%
Mohawk Valley	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Capital	0.9%	0.9%	2.3%	2.1%	2.1%	1.5%	1.5%	1.6%	2.0%	1.7%
Hudson Valley	-0.2%	-0.1%	-0.3%	-0.4%	-0.6%	-0.3%	-0.3%	-0.4%	-0.5%	-0.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	0.6%	-0.7%	-2.1%	-2.5%	-1.4%	-1.2%	-1.2%	-3.0%	-3.5%	-3.2%
Long Island	-1.1%	-1.4%	-3.8%	-4.3%	-3.7%	-3.1%	-3.1%	-3.0%	-3.6%	-3.2%
NYISO Total	**0.0%**	**-0.1%**	**-0.3%**	**-0.3%**	**-0.4%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.4%**	**-0.3%**

Projected Changes in NOx Cost ($ 000s) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	15	4	2	3	3	2	2	4	4	2
Genesee	1	1	0	0	0	0	0	0	0	0
Central	101	18	12	7	10	7	8	8	5	6
North	1	2	3	2	3	2	2	4	5	2
Mohawk Valley	2	7	4	2	4	2	4	4	2	3
Capital	11	21	19	10	17	8	11	11	11	10
Hudson Valley	(59)	(44)	(47)	(36)	(66)	(25)	(37)	(45)	(39)	(38)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(30)	(29)	(26)	(18)	(25)	(13)	(16)	(17)	(19)	(18)
Long Island	(62)	(46)	(66)	(42)	(67)	(33)	(46)	(44)	(46)	(42)
NYISO Total	**(19)**	**(68)**	**(100)**	**(71)**	**(120)**	**(49)**	**(73)**	**(77)**	**(77)**	**(76)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in NOx Emissions (%) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%
Genesee	2.2%	2.0%	4.7%	7.3%	4.0%	3.6%	3.9%	2.7%	3.5%	1.5%
Central	1.0%	0.2%	0.3%	0.3%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%
North	0.5%	0.8%	2.7%	2.9%	2.8%	3.0%	2.4%	3.2%	4.0%	1.7%
Mohawk Valley	1.5%	4.3%	5.4%	4.3%	4.4%	4.2%	5.1%	5.1%	2.3%	3.2%
Capital	0.5%	0.9%	2.0%	1.9%	1.8%	1.5%	1.5%	1.5%	1.7%	1.5%
Hudson Valley	-1.0%	-0.8%	-2.0%	-2.5%	-2.7%	-1.9%	-2.0%	-2.5%	-2.3%	-2.2%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.7%	-1.1%	-2.4%	-2.9%	-2.3%	-2.2%	-2.0%	-2.1%	-2.3%	-2.3%
Long Island	-0.7%	-0.7%	-2.2%	-2.4%	-2.2%	-2.0%	-2.0%	-2.0%	-2.2%	-2.1%
NYISO Total	**0.0%**	**-0.2%**	**-0.6%**	**-0.7%**	**-0.7%**	**-0.5%**	**-0.5%**	**-0.6%**	**-0.6%**	**-0.6%**

Projected LBMP $/MWh - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.22	50.83	51.44	53.22	53.88	56.43	58.14	59.89	61.74	64.20
Genesee	42.01	53.18	53.93	55.93	55.53	58.27	60.13	61.97	63.94	66.55
Central	42.89	54.44	55.30	57.45	59.18	61.70	63.46	65.69	68.04	71.82
North	42.32	53.71	54.56	56.68	58.42	61.01	62.83	64.98	67.25	71.32
Mohawk Valley	44.20	56.09	57.01	59.26	60.99	63.61	65.47	67.78	70.21	73.98
Capital	45.54	58.66	59.71	62.39	63.45	66.06	68.15	70.84	73.66	77.62
Hudson Valley	46.69	60.56	61.76	64.45	65.59	68.25	70.34	73.09	75.81	79.95
Millwood	46.93	61.01	62.25	65.01	66.14	68.81	70.94	73.73	76.49	80.79
Dunwoodie	47.22	61.42	62.63	65.40	66.54	69.23	71.38	74.19	76.96	81.21
NY City	48.23	63.53	64.35	67.20	68.44	71.46	73.84	77.00	80.06	83.96
Long Island	48.54	63.97	64.91	67.74	68.77	71.44	73.65	76.55	79.45	83.49
NYISO Load Weighted Average	**45.96**	**59.52**	**60.41**	**62.97**	**64.11**	**66.88**	**69.00**	**71.70**	**74.38**	**78.12**

Projected Changes in Generator GWh - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	14	5	9	16	11	15	10	16	15	10
Genesee	2	2	3	6	3	4	3	3	2	1
Central	111	60	131	137	152	158	132	119	121	135
North	6	9	28	19	16	18	14	22	16	17
Mohawk Valley	6	5	13	12	11	11	13	15	10	15
Capital	64	115	248	235	231	188	188	178	215	187
Hudson Valley	(40)	(36)	(85)	(105)	(114)	(82)	(92)	(112)	(106)	(100)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(187)	(146)	(435)	(422)	(340)	(355)	(326)	(310)	(320)	(334)
Long Island	(100)	(75)	(241)	(255)	(252)	(233)	(233)	(233)	(235)	(228)
NYISO Total	**(124)**	**(60)**	**(330)**	**(356)**	**(282)**	**(277)**	**(290)**	**(303)**	**(282)**	**(297)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in Loss Payment ($ m) - Leeds - Plt Valley: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
Genesee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
North	(0)	(0)	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)
Mohawk Valley	(0)	(0)	0	0	0	0	0	0	0	(0)
Capital	1	1	1	1	1	1	1	2	2	2
Hudson Valley	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Millwood	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
NY City	(9)	(11)	(2)	(3)	(5)	(6)	(7)	(8)	(8)	(6)
Long Island	(3)	(5)	(0)	(0)	0	(1)	(1)	(1)	(1)	(0)
NYISO Total	(17)	(23)	(8)	(9)	(10)	(13)	(14)	(16)	(16)	(12)

Generic Generation Solution

Projected Changes in Production Cost ($ m) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(4)	(3)	(1)	(2)	(2)	(2)	(2)	(3)	(2)	(2)
Genesee	(3)	(2)	(0)	(1)	(1)	(1)	(2)	(2)	(1)	(1)
Central	(5)	(4)	(1)	(2)	(3)	(3)	(3)	(4)	(5)	(4)
North	(2)	(1)	(0)	(1)	(1)	(1)	(1)	(2)	(2)	(1)
Mohawk Valley	(2)	(2)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)
Capital	(4)	(5)	(1)	(2)	(3)	(3)	(4)	(4)	(5)	(4)
Hudson Valley	(6)	(7)	(7)	(9)	(9)	(10)	(11)	(11)	(12)	(13)
Millwood	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
Dunwoodie	(4)	(5)	(6)	(6)	(7)	(7)	(8)	(8)	(8)	(9)
NY City	(21)	(22)	(30)	(36)	(37)	(37)	(35)	(34)	(31)	(30)
Long Island	(8)	(8)	(12)	(13)	(14)	(15)	(16)	(16)	(17)	(20)
NYISO Total	**(60)**	**(63)**	**(63)**	**(77)**	**(81)**	**(84)**	**(86)**	**(90)**	**(90)**	**(91)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in Generator LBMP Payment ($ m) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(11)	(8)	(4)	(5)	(6)	(7)	(8)	(7)	(7)	(8)
Genesee	(2)	(2)	(1)	(1)	(1)	(1)	(2)	(2)	(1)	(2)
Central	(24)	(23)	(14)	(15)	(17)	(18)	(18)	(19)	(20)	(22)
North	(6)	(5)	(4)	(4)	(5)	(4)	(5)	(5)	(5)	(4)
Mohawk Valley	(2)	(2)	(1)	(2)	(2)	(2)	(2)	(2)	(3)	(3)
Capital	(13)	(31)	(19)	(22)	(24)	(24)	(24)	(24)	(24)	(25)
Hudson Valley	149	169	174	178	182	190	194	202	205	220
Millwood	(9)	(12)	(12)	(14)	(15)	(16)	(16)	(17)	(18)	(20)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(77)	(59)	(78)	(73)	(71)	(73)	(73)	(73)	(80)	(71)
Long Island	(29)	(30)	(40)	(44)	(46)	(52)	(53)	(57)	(53)	(61)
NYISO Total	**(23)**	**(4)**	**2**	**(4)**	**(4)**	**(8)**	**(8)**	**(3)**	**(5)**	**5**

Projected Changes in Congestion Demand ($ m) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	0	(1)	(0)	0	0	(0)	0	1	0
Genesee	(0)	(0)	(0)	(0)	1	0	0	0	1	0
Central	(0)	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(1)
North	(0)	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(2)
Hudson Valley	(2)	(3)	(6)	(6)	(7)	(7)	(7)	(8)	(8)	(10)
Millwood	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(3)
Dunwoodie	(1)	(3)	(5)	(5)	(5)	(5)	(6)	(6)	(6)	(7)
NY City	(2)	(4)	(27)	(27)	(25)	(23)	(19)	(16)	(10)	(15)
Long Island	(2)	(1)	(12)	(11)	(11)	(12)	(12)	(12)	(12)	(17)
NYISO Total	**(9)**	**(15)**	**(55)**	**(54)**	**(51)**	**(51)**	**(49)**	**(45)**	**(38)**	**(56)**

Projected Changes in CO2 Cost ($ 000s) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(300)	(140)	(122)	(144)	(204)	(241)	(258)	(173)	(203)	(275)
Genesee	(25)	(28)	(25)	(24)	(32)	(31)	(43)	(52)	(33)	(68)
Central	(882)	(602)	(494)	(471)	(491)	(525)	(572)	(571)	(559)	(673)
North	(122)	(114)	(150)	(142)	(139)	(124)	(153)	(127)	(115)	(145)
Mohawk Valley	(53)	(47)	(53)	(72)	(73)	(90)	(106)	(95)	(112)	(133)
Capital	(303)	(907)	(822)	(955)	(1011)	(1051)	(1043)	(1015)	(939)	(1117)
Hudson Valley	5243	4990	5543	5839	6254	6673	6986	7285	7393	7837
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(2957)	(1917)	(2546)	(2410)	(2371)	(2508)	(2576)	(2686)	(3092)	(2511)
Long Island	(1048)	(964)	(1321)	(1497)	(1630)	(1909)	(2015)	(2144)	(2013)	(2168)
NYISO Total	**(447)**	**270**	**10**	**124**	**301**	**194**	**220**	**422**	**327**	**747**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in CO2 Emissions (%) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.7%	-0.3%	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%	-0.3%
Genesee	-12.5%	-14.5%	-11.4%	-10.1%	-11.5%	-10.2%	-12.4%	-13.6%	-11.8%	-13.7%
Central	-2.9%	-1.8%	-1.3%	-1.2%	-1.1%	-1.2%	-1.2%	-1.1%	-1.1%	-1.2%
North	-3.3%	-2.9%	-3.5%	-3.0%	-2.7%	-2.3%	-2.6%	-2.0%	-1.7%	-2.0%
Mohawk Valley	-2.3%	-1.8%	-1.8%	-2.2%	-2.1%	-2.3%	-2.6%	-2.2%	-2.5%	-2.6%
Capital	-1.2%	-2.7%	-2.2%	-2.4%	-2.3%	-2.3%	-2.1%	-2.0%	-1.8%	-2.0%
Hudson Valley	42.0%	34.6%	34.2%	32.8%	33.3%	33.1%	32.9%	32.4%	31.3%	31.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-5.6%	-4.3%	-5.0%	-4.4%	-4.1%	-4.0%	-3.8%	-3.8%	-4.1%	-3.2%
Long Island	-5.0%	-4.6%	-5.5%	-5.7%	-5.8%	-6.2%	-6.2%	-6.3%	-5.6%	-5.8%
NYISO Total	**-0.2%**	**0.1%**	**0.0%**	**0.0%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**0.2%**

Projected Changes in SO2 Cost ($ 000s) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(12)	(1)	(0)	(1)	(1)	(2)	(1)	(0)	(0)	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(40)	(11)	(4)	(1)	(3)	(3)	(2)	(1)	(1)	(2)
North	(12)	(6)	(5)	(5)	(4)	(3)	(2)	(2)	(1)	(1)
Mohawk Valley	(1)	(0)	0	0	(0)	0	(0)	(0)	0	0
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(8)	(5)	(3)	(6)	(5)	(3)	(2)	(2)	(3)	(2)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(6)	(2)	(3)	(2)	(1)	(1)	(1)	(1)	(1)	(1)
Long Island	(33)	(19)	(19)	(22)	(21)	(17)	(10)	(9)	(8)	(9)
NYISO Total	**(113)**	**(44)**	**(34)**	**(37)**	**(35)**	**(29)**	**(18)**	**(16)**	**(15)**	**(15)**

Projected Changes in SO2 Emissions (%) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.8%	-0.1%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	0.0%	0.0%	0.0%
Genesee	-15.2%	-17.9%	-12.9%	-12.0%	-13.2%	-9.8%	-12.0%	-14.8%	-11.1%	-13.3%
Central	-3.4%	-1.1%	-0.4%	-0.2%	-0.4%	-0.4%	-0.5%	-0.4%	-0.3%	-0.7%
North	-9.4%	-7.8%	-8.1%	-7.6%	-6.4%	-5.8%	-6.3%	-6.0%	-4.6%	-4.2%
Mohawk Valley	-0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Capital	-1.7%	-3.4%	-2.7%	-2.9%	-3.0%	-3.2%	-3.0%	-2.7%	-2.5%	-2.8%
Hudson Valley	-0.9%	-0.7%	-0.6%	-1.1%	-0.8%	-0.7%	-0.7%	-0.8%	-1.0%	-0.9%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-11.4%	-9.8%	-12.7%	-8.0%	-4.7%	-7.1%	-6.0%	-8.5%	-11.0%	-5.1%
Long Island	-6.5%	-6.4%	-7.3%	-8.4%	-8.0%	-7.6%	-7.7%	-7.7%	-6.9%	-7.2%
NYISO Total	**-2.5%**	**-1.3%**	**-1.2%**	**-1.3%**	**-1.2%**	**-1.2%**	**-1.2%**	**-1.2%**	**-1.2%**	**-1.2%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in NOx Cost ($ 000s) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(85)	(43)	(15)	(9)	(21)	(11)	(16)	(12)	(14)	(16)
Genesee	(4)	(3)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(393)	(117)	(32)	(14)	(26)	(15)	(22)	(18)	(15)	(22)
North	(14)	(12)	(5)	(3)	(6)	(4)	(5)	(4)	(5)	(7)
Mohawk Valley	(11)	(12)	(5)	(5)	(7)	(4)	(6)	(5)	(6)	(7)
Capital	(30)	(70)	(22)	(15)	(25)	(12)	(17)	(15)	(13)	(14)
Hudson Valley	(17)	(44)	(19)	(24)	(44)	(21)	(28)	(35)	(42)	(36)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(273)	(153)	(75)	(39)	(60)	(32)	(41)	(44)	(47)	(34)
Long Island	(352)	(248)	(130)	(83)	(145)	(79)	(112)	(113)	(95)	(98)
NYISO Total	**(1178)**	**(703)**	**(304)**	**(191)**	**(334)**	**(179)**	**(248)**	**(247)**	**(238)**	**(234)**

