



# **2011 Congestion Assessment and Resource Integration Study**

## **CARIS – Phase 1**

## **Appendices B-H**

**DRAFT REPORT**

January 5, 2012

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## 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. This process is described below and explained in full detail in the Initial CARIS Manual found in Appendix F.

### B.1. Phase 1 – Study Phase

Phase 1 of the CARIS is depicted in the following diagram:

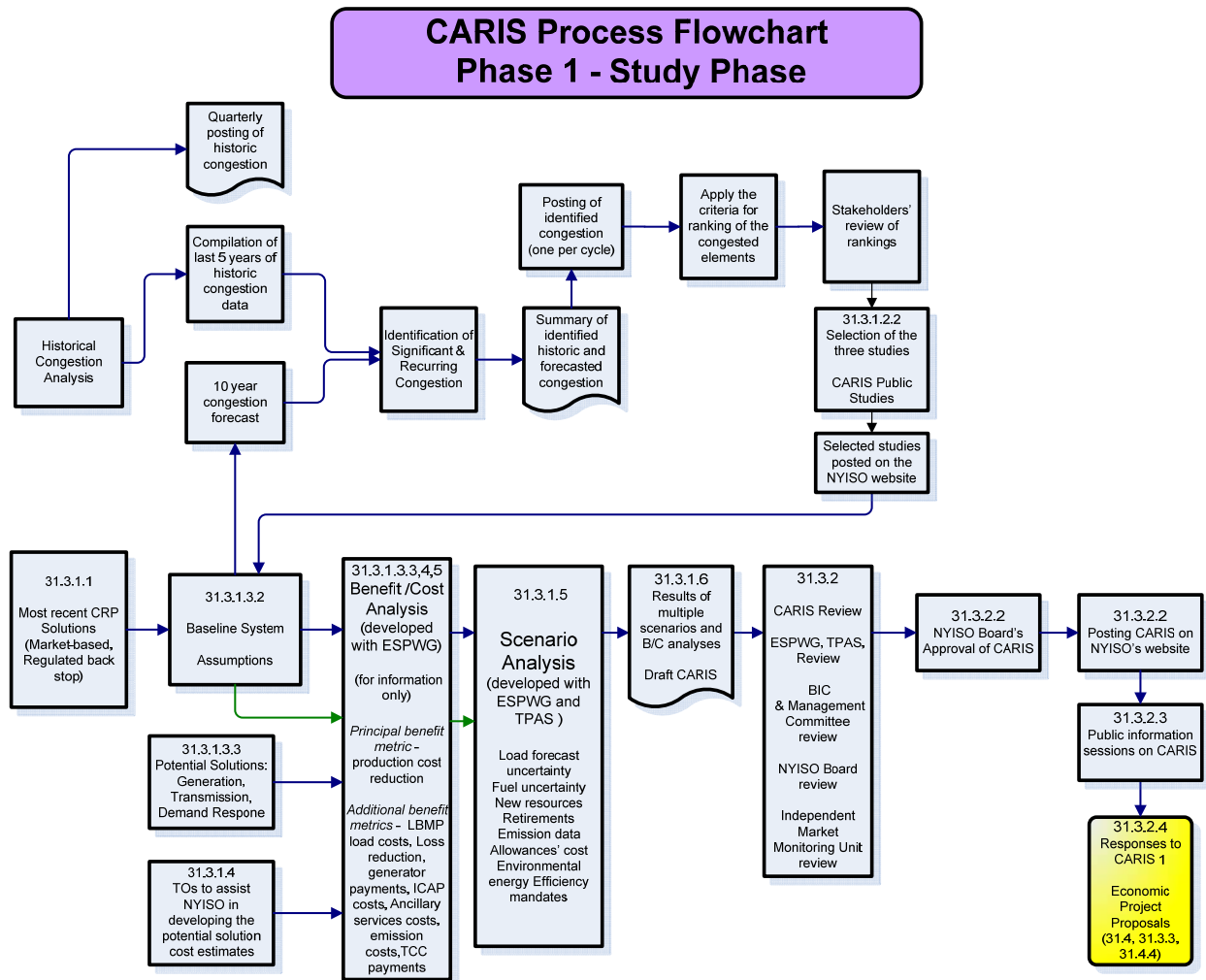


Figure B-1: Phase 1 or Study Phase of the CARIS Process

## B.2. Phase 2 – Projects Phase

Phase 2 of the CARIS is depicted in the following diagram:

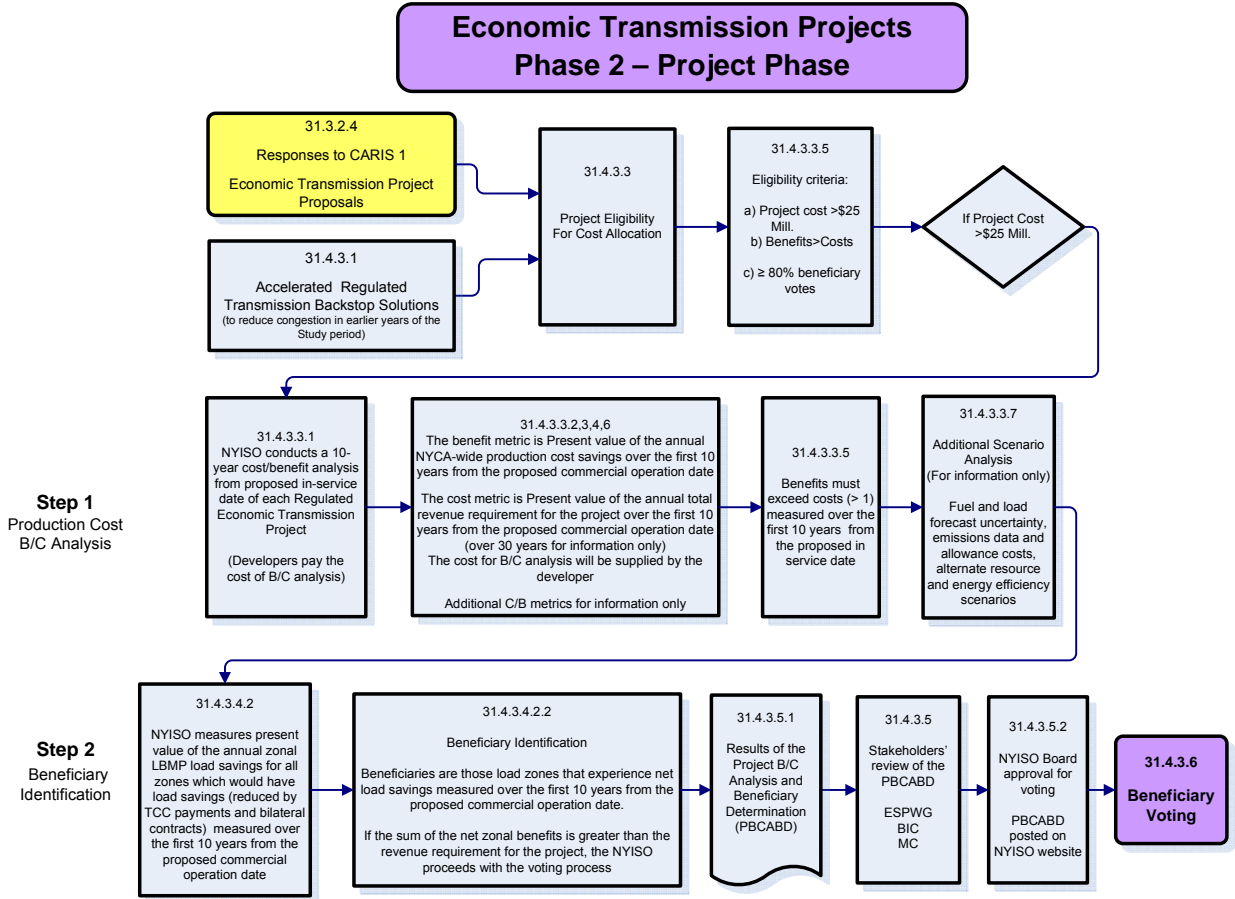


Figure B-2: Phase 2 – Project Phase of the CARIS process

## Voting, Cost Allocation, and Cost Recovery

### Economic Project Beneficiaries Voting, Cost Allocation and Cost Recovery

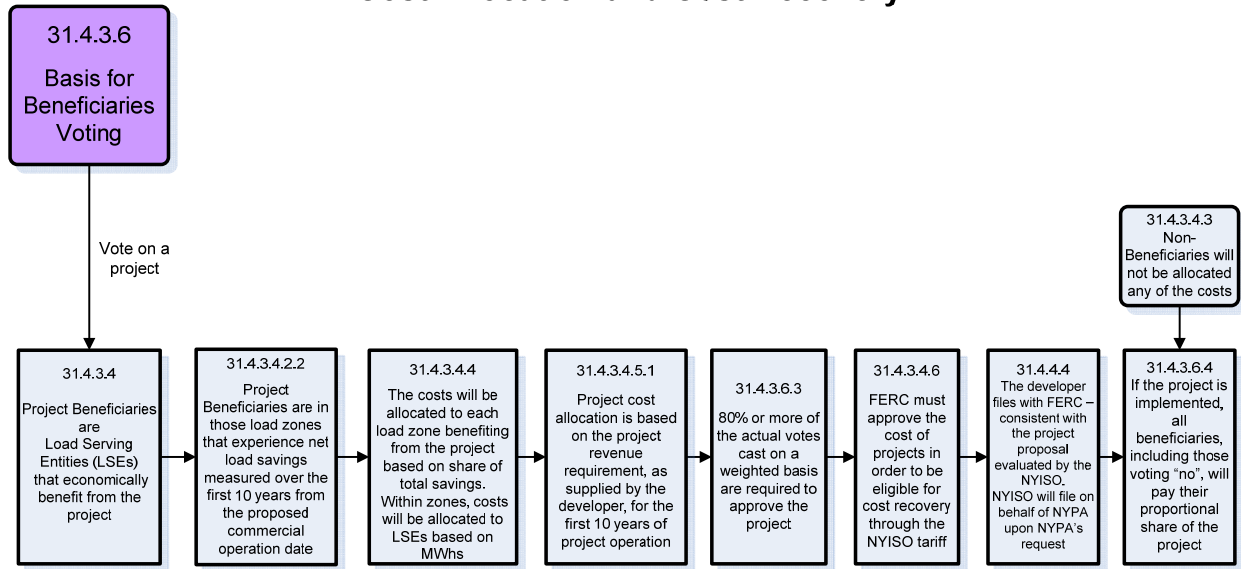


Figure B-3: Voting, Cost Allocation, and Cost Recovery of the CARIS process

## Appendix C – Baseline System Assumptions and Methodology

### C.1. CARIS Model - Base Case Modeling Assumptions for 2011-2020

Implementing the CARIS requires understanding and utilizing a significant amount of data. As stated in Section 31.3.1.1 of Attachment Y, “*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 2011 CARIS Phase 1 is largely derived from the 2010 CRP, 2011 Gold Book and CARIS Assumptions Matrix, Table C-1, shown below. Major components of the data include base load flow data, unit heat rates, unit capacities, fuel prices, transmission constraint modeling, load forecasts, load shape, both simulated and actual and scheduled interchange values, O&M cost, and emission costs. The assumptions matrix was developed in conjunction with NYISO stakeholders at ESPWG.

Table C-1: 2009 and 2011 CARIS Base Case Assumptions Matrix Applied to Database Construction

<b>Parameter</b>	<b>Assumptions from 2009 CARIS Phase 1</b>	<b>Modeling for 2011 CARIS Base Cases</b>
<b>Peak Load</b>	Based on CRP Peak Forecast Use 2009 Base Case Energy Forecast	Based on 2011 Gold Book
Load Shape Model  Energy 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	Same
Load Uncertainty Model	Base Level Forecast will be used. Other load uncertainty levels not evaluated.	Same
Generating Unit Capacities	Any changes in CRP capacities through time to be represented in CARIS.	Updated to 2011 Gold Book
New Units	As per the CRP and scaled back according to procedure (Tariff Attachment Y: Section 31.3.1.3.2)	Updated as per 2011 Gold Book (Application of inclusion rules and procedures)
Wind Resource Modeling	Typical shape for location as per MARS and wind studies.	Updated as per 2011 Gold Book and latest Wind Study as appropriate

Non-NYPA Hydro Capacity Modeling	Pondage Run of River (Hourly)	Updated as per 2011 Gold Book
Special Case Resources	N/A	N/A for model
EDRP Resources	Need to define costs associated, firm modifiers vs. price responsive.	N/A for model
External Capacity – Purchases and Wheel-Throughs	N/A	Modeled based on history of market operations
Retirements	As per the CRP.	Updated as per 2011 Gold Book (Application of inclusion rules)
Planned Outages	As per the CRP.	Scheduled to levelize reserves
Outage Scheduling	As per the maintenance schedules in long term adequacy studies.	Same
Gas Turbines Ambient Derate	Reflected only in summer/winter ratings.	Same
Environmental Modeling	Any impacts assumed in CRP carried forward.	Same, updated
Externalities	Limits on emissions done through allowances, not hard limits.	
Allowances	Allowance cost from Chicago Climate Futures Exchange.	
Commitment and Dispatch Options	Each Balancing Authority Commits separately  Hurdle Rates are employed for commitment and dispatch.	Each BA commits to serve its own load, firm transactions, and potential transfers  Hurdle rates – flat
Operating Reserves	Operating Reserves as per NYCA requirements.	Same
Fuel Price Forecast	NYISO to calibrate monthly forecast based on public information and historical data.	Same but with weekly forecasts
Cost Curve Development	Allowances from Chicago Climate Futures Exchange, Heat Rate development under discussion. Unit specific heat rates are confidential and not disclosed.	Same
Heat Rates NYCA External Systems	Developed from vendor supplied data and fuel input data matched with MWh data for NYCA.	Same

Local Reliability Rules	List and develop appropriate nomograms. Fuel burn restrictions, operating restrictions and exceptions, commitment/dispatch limits	Same
Energy Storage Gilboa PSH Lewiston PSH	Gilboa and Lewiston scheduled against NYCA.	Scheduling checked to conform to historical operations
<b>Transmission System Model</b>		
Power Flow Cases	As per CRP.	Same
Interface Limits  Monitored/contingency pairs  Nomograms  Joint, Grouping  Unit Sensitive Voltage	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.  Transfer limit analysis done in RNA/CRP for critical interfaces. External system limits from input from neighboring systems.	Same plus the use of operational limits
New Transmission Capability	As per CRP.	Updated as per 2011 Gold Book (Application of base case inclusion rules)
Internal Controllable Lines (PARs,DC,VFT)	Optimized in simulation.	Same
<b>Neighboring Systems</b>		
Outside World Area Models  Fuel Forecast	Power flow data from CRP, “production” data developed by NYISO with vendor and neighbor input. Linked with NYCA forecast	Same
External Capacity And Load Forecast	Neighboring systems modeled consistent with reserve margins in the RNA/CRP analysis. Neighboring systems data reviewed and held at required reserve margin.	Same
System representation in Simulation	HQ modeled as fixed hourly schedule, synchronized with all other external injections. Full Representation/Participation - NYISO - NE-ISO - IESO - PJM Classic & AP,AEP,CE,DLCO, DAY, VP)	Same



	<u>Proxy Bus Injection:</u> HQ-NYISO, HQ-NE-ISO, NB-NEISO, HQ - IESO <u>Transmission Only/Zeroed</u> <u>Out:</u> MECS,FE,SPP, MAR, NIPS,OVEC,TVA, FRCC,SERC,ERCOT,WECC	
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	Modified to reflect updated protocols, tariff, and market operation,

Below are descriptions of key data in more detail. The data was developed based on the NYISO’s Tariff requirements and procedures and in collaboration with stakeholders at ESPWG.

### 1. Base Case Load Forecast

Table C-2 presents CARIS Base Case load forecasts and Table C-3 presents summer peak demand from 2011 through 2020, both from the 2011 Gold Book.

Table C-2: Annual Zonal Energy (GWh)

<b>Zone</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
West	15,440	15,376	15,283	15,238	15,148	15,058	14,961	14,845	14,788	14,720
Genesee	9,963	9,994	10,017	10,020	10,034	10,065	10,111	10,156	10,225	10,295
Central	16,396	16,443	16,418	16,478	16,466	16,397	16,333	16,273	16,260	16,264
North	5,510	6,297	6,363	6,399	6,453	6,488	6,544	6,580	6,632	6,685
Mohawk Valley	7,773	7,762	7,790	7,787	7,781	7,777	7,770	7,759	7,776	7,795
Capital	11,275	11,318	11,333	11,332	11,330	11,334	11,300	11,283	11,333	11,381
Hudson Valley	10,478	10,574	10,624	10,667	10,694	10,725	10,733	10,746	10,806	10,870
Millwood	2,962	2,995	2,999	3,008	3,016	3,036	3,043	3,069	3,094	3,132
Dunwoodie	6,145	6,197	6,182	6,188	6,184	6,197	6,203	6,265	6,329	6,411
NY City	54,283	54,746	54,617	54,669	54,632	54,747	54,800	55,350	55,908	56,637
Long Island	22,562	22,819	22,970	23,062	23,187	23,495	23,681	23,912	24,159	24,505
<b>NYCA Total</b>	<b>162,787</b>	<b>164,521</b>	<b>164,596</b>	<b>164,848</b>	<b>164,925</b>	<b>165,319</b>	<b>165,479</b>	<b>166,238</b>	<b>167,310</b>	<b>168,695</b>

Table C-3: Summer Peak Demand by Zone (MW)

<b>Zone</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
West	2,550	2,554	2,550	2,549	2,525	2,495	2,476	2,458	2,451	2,443
Genesee	1,947	1,970	1,987	1,998	2,002	2,005	2,017	2,030	2,047	2,064
Central	2,795	2,825	2,834	2,855	2,849	2,831	2,820	2,814	2,817	2,822
North	648	742	752	757	763	766	773	777	783	790
Mohawk Valley	1,308	1,312	1,321	1,322	1,318	1,310	1,305	1,302	1,305	1,309
Capital	2,173	2,201	2,222	2,234	2,233	2,230	2,227	2,230	2,248	2,264
Hudson Valley	2,256	2,290	2,321	2,345	2,357	2,366	2,375	2,387	2,408	2,428
Millwood	702	711	722	729	732	736	744	750	756	763
Dunwoodie	1,464	1,472	1,484	1,492	1,497	1,497	1,509	1,521	1,538	1,554
NY City	11,505	11,635	11,720	11,785	11,830	11,880	12,015	12,200	12,405	12,585
Long Island	5,364	5,470	5,520	5,543	5,572	5,633	5,655	5,721	5,775	5,845
<b>NYCA Total</b>	<b>32,712</b>	<b>33,182</b>	<b>33,433</b>	<b>33,609</b>	<b>33,678</b>	<b>33,749</b>	<b>33,916</b>	<b>34,190</b>	<b>34,533</b>	<b>34,867</b>

## 2. Power Flow Data

The CARIS uses the network topology, system impedance and transmission line ratings as set forth in the assumption matrix.