Projected Changes in NOx Emissions (%) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.6%	-0.3%	-0.3%	-0.3%	-0.4%	-0.4%	-0.4%	-0.3%	-0.4%	-0.5%
Genesee	-13.2%	-13.3%	-10.6%	-10.1%	-11.4%	-10.1%	-11.7%	-13.1%	-11.0%	-14.0%
Central	-3.8%	-1.1%	-0.7%	-0.6%	-0.6%	-0.6%	-0.6%	-0.5%	-0.5%	-0.7%
North	-4.8%	-4.9%	-4.7%	-4.9%	-4.7%	-5.2%	-5.2%	-3.9%	-4.6%	-5.3%
Mohawk Valley	-7.7%	-8.1%	-8.3%	-10.5%	-8.1%	-7.9%	-8.1%	-6.0%	-8.0%	-7.1%
Capital	-1.4%	-3.0%	-2.4%	-2.6%	-2.5%	-2.4%	-2.3%	-2.1%	-2.0%	-2.2%
Hudson Valley	-0.3%	-0.8%	-0.8%	-1.7%	-1.8%	-1.6%	-1.5%	-1.9%	-2.4%	-2.1%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-6.7%	-5.8%	-7.0%	-6.2%	-5.4%	-5.4%	-4.8%	-5.3%	-5.9%	-4.3%
Long Island	-4.0%	-3.5%	-4.4%	-4.7%	-4.7%	-4.8%	-4.9%	-5.0%	-4.5%	-4.8%
NYISO Total	**-2.5%**	**-1.6%**	**-1.7%**	**-1.8%**	**-1.8%**	**-1.9%**	**-1.8%**	**-1.9%**	**-1.9%**	**-1.9%**

LBMP $/MWh - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	40.84	50.53	50.96	52.70	53.47	55.98	57.67	59.41	61.26	63.73
Genesee	41.57	52.68	53.14	55.05	55.07	57.76	59.58	61.42	63.39	65.96
Central	42.41	53.89	54.41	56.46	58.09	60.64	62.39	64.57	66.82	70.52
North	41.86	53.22	53.75	55.78	57.38	60.00	61.80	63.90	66.08	69.95
Mohawk Valley	43.68	55.52	56.11	58.26	59.85	62.51	64.35	66.60	68.94	72.60
Capital	44.83	57.91	58.45	60.97	62.15	64.77	66.79	69.38	72.11	75.93
Hudson Valley	46.23	60.08	61.50	64.11	65.21	67.86	69.91	72.61	75.34	79.40
Millwood	46.58	60.64	62.31	64.99	66.08	68.72	70.80	73.58	76.36	80.64
Dunwoodie	46.88	61.06	62.73	65.42	66.51	69.16	71.27	74.07	76.87	81.12
NY City	47.97	63.26	64.38	67.14	68.42	71.39	73.83	76.99	80.07	83.95
Long Island	48.27	63.77	64.93	67.71	68.72	71.39	73.55	76.46	79.35	83.38
NYISO Total	**45.59**	**59.14**	**60.09**	**62.57**	**63.73**	**66.48**	**68.60**	**71.28**	**73.95**	**77.64**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in Generator GWh - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(92)	(57)	(47)	(47)	(62)	(66)	(70)	(50)	(59)	(76)
Genesee	(12)	(13)	(10)	(9)	(11)	(10)	(14)	(16)	(10)	(19)
Central	(399)	(313)	(241)	(214)	(205)	(206)	(210)	(205)	(186)	(213)
North	(76)	(63)	(76)	(65)	(59)	(45)	(54)	(43)	(32)	(36)
Mohawk Valley	(21)	(19)	(19)	(21)	(21)	(25)	(28)	(24)	(24)	(30)
Capital	(167)	(461)	(372)	(404)	(400)	(388)	(365)	(342)	(304)	(343)
Hudson Valley	3344	2906	2900	2853	2875	2898	2879	2882	2825	2864
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1458)	(874)	(1041)	(938)	(892)	(881)	(855)	(825)	(909)	(753)
Long Island	(530)	(419)	(514)	(547)	(567)	(617)	(611)	(629)	(561)	(591)
NYISO Total	**587**	**687**	**580**	**608**	**658**	**659**	**672**	**748**	**741**	**803**

Projected Changes in Loss Payment ($ m) - Leeds - Plt Valley: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1	1	1	1	1	1	1	1	1	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	0	0	0	0	0	0	0	0	0	0
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	(0)	0	0	0	0	0	0	0	0	0
Capital	(0)	0	0	0	0	0	0	0	0	0
Hudson Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(2)	(4)	(0)	(1)	(2)	(2)	(2)	(2)	(2)	(2)
Long Island	0	(0)	1	1	1	1	1	2	1	1
NYISO Total	(2)	(5)	2	0	(0)	(0)	(0)	(1)	(0)	(0)

Generic DR/EE Solution

Projected Changes in Production Cost ($ m) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in Load LBMP Payment ($ m) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Genesee	(0)	(1)	(0)	(1)	(0)	(1)	(0)	(1)	(0)	(1)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)
North	(0)	(0)	(0)	(1)	(0)	(0)	(0)	(1)	(1)	(1)
Mohawk Valley	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)
Hudson Valley	(23)	(31)	(31)	(33)	(34)	(35)	(36)	(38)	(39)	(41)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)
Dunwoodie	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)
NY City	(2)	(5)	(5)	(4)	(7)	(4)	(7)	(6)	(6)	(6)
Long Island	(1)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(4)
NYISO Load Weighted Average	**(30)**	**(43)**	**(43)**	**(46)**	**(49)**	**(47)**	**(52)**	**(54)**	**(55)**	**(59)**

Projected Changes in Generator LBMP Payment ($ m) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	(2)	(1)	(2)	(2)	(2)	(2)	(2)	(1)	(2)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(5)	(5)
North	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	(0)	(0)	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(1)
Capital	(1)	(6)	(4)	(4)	(3)	(5)	(4)	(4)	(3)	(5)
Hudson Valley	(2)	(3)	(2)	(3)	(4)	(3)	(4)	(4)	(4)	(4)
Millwood	(1)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(12)	(8)	(13)	(11)	(10)	(12)	(12)	(11)	(15)	(10)
Long Island	(3)	(5)	(6)	(7)	(7)	(7)	(9)	(9)	(7)	(9)
NYISO Total	**(25)**	**(30)**	**(32)**	**(33)**	**(34)**	**(37)**	**(38)**	**(38)**	**(40)**	**(40)**

Projected Changes in Congestion Demand ($ m) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	0	0	0	0	0	0	0	1	1
Genesee	(0)	0	0	0	0	0	0	0	1	0
Central	(0)	(0)	(0)	(0)	0	0	0	0	0	0
North	0	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(3)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)
NY City	0	(1)	(1)	1	(2)	1	(2)	(1)	1	1
Long Island	(0)	0	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(2)
NYISO Total	**(1)**	**(3)**	**(4)**	**(2)**	**(5)**	**(3)**	**(7)**	**(5)**	**(2)**	**(4)**

Projected Changes in CO2 Cost ($ 000s) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(58)	(20)	(14)	(30)	(59)	(38)	(43)	(18)	(18)	(73)
Genesee	(8)	(6)	(8)	(0)	(8)	1	(7)	(6)	(10)	(13)
Central	(109)	(50)	(63)	(39)	(66)	(64)	(82)	(94)	(92)	(96)
North	(21)	(14)	6	(6)	(24)	(22)	(30)	(18)	(8)	(13)
Mohawk Valley	1	(11)	(11)	(17)	(12)	(19)	(15)	(21)	(26)	(25)
Capital	(23)	(151)	(100)	(123)	(72)	(176)	(112)	(114)	(48)	(139)
Hudson Valley	(78)	(52)	(39)	(87)	(131)	(78)	(124)	(116)	(122)	(148)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(479)	(260)	(389)	(316)	(282)	(357)	(405)	(397)	(579)	(275)
Long Island	(104)	(148)	(202)	(228)	(222)	(235)	(294)	(322)	(232)	(286)
NYISO Total	**(879)**	**(713)**	**(819)**	**(846)**	**(877)**	**(988)**	**(1112)**	**(1106)**	**(1135)**	**(1070)**

Projected Changes in CO2 Emissions (%) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	-0.1%
Genesee	-4.0%	-3.1%	-3.7%	-0.2%	-3.0%	0.3%	-2.1%	-1.7%	-3.5%	-2.7%
Central	-0.4%	-0.1%	-0.2%	-0.1%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%
North	-0.6%	-0.4%	0.1%	-0.1%	-0.5%	-0.4%	-0.5%	-0.3%	-0.1%	-0.2%
Mohawk Valley	0.0%	-0.4%	-0.4%	-0.5%	-0.3%	-0.5%	-0.4%	-0.5%	-0.6%	-0.5%
Capital	-0.1%	-0.4%	-0.3%	-0.3%	-0.2%	-0.4%	-0.2%	-0.2%	-0.1%	-0.2%
Hudson Valley	-0.6%	-0.4%	-0.2%	-0.5%	-0.7%	-0.4%	-0.6%	-0.5%	-0.5%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.9%	-0.6%	-0.8%	-0.6%	-0.5%	-0.6%	-0.6%	-0.6%	-0.8%	-0.4%
Long Island	-0.5%	-0.7%	-0.8%	-0.9%	-0.8%	-0.8%	-0.9%	-0.9%	-0.6%	-0.8%
NYISO Total	**-0.5%**	**-0.3%**	**-0.4%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.4%**	**-0.3%**	**-0.3%**	**-0.3%**

Projected Changes in SO2 Cost ($ 000s) - Leeds – Plt. Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	0	(0)	(0)	(1)	(0)	(0)	(0)	(0)	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	0	(0)	(0)	(0)	(0)
Central	(9)	(1)	(0)	1	(1)	(0)	(1)	(1)	(0)	(1)
North	(2)	(0)	0	(1)	(1)	(1)	(0)	(0)	(0)	(0)
Mohawk Valley	1	(0)	0	(0)	(0)	0	0	0	0	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(5)	(1)	(1)	(2)	(2)	(1)	(0)	(1)	(1)	(1)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Long Island	(4)	(3)	(3)	(4)	(3)	(1)	(1)	(1)	(1)	(1)
NYISO Total	**(23)**	**(5)**	**(4)**	**(6)**	**(9)**	**(4)**	**(3)**	**(3)**	**(2)**	**(3)**

Formatted: Header

Projected Changes in SO2 Emissions (%) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.2%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Genesee	-4.2%	-5.2%	-2.7%	-1.3%	-2.5%	0.9%	-1.7%	-0.7%	-3.6%	-3.0%
Central	-0.8%	-0.1%	0.0%	0.1%	-0.2%	-0.1%	-0.2%	-0.2%	-0.1%	-0.2%
North	-1.3%	-0.2%	0.2%	-0.9%	-2.0%	-1.2%	-1.3%	-1.2%	-0.2%	-0.1%
Mohawk Valley	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Capital	-0.2%	-0.6%	-0.4%	-0.5%	-0.2%	-0.7%	-0.5%	-0.4%	-0.1%	-0.5%
Hudson Valley	-0.5%	-0.2%	-0.2%	-0.3%	-0.3%	-0.1%	-0.1%	-0.3%	-0.3%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-3.0%	-2.3%	-0.5%	-0.6%	-0.4%	-0.6%	-2.3%	-2.7%	-3.0%	-0.4%
Long Island	-0.8%	-1.0%	-1.0%	-1.5%	-1.2%	-0.7%	-0.9%	-1.1%	-0.7%	-1.0%
NYISO Total	**-0.5%**	**-0.2%**	**-0.1%**	**-0.2%**	**-0.3%**	**-0.2%**	**-0.2%**	**-0.3%**	**-0.2%**	**-0.3%**

Projected Changes in NOx Cost ($ 000s) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(15)	(6)	(1)	(2)	(4)	(1)	(3)	(1)	(1)	(4)
Genesee	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(41)	(4)	(3)	(0)	(6)	(1)	(4)	(5)	(3)	(4)
North	(2)	(2)	(0)	(0)	(2)	(1)	(2)	(1)	(0)	(1)
Mohawk Valley	(2)	(3)	(1)	(1)	(1)	(1)	(0)	(1)	(2)	(1)
Capital	(3)	(12)	(3)	(2)	(2)	(2)	(2)	(2)	(1)	(2)
Hudson Valley	(45)	(29)	(7)	(9)	(24)	(8)	(13)	(12)	(12)	(12)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(43)	(37)	(5)	(6)	(10)	(4)	(8)	(10)	(11)	(3)
Long Island	(38)	(42)	(21)	(15)	(22)	(9)	(16)	(18)	(13)	(15)
NYISO Total	**(191)**	**(136)**	**(42)**	**(35)**	**(72)**	**(28)**	**(48)**	**(49)**	**(42)**	**(43)**

Projected Changes in NOx Emissions (%) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	0.0%	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-0.1%
Genesee	-4.1%	-2.4%	-3.1%	-0.4%	-2.2%	-0.4%	-1.7%	-2.6%	-3.3%	-2.6%
Central	-0.4%	0.0%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
North	-0.8%	-0.8%	0.0%	-0.5%	-1.3%	-1.2%	-1.4%	-0.8%	-0.2%	-0.5%
Mohawk Valley	-1.3%	-1.9%	-1.8%	-2.8%	-1.1%	-1.6%	-0.4%	-1.3%	-2.3%	-1.1%
Capital	-0.1%	-0.5%	-0.3%	-0.3%	-0.2%	-0.4%	-0.3%	-0.2%	-0.2%	-0.3%
Hudson Valley	-0.8%	-0.5%	-0.3%	-0.7%	-1.0%	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.1%	-1.4%	-0.5%	-0.9%	-0.9%	-0.7%	-0.9%	-1.1%	-1.3%	-0.4%
Long Island	-0.4%	-0.6%	-0.7%	-0.8%	-0.7%	-0.6%	-0.7%	-0.8%	-0.6%	-0.7%
NYISO Total	**-0.4%**	**-0.3%**	**-0.2%**	**-0.3%**	**-0.4%**	**-0.3%**	**-0.4%**	**-0.4%**	**-0.3%**	**-0.3%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected LBMP $/MWh - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.09	50.68	51.00	52.79	53.55	56.08	57.80	59.53	61.38	63.83
Genesee	41.82	52.85	53.16	55.13	55.13	57.85	59.70	61.53	63.49	66.02
Central	42.67	54.08	54.45	56.55	58.22	60.79	62.55	64.75	67.04	70.70
North	42.11	53.39	53.74	55.83	57.48	60.12	61.94	64.06	66.27	70.06
Mohawk Valley	43.97	55.74	56.16	58.37	60.00	62.67	64.54	66.81	69.18	72.77
Capital	45.18	58.24	58.52	61.11	62.32	64.97	67.02	69.65	72.41	76.15
Hudson Valley	46.68	60.56	61.97	64.66	65.81	68.49	70.59	73.33	76.08	80.20
Millwood	47.07	61.26	62.97	65.73	66.83	69.52	71.65	74.46	77.25	81.63
Dunwoodie	47.36	61.66	63.38	66.15	67.26	69.96	72.11	74.94	77.75	82.11
NY City	48.30	63.54	64.75	67.64	68.89	71.89	74.24	77.43	80.47	84.32
Long Island	48.57	64.04	65.32	68.13	69.14	71.84	74.04	76.97	79.87	83.98
NYISO Load Weighted Average	**45.91**	**59.42**	**60.30**	**62.91**	**64.07**	**66.85**	**68.96**	**71.66**	**74.33**	**78.02**