## 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 below are considered non-bulk or sub-transmission facilities for purposes of this study. The figure also displays key transmission interfaces for New York.

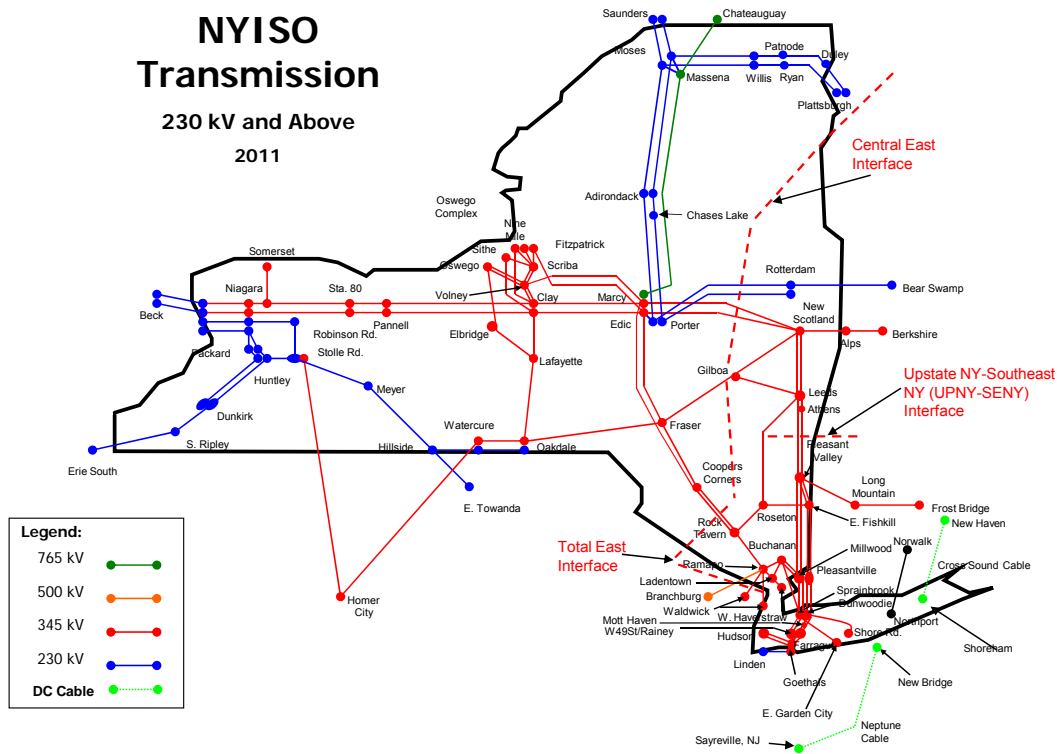


Figure C-1: NYISO 230 kV and above Transmission Map

## New York Control Area Changes, Upgrades and Resource Additions

System changes for 2011 and beyond are as follows:

- a. M29 – 345 kV cable 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. The M29 facility commenced commercial operation in Summer 2011;
- b. Astoria Energy II – 576 MW installed in May 2011;
- c. Steel Winds II – 1.5 MW (summer rating) installed in August 2011;
- d. Greenidge 4 – 106 MW retired 3/18/2011;
- e. Westover 8 – 81.2 MW retired 3/18/2011;
- f. Seneca Energy Ontario - 5.6 MW uprate, proposed commercial operation in November 2011;
- g. Bayonne Energy Center – new 500 MW GT generator in Bayonne NJ, proposed commercial operation in May 2012;
- h. Hudson Transmission Partners (HTP) 660 MW Merchant Transmission Facility, proposed commercial operation in 2013 (not shown in 2011 map above);

- i. Munnsville Wind Power 0.6 MW rating increase proposed in December 2013;
- j. Nine Mile Pt2 – 115 MW uprate proposed in June 2012 and 53 MW uprate proposed in June 2014; and
- k. For study purposes, Athens Special Protection System (SPS) is assumed to no longer be in service starting January 2011.

**External Area Model**

The external areas immediately adjacent to the NYCA are actively modeled, 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. The HQ to NYISO capacity modeled is 1300 MW. External areas surrounding the above areas are only modeled to capture the impact of loop flows.

Six generating plants were also added to the base case in PJM. These additions totaled thirteen generating units with a summer rated capacity of 2621 MWs. Table C-4 lists the new units with associated data.

Table C-4: Generating Units Added to PJM

<b>Unit Name</b>	<b>Summer Capacity</b>	<b>Type/Fuel</b>	<b>Installation Date</b>	<b>Company Name</b>
Fort Martin	585	Coal	March 2011	AP
Peach Bottom	550	CC - NG	July 2011	PECO
Bremo Tenaska	625	CC - NG	April 2011	Dominion VP
Clinch River	534	Coal	March 2012	Dominion VP
Kearny 1	36.4	LM6000-NG	June 2012	PSE&G
Kearny 2	36.4	LM6000-NG	June 2012	PSE&G
Kearny 3	36.4	LM6000-NG	June 2012	PSE&G
Kearny 4	36.4	LM6000-NG	June 2012	PSE&G
Kearny 5	36.4	LM6000-NG	June 2013	PSE&G
Kearny 6	36.4	LM6000-NG	June 2013	PSE&G
Hunlock Creek 3	30	CT - NG	June 2011	UGI Utilities
Hunlock Creek 1	39.3	CT - NG	June 2011	UGI Utilities
Hunlock Creek 2	39.3	CT - NG	June 2011	UGI Utilities

**Hurdle Rates and Interchange Models**

Hurdle rates set the conditions in which economic 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 interface. Hurdle rates help ensure that the production-cost simulation is reasonably consistent with the historical pattern of internal NYCA generation and imports. Hurdle rates are used to allow the simulation model to reflect inter-regional energy market transaction costs.

Two independent hurdle rates are used in the CARIS, one for the commitment of generation and a separate one for the dispatch of generation. Hurdle rates are held constant throughout the 2011-2020 study period as discussed with NYISO stakeholders at ESPWG. The hurdle rate values produce results consistent with NYCA historic total import levels.

Only energy transactions associated with Unforced Capacity Deliverability Rights (UDRs) granted or firm withdrawal rights on controllable tie lines were specifically modeled, namely on the NYISO DC tie-lines (Neptune, Cross Sound Cable (CSC), Linden VFT, and HTP). The flow on the CSC line was modeled to allow up to 330 MW from ISO-NE to Long Island. The flow on the Linden VFT was modeled to allow up to 300 MW of flow from PJM to NYISO. The Neptune and HTP flows were modeled to allow up to 660 MW of flow from PJM into Long Island and New York City respectively.

The hourly interchange flow for each interface connecting the NYISO with neighboring control areas was priced at the LMP of its corresponding proxy bus. The summation of all 8,760 hours determined the annual cost of the energy for each interface. Table C-5 lists the proxy bus location for each interface.

Table C-5: Interchange LMP Proxy Bus

<b>Interface</b>	<b>Proxy bus</b>
PJM	Keystone
Ontario	Bruce
Quebec	Chateauguay and Cedars
Neptune	Raritan River
New England	Sandy Pd
Cross Sound Cable	New Haven Harbor
HTP	Bergen
VFT	Linden 138 kV

#### **4. Production Cost Model**

Production cost 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.

This section discusses how the “production cost input data” is developed. 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 variable expense for fossil fueled generating units. Cost curves are the product of fuel prices and incremental heat rates. Individual unit heat rates are commercially sensitive confidential information and thus are not widely available from generator owners. Unit heat rate input data was updated based on the U.S. Environmental

Protection Agency’s (EPA) Clean Air Market Data and, where available, unit production data from the U.S. Energy Information Administration (USEIA).

Consideration was given to using this approach across all of the units in the simulation. However, the relatively 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 led to the conclusion that vendor-supplied heat rate information could 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.

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.

## 5. Fuel Forecast

Table C-6 shows the regional bases relative to the U.S. national average annual price for each fuel. Figures C-2 through C-5 illustrate forecasted fuel price indices for external areas from which weekly fuel price forecasts were developed.

Table C-6: External Areas Fuel Forecast

	<b>PJM- East</b>	<b>PJM- West</b>	<b>ISONE</b>	<b>IESO</b>
Fuel Oil #2	0.970	1.070	0.960	1.100
Fuel Oil #6	0.970	1.070	0.960	1.100
Natural Gas	1.158	1.012	1.168	1.028
Coal	1.430	1.050	1.500	1.200

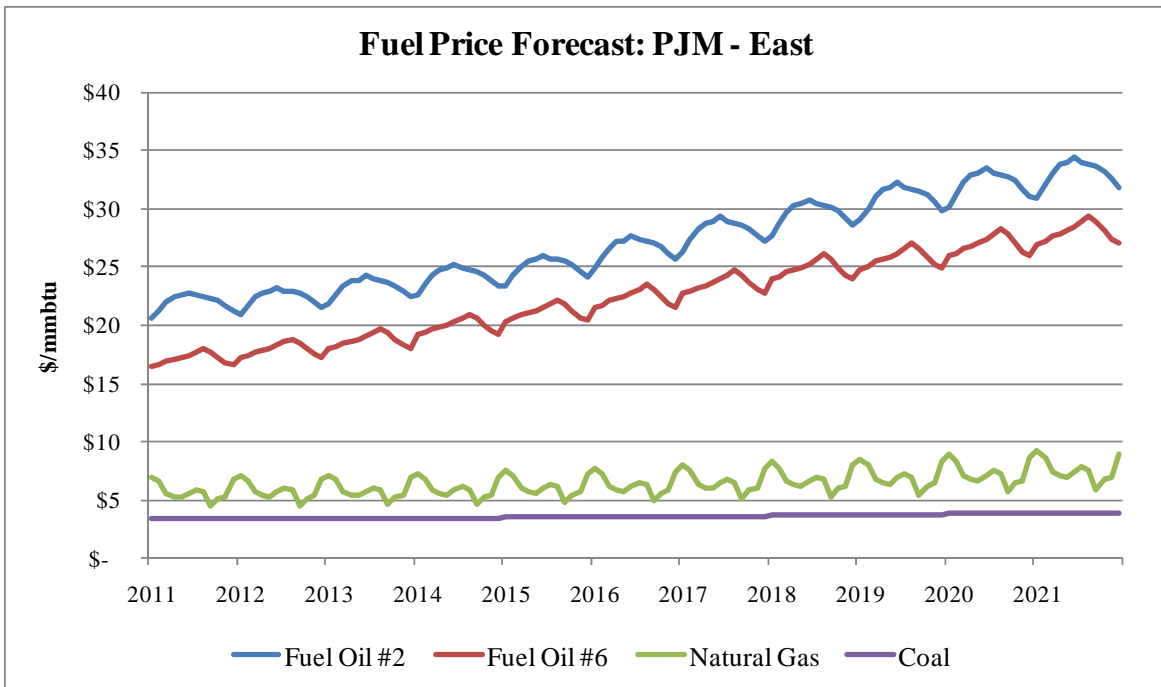


Figure C-2: Forecasted Fuel prices for PJM East (nominal \$)

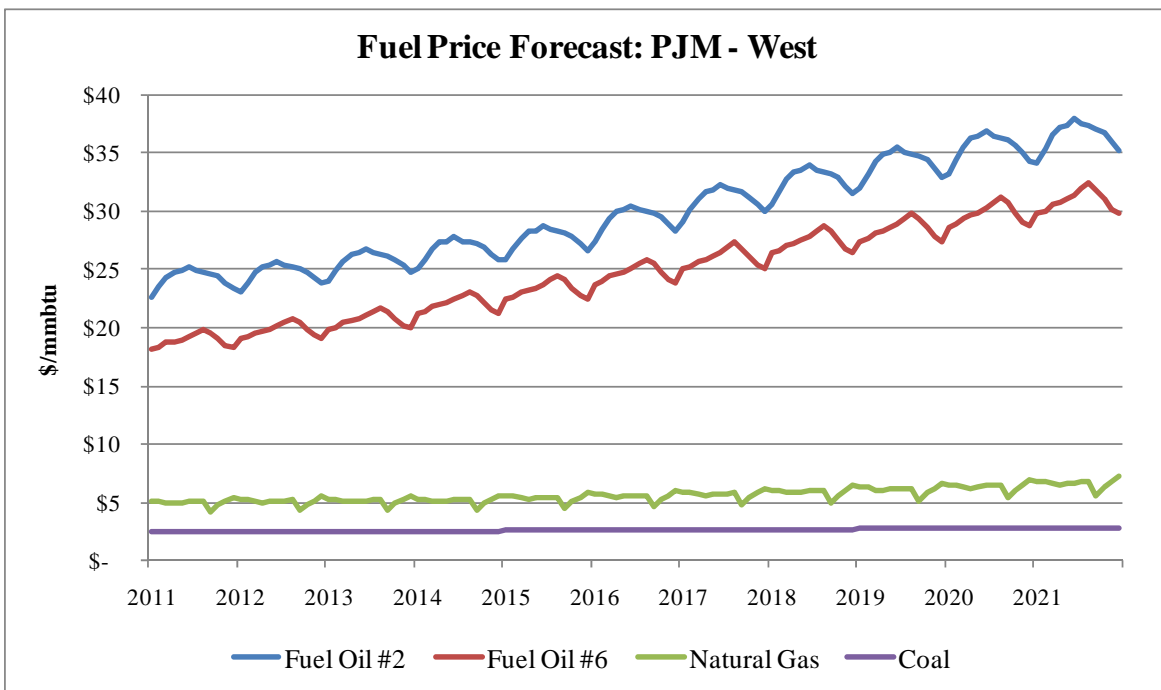


Figure C-3: Forecasted Fuel prices for PJM West (nominal \$)

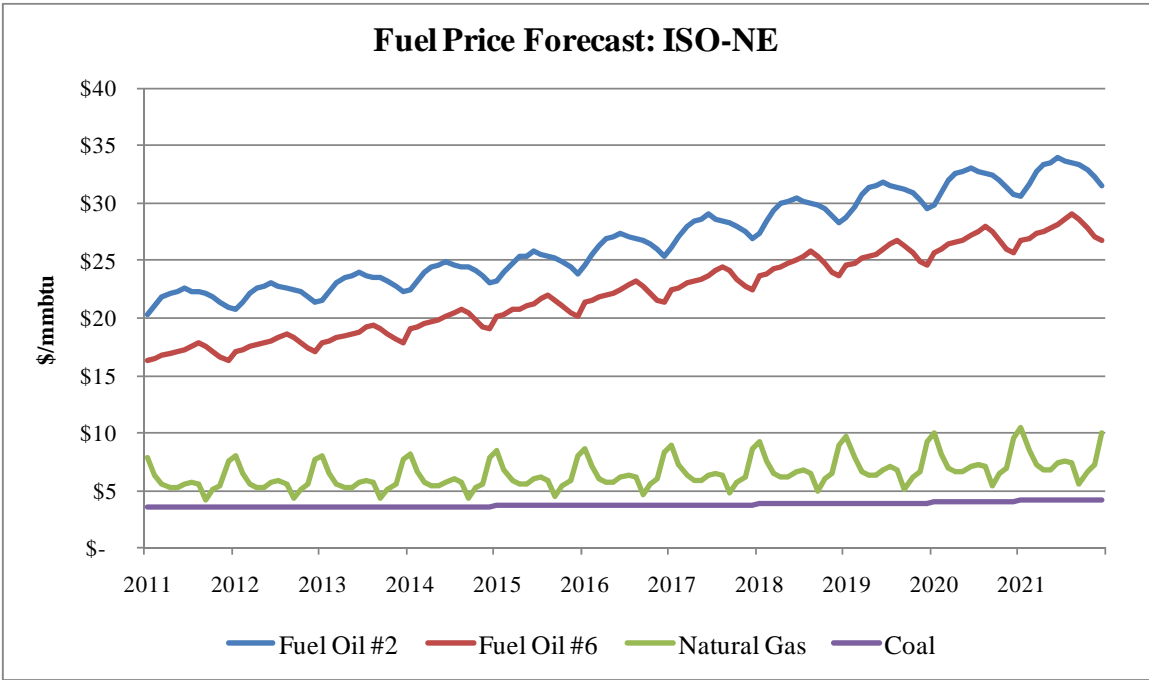


Figure C-4: Forecasted Fuel prices for ISO-NE (nominal \$)

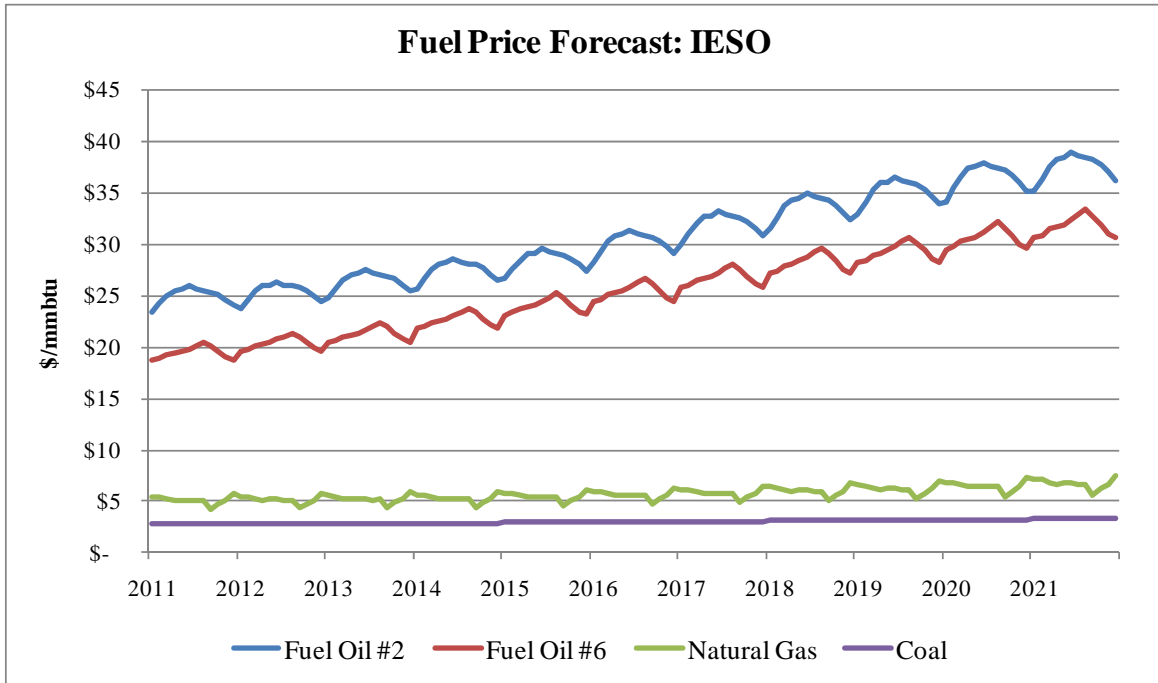


Figure C-5: Forecasted Fuel prices for IESO (nominal \$)



## Fuel Switching

Fuel switching capability is widespread within NYCA. In the NYCA, 38% of the 2011 generating capacity, or 14,275 MW, has the ability to burn either oil or gas. Figure C-6<sup>1</sup> shows the historic relative fuel prices for 2006 -2011.