Projected Changes in Generator GWh - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(19)	(8)	(3)	(8)	(12)	(9)	(13)	(5)	(5)	(17)
Genesee	(4)	(3)	(3)	(0)	(3)	0	(2)	(2)	(3)	(4)
Central	(49)	(26)	(30)	(20)	(25)	(25)	(26)	(31)	(29)	(28)
North	(13)	(7)	4	(2)	(9)	(7)	(9)	(6)	(3)	(3)
Mohawk Valley	(2)	(4)	(4)	(4)	(3)	(5)	(5)	(5)	(5)	(6)
Capital	(12)	(76)	(43)	(52)	(30)	(64)	(37)	(37)	(19)	(39)
Hudson Valley	(31)	(33)	(14)	(28)	(41)	(23)	(36)	(30)	(32)	(33)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0	(0)	(0)
Dunwoodie	0	(0)	(0)	0	(0)	0	0	(0)	(0)	0
NY City	(216)	(105)	(171)	(127)	(113)	(133)	(126)	(111)	(165)	(90)
Long Island	(60)	(66)	(73)	(79)	(74)	(77)	(90)	(90)	(63)	(78)
NYISO Total	**(404)**	**(329)**	**(337)**	**(320)**	**(312)**	**(342)**	**(344)**	**(317)**	**(323)**	**(298)**

Projected Changes in Loss Payment ($ m) - Leeds - Plt Valley: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	0	0	0	0	0	0	0	0
Genesee	0	0	0	0	0	0	0	0	0	0
Central	0	0	0	0	0	0	0	0	0	0
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(0)	0	0	0	0	0	0	(0)	(0)	(0)
Hudson Valley	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)	(4)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Long Island	0	(0)	0	0	0	0	0	0	(0)	(0)
NYISO Total	(2)	(4)	(3)	(4)	(4)	(4)	(4)	(4)	(4)	(5)

H.2. Central East Study

Generic Transmission Solution

Projected Changes in Production Cost ($ m) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	0	0	0	(0)	(0)	0	1	1	(0)
Genesee	(0)	0	0	0	0	0	0	0	(0)	(0)
Central	5	4	2	3	4	3	3	3	3	5
North	0	0	0	1	0	0	(0)	0	0	0
Mohawk Valley	0	0	0	1	0	0	1	1	0	0
Capital	(1)	(7)	(5)	(10)	(6)	(8)	(6)	(8)	(8)	(7)
Hudson Valley	(1)	1	1	1	1	1	1	2	0	2
Millwood	0	0	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	2	0	0	3	3	5	2	1	(1)	1
Long Island	(2)	(2)	2	2	1	1	0	(0)	2	1

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	2	2	1	1	0	(0)	0	0	1	(0)
Genesee	2	3	1	2	1	0	1	1	1	0
Central	2	6	2	3	4	3	4	5	7	7
North	1	3	2	2	2	2	2	2	3	3
Mohawk Valley	1	3	2	2	2	2	2	2	3	3
Capital	(3)	(6)	(7)	(8)	(7)	(7)	(7)	(8)	(9)	(9)
Hudson Valley	(0)	(0)	0	0	0	1	0	1	1	1
Millwood	(0)	0	0	0	0	0	0	0	1	1
Dunwoodie	(0)	0	1	1	1	1	1	1	1	1
NY City	(2)	1	8	9	2	(1)	1	1	1	4
Long Island	(1)	(1)	1	1	1	1	1	1	1	2
NYISO Total	**2**	**12**	**11**	**15**	**6**	**2**	**6**	**8**	**11**	**13**

Projected Changes in Generator LBMP Payment ($ m) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	3	4	1	1	(0)	(1)	0	0	1	(1)
Genesee	1	2	1	1	0	0	0	0	0	0
Central	11	17	9	12	13	11	12	14	20	21
North	2	5	3	4	3	3	3	4	6	5
Mohawk Valley	1	2	1	2	1	1	2	2	2	2
Capital	(7)	(18)	(20)	(26)	(21)	(22)	(20)	(24)	(24)	(26)
Hudson Valley	(1)	1	2	1	1	2	1	2	1	2
Millwood	(1)	0	2	2	1	2	1	2	2	3
Dunwoodie	(0)	0	0	0	0	0	0	0	0	0
NY City	0	0	3	5	4	4	3	3	1	3
Long Island	(3)	(1)	3	3	1	2	1	1	3	3
NYISO Total	**7**	**11**	**4**	**6**	**5**	**1**	**3**	**5**	**12**	**12**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in Congestion Demand ($ m) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	(3)	(1)	(1)	(2)	(2)	(2)	(3)	(5)	(6)
Genesee	(0)	(1)	(0)	(0)	(2)	(2)	(2)	(3)	(3)	(4)
Central	(0)	(1)	(0)	(1)	(0)	(0)	(0)	(1)	(1)	(1)
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(3)	(8)	(6)	(8)	(6)	(6)	(7)	(8)	(10)	(11)
Hudson Valley	(1)	(2)	1	0	0	1	(0)	(0)	(2)	(1)
Millwood	(0)	(1)	1	0	0	0	0	0	(0)	0
Dunwoodie	(0)	(1)	1	1	1	1	1	1	(0)	0
NY City	(4)	(12)	10	8	4	3	3	(2)	(11)	(7)
Long Island	(2)	(5)	3	2	2	2	1	0	(3)	(2)
NYISO Total	**(11)**	**(34)**	**10**	**1**	**(3)**	**(2)**	**(6)**	**(16)**	**(36)**	**(32)**

Projected Changes in CO2 Cost ($ 000s) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(35)	4	(21)	(5)	1	(14)	5	42	45	(48)
Genesee	(1)	2	2	5	0	4	5	7	(1)	(1)
Central	210	145	83	103	181	127	114	117	158	201
North	7	8	15	30	3	20	(15)	27	36	26
Mohawk Valley	26	15	11	23	13	11	28	22	22	14
Capital	(56)	(216)	(188)	(363)	(257)	(320)	(219)	(312)	(321)	(300)
Hudson Valley	(33)	27	49	37	37	50	43	79	14	76
Millwood	0	0	0	0	(0)	0	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	115	2	10	79	117	120	61	79	(16)	26
Long Island	(78)	(46)	60	52	6	53	(11)	(22)	80	57
NYISO Total	**155**	**(59)**	**22**	**(39)**	**101**	**52**	**10**	**39**	**17**	**52**

Projected Changes in CO2 Emissions (%) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	-0.1%
Genesee	-0.7%	0.9%	1.0%	2.1%	0.1%	1.2%	1.3%	1.9%	-0.4%	-0.2%
Central	0.7%	0.4%	0.2%	0.3%	0.4%	0.3%	0.2%	0.2%	0.3%	0.4%
North	0.2%	0.2%	0.3%	0.6%	0.1%	0.4%	-0.3%	0.4%	0.6%	0.4%
Mohawk Valley	1.1%	0.6%	0.4%	0.7%	0.4%	0.3%	0.7%	0.5%	0.5%	0.3%
Capital	-0.2%	-0.6%	-0.5%	-0.9%	-0.6%	-0.7%	-0.5%	-0.6%	-0.6%	-0.5%
Hudson Valley	-0.3%	0.2%	0.3%	0.2%	0.2%	0.3%	0.2%	0.4%	0.1%	0.3%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	0.2%	0.0%	0.0%	0.1%	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%
Long Island	-0.4%	-0.2%	0.2%	0.2%	0.0%	0.2%	0.0%	-0.1%	0.2%	0.2%
NYISO Total	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in SO2 Cost ($ 000s) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	0	(1)	(0)	0	(0)	0	0	0	(0)
Genesee	(0)	0	0	0	0	0	0	(0)	(0)	0
Central	1	(0)	(0)	2	0	(0)	(0)	0	0	1
North	1	1	0	0	0	0	(0)	0	0	0
Mohawk Valley	1	0	(0)	(0)	0	(0)	(0)	0	0	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(0)	1	1	0	(0)	0	0	0	0	(0)
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1	(0)	(0)	0	0	0	(0)	(0)	(0)	(0)
Long Island	(3)	(1)	1	(1)	(1)	0	(0)	(0)	1	0
NYISO Total	**(1)**	**1**	**1**	**1**	**(0)**	**1**	**(0)**	**1**	**1**	**1**

Projected Changes in SO2 Emissions (%) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.2%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%
Genesee	-1.2%	0.6%	2.4%	2.5%	0.2%	1.3%	1.5%	2.3%	-0.2%	0.6%
Central	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
North	0.9%	1.6%	0.8%	0.4%	0.3%	0.5%	-0.2%	1.4%	0.8%	1.3%
Mohawk Valley	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%
Capital	-0.5%	-1.0%	-1.0%	-1.4%	-1.0%	-1.1%	-0.9%	-1.0%	-1.0%	-1.0%
Hudson Valley	0.0%	0.2%	0.1%	0.0%	-0.1%	0.0%	0.1%	0.1%	0.0%	0.0%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	2.9%	0.0%	-0.1%	1.0%	0.3%	0.8%	-0.2%	-1.1%	-0.1%	0.0%
Long Island	-0.7%	-0.4%	0.4%	-0.4%	-0.2%	0.1%	-0.1%	-0.1%	0.5%	0.1%
NYISO Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**0.1%**	**0.0%**

Projected Changes in NOx Cost ($ 000s) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(9)	1	(1)	0	(0)	(1)	0	3	3	(1)
Genesee	(0)	0	0	0	0	0	0	0	(0)	0
Central	44	21	2	3	7	2	3	3	4	5
North	1	1	0	1	0	1	(1)	2	3	2
Mohawk Valley	3	5	1	2	1	1	2	2	1	1
Capital	(6)	(24)	(9)	(8)	(10)	(5)	(6)	(7)	(7)	(6)
Hudson Valley	(21)	15	10	3	8	5	7	10	3	7
Millwood	0	0	0	0	(0)	0	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	31	(7)	1	1	2	3	(1)	(2)	(0)	(0)
Long Island	(33)	(12)	7	(0)	1	3	(1)	(1)	5	2
NYISO Total	**10**	**0**	**11**	**3**	**10**	**8**	**4**	**9**	**12**	**9**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in NOx Emissions (%) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
Genesee	-0.5%	0.9%	0.8%	0.8%	0.3%	1.1%	0.7%	1.1%	-0.7%	0.3%
Central	0.4%	0.2%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.2%
North	0.4%	0.5%	0.1%	1.6%	0.3%	1.1%	-0.6%	1.5%	2.5%	1.3%
Mohawk Valley	1.9%	3.2%	1.8%	3.8%	1.8%	1.4%	3.3%	2.3%	1.5%	1.2%
Capital	-0.3%	-1.0%	-0.9%	-1.4%	-1.0%	-1.0%	-0.8%	-1.0%	-1.0%	-0.9%
Hudson Valley	-0.4%	0.3%	0.4%	0.2%	0.3%	0.4%	0.4%	0.5%	0.2%	0.4%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	0.8%	-0.2%	0.0%	0.1%	0.2%	0.4%	-0.1%	-0.2%	-0.1%	0.0%
Long Island	-0.4%	-0.2%	0.2%	0.0%	0.0%	0.2%	0.0%	-0.1%	0.2%	0.1%
NYISO Total	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**0.1%**	**0.1%**	**0.0%**	**0.1%**	**0.1%**	**0.1%**

Projected LBMP $/MWh - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.22	50.86	51.10	52.91	53.61	56.13	57.87	59.61	61.48	63.87
Genesee	42.03	53.23	53.37	55.40	55.25	57.95	59.83	61.67	63.67	66.12
Central	42.86	54.47	54.67	56.85	58.52	61.07	62.87	65.14	67.56	71.19
North	42.34	53.86	54.02	56.20	57.81	60.43	62.28	64.49	66.86	70.63
Mohawk Valley	44.17	56.20	56.44	58.74	60.32	62.97	64.87	67.22	69.74	73.28
Capital	45.00	57.81	58.02	60.54	61.87	64.51	66.54	69.10	71.85	75.56
Hudson Valley	46.72	60.69	62.12	64.84	66.00	68.69	70.79	73.56	76.34	80.53
Millwood	47.08	61.37	63.19	65.98	67.07	69.78	71.90	74.75	77.56	81.99
Dunwoodie	47.38	61.80	63.61	66.41	67.49	70.20	72.35	75.22	78.05	82.48
NY City	48.30	63.64	64.93	67.85	69.01	71.90	74.34	77.53	80.57	84.47
Long Island	48.58	64.07	65.40	68.24	69.27	71.95	74.15	77.10	80.01	84.17
NYISO Load Weighetd Average	**45.97**	**59.57**	**60.49**	**63.08**	**64.21**	**66.94**	**69.08**	**71.80**	**74.50**	**78.21**

Projected Changes in Generator GWh - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(11)	2	(3)	1	(0)	(2)	1	9	12	(4)
Genesee	(1)	1	1	2	0	1	1	2	(0)	(0)
Central	117	80	44	44	79	52	44	42	52	67
North	4	4	8	12	1	7	(5)	7	7	6
Mohawk Valley	7	5	4	6	4	4	7	5	5	3
Capital	(29)	(116)	(95)	(166)	(113)	(128)	(85)	(116)	(117)	(102)
Hudson Valley	(14)	10	19	14	14	16	13	24	5	21
Millwood	0	0	0	0	(0)	0	(0)	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	17	3	7	32	35	37	21	28	(0)	14
Long Island	(47)	(21)	22	23	3	15	(2)	(7)	23	16
NYISO Total	**43**	**(32)**	**8**	**(32)**	**23**	**1**	**(3)**	**(6)**	**(14)**	**20**

Formatted: Header

Projected Changes in Loss Payment ($ m) - Central East: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
Genesee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)
North	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
Capital	(3)	(4)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(5)
Hudson Valley	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
NY City	(11)	(13)	(16)	(16)	(19)	(20)	(20)	(21)	(20)	(21)
Long Island	(4)	(6)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(8)
NYISO Total	(26)	(33)	(38)	(40)	(41)	(43)	(43)	(44)	(45)	(47)

Generic Generation Solution

Projected Changes in Production Cost ($ m) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(6)	(4)	(5)	(6)	(5)	(6)	(6)	(6)	(6)	(6)
Genesee	(4)	(4)	(5)	(6)	(4)	(5)	(4)	(5)	(5)	(5)
Central	(7)	(7)	(9)	(10)	(11)	(12)	(11)	(13)	(14)	(14)
North	(3)	(2)	(3)	(4)	(4)	(4)	(4)	(5)	(5)	(6)
Mohawk Valley	(3)	(3)	(4)	(5)	(5)	(6)	(5)	(6)	(6)	(7)
Capital	(8)	(10)	(12)	(14)	(13)	(14)	(14)	(17)	(17)	(19)
Hudson Valley	(4)	(4)	(2)	(3)	(4)	(3)	(4)	(4)	(5)	(4)
Millwood	(1)	(1)	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(2)	(2)	0	(0)	(1)	(0)	(1)	(1)	(1)	(0)
NY City	(12)	(8)	7	2	(1)	7	3	2	2	10
Long Island	(5)	(2)	3	1	(0)	1	0	0	(1)	1

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

NYISO Total	**(55)**	**(47)**	**(31)**	**(43)**	**(49)**	**(42)**	**(46)**	**(56)**	**(59)**	**(50)**

Projected Changes in Generator LBMP Payment ($ m) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(14)	(11)	(13)	(14)	(12)	(15)	(15)	(15)	(15)	(17)
Genesee	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Central	(30)	(28)	(31)	(31)	(35)	(36)	(36)	(37)	(38)	(46)
North	(7)	(7)	(10)	(10)	(11)	(11)	(11)	(11)	(10)	(12)
Mohawk Valley	(3)	(3)	(4)	(4)	(5)	(5)	(5)	(5)	(5)	(7)
Capital	118	105	91	91	99	106	110	115	122	123
Hudson Valley	(6)	(8)	(3)	(7)	(7)	(8)	(7)	(8)	(11)	(9)
Millwood	(5)	(5)	(0)	(2)	(3)	(2)	(2)	(3)	(3)	(2)
Dunwoodie	(0)	(0)	0	0	(0)	0	0	0	0	0
NY City	(57)	(40)	(36)	(30)	(31)	(34)	(35)	(33)	(43)	(33)
Long Island	(22)	(19)	(13)	(16)	(19)	(22)	(22)	(24)	(22)	(22)
NYISO Total	**(29)**	**(18)**	**(21)**	**(26)**	**(25)**	**(29)**	**(26)**	**(25)**	**(29)**	**(28)**

Projected Changes in Congestion Demand ($ m) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	1	2	2	5	4	4	5	5	7
Genesee	(0)	(0)	0	0	3	2	2	3	3	4
Central	(0)	(0)	0	(0)	0	0	0	(0)	(0)	2
North	0	(0)	(0)	(0)	0	0	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	0	0	0	0	0	0	0	0
Capital	(2)	(5)	(4)	(5)	(4)	(4)	(5)	(5)	(6)	(6)
Hudson Valley	1	1	5	5	5	6	5	6	6	8
Millwood	0	0	2	2	2	2	2	2	2	3
Dunwoodie	1	1	5	5	5	5	5	5	5	7
NY City	11	16	45	43	44	55	49	55	56	73
Long Island	4	7	17	17	17	18	17	19	18	23
NYISO Total	**15**	**21**	**73**	**68**	**76**	**89**	**78**	**90**	**89**	**120**

Projected Changes in CO2 Cost ($ 000s) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(388)	(153)	(181)	(217)	(228)	(271)	(306)	(208)	(227)	(337)
Genesee	(33)	(30)	(39)	(36)	(44)	(44)	(59)	(57)	(41)	(76)
Central	(1044)	(671)	(669)	(636)	(730)	(761)	(824)	(803)	(792)	(949)
North	(143)	(138)	(211)	(205)	(217)	(200)	(240)	(193)	(173)	(220)
Mohawk Valley	(66)	(52)	(90)	(106)	(113)	(129)	(149)	(144)	(157)	(197)
Capital	4809	3682	3834	4034	4468	4806	5116	5494	5814	5907
Hudson Valley	(186)	(225)	(106)	(285)	(251)	(301)	(280)	(305)	(425)	(384)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(2258)	(1349)	(1549)	(1190)	(1225)	(1543)	(1581)	(1595)	(2053)	(1602)
Long Island	(878)	(699)	(681)	(764)	(933)	(1075)	(1122)	(1265)	(1139)	(1176)
NYISO Total	**(186)**	**365**	**309**	**596**	**726**	**483**	**555**	**924**	**806**	**966**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in CO2 Emissions (1000 Tons) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.9%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.4%	-0.3%	-0.3%	-0.4%
Genesee	-16.5%	-15.5%	-17.8%	-15.0%	-15.7%	-14.4%	-17.2%	-15.1%	-14.4%	-15.3%
Central	-3.5%	-2.0%	-1.8%	-1.6%	-1.7%	-1.7%	-1.7%	-1.6%	-1.5%	-1.7%
North	-3.9%	-3.6%	-4.9%	-4.3%	-4.3%	-3.7%	-4.1%	-3.1%	-2.6%	-3.1%
Mohawk Valley	-2.9%	-1.9%	-3.0%	-3.2%	-3.2%	-3.3%	-3.6%	-3.3%	-3.5%	-3.9%
Capital	19.4%	11.0%	10.4%	10.0%	10.4%	10.5%	10.5%	10.7%	11.0%	10.5%
Hudson Valley	-1.5%	-1.6%	-0.7%	-1.6%	-1.3%	-1.5%	-1.3%	-1.4%	-1.8%	-1.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-4.3%	-3.0%	-3.1%	-2.2%	-2.1%	-2.4%	-2.3%	-2.2%	-2.7%	-2.0%
Long Island	-4.2%	-3.4%	-2.8%	-2.9%	-3.3%	-3.5%	-3.5%	-3.7%	-3.2%	-3.1%
NYISO Total	**-0.1%**	**0.2%**	**0.1%**	**0.2%**	**0.3%**	**0.2%**	**0.2%**	**0.3%**	**0.2%**	**0.3%**

Projected Changes in SO2 Cost ($ 000s) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(15)	(1)	(1)	(2)	(1)	(2)	(1)	(0)	(0)	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(47)	(10)	(4)	(1)	(2)	(3)	(3)	(1)	(1)	(3)
North	(14)	(6)	(7)	(7)	(7)	(5)	(4)	(2)	(2)	(2)
Mohawk Valley	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0	(0)
Capital	0	0	0	0	0	0	0	0	0	0
Hudson Valley	(6)	(4)	(2)	(6)	(3)	(2)	(1)	(1)	(2)	(2)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(3)	(1)	(2)	(0)	(0)	(1)	(0)	(1)	(1)	(0)
Long Island	(28)	(12)	(8)	(9)	(10)	(8)	(5)	(5)	(3)	(4)
NYISO Total	**(114)**	**(35)**	**(25)**	**(24)**	**(24)**	**(21)**	**(14)**	**(11)**	**(8)**	**(11)**

Projected Changes in SO2 Emissions (Tons) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-1.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.2%	0.0%	0.0%	-0.1%
Genesee	-18.2%	-18.8%	-19.2%	-17.2%	-16.4%	-14.0%	-17.5%	-15.7%	-14.3%	-15.7%
Central	-4.0%	-1.0%	-0.5%	-0.1%	-0.3%	-0.5%	-0.6%	-0.3%	-0.3%	-0.8%
North	-10.8%	-8.5%	-12.3%	-11.9%	-10.5%	-9.2%	-11.0%	-7.7%	-5.7%	-6.8%
Mohawk Valley	-1.1%	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	-0.1%
Capital	8.8%	3.4%	2.8%	2.7%	2.7%	2.4%	2.6%	3.1%	3.4%	2.7%
Hudson Valley	-0.7%	-0.6%	-0.3%	-1.0%	-0.5%	-0.5%	-0.3%	-0.6%	-0.6%	-0.7%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-5.7%	-4.1%	-10.4%	-1.8%	-0.7%	-6.3%	-4.5%	-6.7%	-9.0%	-3.8%
Long Island	-5.4%	-4.1%	-3.1%	-3.3%	-3.8%	-3.5%	-3.5%	-4.0%	-2.6%	-3.3%
NYISO Total	**-2.5%**	**-1.0%**	**-0.9%**	**-0.9%**	**-0.8%**	**-0.9%**	**-0.9%**	**-0.8%**	**-0.7%**	**-0.9%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in NOx Cost ($ 000s) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(113)	(48)	(21)	(13)	(23)	(12)	(19)	(14)	(15)	(18)
Genesee	(5)	(4)	(2)	(1)	(2)	(1)	(2)	(2)	(1)	(2)
Central	(461)	(123)	(42)	(19)	(34)	(19)	(30)	(21)	(17)	(29)
North	(16)	(15)	(9)	(5)	(11)	(5)	(9)	(7)	(8)	(9)
Mohawk Valley	(14)	(14)	(9)	(6)	(10)	(5)	(8)	(7)	(8)	(9)
Capital	116	30	8	3	8	5	7	9	10	8
Hudson Valley	(123)	(117)	(19)	(27)	(45)	(27)	(33)	(37)	(44)	(39)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(188)	(97)	(47)	(14)	(29)	(22)	(26)	(28)	(32)	(20)
Long Island	(293)	(168)	(59)	(36)	(71)	(37)	(53)	(57)	(43)	(46)
NYISO Total	**(1097)**	**(556)**	**(198)**	**(118)**	**(217)**	**(124)**	**(172)**	**(165)**	**(159)**	**(164)**

Projected Changes in NOx Emissions (Tons) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.8%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%	-0.4%	-0.4%	-0.5%
Genesee	-16.6%	-14.5%	-16.9%	-15.1%	-15.0%	-14.0%	-16.2%	-16.4%	-14.2%	-16.0%
Central	-4.4%	-1.1%	-1.0%	-0.7%	-0.8%	-0.8%	-0.9%	-0.7%	-0.6%	-1.0%
North	-5.6%	-5.8%	-8.2%	-7.8%	-9.1%	-7.6%	-8.6%	-6.4%	-6.9%	-6.9%
Mohawk Valley	-9.7%	-9.1%	-13.8%	-14.3%	-12.3%	-11.2%	-11.6%	-9.7%	-11.2%	-10.3%
Capital	5.5%	1.3%	0.9%	0.5%	0.9%	0.9%	1.0%	1.3%	1.5%	1.2%
Hudson Valley	-2.1%	-2.1%	-0.8%	-1.9%	-1.9%	-2.1%	-1.8%	-2.0%	-2.6%	-2.3%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-4.6%	-3.7%	-4.3%	-2.3%	-2.7%	-3.7%	-3.1%	-3.3%	-4.1%	-2.5%
Long Island	-3.4%	-2.4%	-2.0%	-2.1%	-2.3%	-2.3%	-2.3%	-2.5%	-2.1%	-2.2%
NYISO Total	**-2.3%**	**-1.3%**	**-1.1%**	**-1.1%**	**-1.2%**	**-1.3%**	**-1.3%**	**-1.2%**	**-1.3%**	**-1.3%**

Projected LBMP $/MWh - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	40.78	50.47	50.74	52.51	53.30	55.79	57.50	59.21	61.05	63.53
Genesee	41.47	52.56	52.76	54.71	54.83	57.50	59.35	61.15	63.12	65.63
Central	42.29	53.76	54.00	56.07	57.66	60.20	61.98	64.09	66.37	70.04
North	41.73	53.09	53.32	55.37	56.94	59.55	61.38	63.41	65.62	69.34
Mohawk Valley	43.56	55.40	55.68	57.86	59.42	62.06	63.95	66.12	68.49	72.03
Capital	44.55	57.52	57.66	60.14	61.39	63.99	66.01	68.48	71.22	74.88
Hudson Valley	46.38	60.37	61.91	64.54	65.65	68.36	70.44	73.13	75.89	80.05
Millwood	46.80	61.09	63.06	65.75	66.82	69.54	71.65	74.43	77.22	81.67
Dunwoodie	47.10	61.50	63.48	66.20	67.26	70.01	72.13	74.93	77.75	82.18
NY City	48.11	63.50	64.89	67.70	68.92	72.02	74.36	77.48	80.54	84.50
Long Island	48.40	63.98	65.44	68.20	69.21	71.94	74.11	77.02	79.91	84.09
NYISO Load Weighetd Average	**45.63**	**59.24**	**60.25**	**62.75**	**63.89**	**66.70**	**68.79**	**71.44**	**74.11**	**77.85**

Projected Changes in Generator GWh - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(115)	(62)	(66)	(69)	(70)	(74)	(83)	(61)	(66)	(88)
Genesee	(16)	(13)	(16)	(13)	(15)	(15)	(19)	(18)	(12)	(21)
Central	(472)	(351)	(321)	(286)	(304)	(299)	(300)	(289)	(269)	(300)
North	(89)	(76)	(104)	(92)	(87)	(75)	(84)	(63)	(48)	(59)
Mohawk Valley	(26)	(21)	(30)	(32)	(33)	(36)	(39)	(36)	(35)	(44)
Capital	3055	2179	2053	2001	2088	2131	2145	2193	2225	2181
Hudson Valley	(80)	(101)	(35)	(89)	(79)	(89)	(79)	(80)	(109)	(92)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1120)	(630)	(610)	(483)	(481)	(526)	(513)	(482)	(574)	(471)
Long Island	(435)	(294)	(245)	(265)	(297)	(329)	(318)	(343)	(296)	(292)
NYISO Total	**704**	**630**	**626**	**672**	**721**	**689**	**710**	**822**	**815**	**814**

Projected Changes in Loss Payment ($ m) - Central East: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	2	2	2	2	2	2	2	3	3	3
Genesee	1	1	1	1	1	1	1	1	1	1
Central	1	1	1	1	1	1	1	1	1	1
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	0	0	0	0	0	0	0	0	0	0
Capital	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Hudson Valley	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Millwood	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	(0)	(0)	(0)	(0)	(0)	(0)	0	(0)
NY City	3	2	(0)	(1)	(0)	0	0	0	1	(1)
Long Island	2	2	0	0	0	1	1	1	1	0
NYISO Total	9	8	3	3	3	4	5	5	6	4

Generic DR/EE Solution

Projected Changes in Production Cost ($ m) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Genesee	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(3)
North	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(23)	(30)	(31)	(33)	(33)	(33)	(36)	(37)	(39)	(41)
Hudson Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(0)	(1)	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(1)
NY City	(2)	(5)	(0)	(5)	(2)	0	(3)	(2)	(3)	(1)
Long Island	(1)	(1)	(0)	(2)	(1)	(1)	(1)	(1)	(1)	(2)
NYISO Total	**(29)**	**(43)**	**(37)**	**(48)**	**(42)**	**(42)**	**(47)**	**(48)**	**(52)**	**(54)**

Projected Changes in Generator LBMP Payment ($ m) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	(2)	(2)	(3)	(2)	(3)	(3)	(3)	(2)	(4)
Genesee	(0)	(1)	(1)	(1)	(0)	(1)	(1)	(1)	(0)	(1)
Central	(4)	(4)	(5)	(4)	(6)	(5)	(5)	(6)	(7)	(7)
North	(1)	(1)	(1)	(2)	(1)	(2)	(2)	(1)	(2)	(2)
Mohawk Valley	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(4)	(10)	(10)	(12)	(10)	(12)	(11)	(12)	(11)	(14)
Hudson Valley	(1)	(2)	(1)	(2)	(2)	(1)	(1)	(1)	(2)	(3)
Millwood	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(1)	(1)	(2)
Dunwoodie	(0)	0	(0)	(0)	(0)	0	0	(0)	(0)	0
NY City	(8)	(5)	(8)	(4)	(5)	(5)	(7)	(6)	(9)	(1)
Long Island	(3)	(4)	(3)	(6)	(4)	(4)	(5)	(6)	(4)	(5)
NYISO Total	**(24)**	**(31)**	**(32)**	**(35)**	**(33)**	**(35)**	**(37)**	**(36)**	**(40)**	**(40)**

Projected Changes in Congestion Demand ($ m) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	0	0	0	0	0	1	1	1	1
Genesee	(0)	(0)	0	0	1	0	0	0	1	1
Central	(0)	(0)	(0)	(0)	(0)	0	(0)	(0)	(0)	0
North	0	(0)	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	(0)	(0)	0	(0)	(0)	(0)	(0)	0
Capital	(1)	(2)	(1)	(2)	(2)	(1)	(2)	(2)	(2)	(2)
Hudson Valley	(0)	(0)	1	0	1	1	0	1	0	1
Millwood	(0)	0	0	0	0	0	0	0	0	0
Dunwoodie	(0)	0	1	0	1	1	0	1	1	1
NY City	0	0	7	3	6	8	5	7	6	12
Long Island	(0)	1	2	2	2	2	2	2	2	2
NYISO Total	**(1)**	**(1)**	**10**	**4**	**8**	**11**	**6**	**9**	**8**	**16**