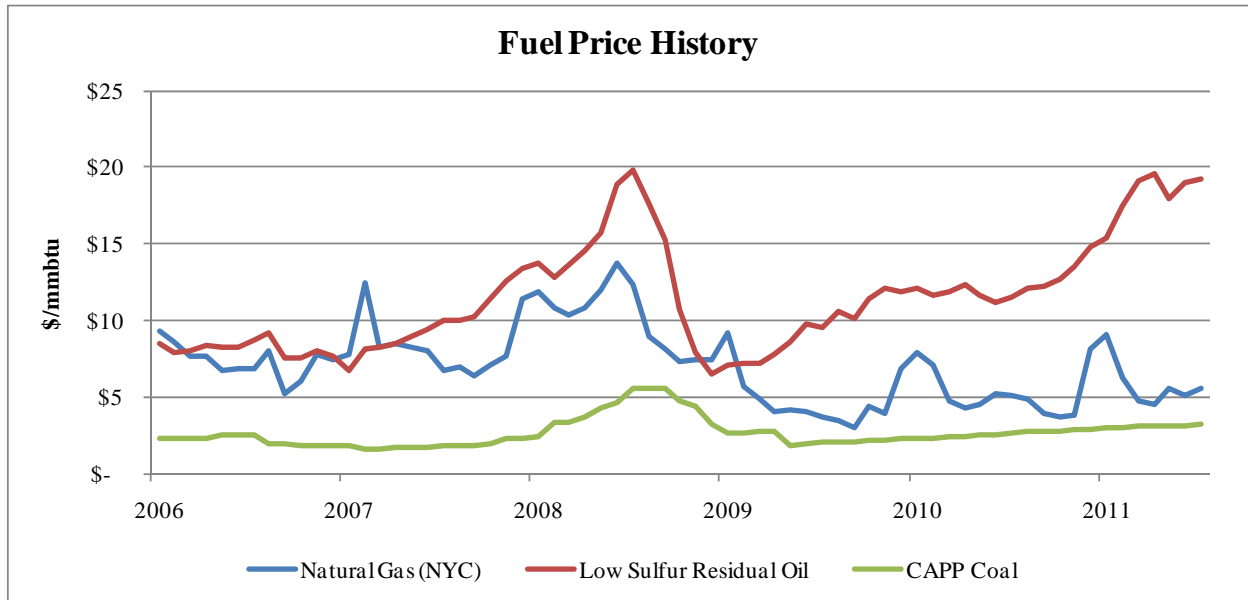


Figure C-6: Historical Natural Gas, Low-Sulfur Residual Oil and Coal (nominal \$)

The production-cost simulation model selects the economic fuel based on weekly production costs for units with dual-fuel capability.

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 critical gas supply facilities. The loss of a gas facility may lead 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 single gas system contingency these units stay on-line at minimum

<sup>1</sup> Sources for the data are as follows: Natural Gas – monthly averages of daily prices for Transco Zone 6 (NY) from ICE; Coal – weekly prices for Central Appalachia 12,500 BTU, 1.2 SO<sub>2</sub>; Residual Oil – monthly average of daily prices published by Platts and Bloomberg.

generation levels and support system voltage. 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. 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, both Ravenswood ST3 and Northport ST4 are modeled to burn oil for the first 3 dispatch points during the Summer Capability Period (736 MW and 249 MW respectively). During the winter and above the 3rd power point they are allowed to switch economically.

### **Generation Maintenance**

Modeling modifications were made to large units in NY to reflect updated outage rates and scheduled maintenance. The MAPS scheduling process was employed to achieve a leveled amount of reserves throughout the year in NY. Other than these changes, the process used to model maintenance was consistent with the 2009 process, which is described below.

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.

### **5. Generic Solution Cost Matrix**

The NYISO defined generic solutions to alleviate congestion by utilizing each resource type (generation, transmission, and demand response), as required by the Tariff, Attachment Y, Section 31.3.1.3.3. Estimates included in the Generic Solution Cost Matrix should not be utilized for purposes outside of the CARIS generic solution 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 estimates.

The development of the generic solutions and their costs was 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 order of magnitude costs for each resource type. 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 in each area. All cost estimates were reviewed by the Transmission Owners and other NYISO stakeholders at ESPWG.

Transmission costs estimates were updated based on current Transmission Owner cost estimates.

Generation costs estimates were based on available NYISO consultant estimates for developing new combined cycle units in Zones F and J. The combined cycle generator plant costs for Zone G (exclusive of interconnection costs) were estimated to be the average of the generation costs for Upstate and Downstate. (Additional information to be provided).

The demand response resource type costs were based on New York utility EEPS filings for their Demand Side Management programs. This customer installed cost approach provides the improved methodology suggested in the 2009 CARIS report.

Generic solutions cost matrix and assumptions for all three types of solutions are presented in Table C-7 through Table C-10 below.

Table C-7: Transmission Cost Matrix

**Base Case Modeling Assumptions for 2011-2020 CARIS Phase 1  
Generic Transmission Cost Matrix  
Order of Magnitude Unit Prices**

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

Cost Range	Zone	Transmission				Substation	System Upgrade Facilities (\$M)
		Line System Voltage (kV)	Block Capacity (MVA)	Construction Type	Transmission Cost (\$M/Mile)	Line Terminal Addition per Substation (\$M)	
High	Zone A-G	345	1000	Overhead	\$7.3	\$9	\$9
Mid	Zone A-G	345	1000	Overhead	\$5	\$6	\$6
Low	Zone A-G	345	1000	Overhead	\$2	\$3	\$3
High	Zone H-J	345	600	Undergrd	\$30	\$30	\$30
Mid	Zone H-J	345	600	Undergrd	\$27	\$25	\$20
Low	Zone H-J	345	600	Undergrd	\$24	\$20	\$10
High	Zone K	138	500	Undergrd	\$20	\$20	\$25
Mid	Zone K	138	500	Undergrd	\$15	\$12	\$15
Low	Zone K	138	500	Undergrd	\$10	\$4	\$5

**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 discussions 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.
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 potential 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-8: Generation Cost Matrix

**Base Case Modeling Assumptions for 2011-2020 CARIS Phase 1  
Generic Generation Cost Matrix  
Order of Magnitude Unit Costs**  
**(Estimates should not be assumed reflective or predictive of actual project costs)**

<b>Cost Range</b>	<b>Plant Location</b>	<b>Plant Block Size Capacity (MW)</b>	<b>Plant Cost per Block Size* (\$M)</b>
High	Zone A-F	500	\$850
Mid	Zone A-F	500	\$696
Low	Zone A-F	500	\$543
High	Zone G	500	\$994
Mid	Zone G	500	\$811
Low	Zone G	500	\$628
High	Zone H-J	500	\$1,139
Mid	Zone H-J	500	\$926
Low	Zone H-J	500	\$712

\* Costs are based on a 547 MW block size.

**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 based upon NYISO filings at FERC and Consultant estimates.***

**2. It is assumed that the plant will be gas combined cycle type. Configured as a 2 x 2 x1 7FA.05 block with selective catalytic reduction (SCRs), total generation 500MW.**

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.

Table C-9: Generator Cost per Unit - 2010 Price Level

<b>GENERATOR COST PER UNIT - 2010 DC Reset Cost Estimates (\$M)</b>						
<b>Zone</b>	<b>Size</b>	<b>Combined Cycle</b>	<b>EPC Costs</b>	<b>Non-EPC Costs</b>	<b>Total</b>	<b>Unit Cost \$/kW</b>
UPSTATE (Capital-F)	547 MW	2 X 2 X 1 7FA.05	\$613	\$149	\$762	\$1,393
Zone G	547 MW	2 X 2 X 1 7FA.05	\$719	\$169	\$888	\$1,623
DOWNSTATE (NYC-J)	547 MW	2 X 2 X 1 7FA.05	\$825	\$188	\$1,013	\$1,853

Table C-10: Demand Response Cost Matrix

<b>Base Case Modeling Assumptions for 2011-2020 CARIS Phase 1                      Generic Demand Response Cost Matrix                      Order of Magnitude Unit Costs</b> <i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>				
<b>Cost Range</b>	<b>Zone</b>	<b>Demand Response Quantity (MW)</b>	<b>Portfolio Type</b>	<b>Total Portfolio Cost (\$M)</b>
High	Zone A-G	100	Energy Efficiency	280
Mid	Zone A-G	100	Energy Efficiency	225
Low	Zone A-G	100	Energy Efficiency	170
High	Zone A-G	100	Demand Response	56
Mid	Zone A-G	100	Demand Response	45
Low	Zone A-G	100	Demand Response	33
High	Zone H-J	100	Energy Efficiency	350
Mid	Zone H-J	100	Energy Efficiency	280
Low	Zone H-J	100	Energy Efficiency	210
High	Zone H-J	100	Demand Response	68
Mid	Zone H-J	100	Demand Response	55
Low	Zone H-J	100	Demand Response	41
High	Zone K	100	Energy Efficiency	285
Mid	Zone K	100	Energy Efficiency	228
Low	Zone K	100	Energy Efficiency	170
High	Zone K	100	Demand Response	86
Mid	Zone K	100	Demand Response	70
Low	Zone K	100	Demand Response	52

**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.*
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. The “Mid” range is derived from the utility filings. The “High” and “Low” are plus and minus 25%, respectively.
6. 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 (MAPS, PROBE)

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Production cost simulation software is the primary analytical tool utilized in the CARIS process. The software performs a security constrained economic dispatch to minimize the production cost to meet load.

#### **MAPS – General Electric’s Market Analysis and Portfolio Simulation**

In conducting the 2011 CARIS analysis the NYISO utilized GE MAPS as the production cost simulation software. MAPS software mimics the operation of the NYISO Day-Ahead electricity market by simulating 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. MAPS features 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 HVDC lines. MAPS software models voltage and stability considerations through operating nomograms that define how voltage and stability 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.** 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 inputs 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**

PROBE software, developed by PowerGEM 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.

PROBE software emulates the Day-Ahead Market (DAM) SCUC operation by using a similar Linear Programming-based optimization 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. In addition, PROBE conducts an unconstrained simulation by removing 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 SCUC operation, including, but not limited to, rules on co-optimization of energy and ancillary services, market mitigation, and marginal losses.

The major difference between MAPS results and PROBE results is that 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; and (f) co-optimization with ancillary services.

## **D.2. Modeling Validation**

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### **Database Verification**

To verify the CARIS database, the NYISO conducted a data and modeling verification process in conjunction with GE. First, the NYISO Planning Staff reviewed all input data and program parameters. After Staff completed its review, modifications and any necessary corrections, the base cases were sent to GE for further verification.

The following topics were examined as part of data verification:

- Forecasts of load data for NYISO zones and external areas (externals);
- Transmission Losses, Spinning Reserves and Thermal Unit Commitment Options
- Transmission interface transfer limits, contingencies and nomograms;
- Hurdle Rates;
- Generator incremental heat rates and emissions rates;
- Modeling of combined cycle units;
- Fuel price forecasts;

- Modeling of pumped storage and hydro units; and,
- Accuracy of generator size, type and location

GE reviewed all the warnings created by the programs to ensure that the results were not affected. Any discrepancies noted by GE were corrected by NYISO as necessary. After the development of the scenarios, similar data verification was performed by the NYISO Staff and any changes made were reviewed by GE. All of these changes were accomplished before the finalization of the base case.

## Appendix E –Detailed Results of 2011 CARIS Phase 1

### E.1. Congestion Assessment – Historic and Projected

One of the features of a Locational Based Marginal Price (LBMP) 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 component – marginal electricity cost without the adjusted cost of congestion and losses;
2. Congestion component – the cost of out-of merit generation dispatch relative to an assumed unconstrained reference point at Marcy substation; and
3. Losses component – the cost for supplying the losses from the accessible marginal generators to a specific point on the grid.

#### E.1.1. Historic Congestion Assessment

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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 calculation does not incorporate the effect of supply and demand response when congestion is removed; and
2. 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.

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 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. The simulation performs a security constrained unit commitment for the market “as it was”, then removes all transmission constraints. Other 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. For more information or source of historical results below see:

[http://www.nyiso.com/public/markets\\_operations/services/planning/documents/index.jsp](http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jsp)

### Historic Congestion Results

The historic congestion analysis results for a constrained system (base case) are presented in Tables E-1 through E-3.

Table E-1: Historic Congestion Demand\$ Payments (2006-2010) by Zone (nominal \$M)

Zone	2006	2007	2008	2009	2010
West	1	(14)	(25)	(14)	(1)
Genesee	2	(14)	(9)	4	6
Central	4	9	18	8	11
North	0	0	(2)	(3)	(1)
Mohawk Valley	2	5	10	4	5
Capital	27	74	143	53	62
Hudson Valley	54	87	176	57	73
Millwood	27	31	78	16	23
Dunwoodie	44	56	124	41	49
NY City	673	700	1403	503	560
Long Island	708	518	624	274	350
<b>NYCA Total</b>	<b>1,542</b>	<b>1,508</b>	<b>2,613</b>	<b>977</b>	<b>1,141</b>

Reported values do not deduct TCCs.

NYCA totals represent the sum of absolute values.

DAM data include Virtual Bidding & Transmission planned outages.

Table E-2: Historic Generator Payments (2006-2010) by Zone (nominal \$M)

<b>Zone</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
West	1,530	1,630	1,701	835	1,035
Genesee	418	491	476	273	334
Central	1,612	1,753	1,825	1,062	1,280
North	633	659	779	393	406
Mohawk Valley	230	206	234	107	110
Capital	704	883	1,175	593	788
Hudson Valley	533	571	532	214	207
Millwood	1,145	1,252	1,725	773	887
Dunwoodie	56	39	39	28	11
NY City	1,895	2,072	2,405	1,125	1,369
Long Island	1,485	1,282	1,286	516	782
<b>NYCA Total</b>	<b>10,241</b>	<b>10,840</b>	<b>12,178</b>	<b>5,919</b>	<b>7,209</b>

DAM data include Virtual bidding & Transmission planned outages.  
Reported values are exclusive of BPCG and Ancillary services.

Table E-3: Historic Load Payments (2006-2010) by Zone (nominal \$M)

<b>Zone</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
West	1,061	511	629	511	629
Genesee	754	435	520	435	520
Central	1,060	569	726	569	726
North	474	193	183	193	183
Mohawk Valley	469	256	313	256	313
Capital	1,008	508	578	508	578
Hudson Valley	1,114	496	630	496	630
Millwood	385	132	168	132	168
Dunwoodie	706	315	375	315	375
NYCity	5,919	2,753	3,305	2,753	3,305
Long Island	2,535	1,231	1,577	1,231	1,577
<b>NYCA Total</b>	<b>15,485</b>	<b>7,397</b>	<b>9,005</b>	<b>7,397</b>	<b>9,005</b>

DAM data include Virtual bidding & Transmission planned outages.

## **E.1.2. Projected Congestion Assessment**

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### **CARIS Metrics**

In conducting the CARIS analysis, seven metrics are used. The primary metric is the production cost metric. Other additional metrics that are included in this report 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 cost (fuel consumption mmBtu multiplied by fuel cost \$/mmBtu);
2. Variable O&M cost (VOM adder \$/MWh);
3. Emission cost (emission allowance price multiplied by total allowance);
4. Start-up Costs (number of starts multiplied by start-up cost); and
5. NYCA Imports and Exports evaluated at the proxy buses LBMP values.

### **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 = (Shadow Price x (Zone Generation Shift Factor (GSF) x Zone Load)).

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

### **3. Generator Payment Metric**

Generator payment represents zonal LBMP based payment to generators located in a zone. The hourly payment to each generator is 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 = summation for all hours (constrained element MW x Shadow Price \$/MW).

Total congestion rent = Summation for all congestion rent values for all system constraints.

## **6. ICAP Metric**

When a generator, transmission line, or demand response/energy efficiency project is built to relieve transmission congestion, the general consequence is a reduction in system production costs. A secondary effect that one of these projects may cause is to reduce the Installed Capacity (ICAP) costs for the entire NY control area. This appendix section serves to describe the methodology and present the detailed results for the quantification of ICAP savings achieved by three types of generic congestion solutions in the CARIS process.

Calculations used to determine ICAP savings are described in NYISO OATT Attachment Y Section 31.3.1.3.5.6. Information regarding the determination of the currently published NYISO ICAP demand curve is beyond the scope of this document and can be found in the NYISO Installed Capacity Manual<sup>2</sup>.

The NYISO has three separate capacity zones: New York City (NYC), Long Island (LI), and NYCA. The demand curves are used to set the clearing price for existing generation capacity in the capacity market auctions. Locational capacity requirements are inherent within each demand curve so as to meet reliability criteria.

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<sup>2</sup> NYISO Installed Capacity Manual, [http://www.nyiso.com/public/webdocs/products/icap/icap\\_manual/icap\\_mnl.pdf](http://www.nyiso.com/public/webdocs/products/icap/icap_manual/icap_mnl.pdf)



The NYISO OATT describes two savings calculation variants for evaluating the ICAP cost savings potentially associated with CARIS project solutions. Both of these methods utilize the most recent ICAP demand curves, escalated to the study year for each locality studied. To escalate each of the three demand curves, a single escalation percentage is chosen and applied to the ICAP Based Reference Points and ICAP Based Maximum Clearing Price, which define the demand curve. For the 2011 CARIS cycle an escalation percentage of 1.7% was chosen consistent with the current demand curves. It is necessary to perform 10 years of escalation, one for each study year, in order to perform savings calculations for each year. The points on the demand curves set for each study year are based upon the load and capacity for each locality. The set of projected demand curves for the 10 year study period serve as the basis for both ICAP savings calculations. Before calculating these potential savings under these two methods, the MW impact of the potential solution is determined as described in the next paragraph.