Projected Changes in CO2 Cost ($ 000s) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(54)	(27)	(20)	(15)	(45)	(34)	(48)	(34)	(18)	(90)
Genesee	(9)	(8)	(9)	(2)	(9)	(4)	(9)	(10)	(8)	(12)
Central	(112)	(82)	(94)	(64)	(67)	(58)	(100)	(124)	(113)	(109)
North	(23)	(16)	0	(17)	(19)	(17)	(40)	(6)	(15)	(26)
Mohawk Valley	(3)	(11)	(15)	(20)	(19)	(23)	(20)	(24)	(31)	(33)
Capital	(61)	(182)	(174)	(198)	(157)	(257)	(202)	(195)	(136)	(260)
Hudson Valley	(51)	(47)	(20)	(56)	(74)	(47)	(7)	(3)	(78)	(146)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(265)	(128)	(274)	(32)	(185)	(179)	(234)	(246)	(334)	78
Long Island	(98)	(109)	(140)	(201)	(189)	(182)	(223)	(266)	(163)	(186)
NYISO Total	**(677)**	**(610)**	**(745)**	**(605)**	**(763)**	**(802)**	**(883)**	**(907)**	**(896)**	**(783)**

Projected Changes in CO2 Emissions (1000 Tons) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-0.1%
Genesee	-4.6%	-4.0%	-3.9%	-0.8%	-3.3%	-1.3%	-2.6%	-2.7%	-2.9%	-2.5%
Central	-0.4%	-0.2%	-0.3%	-0.2%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%
North	-0.6%	-0.4%	0.0%	-0.4%	-0.4%	-0.3%	-0.7%	-0.1%	-0.2%	-0.4%
Mohawk Valley	-0.1%	-0.4%	-0.5%	-0.6%	-0.5%	-0.6%	-0.5%	-0.5%	-0.7%	-0.7%
Capital	-0.2%	-0.5%	-0.5%	-0.5%	-0.4%	-0.6%	-0.4%	-0.4%	-0.3%	-0.5%
Hudson Valley	-0.4%	-0.3%	-0.1%	-0.3%	-0.4%	-0.2%	0.0%	0.0%	-0.3%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.5%	-0.3%	-0.5%	-0.1%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	0.1%
Long Island	-0.5%	-0.5%	-0.6%	-0.8%	-0.7%	-0.6%	-0.7%	-0.8%	-0.5%	-0.5%
NYISO Total	**-0.3%**	**-0.3%**	**-0.3%**	**-0.2%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.2%**

Projected Changes in SO2 Cost ($ 000s) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(2)	0	(0)	0	(1)	(0)	0	(0)	0	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(13)	(1)	(1)	1	(1)	(0)	(0)	(1)	(1)	(0)
North	(2)	(0)	(0)	(1)	(1)	(1)	(1)	(0)	(0)	(0)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	0	0	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(3)	(1)	(1)	(1)	(1)	(0)	0	(0)	(0)	(2)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	(0)	(0)	1	(0)	(0)	0	(0)	(0)	0
Long Island	(5)	(1)	(2)	(4)	(3)	(1)	(1)	(1)	(0)	(1)
NYISO Total	**(22)**	**(4)**	**(5)**	**(4)**	**(7)**	**(3)**	**(2)**	**(2)**	**(2)**	**(2)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in SO2 Emissions (Tons) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Genesee	-5.9%	-4.9%	-3.4%	-2.1%	-2.0%	-0.8%	-2.4%	-2.9%	-3.0%	-2.6%
Central	-1.1%	-0.1%	-0.2%	0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	0.0%
North	-1.4%	-0.6%	-0.8%	-2.0%	-1.3%	-1.1%	-2.0%	-0.7%	-0.4%	-0.4%
Mohawk Valley	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Capital	-0.5%	-0.8%	-0.7%	-0.8%	-0.5%	-0.9%	-0.7%	-0.6%	-0.4%	-0.8%
Hudson Valley	-0.3%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	0.0%	-0.1%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	0.6%	-0.2%	-1.1%	6.1%	-0.2%	-0.3%	0.3%	-1.8%	-0.6%	3.2%
Long Island	-0.9%	-0.5%	-0.8%	-1.4%	-1.2%	-0.5%	-0.6%	-0.8%	-0.4%	-0.7%
NYISO Total	**-0.5%**	**-0.1%**	**-0.2%**	**-0.1%**	**-0.2%**	**-0.1%**	**-0.1%**	**-0.2%**	**-0.1%**	**-0.2%**

Projected Changes in NOx Cost ($ 000s) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(16)	(9)	(2)	(1)	(3)	(1)	(3)	(2)	(1)	(5)
Genesee	(1)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(34)	(12)	(7)	(1)	(4)	(2)	(2)	(5)	(4)	(3)
North	(2)	(2)	(0)	(0)	(2)	(1)	(2)	(0)	(1)	(2)
Mohawk Valley	(3)	(3)	(2)	(1)	(1)	(1)	(1)	(1)	(2)	(1)
Capital	(6)	(15)	(6)	(4)	(5)	(3)	(4)	(3)	(3)	(4)
Hudson Valley	(28)	(20)	(2)	(8)	(14)	(4)	(0)	(1)	(7)	(10)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(15)	(19)	(5)	1	(8)	(1)	(2)	(5)	(4)	6
Long Island	(36)	(29)	(14)	(13)	(19)	(7)	(12)	(13)	(8)	(10)
NYISO Total	**(142)**	**(109)**	**(38)**	**(27)**	**(57)**	**(20)**	**(27)**	**(30)**	**(29)**	**(29)**

Projected Changes in NOx Emissions (Tons) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-0.1%
Genesee	-4.5%	-3.0%	-3.7%	-1.1%	-2.4%	-1.4%	-2.0%	-2.8%	-2.8%	-2.2%
Central	-0.3%	-0.1%	-0.2%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
North	-0.8%	-0.8%	-0.4%	-0.3%	-1.4%	-1.3%	-2.3%	-0.4%	-0.5%	-1.4%
Mohawk Valley	-2.2%	-1.7%	-2.6%	-3.0%	-1.8%	-1.9%	-0.9%	-1.2%	-2.4%	-1.5%
Capital	-0.3%	-0.7%	-0.6%	-0.6%	-0.5%	-0.7%	-0.5%	-0.5%	-0.4%	-0.6%
Hudson Valley	-0.5%	-0.4%	-0.1%	-0.5%	-0.6%	-0.3%	0.0%	-0.1%	-0.4%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.4%	-0.7%	-0.4%	0.2%	-0.7%	-0.2%	-0.2%	-0.6%	-0.4%	0.7%
Long Island	-0.4%	-0.4%	-0.5%	-0.8%	-0.6%	-0.4%	-0.5%	-0.6%	-0.4%	-0.5%
NYISO Total	**-0.3%**	**-0.3%**	**-0.2%**	**-0.3%**	**-0.3%**	**-0.2%**	**-0.2%**	**-0.2%**	**-0.2%**	**-0.2%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected LBMP $/MWh - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.09	50.66	50.98	52.76	53.54	56.05	57.78	59.51	61.35	63.80
Genesee	41.82	52.83	53.12	55.09	55.11	57.80	59.67	61.51	63.47	65.97
Central	42.66	54.06	54.41	56.51	58.18	60.74	62.51	64.70	66.99	70.64
North	42.10	53.37	53.70	55.79	57.43	60.07	61.89	64.01	66.23	69.99
Mohawk Valley	43.96	55.71	56.11	58.32	59.96	62.62	64.49	66.76	69.14	72.70
Capital	45.05	58.03	58.29	60.83	62.08	64.72	66.75	69.35	72.10	75.83
Hudson Valley	46.71	60.62	62.05	64.71	65.89	68.58	70.67	73.42	76.18	80.29
Millwood	47.08	61.29	63.05	65.77	66.92	69.61	71.73	74.55	77.35	81.71
Dunwoodie	47.37	61.69	63.45	66.20	67.35	70.05	72.20	75.03	77.84	82.20
NY City	48.30	63.56	64.82	67.63	68.96	71.94	74.29	77.48	80.51	84.39
Long Island	48.58	64.05	65.36	68.14	69.21	71.89	74.10	77.03	79.93	84.03
NYISO Load Weighetd Average	**45.63**	**59.24**	**60.25**	**62.75**	**63.89**	**66.70**	**68.79**	**71.44**	**74.11**	**77.85**

Projected Changes in Generator GWh - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(22)	(12)	(5)	(7)	(9)	(8)	(16)	(8)	(5)	(21)
Genesee	(5)	(3)	(3)	(1)	(3)	(1)	(3)	(3)	(2)	(3)
Central	(56)	(42)	(42)	(31)	(27)	(21)	(35)	(42)	(36)	(34)
North	(15)	(8)	1	(9)	(6)	(5)	(11)	(2)	(5)	(4)
Mohawk Valley	(3)	(4)	(5)	(5)	(6)	(6)	(6)	(6)	(6)	(8)
Capital	(32)	(92)	(80)	(87)	(65)	(97)	(71)	(67)	(49)	(79)
Hudson Valley	(20)	(32)	(6)	(19)	(21)	(13)	(2)	(1)	(20)	(31)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	0	0	(0)	(0)
Dunwoodie	0	0	(0)	(0)	(0)	0	0	(0)	(0)	0
NY City	(153)	(59)	(119)	(49)	(75)	(70)	(84)	(70)	(107)	(17)
Long Island	(53)	(48)	(48)	(69)	(60)	(57)	(66)	(72)	(42)	(51)
NYISO Total	**(360)**	**(301)**	**(308)**	**(276)**	**(271)**	**(279)**	**(295)**	**(271)**	**(273)**	**(247)**

Projected Changes in Loss Payment ($ m) - Central East: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	0	0	0	0	1	1	1	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	0	0	0	0	0	0	0	0	0	0
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)	(4)
Hudson Valley	0	0	0	0	0	0	0	0	0	(0)
Millwood	0	0	0	0	0	0	0	0	0	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	(0)
NY City	1	0	0	0	0	0	0	0	0	(0)
Long Island	0	0	0	0	0	0	0	0	0	0
NYISO Total	(0)	(1)	(2)	(2)	(2)	(2)	(1)	(2)	(2)	(3)

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

H.3. Study 3: West Central

Generic Transmission Solution

Projected Changes in Production Cost ($ m) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(0)	0	0	0	(0)	(0)	0	1	1	(0)
Genesee	(0)	0	0	0	0	0	0	0	(0)	(0)
Central	5	4	2	3	4	3	3	3	3	5
North	0	0	0	1	0	0	(0)	0	0	0
Mohawk Valley	0	0	0	1	0	0	1	1	0	0
Capital	(1)	(7)	(5)	(10)	(6)	(8)	(6)	(8)	(8)	(7)
Hudson Valley	(1)	1	1	1	1	1	1	2	0	2
Millwood	0	0	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	2	0	0	3	3	5	2	1	(1)	1
Long Island	(2)	(2)	2	2	1	1	0	(0)	2	1

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	3	7	7	7	12	12	12	14	14	19
Genesee	(0)	(4)	(3)	(4)	6	6	5	6	6	10
Central	(2)	(8)	(8)	(9)	(17)	(17)	(17)	(18)	(21)	(26)
North	(1)	(3)	(3)	(4)	(7)	(7)	(7)	(8)	(9)	(11)
Mohawk Valley	(0)	(4)	(4)	(5)	(8)	(8)	(8)	(9)	(10)	(12)
Capital	(0)	(2)	(2)	(2)	(4)	(4)	(4)	(4)	(5)	(5)
Hudson Valley	(0)	(2)	(1)	(2)	(3)	(3)	(3)	(3)	(4)	(5)
Millwood	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(0)	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(2)	(2)
NY City	(1)	(8)	(6)	(8)	(16)	(13)	(14)	(14)	(20)	(17)
Long Island	(0)	(2)	(2)	(2)	(4)	(3)	(3)	(3)	(5)	(5)
NYISO Total	**(1)**	**(27)**	**(24)**	**(30)**	**(44)**	**(38)**	**(41)**	**(42)**	**(55)**	**(56)**

Projected Changes in Generator LBMP Payment ($ m) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	13	16	16	17	29	28	27	32	31	43
Genesee	(0)	(2)	(1)	(2)	3	3	3	3	3	5
Central	(4)	(22)	(21)	(23)	(44)	(41)	(41)	(44)	(52)	(62)
North	(1)	(6)	(5)	(7)	(11)	(10)	(11)	(12)	(13)	(17)
Mohawk Valley	(0)	(2)	(2)	(3)	(4)	(4)	(4)	(4)	(5)	(7)
Capital	(1)	(5)	(7)	(8)	(14)	(12)	(11)	(14)	(14)	(17)
Hudson Valley	(1)	(2)	(1)	(1)	(2)	(2)	(1)	(2)	(2)	(2)
Millwood	0	(2)	(2)	(2)	(4)	(4)	(4)	(4)	(5)	(6)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(6)	(6)	(6)	(7)	(10)	(10)	(14)	(13)	(15)	(14)
Long Island	(1)	(3)	(2)	(4)	(7)	(7)	(6)	(7)	(8)	(9)
NYISO Total	**(2)**	**(34)**	**(32)**	**(38)**	**(64)**	**(59)**	**(61)**	**(64)**	**(80)**	**(86)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in Congestion Demand ($ m) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	2	9	9	10	24	23	23	26	29	39
Genesee	1	2	2	2	17	16	16	18	20	28
Central	0	1	1	2	2	2	2	2	3	4
North	(0)	(0)	(0)	(0)	0	0	0	(0)	0	0
Mohawk Valley	0	0	0	0	1	1	1	1	1	1
Capital	1	5	4	5	9	9	9	10	12	16
Hudson Valley	1	4	4	5	9	9	9	10	11	15
Millwood	0	1	1	1	3	3	3	3	3	4
Dunwoodie	1	2	3	3	6	5	6	6	7	9
NY City	4	22	23	28	51	52	53	59	64	90
Long Island	2	9	9	11	20	19	19	21	24	32
NYISO Total	**12**	**56**	**56**	**68**	**139**	**139**	**140**	**156**	**174**	**238**

Projected Changes in CO2 Cost ($ 000s) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	489	145	164	137	284	159	187	203	138	233
Genesee	(0)	1	(5)	1	2	8	1	3	0	0
Central	13	(164)	(155)	(147)	(374)	(320)	(323)	(313)	(419)	(403)
North	(21)	(28)	(23)	(36)	(52)	(26)	(45)	(38)	(33)	(75)
Mohawk Valley	(3)	(2)	(6)	(16)	(21)	(13)	(2)	(7)	(26)	(32)
Capital	(9)	(59)	(88)	(127)	(120)	(147)	(77)	(165)	(138)	(197)
Hudson Valley	(25)	(12)	(37)	3	(35)	(38)	25	(5)	(23)	(23)
Millwood	0	0	(0)	0	(0)	0	(0)	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(257)	(140)	(166)	(220)	(189)	(244)	(431)	(474)	(366)	(357)
Long Island	(29)	(80)	(62)	(120)	(213)	(223)	(199)	(216)	(229)	(266)
NYISO Total	**159**	**(339)**	**(379)**	**(525)**	**(717)**	**(844)**	**(862)**	**(1012)**	**(1096)**	**(1119)**

Projected Changes in CO2 Emissions (1000 Tons) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1.1%	0.3%	0.3%	0.2%	0.4%	0.2%	0.3%	0.3%	0.2%	0.3%
Genesee	-0.1%	0.6%	-2.3%	0.6%	0.7%	2.7%	0.4%	0.9%	0.2%	0.1%
Central	0.0%	-0.5%	-0.4%	-0.4%	-0.9%	-0.7%	-0.7%	-0.6%	-0.8%	-0.7%
North	-0.6%	-0.7%	-0.5%	-0.8%	-1.0%	-0.5%	-0.8%	-0.6%	-0.5%	-1.0%
Mohawk Valley	-0.1%	-0.1%	-0.2%	-0.5%	-0.6%	-0.3%	0.0%	-0.2%	-0.6%	-0.6%
Capital	0.0%	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%	-0.3%	-0.4%
Hudson Valley	-0.2%	-0.1%	-0.2%	0.0%	-0.2%	-0.2%	0.1%	0.0%	-0.1%	-0.1%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.5%	-0.3%	-0.3%	-0.4%	-0.3%	-0.4%	-0.6%	-0.7%	-0.5%	-0.5%
Long Island	-0.1%	-0.4%	-0.3%	-0.5%	-0.8%	-0.7%	-0.6%	-0.6%	-0.6%	-0.7%
NYISO Total	**0.1%**	**-0.2%**	**-0.2%**	**-0.2%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**