The MW impact is indicative of reduced installed capacity requirement made possible by the congestion mitigation solutions. The megawatt impact, will be computed based on a methodology that: (1) determines the base system loss of load expectation (“LOLE”) for the applicable horizon year (2020); (2) adds the proposed economic project; and (3) calculates the LOLE for the system with the addition of the proposed economic project. If the system LOLE is lower than that of the base system, the procedure is to reduce generation in all New York Control Area (“NYCA”) zones proportionally (*i.e.*, based on proportion of zonal capacity to total NYCA capacity) until the base system LOLE (2020 LOLE of 0.004) is achieved. That amount of reduced generation capacity is the megawatt impact.

The two variants for savings calculations can be better defined and understood by looking at the ICAP Demand Curve diagram below, Figure E-1.

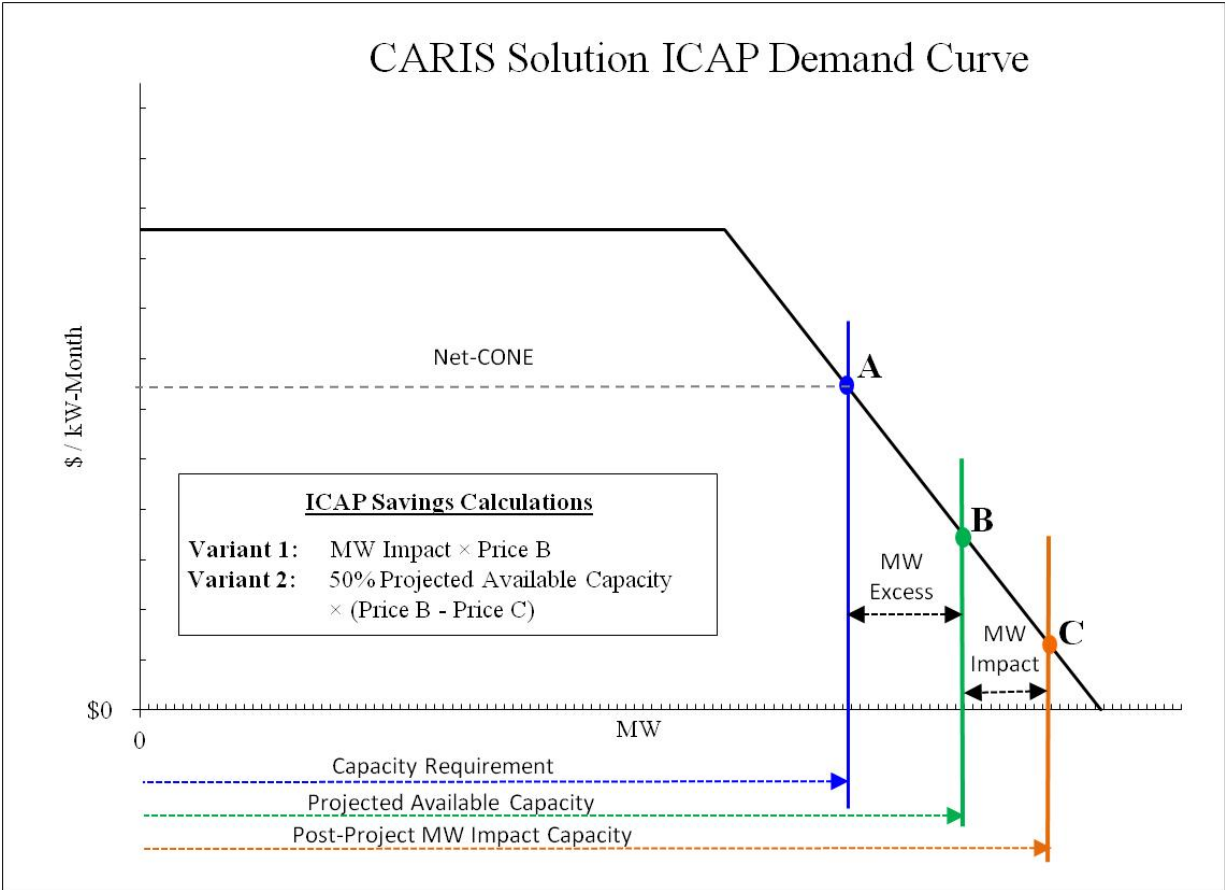


Figure 1: ICAP Savings Calculation Diagram

Figure E-1: CARIS ICAP Demand Curve

Variant #1 of the ICAP savings calculation can now be determined by simply multiplying the MW Impact values in the table above with the pre-project capacity price of the demand curve for the corresponding study year. The MW Impact values are also used to calculate the post-project capacity price for Variant #2, which is then subtracted from the pre-project price and multiplied by 50% of the projected available capacity for the three capacity zones in that year. The results of these calculations for all 10 years of the CARIS study are contained in the Tables E-4 and E-5 below.

Table E-4: ICAP Costs Savings - Variant 1

<b>CARIS I 2011 ICAP Variant #1 Savings Calculations (2011 Present Value M\$)</b>													
<b>Study</b>	<b>Solution</b>	<b>Capacity Zone</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>10-Year Total</b>
<b>Study #1 Central East-New Scotland- Pleasant Valley</b>	Transmission	ROS:	1	0	0	2	2	3	4	6	8	10	37
		NYC:	9	3	0	1	1	1	2	4	6	7	33
		LI:	0	1	1	1	1	2	2	2	3	3	16
		<b>Total:</b>	<b>10</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>86</b>
	Generation	ROS:	3	0	0	3	4	5	8	11	15	18	68
		NYC:	16	5	0	1	1	2	4	8	10	13	60
		LI:	1	1	2	2	3	4	4	4	5	5	31
		<b>Total:</b>	<b>19</b>	<b>6</b>	<b>2</b>	<b>7</b>	<b>8</b>	<b>11</b>	<b>16</b>	<b>23</b>	<b>30</b>	<b>36</b>	<b>160</b>
	DR/EE (F & G)	ROS:	1	0	0	1	1	1	2	3	4	5	18
NYC:		4	1	0	0	0	1	1	2	3	3	16	
LI:		0	0	1	1	1	1	1	1	1	1	8	
<b>Total:</b>		<b>5</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>43</b>	
<b>Study #2 New Scotland- Pleasant Valley</b>	Transmission	ROS:	1	0	0	2	2	3	4	6	8	10	37
		NYC:	9	3	0	1	1	1	2	4	6	7	33
		LI:	0	1	1	1	1	2	2	2	3	3	16
		<b>Total:</b>	<b>10</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>86</b>
	Generation	ROS:	3	0	0	3	4	5	8	11	15	18	68
		NYC:	16	5	0	1	1	2	4	8	10	13	60
		LI:	1	1	2	2	3	4	4	4	5	5	31
		<b>Total:</b>	<b>19</b>	<b>6</b>	<b>2</b>	<b>7</b>	<b>8</b>	<b>11</b>	<b>16</b>	<b>23</b>	<b>30</b>	<b>36</b>	<b>160</b>
	DR/EE (G & I)	ROS:	1	0	0	1	2	2	3	5	6	8	29
NYC:		7	2	0	0	1	1	2	3	4	5	26	
LI:		0	1	1	1	1	1	2	2	2	2	13	
<b>Total:</b>		<b>8</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>7</b>	<b>10</b>	<b>13</b>	<b>15</b>	<b>67</b>	
<b>Study #3 Leeds- Pleasant Valley</b>	Transmission	ROS:	1	0	0	2	2	3	4	6	8	10	37
		NYC:	9	3	0	1	1	1	2	4	6	7	33
		LI:	0	1	1	1	1	2	2	2	3	3	16
		<b>Total:</b>	<b>10</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>86</b>
	Generation	ROS:	3	0	0	3	4	5	8	11	15	18	68
		NYC:	16	5	0	1	1	2	4	8	10	13	60
		LI:	1	1	2	2	3	4	4	4	5	5	31
		<b>Total:</b>	<b>19</b>	<b>6</b>	<b>2</b>	<b>7</b>	<b>8</b>	<b>11</b>	<b>16</b>	<b>23</b>	<b>30</b>	<b>36</b>	<b>160</b>
	DR/EE (G & I)	ROS:	1	0	0	1	2	2	3	5	6	8	29
NYC:		7	2	0	0	1	1	2	3	4	5	26	
LI:		0	1	1	1	1	1	2	2	2	2	13	
<b>Total:</b>		<b>8</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>7</b>	<b>10</b>	<b>13</b>	<b>15</b>	<b>67</b>	

Table E-5: ICAP Costs Savings - Variant 2

CARIS I 2011 ICAP Variant #2 Savings Calculations (2011 Present Value M\$)													
Study	Solution	Capacity Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10-Year Total
<b>Study #1</b> Central East-New Scotland- Pleasant Valley	Transmission	ROS:	37	1	3	48	62	75	81	76	71	67	522
		NYC:	82	81	1	18	24	35	61	57	53	50	464
		LI:	9	21	27	26	24	23	21	20	19	18	208
		<b>Total:</b>	<b>129</b>	<b>103</b>	<b>32</b>	<b>92</b>	<b>110</b>	<b>133</b>	<b>164</b>	<b>153</b>	<b>143</b>	<b>134</b>	<b>1,193</b>
	Generation	ROS:	37	1	3	48	62	75	107	141	132	124	731
		NYC:	153	84	1	18	24	35	80	106	99	93	694
		LI:	9	21	35	40	45	42	40	37	35	33	337
		<b>Total:</b>	<b>199</b>	<b>107</b>	<b>40</b>	<b>106</b>	<b>131</b>	<b>152</b>	<b>226</b>	<b>285</b>	<b>266</b>	<b>249</b>	<b>1,762</b>
	DR/EE (F & G)	ROS:	37	1	3	48	45	43	40	38	36	33	326
NYC:		41	40	1	18	17	23	31	29	27	25	253	
LI:		9	15	14	13	12	11	11	10	9	9	112	
<b>Total:</b>		<b>88</b>	<b>56</b>	<b>18</b>	<b>79</b>	<b>75</b>	<b>77</b>	<b>82</b>	<b>77</b>	<b>72</b>	<b>67</b>	<b>691</b>	
<b>Study #2</b> New Scotland- Pleasant Valley	Transmission	ROS:	37	1	3	48	62	75	81	76	71	67	522
		NYC:	82	81	1	18	24	35	61	57	53	50	464
		LI:	9	21	27	26	24	23	21	20	19	18	208
		<b>Total:</b>	<b>129</b>	<b>103</b>	<b>32</b>	<b>92</b>	<b>110</b>	<b>133</b>	<b>164</b>	<b>153</b>	<b>143</b>	<b>134</b>	<b>1,193</b>
	Generation	ROS:	37	1	3	48	62	75	107	141	132	124	731
		NYC:	153	84	1	18	24	35	80	106	99	93	694
		LI:	9	21	35	40	45	42	40	37	35	33	337
		<b>Total:</b>	<b>199</b>	<b>107</b>	<b>40</b>	<b>106</b>	<b>131</b>	<b>152</b>	<b>226</b>	<b>285</b>	<b>266</b>	<b>249</b>	<b>1,762</b>
	DR/EE (G & I)	ROS:	37	1	3	48	62	67	63	60	56	53	451
NYC:		65	63	1	18	24	33	48	45	42	39	378	
LI:		9	21	21	20	19	18	17	16	15	14	170	
<b>Total:</b>		<b>111</b>	<b>86</b>	<b>26</b>	<b>86</b>	<b>105</b>	<b>118</b>	<b>129</b>	<b>120</b>	<b>113</b>	<b>106</b>	<b>999</b>	
<b>Study #3</b> Leeds- Pleasant Valley	Transmission	ROS:	37	1	3	48	62	75	81	76	71	67	522
		NYC:	82	81	1	18	24	35	61	57	53	50	464
		LI:	9	21	27	26	24	23	21	20	19	18	208
		<b>Total:</b>	<b>129</b>	<b>103</b>	<b>32</b>	<b>92</b>	<b>110</b>	<b>133</b>	<b>164</b>	<b>153</b>	<b>143</b>	<b>134</b>	<b>1,193</b>
	Generation	ROS:	37	1	3	48	62	75	107	141	132	124	731
		NYC:	153	84	1	18	24	35	80	106	99	93	694
		LI:	9	21	35	40	45	42	40	37	35	33	337
		<b>Total:</b>	<b>199</b>	<b>107</b>	<b>40</b>	<b>106</b>	<b>131</b>	<b>152</b>	<b>226</b>	<b>285</b>	<b>266</b>	<b>249</b>	<b>1,762</b>
	DR/EE (G & I)	ROS:	37	1	3	48	62	67	63	60	56	53	451
NYC:		65	63	1	18	24	33	48	45	42	39	378	
LI:		9	21	21	20	19	18	17	16	15	14	170	
<b>Total:</b>		<b>111</b>	<b>86</b>	<b>26</b>	<b>86</b>	<b>105</b>	<b>118</b>	<b>129</b>	<b>120</b>	<b>113</b>	<b>106</b>	<b>999</b>	

The base case that was used for LOLE calculations was the 2010 NYISO Reliability Needs Assessment (RNA) base case. Updates were made to match with the capacity resources contained in the production cost simulation base case. A series of project cases was created to simulate transmission, generation, and demand response/energy efficiency projects. To simulate the three transmission project cases, the following changes to interface transfer limits were made, as indicated in Table E-6.

Table E-6: MARS Interface Modifications for ICAP Calculations

<b>CARIS ICAP MARS Transfer Limits for Key Interfaces (MW)</b>				
<b>MARS Interface</b>	<b>Basecase</b>	<b>CE-NS-PV Solution</b>	<b>NS-PV Solution</b>	<b>LE-PV Solution</b>
CENTRAL EAST	3350	3950*	3450**	3350
F TO G	3500	3900	3900	3900
UPNYSENY	5475	6275	6275	6275
TOTAL EAST	6925	7525	7025	6925
*600 MW Added to Nomogram Limits **100 MW Added to Nomogram Limits				

To simulate the generation project case, 1000 MW of capacity was added to Zone G. The demand response and energy efficiency project cases were created by adding 100 MW of SCR generation and 100 MW load modifiers to Zones F & G or G & I, depending upon the study.

After the base case and project case LOLE values were determined, capacity was removed from each NYISO zone in the each project case, based on the zonal total capacity ratio, until the base case LOLE was reached. The resultant amount of capacity removed is equivalent to the MW Impact of that project case. The MW Impact results for each of the project cases, for the 2020 study year are presented in Table E-7.

Table E-7: ICAP MW Impact

<b>Study</b>	<b>Solutions</b>	<b>2020 MW Impact (MW)</b>			
		<b>ROS</b>	<b>NYC</b>	<b>LI</b>	<b>Total</b>
<b>Study 1: Central East-New Scotland-Pleasant Valley</b>	Transmission	443	161	96	<b>700</b>
	Generation	824	299	177	<b>1300</b>
	Demand Response	222	80	48	<b>350</b>
<b>Study 2: New Scotland-Pleasant Valley</b>	Transmission	443	161	96	<b>700</b>
	Generation	824	299	177	<b>1300</b>
	Demand Response	348	126	75	<b>550</b>
<b>Study 3: Leeds-Pleasant Valley</b>	Transmission	443	161	96	<b>700</b>
	Generation	824	299	177	<b>1300</b>
	Demand Response	348	126	75	<b>550</b>

## CARIS Base Case Metrics Results

When comparing historic PROBE values of congestion and other metrics with the projected CARIS values, it is important to note that there are significant differences in assumptions used by these tools. MAPS, unlike PROBE, 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) BPCG payments; and (f) co-optimization with ancillary services.

The detailed projected CARIS base case results are presented in Tables E-8 through E-21. Table E-8 below presents the summation of the NYCA zonal base case results for the ten-year study period.

Table E-8: Projected CARIS Base Case Results 2011-2020 (Nominal \$M)

Base Case Summary	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NYCA-Wide Production Costs (\$M)	4,386	5,035	5,186	5,378	5,631	5,909	6,145	6,434	6,765	7,134
NYCA Demand\$ Congestion (\$M)	709	646	670	636	672	740	796	929	1,023	1,098
Load LBMP Payments (\$M)	7,853	8,765	9,027	9,376	9,822	10,412	10,823	11,348	11,905	12,536
Generator LBMP Payments (\$M)	6,461	7,310	7,488	7,794	8,126	8,775	9,108	9,494	9,907	10,362
Load Pmts Lossess (\$M)	418	462	476	500	523	575	599	631	665	707
SO <sub>2</sub> Costs (\$M)	4	9	9	8	8	9	9	10	10	11
SO <sub>2</sub> Emissions (Tons)	39,817	29,062	28,308	26,072	24,708	26,773	27,450	28,728	29,322	29,525
CO <sub>2</sub> Costs (\$M)	87	397	482	568	644	765	827	897	972	1,048
CO <sub>2</sub> Emissions ('000s Tons)	39,817	29,062	28,308	26,072	24,708	26,773	27,450	28,728	29,322	29,525
NO <sub>x</sub> Costs (\$M)	16	19	26	36	35	37	37	38	39	40
NO <sub>x</sub> Emissions (Tons)	26,753	23,591	23,299	22,762	22,072	22,995	23,302	23,864	24,160	24,334
LBMP (\$/MWh)	47	52	54	56	58	62	64	66	69	72
TCC Payments - Congestion Rents (\$M)	927	828	847	855	880	926	954	1,052	1,105	1,164

Table E-9: Projected Production Costs (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	360	404	411	419	416	438	458	484	502	517
Genesee	31	36	36	36	37	37	37	38	38	39
Central	480	546	558	587	602	637	656	675	698	720
North	13	15	15	19	20	23	23	23	22	23
Mohawk Valley	4	4	4	5	5	5	5	4	4	4
Capital	766	898	921	963	1,007	1,059	1,103	1,154	1,200	1,258
Hudson Valley	110	86	84	82	83	99	112	133	148	165
Millwood	116	132	134	136	138	140	141	143	145	147
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	1,196	1,446	1,467	1,529	1,608	1,803	1,874	1,939	2,039	2,139
Long Island	454	508	528	543	571	640	663	697	735	771
<b>NYCA-wide</b>	<b>4,386</b>	<b>5,035</b>	<b>5,186</b>	<b>5,378</b>	<b>5,631</b>	<b>5,909</b>	<b>6,145</b>	<b>6,434</b>	<b>6,765</b>	<b>7,134</b>

Table E-10: Projected Load Payments (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	583	661	676	705	734	761	782	800	827	855
Genesee	410	464	478	500	524	550	572	593	619	649
Central	670	758	779	816	853	893	921	949	984	1,024
North	216	281	292	306	324	343	358	371	388	408
Mohawk Valley	312	350	362	377	394	415	429	443	461	481
Capital	524	579	597	617	646	684	707	734	767	801
Hudson Valley	530	587	607	630	661	703	731	764	801	840
Millwood	151	167	172	178	187	200	208	220	231	244
Dunwoodie	320	352	362	374	391	416	433	458	482	510
NY City	2,893	3,187	3,275	3,388	3,545	3,770	3,923	4,153	4,382	4,640
Long Island	1,244	1,378	1,428	1,484	1,563	1,678	1,761	1,863	1,964	2,084
<b>Total NYCA</b>	<b>7,853</b>	<b>8,765</b>	<b>9,027</b>	<b>9,376</b>	<b>9,822</b>	<b>10,412</b>	<b>10,823</b>	<b>11,348</b>	<b>11,905</b>	<b>12,536</b>

Table E-11: Projected Generator Payments (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1,027	1,111	1,131	1,160	1,184	1,240	1,285	1,334	1,380	1,428
Genesee	187	212	217	227	238	249	257	265	274	287
Central	1,202	1,369	1,406	1,476	1,543	1,637	1,692	1,751	1,817	1,896
North	327	370	380	400	419	443	457	471	487	509
Mohawk Valley	122	138	143	149	155	163	169	174	181	188
Capital	909	1,072	1,100	1,153	1,203	1,284	1,333	1,388	1,441	1,504
Hudson Valley	169	123	121	118	120	139	156	183	201	222
Millwood	780	861	885	915	958	1,019	1,056	1,104	1,151	1,202
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1,246	1,513	1,545	1,616	1,697	1,918	1,991	2,071	2,180	2,287
Long Island	491	541	560	579	609	683	711	753	795	839
<b>Total NYCA</b>	<b>6,461</b>	<b>7,310</b>	<b>7,488</b>	<b>7,794</b>	<b>8,126</b>	<b>8,775</b>	<b>9,108</b>	<b>9,494</b>	<b>9,907</b>	<b>10,362</b>

Table E-12: Projected Generator GWh

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	26,143	24,879	24,644	24,213	23,584	23,661	23,733	23,908	23,863	23,799
Genesee	4,678	4,694	4,679	4,681	4,680	4,692	4,675	4,676	4,675	4,690
Central	28,778	29,222	29,155	29,532	29,430	29,750	29,684	29,647	29,660	29,703
North	8,024	8,061	8,038	8,095	8,105	8,164	8,131	8,108	8,084	8,114
Mohawk Valley	2,988	2,988	2,992	2,998	2,986	2,984	2,982	2,983	2,983	2,981
Capital	19,341	20,759	20,710	20,964	20,958	21,221	21,241	21,312	21,278	21,357
Hudson Valley	3,142	1,992	1,913	1,768	1,709	1,898	2,056	2,324	2,463	2,605
Millwood	15,763	15,789	15,763	15,763	15,764	15,789	15,762	15,763	15,763	15,789
Dunwoodie	6	6	6	6	6	6	6	6	6	6
NY City	23,052	25,819	25,603	25,957	26,044	27,904	27,830	27,542	27,767	27,825
Long Island	8,454	8,612	8,675	8,659	8,683	9,240	9,219	9,281	9,392	9,440
<b>Total NYCA</b>	<b>140,369</b>	<b>142,821</b>	<b>142,178</b>	<b>142,636</b>	<b>141,947</b>	<b>145,306</b>	<b>145,319</b>	<b>145,550</b>	<b>145,933</b>	<b>146,309</b>

Table E-13: Projected Loss Payments (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(39)	(35)	(35)	(35)	(35)	(44)	(46)	(48)	(50)	(52)
Genesee	(9)	(9)	(9)	(8)	(9)	(12)	(12)	(13)	(13)	(14)
Central	5	8	9	10	10	9	9	9	10	10
North	(2)	(1)	(1)	(1)	(1)	(2)	(2)	(1)	(1)	(1)
Mohawk Valley	10	12	12	13	13	14	14	14	15	16
Capital	21	22	22	23	25	28	29	29	31	32
Hudson Valley	38	42	43	45	47	52	54	57	59	62
Millwood	12	13	14	14	15	17	18	18	19	21
Dunwoodie	26	28	29	30	31	35	36	38	40	42
NY City	246	263	269	280	290	327	340	359	379	403
Long Island	110	119	123	129	135	151	158	167	177	189
<b>Total NYCA</b>	<b>418</b>	<b>462</b>	<b>476</b>	<b>500</b>	<b>523</b>	<b>575</b>	<b>599</b>	<b>631</b>	<b>665</b>	<b>707</b>

Table E-14: Projected SO<sub>2</sub> Emission Costs (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	2.06	4.83	4.77	4.45	4.22	4.51	4.66	4.79	4.90	4.90
Genesee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central	0.14	0.07	0.08	0.07	0.06	0.08	0.08	0.10	0.11	0.12
North	0.04	0.12	0.13	0.13	0.14	0.19	0.20	0.21	0.21	0.20
Mohawk Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
Hudson Valley	1.13	1.81	1.80	1.59	1.54	1.84	2.08	2.52	2.77	3.01
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	0.02	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.11	0.11
Long Island	0.58	1.77	1.82	1.85	1.89	2.12	2.16	2.24	2.32	2.41
<b>Total NYCA</b>	<b>3.98</b>	<b>8.72</b>	<b>8.70</b>	<b>8.22</b>	<b>7.98</b>	<b>8.87</b>	<b>9.32</b>	<b>9.99</b>	<b>10.46</b>	<b>10.79</b>



Table E-15: Projected SO<sub>2</sub> Emission Tons (2011-2020) by Zone

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	20,617	16,098	15,502	14,119	13,052	13,627	13,726	13,779	13,741	13,418
Genesee	0	0	0	0	0	0	0	0	0	0
Central	1,357	236	247	220	200	227	245	279	303	319
North	354	389	415	412	446	560	577	593	600	554
Mohawk Valley	37	3	3	8	8	3	3	3	3	8
Capital	66	72	71	73	72	74	74	74	74	74
Hudson Valley	11,314	6,046	5,840	5,054	4,777	5,543	6,142	7,254	7,765	8,236
Millwood	12	12	12	12	12	12	12	12	12	12
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	234	291	289	293	292	319	315	307	314	313
Long Island	5,825	5,914	5,928	5,878	5,849	6,408	6,355	6,426	6,509	6,590
<b>Total NYCA</b>	<b>39,817</b>	<b>29,062</b>	<b>28,308</b>	<b>26,072</b>	<b>24,708</b>	<b>26,773</b>	<b>27,450</b>	<b>28,728</b>	<b>29,322</b>	<b>29,525</b>

Table E-16: Projected CO<sub>2</sub> Emission Costs (2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	22.4	90.9	109.0	122.6	131.2	150.5	164.0	179.9	192.7	204.4
Genesee	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
Central	8.2	33.4	41.1	50.0	56.7	67.0	72.4	78.4	85.0	91.2
North	0.2	1.2	1.4	2.1	2.6	3.3	3.4	3.3	3.3	3.7
Mohawk Valley	0.1	0.3	0.3	0.5	0.5	0.6	0.6	0.5	0.5	0.6
Capital	16.2	81.5	99.6	119.8	137.9	157.8	169.9	183.4	197.0	212.7
Hudson Valley	5.5	14.4	16.9	17.7	19.5	25.5	30.3	38.1	43.9	50.3
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	25.1	129.9	157.2	188.4	218.3	266.3	286.0	304.6	330.8	356.7
Long Island	9.6	45.6	56.5	66.5	77.0	93.8	100.6	109.0	119.0	128.4
<b>Total NYCA</b>	<b>87</b>	<b>397</b>	<b>482</b>	<b>568</b>	<b>644</b>	<b>765</b>	<b>827</b>	<b>897</b>	<b>972</b>	<b>1,048</b>

Table E-17: Projected CO<sub>2</sub> Emission '000's Tons (2011-2020) by Zone

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	10,464	9,090	8,897	8,452	7,832	7,919	8,026	8,190	8,167	8,057
Genesee	3	5	4	5	5	3	3	3	2	3
Central	3,830	3,342	3,353	3,450	3,383	3,526	3,546	3,570	3,600	3,596
North	112	121	118	147	153	172	165	152	139	146
Mohawk Valley	37	30	28	32	30	29	27	25	23	24
Capital	7,551	8,148	8,134	8,263	8,232	8,305	8,318	8,350	8,349	8,385
Hudson Valley	2,570	1,440	1,377	1,223	1,164	1,340	1,484	1,736	1,860	1,982
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	11,710	12,986	12,830	12,996	13,035	14,016	13,999	13,873	14,016	14,060
Long Island	4,479	4,564	4,612	4,584	4,598	4,939	4,923	4,963	5,041	5,062
<b>Total NYCA</b>	<b>40,758</b>	<b>39,725</b>	<b>39,353</b>	<b>39,153</b>	<b>38,431</b>	<b>40,251</b>	<b>40,490</b>	<b>40,861</b>	<b>41,198</b>	<b>41,314</b>

Table E-18: Projected NOx Emission Costs 2011-2020) by Zone (nominal \$M)

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6.1	7.3	9.9	13.8	13.0	13.0	13.2	13.4	13.5	13.7
Genesee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	1.4	1.1	1.6	2.3	2.2	2.3	2.4	2.5	2.6	2.7
North	0.2	0.3	0.4	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Mohawk Valley	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Capital	0.6	0.8	1.1	1.6	1.5	1.5	1.5	1.5	1.5	1.5
Hudson Valley	2.2	1.7	2.2	2.9	2.8	3.2	3.5	4.1	4.4	4.8
Millwood	0.6	0.8	1.2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	1.4	2.0	2.7	4.0	4.0	4.5	4.5	4.4	4.5	4.6
Long Island	3.4	4.6	6.3	9.2	9.2	9.6	9.6	9.7	9.8	10.1
<b>Total NYCA</b>	<b>16.1</b>	<b>18.9</b>	<b>25.6</b>	<b>36.4</b>	<b>35.3</b>	<b>36.8</b>	<b>37.3</b>	<b>38.2</b>	<b>39.0</b>	<b>40.3</b>

Table E-19: Projected NOx in Tons (2011-2020) by Zone

Zone	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	10,130	9,130	8,974	8,646	8,108	8,134	8,225	8,376	8,347	8,264
Genesee	6	7	6	7	7	6	6	6	6	6
Central	2,348	1,418	1,437	1,411	1,360	1,436	1,473	1,541	1,592	1,612
North	393	396	396	400	402	409	408	407	405	405
Mohawk Valley	227	228	226	229	228	227	225	223	222	222
Capital	920	966	961	972	942	931	928	926	927	926
Hudson Valley	3,635	2,109	2,003	1,795	1,720	1,983	2,197	2,552	2,728	2,919
Millwood	1,046	1,049	1,046	1,046	1,046	1,049	1,046	1,046	1,046	1,050
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	2,359	2,545	2,483	2,518	2,521	2,799	2,797	2,753	2,799	2,803
Long Island	5,687	5,743	5,764	5,738	5,738	6,021	5,996	6,034	6,089	6,127
<b>Total NYCA</b>	<b>26,753</b>	<b>23,591</b>	<b>23,299</b>	<b>22,762</b>	<b>22,072</b>	<b>22,995</b>	<b>23,302</b>	<b>23,864</b>	<b>24,160</b>	<b>24,334</b>

Table E-20: Projected TCC Payments (nominal \$M)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Total Congestion Rents</b>	927	828	847	855	880	926	954	1,052	1,105	1,164

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

Table E-21: Projected Zonal LBMP \$/MWh (2011-2020) by Zone

<b>Zone</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
West	39.87	45.44	46.74	48.88	51.21	53.44	55.28	57.04	59.16	61.41
Genesee	41.48	46.86	48.18	50.26	52.65	55.14	57.07	58.91	61.12	63.57
Central	42.79	48.34	49.74	51.85	54.30	57.12	59.16	61.16	63.47	66.04
North	41.03	46.52	47.86	49.91	52.27	54.94	56.93	58.82	61.03	63.50
Mohawk Valley	43.75	49.28	50.71	52.82	55.30	58.23	60.33	62.40	64.78	67.42
Capital	47.85	52.77	54.29	56.15	58.77	62.24	64.52	67.09	69.76	72.59
Hudson Valley	50.06	55.21	56.82	58.74	61.47	65.24	67.69	70.60	73.56	76.67
Millwood	50.95	56.02	57.65	59.55	62.32	66.19	68.70	71.76	74.83	78.03
Dunwoodie	51.20	56.26	57.90	59.79	62.57	66.47	68.99	72.08	75.17	78.40
NY City	51.88	56.94	58.64	60.59	63.39	67.31	69.88	73.05	76.23	79.57
Long Island	54.44	59.88	61.70	63.90	66.92	70.99	73.90	77.28	80.63	84.29
<b>NYCA Avg. LBMP</b>	<b>46.85</b>	<b>52.14</b>	<b>53.66</b>	<b>55.68</b>	<b>58.29</b>	<b>61.57</b>	<b>63.86</b>	<b>66.38</b>	<b>69.07</b>	<b>71.95</b>

## **E.2. Selection of Three Studies**

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

In Step 1, both historic (5 years) and projected (10 years) congested elements for the fifteen- 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 (thus indicating a diminishing return), then that element is removed from the list and is no longer considered for further analysis. The remaining top congested elements (up to five) are then further considered as primary elements for inclusion in Step 2.

In Step 2, the top congested elements from Step 1 are relieved independently to determine if any needs to be grouped with other elements that show significant congestion when a primary element is relieved. The top congested elements are relieved by increasing their limit to 9999 MW for a mid and horizon year. In addition, the impedance of the circuit is reduced to reflect the impact of a new parallel circuit. 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-22 shows the Demand\$ congestion for the base case and the relaxation cases for year 2015 and 2020.

Table E-22: Demand\$ Congestion Results for Relaxation of Top Congested Elements

Total Congestion Demand\$ (M\$)	Type	2015					2020				
		BASE CASE	Relax Leeds-Pleasant Valley	Relax Central East (CE)	Relax CE-New Scotland-LdsPV	Relax - New Scotland-LdsPV	BASE CASE	Relax Leeds-Pleasant Valley	Relax Central East (CE)	Relax CE-New Scotland-LdsPV	Relax - New Scotland-LdsPV
LEEDS-PLSNTVLY	Contingency	205	-	304	-	-	377	-	554	-	-
CENTRAL EAST	Interface	212	295	-	-	337	329	465	-	-	551
DUNWOODIE_SHORE RD_345	Contingency	57	66	56	78	68	80	90	77	109	95
GREENWOOD LINES	Contingency	13	12	12	14	12	19	19	19	20	18
WEST CENTRAL-OP*	Interface	2	3	8	13	2	9	10	18	29	10
GOTHLA A - GOWANUSS	Contingency	5	3	5	3	3	8	6	8	5	5
LEEDS3_NEW SCOTLAND_345	Contingency	-	53	5	-	-	-	138	7	-	-

\*The absolute value of congestion is reported.

Table E-23 shows the change in production cost when the top elements are relieved. Central East-New Scotland-Pleasant Valley, New Scotland-Pleasant Valley, and Leeds-Pleasant Valley have the highest production cost savings, and are therefore selected as the three studies.

Table E-23: Production Cost Savings (nominal \$M) Due to Relaxation of Primary Elements

Elements	2015	2020
CE-NS-PV	49.5	71.5
NS-PV	20.4	31.4
LEEDS-PLSNTVLY	17.7	26.5
DUNWOODIE_SHORE RD_345	10.2	5.6
CENTRAL EAST	15.1	13.8
GREENWOOD LINES	3.2	5.5
GOTHLA A - GOWANUSS	3.3	3.5
WEST CENTRAL-OP	0.5	0.1

## E.3. Generic Solutions

### Modeling Modifications

The NYISO developed generic solutions for each of the three studies. The generic solutions are each added to the base case in order to determine the impact on congestion for the grouped elements in each study. It is assumed that each of the generic solutions is installed in the first study year (2011). This assumption allows for the calculation of the full ten-year production cost and additional metrics resulting from the generic solution. The transfer limits were adjusted as necessary in the generic solution cases.

For each study, one block of transmission (>1000MW), two blocks of generation (1000MW), and two blocks of demand response (400MW) were implemented after considering

whether a majority of the congestion on the grouped elements being studied could be relieved and whether diminishing returns could be realized from implementing additional blocks.

Disclaimers:

- Other solutions may exist which will better alleviate the congestion on the studied elements.
- 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.

**Study1: Central East-New Scotland-Pleasant Valley**

Table E-24 below presents the change in the number of congested hours by constraints after the generic solution has been applied. Negative values indicate a reduction in congested hours. Detailed results for all CARIS metrics, representing the change between the base case values and the values after the three generic solutions have been applied, are presented in Attachment H.

Table E-24: Change in Number of Congested Hours

Study 1: Central East - New Scotland - Pleasant Valley										
	Change in # of Congested Hours: Transmission Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(1,707)	(1,592)	(1,618)	(1,665)	(1,683)	(1,694)	(1,681)	(1,811)	(1,833)	(1,948)
CENTRAL EAST	(322)	(388)	(370)	(422)	(363)	(445)	(546)	(539)	(511)	(548)
DUNWOODIE-SHORE ROAD	442	322	276	263	258	291	279	282	290	319
GREENWOOD LINES	372	419	314	367	333	156	294	210	215	233
WEST CENTRAL-OP	311	642	671	528	552	580	523	581	501	432
GOTHALS-GOWANUS	104	111	92	96	111	(8)	89	(30)	81	91
LEEDS3_NEW SCOTLAND_345	(1)	(12)	(19)	(11)	(12)	(19)	(27)	(25)	(37)	(20)
ASTORIAW 138_HG5_138	(343)	(302)	(249)	(259)	(264)	(267)	(247)	(307)	(329)	(307)
	Change in # of Congested Hours: Generation Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(856)	(743)	(765)	(817)	(817)	(853)	(780)	(820)	(817)	(869)
CENTRAL EAST	30	(38)	32	41	(18)	20	(13)	(115)	(121)	19
DUNWOODIE-SHORE ROAD	350	254	200	188	201	248	235	221	218	241
GREENWOOD LINES	408	471	530	593	559	604	651	523	602	474
WEST CENTRAL-OP	(10)	(104)	(126)	(70)	(87)	(77)	(63)	(130)	(142)	(24)
GOTHALS-GOWANUS	(108)	(192)	(207)	(196)	(253)	(446)	(322)	(423)	(397)	(264)
LEEDS3_NEW SCOTLAND_345	(1)	(12)	(12)	(10)	(11)	(18)	(26)	(20)	(29)	(13)
ASTORIAW 138_HG5_138	(610)	(682)	(726)	(606)	(592)	(689)	(728)	(779)	(764)	(639)
	Change in # of Congested Hours: Demand Response Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	26	104	100	86	77	64	88	134	114	142
CENTRAL EAST	(37)	(110)	(72)	(82)	(102)	(63)	(106)	(99)	(94)	(84)
DUNWOODIE-SHORE ROAD	46	26	29	20	23	26	29	17	5	15
GREENWOOD LINES	(11)	59	12	98	63	79	60	68	28	29
WEST CENTRAL-OP	(2)	(20)	(43)	(24)	(36)	(23)	(20)	(17)	(15)	(7)
GOTHALS-GOWANUS	33	(22)	(37)	(76)	(9)	(59)	(13)	(109)	(42)	1
LEEDS3_NEW SCOTLAND_345	0	9	0	0	3	4	8	10	2	4
ASTORIAW 138_HG5_138	(41)	(49)	(33)	(84)	(84)	(68)	(67)	(104)	(106)	(30)

Note: Negative values imply a reduction.