Formatted: Header

Projected Changes in SO2 Cost ($ 000s) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	22	5	4	3	6	2	2	1	1	1
Genesee	(0)	(0)	(0)	(0)	0	0	0	(0)	(0)	(0)
Central	4	(1)	(1)	3	(1)	(0)	(0)	1	(0)	(0)
North	(2)	(2)	(2)	(1)	(2)	(1)	(1)	(1)	(0)	(1)
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(1)	0	(1)	0	(1)	(0)	0	0	(0)	(0)
Millwood	0	0	(0)	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0	0
Long Island	(1)	(3)	(1)	(2)	(3)	(2)	(1)	(1)	(2)	(2)
NYISO Total	**20**	**(1)**	**(0)**	**1**	**(1)**	**(1)**	**(1)**	**(0)**	**(2)**	**(1)**

Projected Changes in SO2 Emissions (Tons) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1.4%	0.4%	0.4%	0.3%	0.6%	0.2%	0.3%	0.2%	0.1%	0.3%
Genesee	-1.6%	-1.5%	-3.2%	-1.2%	0.5%	2.7%	0.7%	-0.3%	-0.3%	-0.8%
Central	0.3%	-0.1%	-0.1%	0.3%	-0.1%	0.0%	0.0%	0.2%	0.0%	0.0%
North	-1.5%	-2.6%	-2.5%	-2.2%	-3.3%	-1.0%	-2.2%	-1.8%	-1.6%	-1.8%
Mohawk Valley	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%
Capital	0.0%	-0.2%	-0.4%	-0.5%	-0.5%	-0.6%	-0.5%	-0.6%	-0.4%	-0.7%
Hudson Valley	-0.2%	0.0%	-0.2%	0.1%	-0.2%	-0.1%	0.0%	0.1%	0.0%	0.0%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-2.2%	-0.2%	-0.3%	-1.6%	-0.3%	-0.4%	-2.9%	-3.5%	0.1%	0.3%
Long Island	-0.2%	-0.9%	-0.4%	-0.9%	-1.2%	-1.0%	-0.8%	-1.0%	-1.4%	-1.4%
NYISO Total	**0.4%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**-0.1%**	**0.0%**	**0.0%**	**-0.2%**	**-0.1%**

Projected Changes in NOx Cost ($ 000s) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	137	33	13	7	21	6	9	11	7	10
Genesee	(0)	0	(0)	(0)	0	0	0	0	0	0
Central	105	(15)	(5)	0	(12)	(4)	(5)	(2)	(5)	(6)
North	(2)	(4)	(1)	(1)	(3)	(2)	(3)	(2)	(1)	(5)
Mohawk Valley	(1)	(0)	(1)	(1)	(2)	(1)	(0)	(1)	(2)	(2)
Capital	(1)	(6)	(3)	(2)	(5)	(3)	(3)	(4)	(3)	(4)
Hudson Valley	(8)	(9)	(7)	(1)	(7)	(4)	3	(3)	(2)	(3)
Millwood	0	0	(0)	0	(0)	0	(0)	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(17)	(16)	(3)	(5)	(5)	(2)	(9)	(11)	(5)	(3)
Long Island	(13)	(27)	(6)	(8)	(23)	(9)	(11)	(13)	(15)	(13)
NYISO Total	**200**	**(44)**	**(13)**	**(12)**	**(37)**	**(18)**	**(19)**	**(23)**	**(26)**	**(25)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in NOx Emissions (Tons) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1.0%	0.3%	0.2%	0.2%	0.4%	0.2%	0.2%	0.3%	0.2%	0.3%
Genesee	0.0%	0.5%	-0.7%	-0.6%	1.8%	2.8%	1.3%	0.6%	1.1%	0.1%
Central	1.0%	-0.1%	-0.1%	0.0%	-0.3%	-0.2%	-0.2%	-0.1%	-0.2%	-0.2%
North	-0.8%	-1.6%	-1.3%	-1.4%	-2.1%	-2.3%	-2.7%	-1.8%	-1.3%	-3.8%
Mohawk Valley	-0.3%	-0.2%	-1.2%	-3.3%	-3.0%	-1.6%	-0.3%	-0.8%	-2.6%	-2.5%
Capital	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.5%	-0.4%	-0.5%	-0.4%	-0.6%
Hudson Valley	-0.1%	-0.2%	-0.3%	-0.1%	-0.3%	-0.3%	0.1%	-0.1%	-0.1%	-0.2%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.4%	-0.6%	-0.3%	-0.8%	-0.5%	-0.3%	-1.1%	-1.3%	-0.6%	-0.3%
Long Island	-0.1%	-0.4%	-0.2%	-0.5%	-0.7%	-0.6%	-0.5%	-0.6%	-0.7%	-0.7%
NYISO Total	**0.4%**	**-0.1%**	**-0.1%**	**-0.1%**	**-0.2%**	**-0.2%**	**-0.1%**	**-0.2%**	**-0.2%**	**-0.2%**

Projected LBMP $/MWh - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.30	51.13	51.46	53.29	54.33	56.89	58.54	60.42	62.27	65.04
Genesee	41.82	52.58	52.91	54.86	55.74	58.45	60.20	62.20	64.15	67.06
Central	42.62	53.67	54.05	56.08	57.31	59.91	61.66	63.78	65.94	69.28
North	42.06	52.98	53.35	55.35	56.55	59.22	61.02	63.07	65.13	68.60
Mohawk Valley	43.95	55.27	55.69	57.83	59.06	61.76	63.60	65.81	68.04	71.28
Capital	45.20	58.17	58.39	61.01	62.04	64.74	66.80	69.40	72.15	75.85
Hudson Valley	46.76	60.57	61.98	64.66	65.66	68.39	70.48	73.21	75.91	79.98
Millwood	47.13	61.25	63.00	65.74	66.74	69.46	71.59	74.39	77.14	81.47
Dunwoodie	47.42	61.64	63.39	66.16	67.16	69.89	72.04	74.87	77.62	81.94
NY City	48.33	63.49	64.72	67.56	68.71	71.72	74.09	77.28	80.24	84.14
Long Island	48.62	64.01	65.30	68.12	69.07	71.78	73.98	76.90	79.77	83.85
NYISO Load Weighetd Average	**45.95**	**59.34**	**60.29**	**62.82**	**63.92**	**66.71**	**68.82**	**71.52**	**74.23**	**77.82**

Projected Changes in Generator GWh - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	127	37	34	31	54	34	34	40	31	41
Genesee	(0)	1	(2)	0	1	3	0	1	0	0
Central	(39)	(87)	(77)	(74)	(160)	(131)	(125)	(122)	(151)	(139)
North	(13)	(14)	(11)	(17)	(22)	(7)	(13)	(12)	(10)	(16)
Mohawk Valley	(1)	(1)	(2)	(4)	(6)	(3)	(1)	(2)	(5)	(6)
Capital	(5)	(31)	(42)	(56)	(55)	(60)	(32)	(61)	(52)	(66)
Hudson Valley	(11)	(19)	(12)	(0)	(10)	(11)	7	(3)	(7)	(7)
Millwood	0	0	(0)	0	(0)	0	(0)	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(101)	(72)	(78)	(79)	(88)	(98)	(143)	(137)	(130)	(119)
Long Island	(23)	(34)	(28)	(46)	(87)	(84)	(69)	(73)	(76)	(89)
NYISO Total	**(66)**	**(222)**	**(218)**	**(244)**	**(372)**	**(358)**	**(341)**	**(369)**	**(400)**	**(400)**

Projected Changes in Loss Payment ($ m) - West Central: Transmission Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	3	7	7	8	7	7	7	8	8	9
Genesee	0	0	0	1	0	0	0	0	0	0
Central	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
North	0	1	1	1	1	0	1	1	1	1
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(1)
Hudson Valley	0	0	0	0	(0)	(0)	(0)	(0)	(0)	(1)
Millwood	0	0	0	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	(0)	(0)	(0)	(0)	(0)	(1)
NY City	1	0	1	0	(5)	(5)	(5)	(6)	(7)	(6)
Long Island	1	1	1	1	(0)	(0)	(0)	(0)	(1)	(2)
NYISO Total	6	9	10	10	1	2	1	1	(0)	(1)

Generic Generation Solution

Projected Changes in Production Cost ($ m) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Projected Changes in Load LBMP Payment ($ m) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(7)	(6)	(6)	(7)	(5)	(7)	(7)	(7)	(8)	(7)
Genesee	(6)	(7)	(7)	(8)	(5)	(6)	(6)	(7)	(7)	(7)
Central	(9)	(12)	(13)	(14)	(15)	(16)	(16)	(18)	(22)	(20)
North	(3)	(5)	(5)	(5)	(6)	(6)	(6)	(7)	(8)	(9)
Mohawk Valley	(4)	(5)	(6)	(6)	(7)	(7)	(7)	(8)	(10)	(10)
Capital	(3)	(2)	(3)	(3)	(4)	(4)	(4)	(5)	(5)	(6)
Hudson Valley	(2)	(2)	(1)	(1)	(2)	(2)	(2)	(3)	(3)	(3)
Millwood	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(1)	(1)	0	(0)	(1)	(1)	(1)	(1)	(1)	(1)
NY City	(5)	(1)	6	3	(1)	5	5	4	7	9
Long Island	(2)	(0)	2	2	0	1	1	0	(0)	1
NYISO Total	(43)	(42)	(32)	(41)	(45)	(44)	(46)	(52)	(57)	(54)

Formatted: Header

Projected Changes in Generator LBMP Payment ($ m) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(19)	(14)	(15)	(17)	(13)	(16)	(16)	(16)	(18)	(18)
Genesee	(3)	(4)	(4)	(5)	(3)	(4)	(4)	(4)	(4)	(4)
Central	68	74	74	76	77	83	88	91	93	92
North	(7)	(9)	(9)	(11)	(12)	(12)	(13)	(13)	(14)	(16)
Mohawk Valley	(3)	(4)	(5)	(5)	(6)	(6)	(6)	(7)	(7)	(9)
Capital	(10)	(23)	(26)	(27)	(30)	(32)	(31)	(31)	(30)	(38)
Hudson Valley	(5)	(7)	(3)	(8)	(8)	(9)	(7)	(9)	(10)	(9)
Millwood	(3)	(3)	(0)	(1)	(2)	(2)	(2)	(3)	(3)	(3)
Dunwoodie	(0)	(0)	0	0	(0)	(0)	(0)	(0)	(0)	0
NY City	(38)	(26)	(30)	(27)	(26)	(27)	(30)	(29)	(38)	(28)
Long Island	(15)	(12)	(10)	(11)	(15)	(17)	(18)	(20)	(19)	(19)
NYISO Total	**(38)**	**(28)**	**(28)**	**(35)**	**(36)**	**(42)**	**(40)**	**(40)**	**(50)**	**(52)**

Projected Changes in Congestion Demand ($ m) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	1	4	4	5	8	8	8	9	11	14
Genesee	0	1	1	1	5	5	5	6	7	9
Central	1	1	1	2	2	3	3	3	2	7
North	(0)	(0)	(0)	0	0	0	0	0	(0)	0
Mohawk Valley	0	0	1	1	1	1	1	1	1	2
Capital	3	6	5	7	7	7	7	8	10	11
Hudson Valley	3	5	7	8	8	9	9	10	11	13
Millwood	1	2	2	2	2	3	3	3	3	4
Dunwoodie	2	4	5	5	5	6	6	6	7	9
NY City	21	37	47	51	52	62	63	71	83	97
Long Island	8	15	18	20	20	22	22	24	27	32
NYISO Total	**39**	**74**	**90**	**102**	**110**	**124**	**125**	**140**	**163**	**197**

Projected Changes in CO_2 Cost ($ 000s) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(601)	(121)	(196)	(234)	(177)	(232)	(242)	(195)	(271)	(306)
Genesee	(43)	(35)	(36)	(36)	(48)	(49)	(62)	(66)	(43)	(83)
Central	2851	3141	3497	3859	4138	4507	4836	5143	5414	5551
North	(95)	(84)	(101)	(114)	(139)	(128)	(171)	(149)	(118)	(165)
Mohawk Valley	(84)	(58)	(89)	(106)	(119)	(133)	(147)	(147)	(171)	(215)
Capital	(241)	(667)	(731)	(816)	(949)	(1012)	(950)	(883)	(833)	(1098)
Hudson Valley	(192)	(207)	(124)	(316)	(310)	(358)	(294)	(362)	(376)	(381)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1542)	(937)	(1267)	(1171)	(1030)	(1187)	(1345)	(1396)	(1827)	(1369)
Long Island	(611)	(487)	(538)	(567)	(728)	(826)	(917)	(1010)	(1028)	(1004)
NYISO Total	**(558)**	**546**	**413**	**499**	**638**	**581**	**708**	**935**	**748**	**930**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in CO2 Emissions (1000 Tons) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-1.3%	-0.2%	-0.3%	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%
Genesee	-21.3%	-17.7%	-16.5%	-15.2%	-17.5%	-16.2%	-17.9%	-17.3%	-15.2%	-16.8%
Central	9.4%	9.4%	9.4%	9.6%	9.6%	9.9%	10.0%	10.2%	10.3%	10.1%
North	-2.6%	-2.2%	-2.4%	-2.4%	-2.7%	-2.3%	-2.9%	-2.4%	-1.8%	-2.3%
Mohawk Valley	-3.7%	-2.2%	-3.0%	-3.2%	-3.3%	-3.5%	-3.6%	-3.3%	-3.7%	-4.2%
Capital	-1.0%	-2.0%	-2.0%	-2.0%	-2.2%	-2.2%	-2.0%	-1.7%	-1.6%	-2.0%
Hudson Valley	-1.5%	-1.4%	-0.8%	-1.8%	-1.6%	-1.8%	-1.4%	-1.6%	-1.6%	-1.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-2.9%	-2.1%	-2.5%	-2.2%	-1.8%	-1.9%	-2.0%	-1.9%	-2.4%	-1.7%
Long Island	-2.9%	-2.3%	-2.2%	-2.2%	-2.6%	-2.7%	-2.8%	-3.0%	-2.8%	-2.7%
NYISO Total	**-0.3%**	**0.3%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.3%**	**0.2%**	**0.3%**

Projected Changes in SO2 Cost ($ 000s) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(25)	0	(1)	(2)	(1)	(1)	(0)	(0)	(0)	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(54)	(8)	(3)	(2)	(3)	(3)	(2)	(1)	(1)	(3)
North	(12)	(7)	(6)	(5)	(6)	(4)	(3)	(2)	(1)	(2)
Mohawk Valley	(2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(6)	(4)	(1)	(6)	(4)	(3)	(1)	(2)	(2)	(2)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(2)	(1)	(2)	(1)	(0)	(1)	(0)	(1)	(1)	(0)
Long Island	(17)	(6)	(6)	(5)	(7)	(4)	(3)	(3)	(3)	(3)
NYISO Total	**(119)**	**(26)**	**(20)**	**(22)**	**(21)**	**(16)**	**(10)**	**(9)**	**(8)**	**(10)**