## Study 2: New Scotland-Pleasant Valley

Table E-25 below presents the change in the number of congested hours by constraints after the generic solution has been applied. Negative values indicate a reduction in congested hours. Detailed results for all CARIS metrics, representing the change between the base case values and the values after the three generic solutions have been applied, are presented in Attachment H.

Table E-25: Change in Number of Congested Hours

Study 2: New Scotland - Pleasant Valley										
	Change in # of Congested Hours: Transmission Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(1,757)	(1,652)	(1,687)	(1,722)	(1,740)	(1,758)	(1,757)	(1,891)	(1,935)	(2,055)
CENTRAL EAST	249	347	326	413	421	414	339	388	400	437
DUNWOODIE-SHORE ROAD	395	295	258	235	225	259	262	272	284	301
GREENWOOD LINES	180	177	177	152	170	91	125	41	143	161
WEST CENTRAL-OP	48	122	130	137	134	172	148	152	155	154
GOTHALS-GOWANUS	(4)	46	(2)	37	45	(13)	(40)	(88)	(11)	28
LEEDS3_NEW SCOTLAND_345	(1)	(12)	(19)	(11)	(12)	(19)	(27)	(25)	(37)	(20)
ASTORIAW 138_HG5_138	(319)	(243)	(202)	(228)	(221)	(212)	(237)	(299)	(297)	(321)
	Change in # of Congested Hours: Generation Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(856)	(743)	(765)	(817)	(817)	(853)	(780)	(820)	(817)	(869)
CENTRAL EAST	30	(38)	32	41	(18)	20	(13)	(115)	(121)	19
DUNWOODIE-SHORE ROAD	350	254	200	188	201	248	235	221	218	241
GREENWOOD LINES	408	471	530	593	559	604	651	523	602	474
WEST CENTRAL-OP	(10)	(104)	(126)	(70)	(87)	(77)	(63)	(130)	(142)	(24)
GOTHALS-GOWANUS	(108)	(192)	(207)	(196)	(253)	(446)	(322)	(423)	(397)	(264)
LEEDS3_NEW SCOTLAND_345	(1)	(12)	(12)	(10)	(11)	(18)	(26)	(20)	(29)	(13)
ASTORIAW 138_HG5_138	(610)	(682)	(726)	(606)	(592)	(689)	(728)	(779)	(764)	(639)
	Change in # of Congested Hours: Demand Response Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(80)	(39)	(75)	(84)	(58)	(63)	(53)	(59)	(35)	(55)
CENTRAL EAST	(6)	(29)	3	15	(46)	(3)	(23)	(20)	(9)	22
DUNWOODIE-SHORE ROAD	75	68	49	42	42	55	61	30	41	33
GREENWOOD LINES	43	21	3	107	79	77	72	59	49	72
WEST CENTRAL-OP	4	(22)	(38)	(26)	(31)	(21)	(19)	(28)	(26)	(21)
GOTHALS-GOWANUS	8	(43)	(65)	(46)	6	(35)	(11)	(118)	(33)	(33)
LEEDS3_NEW SCOTLAND_345	(1)	(2)	(4)	(2)	(7)	(5)	(5)	0	(7)	0
ASTORIAW 138_HG5_138	(68)	(77)	(75)	(111)	(113)	(91)	(109)	(114)	(131)	(44)

Note: Negative values imply a reduction.

## Study 3: Leeds - Pleasant Valley

Table E-26 below presents the change in the number of congested hours by constraint after the generic solution has been applied. Negative values indicate a reduction in congested hours. Detailed results for all CARIS metrics, representing the change between the base case values and the values after the three generic solutions have been applied, are presented in Attachment H.

Table E-26: Change in Number of Congested Hours

Study 3: Leeds - Pleasant Valley										
	Change in # of Congested Hours: Transmission Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(1,830)	(1,710)	(1,770)	(1,811)	(1,843)	(1,866)	(1,881)	(2,048)	(2,131)	(2,261)
CENTRAL EAST	316	398	372	425	477	464	380	406	377	436
DUNWOODIE-SHORE ROAD	279	211	165	153	157	171	185	177	165	193
GREENWOOD LINES	89	67	68	33	71	23	73	(8)	102	135
WEST CENTRAL-OP	7	24	(8)	31	50	67	23	2	5	(17)
GOTHALS-GOWANUS	9	(16)	(11)	39	(7)	(3)	(49)	(101)	(14)	54
LEEDS3_NEW SCOTLAND_345	659	604	646	675	692	719	780	909	1,010	1,073
ASTORIAW 138_HG5_138	(278)	(233)	(177)	(180)	(172)	(166)	(202)	(180)	(239)	(209)
	Change in # of Congested Hours: Generation Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(856)	(743)	(765)	(817)	(817)	(853)	(780)	(820)	(817)	(869)
CENTRAL EAST	30	(38)	32	41	(18)	20	(13)	(115)	(121)	19
DUNWOODIE-SHORE ROAD	350	254	200	188	201	248	235	221	218	241
GREENWOOD LINES	408	471	530	593	559	604	651	523	602	474
WEST CENTRAL-OP	(10)	(104)	(126)	(70)	(87)	(77)	(63)	(130)	(142)	(24)
GOTHALS-GOWANUS	(108)	(192)	(207)	(196)	(253)	(446)	(322)	(423)	(397)	(264)
LEEDS3_NEW SCOTLAND_345	(1)	(12)	(12)	(10)	(11)	(18)	(26)	(20)	(29)	(13)
ASTORIAW 138_HG5_138	(610)	(682)	(726)	(606)	(592)	(689)	(728)	(779)	(764)	(639)
	Change in # of Congested Hours: Demand Response Solution									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LEEDS-PLEASANT VALLEY	(80)	(39)	(75)	(84)	(58)	(63)	(53)	(59)	(35)	(55)
CENTRAL EAST	(6)	(29)	3	15	(46)	(3)	(23)	(20)	(9)	22
DUNWOODIE-SHORE ROAD	75	68	49	42	42	55	61	30	41	33
GREENWOOD LINES	43	21	3	107	79	77	72	59	49	72
WEST CENTRAL-OP	4	(22)	(38)	(26)	(31)	(21)	(19)	(28)	(26)	(21)
GOTHALS-GOWANUS	8	(43)	(65)	(46)	6	(35)	(11)	(118)	(33)	(33)
LEEDS3_NEW SCOTLAND_345	(1)	(2)	(4)	(2)	(7)	(5)	(5)	0	(7)	0
ASTORIAW 138_HG5_138	(68)	(77)	(75)	(111)	(113)	(91)	(109)	(114)	(131)	(44)

Note: Negative values imply a reduction.

## E.4. Benefit/Cost Analysis

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



Table E-27: Generic Solution Costs for Each Study (\$M)

<b>Generic Solution Cost Summary (\$M)</b>			
	<b>Study 1:</b>	<b>Study 2:</b>	<b>Study 3:</b>
<b>Studies</b>	<b>Central East-New Scotland-Pleasant Valley</b>	<b>New Scotland- Pleasant Valley</b>	<b>Leeds - Pleasant Valley</b>
<b>Transmission</b>			
Substation Terminals	Edic to New Scotland to Pleasant Valley	New Scotland to Pleasant Valley	Leeds to Pleasant Valley
Miles (# of terminals)	155 (3)	65 (2)	39 (2)
High	\$1,168	\$502	\$312
Mid	\$799	\$343	\$213
Low	\$322	\$139	\$87
<b>Generation</b>			
Substation Terminal	Pleasant Valley	Pleasant Valley	Pleasant Valley
# of 500 MW Blocks	2	2	2
High	\$1,988	\$1,988	\$1,988
Mid	\$1,622	\$1,622	\$1,622
Low	\$1,256	\$1,256	\$1,256
<b>Demand Response</b>			
Zone	F & G	G&I	G&I
# of 200 MW Blocks	2	2	2
High	\$672	\$754	\$754
Mid	\$540	\$605	\$605
Low	\$406	\$454	\$454

Table E-28: Generic Solutions for Study 1: Central East to New Scotland to Pleasant Valley

<b>Generic Solution</b>			
<b>Study 1: Central East-New Scotland-Pleasant Valley</b>			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
<b>Transmission Solution: Edic to New Scotland to Pleasant Valley</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Transmission Line (Miles)	155	\$7.3	\$1,131.5
Substation Line Terminal	3	\$9	\$27.0

System Upgrade	1	\$9	\$9.0
<b>Total High Transmission Solution Cost</b>			<b>\$1,168</b>
<b>Mid</b>			
Transmission Line (Miles)	155	\$5	\$775.0
Substation Line Terminal	3	\$6	\$18.0
System Upgrade	1	\$6	\$6.0
<b>Total Mid Transmission Solution Cost</b>			<b>\$799</b>
<b>Low</b>			
Transmission Line (Miles)	155	\$2	\$310.0
Substation Line Terminal	3	\$3	\$9.0
System Upgrade	1	\$3	\$3.0
<b>Total Low Transmission Solution Cost</b>			<b>\$322</b>
<b>Generation Solution: Pleasant Valley</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Plant in Zone G (500 MW Blocks)	2	\$994	\$1,988
<b>Total High Generation Solution Cost</b>			<b>\$1,988</b>
<b>Mid</b>			
Plant in Zone G (500 MW Blocks)	2	\$811	\$1,622
<b>Total Mid Generation Solution Cost</b>			<b>\$1,622</b>
<b>Low</b>			
Plant in Zone G (500 MW Blocks)	2	\$628	\$1,256
<b>Total Low Generation Solution Cost</b>			<b>\$1,256</b>
<b>Demand Response Solution: Zone F &amp; G</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Energy Efficiency (100 MW Blocks)	2	\$280	\$560
Demand Response (100 MW Blocks)	2	\$56	\$112
<b>Total High Demand Response Solution Costs</b>			<b>\$672</b>
<b>Mid</b>			
Energy Efficiency (100 MW Blocks)	2	\$225	\$450
Demand Response (100 MW Blocks)	2	\$45	\$90
<b>Total Mid Demand Response Solution Costs</b>			<b>\$540</b>

<b>Low</b>			
Energy Efficiency (100 MW Blocks)	2	\$170	\$340
Demand Response (100 MW Blocks)	2	\$33	\$66
<b>Total Low Demand Response Solution Costs</b>			<b>\$406</b>

Table E-29: Generic Solutions for Study 2: New Scotland- Pleasant Valley

<b>Generic Solution</b>			
<b>Study 2: New Scotland-Pleasant Valley</b>			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
<b>Transmission Solution: New Scotland to Pleasant Valley</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Transmission Line (Miles)	65	\$7.3	\$474.5
Substation Line Terminal	2	\$9	\$18.0
System Upgrade	1	\$9	\$9.0
<b>Total High Transmission Solution Cost</b>			<b>\$502</b>
<b>Mid</b>			
Transmission Line (Miles)	65	\$5	\$325.0
Substation Line Terminal	2	\$6	\$12.0
System Upgrade	1	\$6	\$6.0
<b>Total Mid Transmission Solution Cost</b>			<b>\$343</b>
<b>Low</b>			
Transmission Line (Miles)	65	\$2	\$130.0
Substation Line Terminal	2	\$3	\$6.0
System Upgrade	1	\$3	\$3.0
<b>Total Low Transmission Solution Cost</b>			<b>\$139</b>
<b>Generation Solution: Pleasant Valley</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Plant in Zone G (500 MW Blocks)	2	\$994	\$1,988
<b>Total High Generation Solution Cost</b>			<b>\$1,988</b>
<b>Mid</b>			
Plant in Zone G (500 MW Blocks)	2	\$811	\$1,622
<b>Total Mid Generation Solution Cost</b>			<b>\$1,622</b>

<b>Low</b>			
Plant in Zone G (500 MW Blocks)	2	\$628	\$1,256
<b>Total Low Generation Solution Cost</b>			<b>\$1,256</b>
<b>Generic Demand Response Solution: Zone G and I</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Energy Efficiency in Zone G (100 MW Blocks)	1	\$280	\$280
Demand Response in Zone G (100 MW Blocks)	1	\$56	\$56
Energy Efficiency in Zone I (100 MW Blocks)	1	\$350	\$350
Demand Response in Zone I (100 MW Blocks)	1	\$68	\$68
<b>Total High Demand Response Solution Costs</b>			<b>\$754</b>
<b>Mid</b>			
Energy Efficiency (100 MW Blocks)	1	\$225	\$225
Demand Response (100 MW Blocks)	1	\$45	\$45
Energy Efficiency in Zone I (100 MW Blocks)	1	\$280	\$280
Demand Response in Zone I (100 MW Blocks)	1	\$55	\$55
<b>Total Mid Demand Response Solution Costs</b>			<b>\$605</b>
<b>Low</b>			
Energy Efficiency (100 MW Blocks)	1	\$170	\$170
Demand Response (100 MW Blocks)	1	\$33	\$33
Energy Efficiency in Zone I (100 MW Blocks)	1	\$210	\$210
Demand Response in Zone I (100 MW Blocks)	1	\$41	\$41
<b>Total Low Demand Response Solution Costs</b>			<b>\$454</b>

Table E-30: Generic Solutions for Study 3: Leeds-Pleasant Valley

<b>Generic Solution</b>			
<b>Study 3: Leeds - Pleasant Valley</b>			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
<b>Transmission Solution: Leeds - Pleasant Valley</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Transmission Line (Miles)	39	\$7.3	\$284.7
Substation Line Terminal	2	\$9	\$18.0

System Upgrade	1	\$9	\$9.0
<b>Total High Transmission Solution Cost</b>			<b>\$312</b>
<b>Mid</b>			
Transmission Line (Miles)	39	\$5	\$195.0
Substation Line Terminal	2	\$6	\$12.0
System Upgrade	1	\$6	\$6.0
<b>Total Mid Transmission Solution Cost</b>			<b>\$213</b>
<b>Low</b>			
Transmission Line (Miles)	39	\$2	\$78.0
Substation Line Terminal	2	\$3	\$6.0
System Upgrade	1	\$3	\$3.0
<b>Total Low Transmission Solution Cost</b>			<b>\$87</b>
<b>Generation Solution: Pleasant Valley</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Plant in Zone G (500 MW Blocks)	2	\$994	\$1,988
<b>Total High Generation Solution Cost</b>			<b>\$1,988</b>
<b>Mid</b>			
Plant in Zone G (500 MW Blocks)	2	\$811	\$1,622
<b>Total Mid Generation Solution Cost</b>			<b>\$1,622</b>
<b>Low</b>			
Plant in Zone G (500 MW Blocks)	2	\$628	\$1,256
<b>Total Low Generation Solution Cost</b>			<b>\$1,256</b>
<b>Demand Response Solution: Zone G &amp; I</b>			
<b>Cost Range</b>	<b>Quantity</b>	<b>Unit Pricing (\$M)</b>	<b>Total (\$M)</b>
<b>High</b>			
Energy Efficiency (100 MW Blocks)	1	\$280	\$280
Demand Response (100 MW Blocks)	1	\$56	\$56
Energy Efficiency in Zone I (100 MW Blocks)	1	\$350	\$350
Demand Response in Zone I (100 MW Blocks)	1	\$68	\$68
<b>Total High Demand Response Solution Costs</b>			<b>\$754</b>
<b>Mid</b>			
Energy Efficiency (100 MW Blocks)	1	\$225	\$225
Demand Response (100 MW Blocks)	1	\$45	\$45
Energy Efficiency in Zone I (100 MW Blocks)	1	\$280	\$280

Demand Response in Zone I (100 MW Blocks)	1	\$55	\$55
<b>Total High Demand Response Solution Costs</b>			<b>\$605</b>
<b>Low</b>			
Energy Efficiency (100 MW Blocks)	1	\$170	\$170
Demand Response (100 MW Blocks)	1	\$33	\$33
Energy Efficiency in Zone I (100 MW Blocks)	1	\$210	\$210
Demand Response in Zone I (100 MW Blocks)	1	\$41	\$41
<b>Total High Demand Response Solution Costs</b>			<b>\$454</b>

## **Appendix F – Initial CARIS Manual (link)**

[http://www.nyiso.com/public/webdocs/services/planning/initial\\_caris\\_manual\\_bic\\_approved/Initial\\_CARIS\\_Manual.pdf](http://www.nyiso.com/public/webdocs/services/planning/initial_caris_manual_bic_approved/Initial_CARIS_Manual.pdf)

The NYISO's existing CRPP manual and existing Initial CARIS manual are currently being integrated into a single Comprehensive System Planning Process (CSPP) Manual.

## **Appendix G - 2010 RNA and CRP Reports (link)**

The 2010 RNA and CRP reports can be found through the following links:

[http://www.nyiso.com/public/webdocs/services/planning/reliability\\_assessments/2010\\_Reliability\\_Needs\\_Assessment\\_Final\\_Report\\_September\\_2010.pdf](http://www.nyiso.com/public/webdocs/services/planning/reliability_assessments/2010_Reliability_Needs_Assessment_Final_Report_September_2010.pdf)

[http://www.nyiso.com/public/webdocs/services/planning/reliability\\_assessments/CRP\\_2010\\_FINAL\\_REPORT\\_January\\_11\\_2011.pdf](http://www.nyiso.com/public/webdocs/services/planning/reliability_assessments/CRP_2010_FINAL_REPORT_January_11_2011.pdf)

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## 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 \$M and are calculated as Solution minus base case. Negative values are shown in red and with brackets (except for tables showing percentage changes) and represent a reduction in costs/payments.

### H.1. Study 1: Central East - New Scotland - Pleasant Valley (CE-NS-PV)

#### Generic Transmission Solution

Projected Changes in Production Cost (\$M) – CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	9	14	14	17	27	25	20	23	23	28
Genesee	0	0	0	1	0	0	1	1	1	1
Central	33	32	31	28	32	36	40	44	47	56
North	6	8	9	8	8	12	15	15	17	16
Mohawk Valley	2	1	1	1	1	1	1	1	1	1
Capital	4	4	5	7	7	6	9	9	11	11
Hudson Valley	(16)	(22)	(20)	(22)	(22)	(23)	(27)	(36)	(40)	(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	(101)	(109)	(101)	(96)	(103)	(103)	(119)	(117)	(132)	(158)
Long Island	(19)	(14)	(13)	(10)	(11)	(13)	(14)	(12)	(17)	(14)
<b>NYCA Total</b>	<b>(80)</b>	<b>(86)</b>	<b>(74)</b>	<b>(68)</b>	<b>(61)</b>	<b>(59)</b>	<b>(74)</b>	<b>(72)</b>	<b>(88)</b>	<b>(97)</b>
<b>NYCA-wide</b>	<b>(47)</b>	<b>(44)</b>	<b>(43)</b>	<b>(43)</b>	<b>(45)</b>	<b>(47)</b>	<b>(51)</b>	<b>(53)</b>	<b>(62)</b>	<b>(66)</b>

Projected Changes in Load LBMP Payment (\$M) – CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	26	20	19	20	17	21	23	24	27	31
Genesee	19	16	15	17	15	18	19	21	24	28
Central	32	28	27	28	26	32	36	38	44	49
North	12	13	13	13	13	15	17	18	21	23
Mohawk Valley	15	13	13	14	13	15	17	18	21	23
Capital	11	9	8	9	9	11	13	13	16	19
Hudson Valley	(8)	(8)	(10)	(7)	(10)	(8)	(8)	(11)	(11)	(10)
Millwood	(4)	(4)	(5)	(4)	(4)	(4)	(4)	(6)	(6)	(6)
Dunwoodie	(9)	(8)	(9)	(8)	(9)	(9)	(8)	(12)	(12)	(12)
NY City	(61)	(57)	(68)	(58)	(70)	(68)	(64)	(93)	(92)	(90)
Long Island	(8)	(8)	(11)	(7)	(11)	(9)	(8)	(18)	(17)	(14)
<b>NYCA Total</b>	<b>25</b>	<b>13</b>	<b>(7)</b>	<b>17</b>	<b>(10)</b>	<b>13</b>	<b>35</b>	<b>(7)</b>	<b>16</b>	<b>41</b>

Projected Changes in Generator LBMP Payment (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	59	51	49	53	58	60	61	64	70	79
Genesee	9	8	7	8	7	8	9	10	11	13
Central	89	83	80	87	86	104	115	122	136	153
North	24	24	24	25	24	30	35	37	42	43
Mohawk Valley	10	8	8	8	7	9	9	10	12	13
Capital	40	34	35	37	38	43	50	53	63	70
Hudson Valley	(22)	(26)	(25)	(25)	(25)	(27)	(32)	(43)	(46)	(44)
Millwood	(15)	(15)	(16)	(14)	(18)	(16)	(15)	(21)	(21)	(21)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(113)	(128)	(128)	(117)	(130)	(129)	(142)	(154)	(166)	(186)
Long Island	(22)	(18)	(18)	(13)	(17)	(18)	(19)	(23)	(26)	(22)
<b>NYCA Total</b>	<b>58</b>	<b>21</b>	<b>16</b>	<b>48</b>	<b>30</b>	<b>65</b>	<b>71</b>	<b>55</b>	<b>74</b>	<b>97</b>

Projected Changes in Congestion Demand (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(1)	3	3	4	4	6	7	8	11	11
Genesee	(1)	1	2	1	2	3	4	5	6	5
Central	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(3)	(3)
North	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(4)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)
Capital	(13)	(12)	(12)	(13)	(12)	(14)	(14)	(17)	(19)	(20)
Hudson Valley	(30)	(27)	(28)	(27)	(27)	(30)	(32)	(38)	(43)	(46)
Millwood	(11)	(10)	(10)	(10)	(10)	(11)	(12)	(14)	(15)	(17)
Dunwoodie	(22)	(19)	(20)	(19)	(19)	(22)	(23)	(27)	(31)	(33)
NY City	(174)	(154)	(159)	(155)	(159)	(178)	(188)	(230)	(255)	(276)
Long Island	(57)	(50)	(50)	(48)	(49)	(57)	(62)	(77)	(86)	(93)
<b>NYCA Total</b>	<b>(313)</b>	<b>(274)</b>	<b>(280)</b>	<b>(272)</b>	<b>(276)</b>	<b>(308)</b>	<b>(327)</b>	<b>(397)</b>	<b>(440)</b>	<b>(476)</b>

Projected Changes in CO2 Cost (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.5	2.9	3.4	4.8	8.7	8.7	7.2	8.5	8.9	10.8
Genesee	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Central	1.0	3.7	4.0	4.1	5.1	6.6	7.6	8.9	9.9	12.5
North	0.1	0.8	1.0	1.0	1.1	1.8	2.3	2.5	2.9	2.7
Mohawk Valley	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3
Capital	0.1	0.3	0.5	0.8	1.0	0.9	1.5	1.5	1.9	1.9
Hudson Valley	(0.5)	(3.1)	(3.5)	(4.0)	(4.2)	(5.0)	(5.8)	(8.6)	(10.0)	(9.4)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(2.0)	(9.4)	(10.4)	(11.4)	(13.3)	(14.5)	(17.6)	(17.7)	(20.5)	(25.4)
Long Island	(0.4)	(1.3)	(1.4)	(1.2)	(1.5)	(1.9)	(2.1)	(1.9)	(2.7)	(2.3)
<b>NYCA Total</b>	<b>(1.1)</b>	<b>(5.9)</b>	<b>(6.3)</b>	<b>(5.7)</b>	<b>(2.9)</b>	<b>(3.0)</b>	<b>(6.6)</b>	<b>(6.5)</b>	<b>(9.4)</b>	<b>(8.8)</b>

Projected Changes in CO2 Emissions (%) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	2.2%	3.2%	3.1%	3.9%	6.7%	5.8%	4.4%	4.7%	4.6%	5.3%
Genesee	102.3%	63.8%	70.2%	94.9%	89.7%	109.1%	165.3%	158.2%	182.9%	157.6%
Central	12.6%	11.1%	9.7%	8.2%	9.0%	9.8%	10.5%	11.4%	11.7%	13.6%
North	57.0%	63.0%	66.1%	48.6%	44.3%	55.7%	68.7%	74.9%	87.1%	74.2%
Mohawk Valley	103.7%	36.3%	30.7%	25.7%	26.6%	34.6%	37.8%	48.9%	47.6%	46.8%
Capital	0.5%	0.4%	0.5%	0.7%	0.7%	0.6%	0.9%	0.8%	1.0%	0.9%
Hudson Valley	-9.9%	-21.5%	-20.6%	-22.6%	-21.7%	-19.4%	-19.2%	-22.5%	-22.7%	-18.7%
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-8.0%	-7.2%	-6.6%	-6.1%	-6.1%	-5.5%	-6.2%	-5.8%	-6.2%	-7.1%
Long Island	-4.1%	-2.8%	-2.5%	-1.8%	-2.0%	-2.0%	-2.1%	-1.8%	-2.3%	-1.8%
<b>NYCA Total</b>	<b>-1.3%</b>	<b>-1.5%</b>	<b>-1.3%</b>	<b>-1.0%</b>	<b>-0.5%</b>	<b>-0.4%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-1.0%</b>	<b>-0.8%</b>

Projected Changes in SO2 Cost (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.06	0.27	0.25	0.29	0.33	0.33	0.34	0.37	0.38	0.44
Genesee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.05
North	0.01	0.04	0.04	0.04	0.04	0.06	0.07	0.07	0.07	0.07
Mohawk Valley	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hudson Valley	(0.08)	(0.33)	(0.32)	(0.30)	(0.27)	(0.28)	(0.31)	(0.47)	(0.53)	(0.45)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Long Island	(0.02)	(0.05)	(0.04)	(0.04)	(0.03)	(0.05)	(0.05)	(0.02)	(0.05)	(0.02)
<b>NYCA Total</b>	<b>0.00</b>	<b>(0.05)</b>	<b>(0.06)</b>	<b>0.01</b>	<b>0.07</b>	<b>0.08</b>	<b>0.07</b>	<b>(0.02)</b>	<b>(0.10)</b>	<b>0.06</b>

Projected Changes in SO2 Emissions (%) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	3.0%	5.6%	5.2%	6.6%	7.7%	7.4%	7.2%	7.8%	7.7%	8.9%
Genesee	8.4%	7.4%	7.4%	11.1%	9.6%	8.6%	10.6%	10.2%	10.2%	11.5%
Central	18.3%	37.2%	21.7%	23.8%	25.6%	31.1%	32.5%	33.7%	32.2%	38.9%
North	38.1%	37.5%	35.1%	30.3%	28.3%	31.3%	35.7%	31.9%	34.9%	32.1%
Mohawk Valley	274.6%	146.0%	3.3%	58.1%	76.8%	277.3%	279.3%	446.1%	382.8%	135.5%
Capital	1.4%	1.3%	1.1%	1.4%	1.4%	1.1%	1.6%	1.5%	1.7%	1.7%
Hudson Valley	-7.4%	-18.2%	-17.7%	-18.9%	-17.6%	-15.3%	-14.8%	-18.5%	-19.3%	-15.0%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-10.0%	-9.7%	-9.4%	-8.5%	-8.5%	-7.9%	-9.0%	-9.5%	-10.6%	-12.0%
Long Island	-3.6%	-2.8%	-2.3%	-1.9%	-1.8%	-2.3%	-2.3%	-1.1%	-2.0%	-1.0%
<b>NYCA Total</b>	<b>0.1%</b>	<b>-0.5%</b>	<b>-0.7%</b>	<b>0.1%</b>	<b>0.9%</b>	<b>0.9%</b>	<b>0.7%</b>	<b>-0.2%</b>	<b>-1.0%</b>	<b>0.6%</b>

Projected Changes in NOx Cost (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.1	0.2	0.2	0.4	0.7	0.6	0.5	0.5	0.5	0.6
Genesee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mohawk Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hudson Valley	(0.3)	(0.4)	(0.5)	(0.7)	(0.6)	(0.7)	(0.8)	(1.0)	(1.1)	(1.0)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.1)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)
Long Island	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
<b>NYCA Total</b>	<b>(0.1)</b>	<b>(0.3)</b>	<b>(0.3)</b>	<b>(0.4)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.6)</b>	<b>(0.3)</b>

Projected Changes in NOx Emissions (%) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1.9%	2.5%	2.4%	3.0%	5.5%	4.7%	3.4%	3.7%	3.7%	4.2%
Genesee	24.3%	17.4%	13.7%	19.7%	18.4%	15.7%	18.4%	18.5%	16.2%	21.9%
Central	14.6%	14.3%	10.4%	9.9%	10.5%	12.3%	13.3%	14.9%	15.0%	19.0%
North	3.5%	3.9%	4.0%	3.6%	3.4%	4.8%	5.6%	5.5%	6.0%	5.3%
Mohawk Valley	6.0%	3.9%	3.5%	2.8%	2.5%	3.1%	3.2%	3.4%	3.2%	3.3%
Capital	1.2%	1.2%	1.2%	1.0%	1.4%	1.5%	1.9%	2.1%	2.2%	2.5%
Hudson Valley	-11.6%	-23.0%	-22.0%	-24.0%	-23.2%	-21.6%	-21.4%	-24.6%	-24.3%	-20.8%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-10.0%	-8.8%	-7.8%	-7.0%	-7.0%	-6.8%	-7.7%	-6.7%	-8.6%	-8.9%
Long Island	-2.3%	-1.6%	-1.5%	-1.1%	-1.1%	-1.3%	-1.3%	-1.1%	-1.4%	-0.9%
<b>NYCA Total</b>	<b>-0.8%</b>	<b>-1.4%</b>	<b>-1.3%</b>	<b>-1.0%</b>	<b>-0.1%</b>	<b>-0.4%</b>	<b>-1.0%</b>	<b>-1.2%</b>	<b>-1.6%</b>	<b>-0.9%</b>

Projected LBMP \$/MWh - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	41.43	46.69	47.94	50.12	52.30	54.73	56.83	58.59	60.90	63.39
Genesee	43.18	48.27	49.53	51.71	53.95	56.65	58.85	60.69	63.19	65.95
Central	44.57	49.90	51.29	53.45	55.79	58.94	61.26	63.39	66.04	68.88
North	43.23	48.55	49.90	52.02	54.29	57.29	59.57	61.63	64.21	67.01
Mohawk Valley	45.62	50.94	52.35	54.54	56.92	60.19	62.57	64.76	67.48	70.42
Capital	48.62	53.42	54.86	56.74	59.37	63.04	65.53	68.05	70.92	73.94
Hudson Valley	49.45	54.58	56.06	58.13	60.71	64.58	67.19	69.78	72.77	75.92
Millwood	49.90	54.98	56.47	58.54	61.14	65.08	67.72	70.36	73.40	76.61
Dunwoodie	50.13	55.21	56.69	58.77	61.37	65.34	67.98	70.66	73.72	76.95
NY City	51.00	56.12	57.63	59.71	62.34	66.30	68.96	71.77	74.95	78.32
Long Island	54.21	59.61	61.35	63.67	66.57	70.72	73.69	76.78	80.17	83.91
<b>NYCA Average</b>	<b>47.39</b>	<b>52.57</b>	<b>54.01</b>	<b>56.13</b>	<b>58.61</b>	<b>62.08</b>	<b>64.56</b>	<b>66.95</b>	<b>69.80</b>	<b>72.85</b>

Projected Changes in Generator GWh - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	237	305	293	347	542	477	371	405	397	442
Genesee	6	6	6	9	7	7	8	7	7	9
Central	762	622	601	509	560	617	659	694	718	814
North	126	149	153	141	133	188	222	222	237	212
Mohawk Valley	41	17	15	13	12	15	16	17	16	17
Capital	36	36	79	138	141	92	145	138	184	173
Hudson Valley	(323)	(377)	(341)	(341)	(318)	(332)	(366)	(487)	(517)	(465)
Millwood	0	0	0	0	0	0	(1)	0	0	1
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,617)	(1,713)	(1,562)	(1,434)	(1,445)	(1,360)	(1,502)	(1,392)	(1,487)	(1,710)
Long Island	(258)	(186)	(169)	(124)	(136)	(146)	(145)	(127)	(162)	(128)
<b>NYCA Total</b>	<b>(989)</b>	<b>(1,140)</b>	<b>(926)</b>	<b>(744)</b>	<b>(504)</b>	<b>(441)</b>	<b>(591)</b>	<b>(523)</b>	<b>(606)</b>	<b>(635)</b>

Projected Changes in Loss Payment (\$M) - CE-NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(6)	(6)	(6)	(6)	(6)	(7)	(7)	(7)	(8)	(8)
Genesee	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)
Central	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)
North	(1)	(1)	(1)	(1)	(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	(3)	(3)	(4)	(4)	(4)	(4)	(5)	(4)	(4)	(4)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)
Dunwoodie	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)
NY City	(15)	(17)	(20)	(19)	(21)	(23)	(22)	(24)	(24)	(23)
Long Island	(5)	(6)	(8)	(7)	(8)	(9)	(9)	(10)	(10)	(9)
<b>NYCA Total</b>	<b>(38)</b>	<b>(43)</b>	<b>(47)</b>	<b>(47)</b>	<b>(50)</b>	<b>(55)</b>	<b>(55)</b>	<b>(58)</b>	<b>(59)</b>	<b>(59)</b>

## Generic Generation Solution

Projected Changes in Production Cost (\$M) - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	0	(2)	(6)	(5)	(9)	(6)	(15)	(14)	(5)
Genesee	(0)	(0)	(0)	0	0	0	0	0	0	0
Central	(3)	(1)	0	(4)	(3)	(8)	(8)	(9)	(13)	(16)
North	(1)	(1)	(2)	(2)	(3)	(4)	(3)	(4)	(3)	(3)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(20)	(19)	(17)	(19)	(19)	(17)	(13)	(10)	(9)	(6)
Hudson Valley	201	247	258	274	290	321	330	344	357	371
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(110)	(140)	(135)	(125)	(137)	(156)	(176)	(183)	(185)	(207)
Long Island	(18)	(15)	(15)	(14)	(16)	(18)	(16)	(13)	(20)	(17)
<b>NYCA Total</b>	<b>48</b>	<b>72</b>	<b>88</b>	<b>104</b>	<b>106</b>	<b>109</b>	<b>107</b>	<b>110</b>	<b>112</b>	<b>116</b>
<b>NYCA-wide</b>	<b>(27)</b>	<b>(36)</b>	<b>(35)</b>	<b>(39)</b>	<b>(43)</b>	<b>(54)</b>	<b>(57)</b>	<b>(59)</b>	<b>(66)</b>	<b>(72)</b>

Projected Changes in Load LBMP Payment (\$M) -CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	3	4	2	2	2	1	0	4	6	5
Genesee	2	3	1	1	1	(0)	(0)	2	3	3
Central	3	3	0	0	(0)	(2)	(2)	2	3	3
North	1	1	0	(0)	(0)	(1)	(1)	0	1	1
Mohawk Valley	1	1	(0)	(0)	(1)	(2)	(1)	0	1	1
Capital	(1)	(2)	(3)	(4)	(2)	(4)	(5)	(3)	(3)	(1)
Hudson Valley	(12)	(12)	(14)	(14)	(14)	(17)	(17)	(19)	(17)	(19)
Millwood	(4)	(4)	(5)	(5)	(5)	(6)	(6)	(7)	(6)	(7)
Dunwoodie	(10)	(9)	(10)	(10)	(10)	(12)	(12)	(14)	(13)	(14)
NY City	(72)	(68)	(73)	(78)	(74)	(93)	(93)	(108)	(100)	(109)
Long Island	(13)	(13)	(13)	(12)	(9)	(14)	(14)	(21)	(13)	(17)
<b>NYCA Total</b>	<b>(103)</b>	<b>(97)</b>	<b>(115)</b>	<b>(121)</b>	<b>(112)</b>	<b>(151)</b>	<b>(150)</b>	<b>(163)</b>	<b>(139)</b>	<b>(156)</b>

Projected Changes in Generator LBMP Payment (\$M) -CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	7	2	(2)	(1)	(8)	(5)	(7)	(4)	3
Genesee	1	1	0	0	0	(1)	(0)	1	2	1
Central	(0)	4	0	(5)	(6)	(14)	(14)	(10)	(11)	(13)
North	0	1	(2)	(1)	(3)	(5)	(4)	(3)	(2)	(2)
Mohawk Valley	1	1	0	0	(0)	(0)	(0)	0	1	1
Capital	(15)	(18)	(17)	(19)	(17)	(19)	(15)	(8)	(4)	4
Hudson Valley	215	274	286	304	323	361	371	386	404	420
Millwood	(19)	(19)	(20)	(21)	(20)	(26)	(26)	(28)	(28)	(30)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(133)	(164)	(165)	(156)	(165)	(195)	(214)	(227)	(223)	(246)
Long Island	(25)	(21)	(20)	(19)	(20)	(24)	(23)	(26)	(26)	(27)
<b>NYCA Total</b>	<b>30</b>	<b>65</b>	<b>64</b>	<b>80</b>	<b>90</b>	<b>70</b>	<b>70</b>	<b>79</b>	<b>109</b>	<b>110</b>