Projected Changes in SO2 Emissions (Tons) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-1.6%	0.0%	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%	0.0%	-0.1%	0.0%
Genesee	-22.4%	-21.9%	-18.5%	-17.1%	-18.8%	-16.1%	-16.3%	-18.3%	-14.8%	-17.2%
Central	-4.6%	-0.8%	-0.4%	-0.2%	-0.4%	-0.5%	-0.5%	-0.3%	-0.3%	-0.8%
North	-9.9%	-9.7%	-10.2%	-9.0%	-9.7%	-8.0%	-9.5%	-7.9%	-4.7%	-5.5%
Mohawk Valley	-1.8%	0.0%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%	-0.3%	-0.1%
Capital	-1.5%	-2.8%	-2.8%	-2.7%	-3.0%	-3.3%	-3.0%	-2.6%	-2.2%	-3.1%
Hudson Valley	-0.6%	-0.6%	-0.3%	-1.0%	-0.7%	-0.6%	-0.4%	-0.6%	-0.6%	-0.7%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-4.0%	-4.0%	-9.9%	-3.9%	-1.5%	-4.3%	-4.1%	-5.3%	-8.7%	-4.5%
Long Island	-3.3%	-2.1%	-2.3%	-2.0%	-2.5%	-1.8%	-2.1%	-2.3%	-2.2%	-2.2%
NYISO Total	**-2.6%**	**-0.8%**	**-0.7%**	**-0.8%**	**-0.7%**	**-0.7%**	**-0.7%**	**-0.7%**	**-0.6%**	**-0.8%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in NOx Cost ($ 000s) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(169)	(41)	(22)	(13)	(18)	(11)	(16)	(13)	(17)	(17)
Genesee	(6)	(4)	(2)	(1)	(2)	(1)	(2)	(2)	(1)	(2)
Central	(444)	(29)	(4)	2	(0)	(1)	1	5	7	(2)
North	(13)	(12)	(6)	(4)	(8)	(5)	(8)	(7)	(7)	(9)
Mohawk Valley	(16)	(16)	(9)	(6)	(11)	(6)	(8)	(8)	(8)	(11)
Capital	(22)	(48)	(19)	(12)	(22)	(12)	(15)	(13)	(11)	(14)
Hudson Valley	(129)	(107)	(26)	(31)	(57)	(33)	(36)	(44)	(39)	(40)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(135)	(69)	(41)	(17)	(26)	(16)	(22)	(23)	(31)	(20)
Long Island	(183)	(99)	(43)	(25)	(52)	(25)	(40)	(42)	(39)	(36)
NYISO Total	**(1116)**	**(423)**	**(173)**	**(107)**	**(196)**	**(109)**	**(146)**	**(147)**	**(147)**	**(151)**

Projected Changes in NOx Emissions (Tons) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-1.2%	-0.3%	-0.4%	-0.4%	-0.3%	-0.4%	-0.4%	-0.3%	-0.5%	-0.5%
Genesee	-20.6%	-15.9%	-15.7%	-14.5%	-15.6%	-15.5%	-16.2%	-17.4%	-14.5%	-15.8%
Central	-4.3%	-0.3%	-0.1%	0.1%	0.0%	0.0%	0.0%	0.2%	0.2%	-0.1%
North	-4.4%	-4.9%	-5.9%	-5.6%	-6.5%	-6.7%	-7.4%	-6.1%	-6.1%	-6.8%
Mohawk Valley	-10.9%	-10.6%	-13.7%	-14.7%	-13.5%	-11.8%	-11.6%	-9.9%	-11.7%	-12.0%
Capital	-1.0%	-2.0%	-2.1%	-2.1%	-2.3%	-2.3%	-2.1%	-1.8%	-1.7%	-2.1%
Hudson Valley	-2.2%	-1.9%	-1.1%	-2.2%	-2.3%	-2.5%	-2.0%	-2.4%	-2.3%	-2.4%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-3.3%	-2.6%	-3.8%	-2.7%	-2.4%	-2.7%	-2.6%	-2.8%	-3.9%	-2.5%
Long Island	-2.1%	-1.4%	-1.5%	-1.4%	-1.7%	-1.6%	-1.7%	-1.9%	-1.8%	-1.8%
NYISO Total	**-2.4%**	**-1.0%**	**-1.0%**	**-1.0%**	**-1.1%**	**-1.1%**	**-1.1%**	**-1.1%**	**-1.2%**	**-1.2%**

Projected LBMP $/MWh - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	40.72	50.34	50.66	52.41	53.26	55.74	57.43	59.15	60.96	63.47
Genesee	41.32	52.25	52.55	54.45	54.72	57.36	59.19	61.00	62.92	65.48
Central	42.16	53.44	53.79	55.82	57.41	59.93	61.67	63.78	65.90	69.62
North	41.64	52.78	53.13	55.12	56.71	59.28	61.07	63.11	65.16	68.85
Mohawk Valley	43.50	55.13	55.53	57.66	59.23	61.84	63.68	65.87	68.08	71.63
Capital	45.02	58.18	58.37	60.99	62.15	64.75	66.79	69.36	72.16	75.84
Hudson Valley	46.57	60.54	62.02	64.70	65.80	68.48	70.55	73.27	76.03	80.15
Millwood	46.96	61.23	63.07	65.82	66.88	69.57	71.68	74.47	77.27	81.66
Dunwoodie	47.26	61.64	63.48	66.25	67.31	70.02	72.15	74.96	77.78	82.15
NY City	48.25	63.61	64.90	67.72	68.96	72.00	74.40	77.54	80.66	84.51
Long Island	48.52	64.09	65.44	68.26	69.25	71.96	74.15	77.06	79.99	84.13
NYISO Total	**45.71**	**59.27**	**60.24**	**62.76**	**63.92**	**66.69**	**68.80**	**71.46**	**74.13**	**77.83**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Projected Changes in Generator GWh - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(174)	(54)	(65)	(68)	(57)	(67)	(71)	(57)	(74)	(84)
Genesee	(21)	(15)	(15)	(13)	(17)	(17)	(19)	(20)	(13)	(23)
Central	2036	1842	1839	1878	1905	1961	1999	2028	2059	2035
North	(58)	(44)	(47)	(49)	(55)	(44)	(57)	(46)	(28)	(39)
Mohawk Valley	(31)	(23)	(30)	(32)	(34)	(37)	(39)	(38)	(37)	(47)
Capital	(129)	(330)	(328)	(342)	(372)	(372)	(332)	(296)	(271)	(336)
Hudson Valley	(85)	(94)	(45)	(100)	(96)	(109)	(84)	(95)	(97)	(92)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(758)	(421)	(481)	(438)	(390)	(408)	(433)	(414)	(504)	(393)
Long Island	(296)	(191)	(184)	(184)	(225)	(240)	(251)	(263)	(253)	(243)
NYISO Total	**484**	**669**	**646**	**651**	**660**	**668**	**713**	**798**	**782**	**776**

Projected Changes in Loss Payment ($ m) - West Central: Generation Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	2	2	2	3	2	3	3	3	3	4
Genesee	(0)	(0)	0	0	(0)	(0)	(0)	(0)	(0)	(0)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
North	0	0	0	0	1	1	1	1	1	1
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	1	1	1	1	1	1	1	1	1	1
Hudson Valley	1	1	1	1	1	1	1	1	1	1
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	1	1	1	0	1	1	1	1	1	0
NY City	6	5	5	4	4	5	6	6	6	4
Long Island	3	2	2	2	2	2	3	3	3	2
NYISO Total	14	12	11	11	11	12	14	14	15	12

Generic DR/EE Solution

Projected Changes in Production Cost ($ m) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	1	1	1	1	1	1	2	1
Genesee	0	0	0	0	0	0	0	0	0	0
Central	4	3	7	8	8	10	8	8	8	9
North	0	0	1	1	1	1	1	1	1	1
Mohawk Valley	0	0	1	1	1	1	1	1	1	1
Capital	3	6	14	14	14	12	12	12	15	13
Hudson Valley	(2)	(3)	(6)	(8)	(9)	(6)	(8)	(10)	(10)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(9)	(30)	(31)	(24)	(25)	(25)	(26)	(30)	(33)
Long Island	(5)	(6)	(17)	(20)	(19)	(19)	(18)	(20)	(21)	(22)

(These figures exclude the impact of interchange flows)

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in Load LBMP Payment ($ m) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(1)	(2)	(2)	(2)	(1)	(2)	(1)	(2)	(2)	(2)
Genesee	(1)	(2)	(2)	(2)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(22)	(29)	(29)	(31)	(32)	(33)	(34)	(35)	(37)	(40)
North	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)
Mohawk Valley	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Capital	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)
Hudson Valley	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
NY City	(2)	(1)	1	(6)	(2)	1	(2)	(1)	(1)	(0)
Long Island	(1)	(1)	0	(1)	(1)	(0)	(1)	(0)	(1)	(1)
NYISO Total	**(29)**	**(39)**	**(36)**	**(48)**	**(44)**	**(41)**	**(45)**	**(45)**	**(50)**	**(52)**

Projected Changes in Generator LBMP Payment ($ m) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(4)	(4)	(3)	(4)	(3)	(4)	(3)	(3)	(4)	(4)
Genesee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(7)	(8)	(8)	(10)	(11)	(10)	(10)	(11)	(11)	(14)
North	(1)	(2)	(2)	(2)	(3)	(2)	(3)	(3)	(3)	(3)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)
Capital	(2)	(5)	(5)	(6)	(6)	(7)	(5)	(6)	(6)	(6)
Hudson Valley	(1)	(2)	(1)	(2)	(2)	(1)	(1)	(1)	(2)	(2)
Millwood	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	0	(0)	(0)	0
NY City	(8)	(6)	(7)	(3)	(4)	(6)	(7)	(5)	(8)	(3)
Long Island	(2)	(2)	(2)	(4)	(4)	(3)	(4)	(4)	(3)	(4)
NYISO Total	**(26)**	**(32)**	**(31)**	**(37)**	**(35)**	**(36)**	**(37)**	**(37)**	**(40)**	**(42)**

Projected Changes in Congestion Demand ($ m) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	1	1	1	2	2	2	2	3	3
Genesee	0	0	0	0	1	1	1	1	2	2
Central	0	0	0	0	0	0	0	0	0	(0)
North	(0)	(0)	(0)	0	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	0	0	0	0	0	0	0	0	0	0
Capital	0	1	1	1	1	1	1	2	2	2
Hudson Valley	0	1	2	2	2	2	2	2	2	2
Millwood	0	0	1	0	1	1	1	1	1	1
Dunwoodie	0	1	1	1	1	1	1	1	2	1
NY City	3	9	11	8	11	15	13	14	17	19
Long Island	1	4	5	4	4	5	5	5	6	6
NYISO Total	**6**	**18**	**22**	**19**	**23**	**27**	**26**	**29**	**35**	**35**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in CO2 Cost ($ 000s) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(96)	(44)	(41)	(35)	(61)	(48)	(51)	(50)	(40)	(72)
Genesee	(11)	(6)	(10)	(5)	(11)	(2)	(12)	(11)	(11)	(18)
Central	(177)	(85)	(91)	(125)	(123)	(116)	(122)	(163)	(119)	(192)
North	(21)	(4)	(9)	(15)	(25)	(17)	(32)	(13)	(13)	(26)
Mohawk Valley	(6)	(15)	(20)	(23)	(25)	(26)	(25)	(33)	(38)	(42)
Capital	(22)	(105)	(105)	(143)	(101)	(175)	(96)	(132)	(86)	(121)
Hudson Valley	(34)	(42)	(36)	(76)	(86)	(22)	(26)	(57)	(84)	(115)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(291)	(213)	(286)	16	(116)	(209)	(280)	(243)	(316)	(93)
Long Island	(52)	(74)	(118)	(167)	(150)	(148)	(192)	(221)	(142)	(187)
NYISO Total	**(710)**	**(590)**	**(715)**	**(573)**	**(698)**	**(764)**	**(836)**	**(924)**	**(849)**	**(866)**

Projected Changes in CO2 Emissions (1000 Tons) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	-0.1%
Genesee	-5.5%	-3.3%	-4.3%	-2.2%	-4.0%	-0.8%	-3.5%	-3.0%	-4.0%	-3.7%
Central	-0.6%	-0.3%	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%
North	-0.6%	-0.1%	-0.2%	-0.3%	-0.5%	-0.3%	-0.5%	-0.2%	-0.2%	-0.4%
Mohawk Valley	-0.3%	-0.6%	-0.7%	-0.7%	-0.7%	-0.7%	-0.6%	-0.7%	-0.8%	-0.8%
Capital	-0.1%	-0.3%	-0.3%	-0.4%	-0.2%	-0.4%	-0.2%	-0.3%	-0.2%	-0.2%
Hudson Valley	-0.3%	-0.3%	-0.2%	-0.4%	-0.5%	-0.1%	-0.1%	-0.3%	-0.4%	-0.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.5%	-0.5%	-0.6%	0.0%	-0.2%	-0.3%	-0.4%	-0.3%	-0.4%	-0.1%
Long Island	-0.3%	-0.4%	-0.5%	-0.6%	-0.5%	-0.5%	-0.6%	-0.6%	-0.4%	-0.5%
NYISO Total	**-0.4%**	**-0.3%**	**-0.3%**	**-0.2%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.3%**	**-0.2%**

Projected Changes in SO2 Cost ($ 000s) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(4)	(1)	(1)	(1)	(1)	(0)	0	(0)	(0)	(0)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(9)	(1)	(0)	(1)	(1)	(0)	(0)	(1)	(0)	(1)
North	(2)	(0)	(0)	(1)	(1)	(1)	(0)	(0)	(0)	(0)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Hudson Valley	(2)	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(0)	(2)
Millwood	0	0	(0)	(0)	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(0)	(0)	(0)	1	(0)	(0)	(0)	(0)	(0)	0
Long Island	(3)	(1)	(1)	(2)	(2)	(0)	(1)	(1)	(0)	(1)
NYISO Total	**(21)**	**(4)**	**(4)**	**(5)**	**(6)**	**(2)**	**(1)**	**(3)**	**(1)**	**(3)**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected Changes in SO2 Emissions (Tons) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.3%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Genesee	-6.5%	-4.9%	-4.3%	-3.4%	-3.5%	-0.8%	-2.6%	-2.2%	-4.1%	-3.6%
Central	-0.8%	-0.1%	0.0%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%
North	-1.9%	0.0%	-0.7%	-1.8%	-1.9%	-1.2%	-1.0%	-1.1%	-0.6%	-0.4%
Mohawk Valley	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%
Capital	-0.2%	-0.6%	-0.5%	-0.5%	-0.4%	-0.7%	-0.4%	-0.4%	-0.2%	-0.4%
Hudson Valley	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	-0.2%	-0.1%	-0.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.4%	-1.0%	-1.1%	6.2%	-0.1%	-0.4%	-0.4%	-2.5%	-0.6%	1.3%
Long Island	-0.7%	-0.3%	-0.5%	-0.9%	-0.6%	-0.2%	-0.4%	-0.6%	-0.3%	-0.7%
NYISO Total	**-0.5%**	**-0.1%**	**-0.1%**	**-0.2%**	**-0.2%**	**-0.1%**	**-0.1%**	**-0.2%**	**-0.1%**	**-0.3%**

Projected Changes in NOx Cost ($ 000s) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(26)	(12)	(4)	(2)	(5)	(2)	(4)	(3)	(2)	(4)
Genesee	(2)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(80)	(15)	(5)	(5)	(8)	(3)	(3)	(7)	(3)	(6)
North	(3)	(2)	(1)	(1)	(2)	(1)	(2)	(1)	(0)	(2)
Mohawk Valley	(3)	(4)	(2)	(2)	(2)	(1)	(1)	(2)	(2)	(2)
Capital	(2)	(8)	(3)	(2)	(3)	(2)	(2)	(2)	(1)	(2)
Hudson Valley	(21)	(16)	(5)	(9)	(15)	(3)	(2)	(6)	(8)	(9)
Millwood	0	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(27)	(25)	(4)	3	(5)	(2)	(2)	(7)	(4)	1
Long Island	(26)	(20)	(11)	(10)	(12)	(4)	(9)	(10)	(6)	(9)
NYISO Total	**(190)**	**(102)**	**(35)**	**(28)**	**(51)**	**(18)**	**(26)**	**(37)**	**(28)**	**(32)**

Projected Changes in NOx Emissions (Tons) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Genesee	-5.6%	-2.9%	-3.5%	-2.0%	-2.8%	-1.6%	-3.0%	-3.3%	-3.3%	-3.0%
Central	-0.8%	-0.1%	-0.1%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%
North	-0.9%	-0.7%	-0.7%	-0.9%	-1.4%	-1.4%	-1.9%	-0.6%	-0.2%	-1.3%
Mohawk Valley	-2.0%	-2.7%	-3.7%	-3.8%	-2.4%	-1.9%	-1.5%	-2.0%	-3.0%	-2.0%
Capital	-0.1%	-0.3%	-0.3%	-0.4%	-0.3%	-0.4%	-0.2%	-0.3%	-0.2%	-0.3%
Hudson Valley	-0.4%	-0.3%	-0.2%	-0.7%	-0.6%	-0.2%	-0.1%	-0.3%	-0.5%	-0.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-0.7%	-0.9%	-0.4%	0.5%	-0.4%	-0.4%	-0.3%	-0.8%	-0.5%	0.1%
Long Island	-0.3%	-0.3%	-0.4%	-0.6%	-0.4%	-0.2%	-0.4%	-0.4%	-0.3%	-0.4%
NYISO Total	**-0.4%**	**-0.2%**	**-0.2%**	**-0.3%**	**-0.3%**	**-0.2%**	**-0.2%**	**-0.3%**	**-0.2%**	**-0.3%**

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Projected LBMP $/MWh - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	41.04	50.61	50.94	52.71	53.50	56.03	57.75	59.49	61.32	63.77
Genesee	41.75	52.73	53.04	54.99	55.06	57.77	59.63	61.47	63.42	65.95
Central	42.56	53.90	54.28	56.36	58.02	60.58	62.33	64.53	66.78	70.41
North	42.05	53.27	53.63	55.70	57.34	59.97	61.77	63.91	66.08	69.87
Mohawk Valley	43.91	55.61	56.04	58.22	59.85	62.52	64.37	66.65	68.98	72.56
Capital	45.19	58.25	58.52	61.09	62.29	64.94	67.00	69.64	72.39	76.15
Hudson Valley	46.72	60.65	62.08	64.74	65.90	68.59	70.69	73.45	76.20	80.32
Millwood	47.09	61.32	63.07	65.79	66.92	69.62	71.75	74.57	77.36	81.74
Dunwoodie	47.38	61.72	63.48	66.21	67.35	70.06	72.21	75.05	77.86	82.22
NY City	48.31	63.61	64.83	67.61	68.95	71.96	74.30	77.50	80.54	84.40
Long Island	48.59	64.07	65.39	68.16	69.21	71.91	74.11	77.06	79.94	84.07
NYISO Total	**45.91**	**59.44**	**60.39**	**62.89**	**64.10**	**66.87**	**68.98**	**71.70**	**74.35**	**78.04**

Projected Changes in Generator GWh - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	(32)	(14)	(9)	(9)	(14)	(12)	(17)	(13)	(10)	(16)
Genesee	(5)	(3)	(4)	(2)	(4)	(1)	(4)	(3)	(3)	(5)
Central	(76)	(42)	(43)	(54)	(50)	(45)	(44)	(57)	(38)	(59)
North	(13)	(1)	(3)	(6)	(10)	(4)	(9)	(4)	(5)	(5)
Mohawk Valley	(4)	(6)	(6)	(6)	(7)	(8)	(7)	(8)	(8)	(10)
Capital	(11)	(51)	(46)	(62)	(42)	(64)	(33)	(43)	(29)	(37)
Hudson Valley	(15)	(29)	(11)	(26)	(25)	(6)	(7)	(14)	(21)	(23)
Millwood	0	(0)	(0)	(0)	(0)	(0)	0	0	(0)	(0)
Dunwoodie	0	0	(0)	(0)	(0)	0	0	(0)	(0)	0
NY City	(148)	(90)	(116)	(30)	(54)	(75)	(94)	(63)	(98)	(45)
Long Island	(32)	(30)	(40)	(57)	(48)	(44)	(55)	(58)	(36)	(48)
NYISO Total	**(336)**	**(266)**	**(278)**	**(251)**	**(254)**	**(259)**	**(269)**	**(263)**	**(249)**	**(249)**

Projected Changes in Loss Payment ($ m) - West Central: DR/EE Solution

Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
West	0	0	0	0	0	0	1	1	1	1
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	0	0	0	0	0	0	0	0	0	0
Hudson Valley	0	0	0	0	0	0	0	0	0	0
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1	1	1	0	0	0	1	1	0	0
Long Island	0	0	0	0	0	0	0	0	0	0
NYISO Total	1	1	1	(0)	0	0	1	0	0	(0)

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Header

Formatted: Footer, Border: Top: (No border)

Formatted: Font: (Default) Times New Roman, 12 pt

Page 12: [1] Formatted	Author

Font: (Default) Arial

Page 12: [1] Formatted	Author

Font: (Default) Arial

Page 12: [2] Formatted	Author

Font: (Default) Arial

Page 12: [2] Formatted	Author

Font: (Default) Arial

Page 12: [3] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [3] Formatted	Author

Font: (Default) Arial

Page 12: [4] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [4] Formatted	Author

Font: (Default) Arial

Page 12: [5] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [5] Formatted	Author

Font: (Default) Arial

Page 12: [6] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [6] Formatted	Author

Font: (Default) Arial

Page 12: [7] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [7] Formatted	Author

Font: (Default) Arial

Page 12: [8] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [8] Formatted	Author

Font: (Default) Arial

Page 12: [9] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [9] Formatted	Author

Font: (Default) Arial

Page 12: [10] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [10] Formatted	Author

Font: (Default) Arial

Page 12: [11] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [11] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [11] Formatted	Author

Font: (Default) Arial

Page 12: [12] Formatted	Author

Font: (Default) Arial, Not Bold

Page 12: [12] Formatted	Author

Font: (Default) Arial

Page 12: [13] Formatted	Author

Font: (Default) Arial, French (France)

Page 12: [13] Formatted	Author

Font: (Default) Arial, French (France)

Page 12: [13] Formatted	Author

Font: (Default) Arial, French (France)

Page 15: [14] Formatted	Author

Normal

Page 15: [15] Formatted	Author

Centered

Page 15: [16] Change	Author

Formatted Table

Page 15: [17] Formatted	Author

Font: (Default) Arial

Page 15: [18] Formatted	Author

Font: (Default) Arial

Page 15: [19] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [19] Formatted	Author

Font: (Default) Arial

Page 15: [20] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [20] Formatted	Author

Font: (Default) Arial

Page 15: [21] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [21] Formatted	Author

Font: (Default) Arial

Page 15: [22] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [22] Formatted	Author

Font: (Default) Arial

Page 15: [23] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [23] Formatted	Author

Font: (Default) Arial

Page 15: [24] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [24] Formatted	Author

Font: (Default) Arial

Page 15: [25] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [25] Formatted	Author

Font: (Default) Arial

Page 15: [26] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [26] Formatted	Author

Font: (Default) Arial

Page 15: [27] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [27] Formatted	Author

Font: (Default) Arial

Page 15: [28] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [28] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [28] Formatted	Author

Font: (Default) Arial

Page 15: [29] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [29] Formatted	Author

Font: (Default) Arial

Page 15: [30] Formatted	Author

Font: (Default) Arial

Page 15: [30] Formatted	Author

Font: (Default) Arial

Page 15: [31] Formatted	Author

Centered

Page 15: [32] Change	Author

Formatted Table

Page 15: [33] Formatted	Author

Font: (Default) Arial

Page 15: [34] Formatted	Author

Font: (Default) Arial

Page 15: [35] Formatted	Author

Right

Page 15: [36] Formatted	Author

Font: (Default) Arial

Page 15: [36] Formatted	Author

Font: (Default) Arial

Page 15: [37] Formatted	Author

Font: (Default) Arial

Page 15: [37] Formatted	Author

Font: (Default) Arial

Page 15: [38] Formatted	Author

Font: (Default) Arial, Not Bold

Page 15: [39] Formatted	Author

Font: (Default) Arial

Page 15: [39] Formatted	Author

Font: (Default) Arial

Page 15: [40] Formatted	Author

Font: (Default) Arial

Page 15: [40] Formatted	Author

Font: (Default) Arial

Page 15: [40] Formatted	Author

Font: (Default) Arial

Page 15: [41] Formatted	Author

Font: (Default) Arial

Page 15: [42] Formatted	Author

Right

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted	Author

Font: (Default) Arial

Page 15: [43] Formatted **Author**

Font: (Default) Arial

Page 15: [44] Formatted **Author**

Font: (Default) Arial, Not Bold

Page 15: [45] Formatted **Author**

Font: (Default) Arial

Page 15: [46] Formatted **Author**

Right

Page 15: [47] Formatted **Author**

Font: (Default) Arial

Page 15: [48] Formatted **Author**

Font: (Default) Arial

Page 15: [48] Formatted **Author**

Font: (Default) Arial

Page 15: [49] Formatted **Author**

Font: (Default) Arial

Page 15: [49] Formatted **Author**

Font: (Default) Arial

Page 15: [50] Formatted **Author**

Font: (Default) Arial, Not Bold

Page 15: [51] Formatted **Author**

Font: (Default) Arial

Page 15: [52] Formatted **Author**

Font: (Default) Arial

Page 15: [52] Formatted **Author**

Font: (Default) Arial

Page 15: [53] Formatted **Author**

Font: (Default) Arial

Page 15: [53] Formatted **Author**

Font: (Default) Arial

Page 15: [54] Formatted **Author**

Right

Page 15: [55] Formatted **Author**

Font: (Default) Arial

Page 15: [55] Formatted **Author**

Font: (Default) Arial

Page 15: [55] Formatted **Author**

Font: (Default) Arial

Page 15: [55] Formatted **Author**

Font: (Default) Arial

Page 15: [55] Formatted **Author**

Font: (Default) Arial

Page 15: [55] Formatted **Author**
Font: (Default) Arial

Page 15: [55] Formatted **Author**
Font: (Default) Arial

Page 15: [55] Formatted **Author**
Font: (Default) Arial

Page 15: [55] Formatted **Author**
Font: (Default) Arial

Page 15: [55] Formatted **Author**
Font: (Default) Arial

Page 15: [56] Formatted **Author**
Font: (Default) Arial, Not Bold

Page 15: [57] Formatted **Author**
Font: (Default) Arial

Page 15: [58] Formatted **Author**
Right

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [59] Formatted **Author**
Font: (Default) Arial

Page 15: [60] Formatted **Author**
Font: (Default) Arial, Not Bold

Page 15: [61] Formatted **Author**
Right

Page 15: [62] Formatted **Author**
Font: (Default) Arial

Page 15: [63] Formatted **Author**
Font: (Default) Arial

Page 15: [63] Formatted **Author**
Font: (Default) Arial

Page 15: [64] Formatted **Author**
Font: (Default) Arial

Page 15: [64] Formatted **Author**
Font: (Default) Arial

Page 15: [64] Formatted **Author**
Font: (Default) Arial

Page 15: [65] Formatted **Author**
Font: (Default) Arial, Not Bold

Page 15: [66] Formatted **Author**
Font: (Default) Arial

Page 15: [67] Formatted **Author**
Font: (Default) Arial

Page 15: [68] Formatted **Author**
Font: (Default) Arial

Page 15: [68] Formatted **Author**
Font: (Default) Arial

Page 15: [69] Formatted **Author**
Font: (Default) Arial

Page 15: [70] Formatted **Author**
Right

Page 15: [71] Formatted **Author**
Font: (Default) Arial

Page 15: [71] Formatted **Author**
Font: (Default) Arial

Page 15: [71] Formatted **Author**
Font: (Default) Arial

Page 15: [72] Formatted **Author**
Font: (Default) Arial

Page 15: [72] Formatted **Author**
Font: (Default) Arial

Page 15: [72] Formatted **Author**
Font: (Default) Arial

Page 15: [73] Formatted **Author**
Font: (Default) Arial, Not Bold

Page 15: [74] Formatted **Author**
Font: (Default) Arial

Page 15: [74] Formatted **Author**
Font: (Default) Arial

Page 15: [75] Formatted	Author

Font: (Default) Arial

Page 15: [75] Formatted	Author

Font: (Default) Arial

Page 15: [76] Formatted	Author

Right

Page 15: [77] Formatted	Author

Font: (Default) Arial, Not Bold

Page 27: [78] Formatted	Author

Centered, Don't keep with next, Don't keep lines together

Page 27: [79] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [80] Formatted	Author

Centered, Don't keep with next, Don't keep lines together

Page 27: [81] Change	Author

Formatted Table

Page 27: [82] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [83] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [83] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [84] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [85] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [85] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [85] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [85] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [86] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [87] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [88] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [88] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [88] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [88] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [89] Formatted **Author**
Don't keep with next, Don't keep lines together

Page 27: [90] Formatted **Author**
Font: (Default) Arial, 10 pt

Page 27: [90] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [90] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [90] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [91] Formatted **Author**
Don't keep with next, Don't keep lines together

Page 27: [92] Formatted **Author**
Left, Don't keep with next, Don't keep lines together

Page 27: [93] Change **Author**
Formatted Table

Page 27: [94] Formatted **Author**
Font: (Default) Arial, 10 pt

Page 27: [95] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [95] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [95] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [96] Formatted **Author**
Don't keep with next, Don't keep lines together

Page 27: [97] Change **Author**
Formatted Table

Page 27: [98] Formatted **Author**
Font: (Default) Arial, 10 pt

Page 27: [98] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [98] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [98] Formatted **Author**
Font: (Default) Arial, 10 pt, Not Bold

Page 27: [99] Formatted **Author**
Don't keep with next, Don't keep lines together

Page 27: [100] Formatted **Author**
Font: (Default) Arial, 10 pt

Page 27: [100] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [100] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [100] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [101] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [102] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [102] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [102] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [102] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [103] Formatted	Author

Centered, Don't keep with next, Don't keep lines together

Page 27: [104] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [105] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [106] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [106] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [106] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [107] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [108] Change	Author

Formatted Table

Page 27: [109] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [110] Formatted	Author

Centered, Don't keep with next, Don't keep lines together

Page 27: [111] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [112] Formatted	Author

Centered, Don't keep with next, Don't keep lines together

Page 27: [113] Formatted	Author

Font: (Default) Arial, 10 pt

Page 27: [114] Formatted **Author**

Don't keep with next, Don't keep lines together

Page 27: [115] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [115] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [115] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [116] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [117] Formatted **Author**

Don't keep with next, Don't keep lines together

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [118] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [119] Formatted **Author**

Don't keep with next, Don't keep lines together

Page 27: [120] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [121] Formatted **Author**

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [122] Formatted **Author**

Font: (Default) Arial, 10 pt

Page 27: [123] Formatted	Author

Don't keep with next, Don't keep lines together

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [124] Formatted	Author

Font: (Default) Arial, 10 pt, Not Bold

Page 27: [125] Formatted	Author

Normal