Projected Changes in Congestion Demand (\$M) - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(2)	(2)
Genesee	0	(0)	0	0	0	(0)	(0)	(0)	(1)	(0)
Central	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
North	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(3)	(6)	(4)	(4)	(3)	(3)	(4)	(5)	(5)	(3)
Hudson Valley	(14)	(15)	(14)	(14)	(13)	(15)	(15)	(20)	(19)	(21)
Millwood	(5)	(5)	(5)	(5)	(5)	(6)	(6)	(7)	(7)	(8)
Dunwoodie	(11)	(11)	(10)	(10)	(10)	(11)	(11)	(15)	(14)	(16)
NY City	(84)	(85)	(77)	(81)	(76)	(87)	(89)	(119)	(116)	(125)
Long Island	(19)	(20)	(14)	(12)	(10)	(11)	(12)	(26)	(19)	(24)
<b>NYCA Total</b>	<b>(137)</b>	<b>(144)</b>	<b>(126)</b>	<b>(127)</b>	<b>(118)</b>	<b>(136)</b>	<b>(139)</b>	<b>(195)</b>	<b>(185)</b>	<b>(199)</b>

Projected Changes in CO2 Cost (\$M) -CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.5)	(1.7)	(1.9)	(3.4)	(2.4)	(6.0)	(6.0)	(2.4)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.2)	(0.2)	(0.0)	(0.6)	(0.5)	(1.3)	(1.6)	(1.9)	(2.9)	(3.7)
North	(0.0)	(0.1)	(0.2)	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.6)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.4)	(1.8)	(1.9)	(2.4)	(2.8)	(2.7)	(2.1)	(1.7)	(1.5)	(1.1)
Hudson Valley	3.7	21.4	26.7	32.8	38.6	46.1	48.8	51.4	54.5	58.7
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(2.3)	(12.7)	(14.6)	(15.4)	(18.6)	(23.3)	(27.5)	(29.3)	(30.2)	(34.8)
Long Island	(0.4)	(1.4)	(1.6)	(1.8)	(2.2)	(2.7)	(2.4)	(2.2)	(3.3)	(3.0)
<b>NYCA Total</b>	<b>0</b>	<b>5</b>	<b>8</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>13</b>

Projected Changes in CO2 Emissions (%) - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.5%	-1.4%	-1.5%	-2.3%	-1.4%	-3.3%	-3.1%	-1.2%
Genesee	-2.1%	-12.2%	-17.9%	6.5%	13.2%	17.1%	21.6%	18.1%	36.3%	30.3%
Central	-2.6%	-0.5%	-0.1%	-1.3%	-0.9%	-1.9%	-2.2%	-2.4%	-3.4%	-4.0%
North	-8.3%	-8.3%	-16.4%	-9.1%	-15.7%	-16.5%	-15.9%	-18.2%	-17.1%	-15.0%
Mohawk Valley	8.0%	-4.5%	-4.1%	-4.3%	-5.0%	-6.4%	-5.9%	-4.7%	-3.0%	-4.1%
Capital	-2.7%	-2.2%	-1.9%	-2.0%	-2.0%	-1.7%	-1.2%	-0.9%	-0.8%	-0.5%
Hudson Valley	66.8%	148.3%	158.4%	185.2%	198.0%	180.8%	161.1%	134.8%	124.2%	116.7%
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-9.2%	-9.8%	-9.3%	-8.2%	-8.5%	-8.7%	-9.6%	-9.6%	-9.1%	-9.7%
Long Island	-4.1%	-3.0%	-2.8%	-2.6%	-2.9%	-2.8%	-2.4%	-2.0%	-2.7%	-2.3%
<b>NYCA Total</b>	<b>0.4%</b>	<b>1.3%</b>	<b>1.6%</b>	<b>1.9%</b>	<b>1.9%</b>	<b>1.6%</b>	<b>1.5%</b>	<b>1.1%</b>	<b>1.0%</b>	<b>1.3%</b>

Projected Changes in SO<sub>2</sub> Cost (\$M) – CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	0.0	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.6)	(0.7)	(0.6)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Long Island	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	(0.0)
<b>NYCA Total</b>	<b>(0.2)</b>	<b>(0.4)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.5)</b>	<b>(0.7)</b>	<b>(0.6)</b>	<b>(0.8)</b>	<b>(0.9)</b>	<b>(0.8)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) – CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.8%	-2.5%	-2.1%	-4.2%	-2.6%	-2.4%	-2.6%	-1.9%
Genesee	-0.3%	-1.4%	-1.7%	0.4%	0.9%	0.9%	1.0%	0.8%	1.5%	1.9%
Central	-4.0%	-3.7%	-2.4%	-4.8%	-2.8%	-3.5%	-5.7%	-8.1%	-9.0%	-10.5%
North	-10.1%	-11.2%	-17.6%	-12.1%	-11.8%	-14.1%	-13.3%	-14.9%	-11.9%	-13.7%
Mohawk Valley	38.9%	-0.9%	-0.8%	0.2%	-3.4%	-1.5%	-1.5%	-1.3%	-1.0%	0.1%
Capital	-3.4%	-3.3%	-2.9%	-3.1%	-2.8%	-2.6%	-1.9%	-1.5%	-1.3%	-0.8%
Hudson Valley	-15.9%	-18.4%	-17.1%	-18.7%	-17.6%	-21.4%	-19.9%	-22.8%	-24.0%	-21.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-11.2%	-13.6%	-13.0%	-11.0%	-11.4%	-12.4%	-13.8%	-14.8%	-15.2%	-15.5%
Long Island	-3.8%	-3.1%	-3.2%	-3.1%	-3.2%	-3.2%	-2.3%	-1.5%	-3.2%	-1.6%
<b>NYCA Total</b>	<b>-5.3%</b>	<b>-4.8%</b>	<b>-5.1%</b>	<b>-6.0%</b>	<b>-5.7%</b>	<b>-7.8%</b>	<b>-6.8%</b>	<b>-7.8%</b>	<b>-8.8%</b>	<b>-7.8%</b>

Projected Changes in NO<sub>x</sub> Cost (\$M) – CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.0	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.4)	(0.3)	(0.1)
Genesee	0.0	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.3)	(0.2)	(0.2)	(0.3)	(0.2)	(0.4)	(0.4)	(0.6)	(0.7)	(0.8)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)
Long Island	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.2)	(0.1)
<b>NYCA Total</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(2)</b>	<b>(2)</b>	<b>(2)</b>

Projected Changes in NOx Emissions (%) - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.3%	-0.9%	-1.1%	-1.5%	-1.0%	-2.8%	-2.6%	-0.8%
Genesee	0.1%	-1.7%	-2.6%	0.7%	1.6%	1.5%	1.6%	1.4%	2.5%	3.4%
Central	-4.8%	-2.0%	-1.3%	-2.1%	-1.6%	-2.2%	-2.9%	-3.9%	-4.5%	-5.3%
North	-0.6%	-0.7%	-1.3%	-0.9%	-1.3%	-1.6%	-1.5%	-1.7%	-1.4%	-1.4%
Mohawk Valley	-0.1%	-0.5%	-0.4%	-0.4%	-0.5%	-0.6%	-0.5%	-0.3%	-0.2%	-0.3%
Capital	-1.2%	-1.2%	-1.0%	-1.3%	-1.4%	-1.8%	-1.4%	-1.0%	-1.0%	-0.5%
Hudson Valley	-13.1%	-11.3%	-8.9%	-9.6%	-7.5%	-11.3%	-11.9%	-15.2%	-16.8%	-15.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-13.0%	-12.7%	-12.1%	-10.8%	-10.9%	-11.1%	-12.7%	-12.4%	-12.6%	-12.4%
Long Island	-2.4%	-1.8%	-1.8%	-1.7%	-1.8%	-1.8%	-1.4%	-1.2%	-1.8%	-1.3%
<b>NYCA Total</b>	<b>-3.9%</b>	<b>-3.0%</b>	<b>-2.8%</b>	<b>-2.9%</b>	<b>-2.9%</b>	<b>-3.6%</b>	<b>-3.6%</b>	<b>-4.7%</b>	<b>-5.1%</b>	<b>-4.3%</b>

Projected LBMP \$/MWh - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	40.03	45.65	46.83	48.94	51.30	53.40	55.24	57.25	59.45	61.65
Genesee	41.61	47.03	48.21	50.26	52.65	55.00	56.94	59.05	61.33	63.69
Central	42.91	48.47	49.70	51.79	54.24	56.89	58.95	61.20	63.55	66.11
North	41.15	46.70	47.87	49.89	52.24	54.74	56.76	58.89	61.13	63.57
Mohawk Valley	43.81	49.36	50.61	52.70	55.18	57.93	60.05	62.35	64.76	67.38
Capital	47.77	52.51	53.96	55.77	58.51	61.76	64.04	66.70	69.42	72.36
Hudson Valley	49.11	54.20	55.70	57.59	60.35	63.81	66.27	69.11	72.11	75.14
Millwood	49.75	54.79	56.31	58.17	60.97	64.50	67.02	69.94	73.04	76.13
Dunwoodie	49.99	55.03	56.56	58.41	61.23	64.79	67.32	70.25	73.38	76.49
NY City	50.85	55.94	57.52	59.37	62.24	65.84	68.43	71.45	74.68	77.92
Long Island	54.05	59.46	61.26	63.49	66.63	70.54	73.47	76.64	80.20	83.76
<b>NYCA Avg.</b>	<b>46.46</b>	<b>51.74</b>	<b>53.14</b>	<b>55.13</b>	<b>57.78</b>	<b>60.84</b>	<b>63.14</b>	<b>65.71</b>	<b>68.46</b>	<b>71.29</b>

Projected Changes in Generator GWh - CE-NS-PV: Generation Solution



Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	2	(34)	(105)	(108)	(162)	(107)	(269)	(248)	(82)
Genesee	(0)	(1)	(1)	0	1	1	2	1	1	2
Central	(101)	(16)	7	(73)	(57)	(136)	(144)	(142)	(212)	(246)
North	(18)	(20)	(39)	(26)	(47)	(56)	(52)	(55)	(47)	(43)
Mohawk Valley	1	(2)	(2)	(3)	(3)	(4)	(3)	(2)	(1)	(2)
Capital	(456)	(398)	(341)	(345)	(342)	(295)	(190)	(142)	(83)	(31)
Hudson Valley	4,303	5,052	5,120	5,293	5,351	5,709	5,649	5,646	5,637	5,622
Millwood	0	0	0	0	0	0	1	0	0	1
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,891)	(2,299)	(2,172)	(1,952)	(2,029)	(2,209)	(2,421)	(2,393)	(2,311)	(2,446)
Long Island	(265)	(206)	(202)	(188)	(201)	(210)	(177)	(150)	(205)	(171)
<b>NYCA Total</b>	<b>1,578</b>	<b>2,111</b>	<b>2,336</b>	<b>2,602</b>	<b>2,566</b>	<b>2,637</b>	<b>2,560</b>	<b>2,494</b>	<b>2,531</b>	<b>2,603</b>

Projected Changes in Loss Payment (\$M) - CE-NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	1	1	2	2	2	2	2	2	2
Genesee	0	0	0	1	1	1	1	1	1	1
Central	0	0	0	0	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	0	0	0	0	0	0	0	0	0	(0)
Hudson Valley	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(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	3	2	1	1	0	1	1	2	3
Long Island	1	1	0	0	0	(0)	0	0	1	1
<b>NYCA Total</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

## Generic DR/EE Solution

Projected Changes in Production Cost (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	(1)	(1)	(2)	(4)	(2)	(1)	(1)	(3)	(2)
Genesee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Central	(3)	(3)	(3)	(1)	(2)	(2)	(3)	(3)	(6)	(5)
North	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(1)
Mohawk Valley	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(9)	(7)	(7)	(5)	(6)	(6)	(5)	(5)	(5)	(4)
Hudson Valley	(2)	(2)	(2)	(3)	(2)	(2)	(2)	(4)	(3)	(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	(14)	(15)	(13)	(17)	(16)	(17)	(20)	(16)	(11)	(20)
Long Island	(1)	(2)	(1)	(1)	(3)	(3)	(3)	(2)	(3)	(3)
<b>NYCA Total</b>	<b>(30)</b>	<b>(30)</b>	<b>(28)</b>	<b>(30)</b>	<b>(34)</b>	<b>(32)</b>	<b>(35)</b>	<b>(34)</b>	<b>(33)</b>	<b>(39)</b>
<b>NYCA- wide</b>	<b>(50)</b>	<b>(54)</b>	<b>(54)</b>	<b>(57)</b>	<b>(61)</b>	<b>(63)</b>	<b>(67)</b>	<b>(67)</b>	<b>(71)</b>	<b>(75)</b>

Projected Changes in Load LBMP Payment (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	(1)	(2)	(0)	(1)	(2)	(2)	(2)	(1)	(1)
Genesee	(0)	(1)	(2)	(0)	(0)	(2)	(2)	(2)	(1)	(1)
Central	(1)	(1)	(3)	(1)	(1)	(3)	(3)	(3)	(2)	(2)
North	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	(0)	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(28)	(32)	(33)	(33)	(34)	(37)	(39)	(40)	(42)	(43)
Hudson Valley	(26)	(29)	(31)	(30)	(32)	(35)	(36)	(37)	(38)	(39)
Millwood	(0)	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(1)	(1)	(2)	(1)	(1)	(2)	(2)	(2)	(1)	(1)
NY City	(7)	(8)	(15)	(5)	(8)	(16)	(13)	(16)	(8)	(8)
Long Island	(1)	(3)	(5)	0	(1)	(4)	(3)	(5)	(0)	(1)
<b>NYCA Total</b>	<b>(66)</b>	<b>(76)</b>	<b>(95)</b>	<b>(71)</b>	<b>(79)</b>	<b>(104)</b>	<b>(101)</b>	<b>(109)</b>	<b>(96)</b>	<b>(99)</b>

Projected Changes in Generator LBMP Payment (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(1)	(2)	(4)	(3)	(5)	(5)	(4)	(5)	(5)	(5)
Genesee	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
Central	(4)	(5)	(8)	(4)	(5)	(8)	(8)	(9)	(8)	(9)
North	(1)	(1)	(2)	(1)	(2)	(3)	(2)	(3)	(2)	(2)
Mohawk Valley	(0)	(0)	(1)	(0)	(0)	(1)	(0)	(0)	(0)	(0)
Capital	(13)	(15)	(16)	(11)	(12)	(15)	(14)	(15)	(16)	(13)
Hudson Valley	(3)	(3)	(3)	(4)	(2)	(3)	(3)	(6)	(4)	(5)
Millwood	(2)	(2)	(4)	(1)	(2)	(4)	(3)	(4)	(2)	(2)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(15)	(18)	(21)	(18)	(19)	(24)	(26)	(24)	(15)	(24)
Long Island	(2)	(3)	(4)	(1)	(3)	(5)	(4)	(4)	(2)	(3)
<b>NYCA Total</b>	<b>(41)</b>	<b>(50)</b>	<b>(64)</b>	<b>(42)</b>	<b>(51)</b>	<b>(67)</b>	<b>(66)</b>	<b>(71)</b>	<b>(56)</b>	<b>(64)</b>

Projected Changes in Congestion Demand (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	0	0	0	0	(0)	0	0	0	(0)
Genesee	0	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(3)
Central	4	3	2	3	2	3	2	2	2	1
North	4	6	6	6	6	6	6	6	6	5
Mohawk Valley	2	2	1	1	1	1	0	0	(0)	(2)
Capital	40	35	35	33	33	37	39	43	47	47
Hudson Valley	51	46	46	43	45	50	53	62	69	71
Millwood	18	16	16	15	16	17	18	21	24	23
Dunwoodie	36	32	32	30	31	34	37	43	48	50
NY City	336	302	314	297	311	340	368	434	489	525
Long Island	191	184	191	191	201	221	239	270	297	317
<b>NYCA Total</b>	<b>692</b>	<b>630</b>	<b>655</b>	<b>626</b>	<b>657</b>	<b>725</b>	<b>783</b>	<b>909</b>	<b>1,014</b>	<b>1,085</b>

Projected Changes in CO2 Cost (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0.0)	(0.1)	(0.1)	(0.7)	(1.2)	(0.7)	(0.3)	(0.5)	(1.0)	(1.0)
Genesee	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Central	(0.1)	(0.4)	(0.5)	(0.2)	(0.5)	(0.4)	(0.6)	(0.8)	(1.3)	(1.0)
North	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.3)	(0.2)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.2)	(0.6)	(0.7)	(0.6)	(0.9)	(0.9)	(0.8)	(0.8)	(0.8)	(0.6)
Hudson Valley	(0.1)	(0.3)	(0.4)	(0.6)	(0.4)	(0.5)	(0.3)	(1.2)	(1.0)	(1.2)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.3)	(1.3)	(1.4)	(2.1)	(2.2)	(2.4)	(3.1)	(2.6)	(1.7)	(3.3)
Long Island	(0.0)	(0.1)	(0.1)	(0.1)	(0.4)	(0.4)	(0.4)	(0.3)	(0.5)	(0.5)
<b>NYCA Total</b>	<b>(1)</b>	<b>(3)</b>	<b>(3)</b>	<b>(4)</b>	<b>(6)</b>	<b>(6)</b>	<b>(6)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>

Projected Changes in CO2 Emissions (%) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	-0.1%	-0.1%	-0.1%	-0.5%	-0.9%	-0.5%	-0.2%	-0.3%	-0.5%	-0.5%
Genesee	-6.4%	-15.3%	-7.2%	-5.1%	-4.1%	-4.6%	-18.2%	-28.4%	-26.7%	-11.1%
Central	-1.5%	-1.3%	-1.3%	-0.3%	-0.8%	-0.6%	-0.9%	-1.0%	-1.5%	-1.1%
North	-4.5%	-7.4%	-8.7%	-3.7%	-7.9%	-6.6%	-5.4%	-7.8%	-7.9%	-6.5%
Mohawk Valley	-6.4%	-2.9%	-3.3%	-2.5%	-3.3%	-2.6%	-2.7%	-2.6%	-3.3%	-2.1%
Capital	-1.2%	-0.8%	-0.7%	-0.5%	-0.6%	-0.6%	-0.5%	-0.4%	-0.4%	-0.3%
Hudson Valley	-1.3%	-1.8%	-2.5%	-3.6%	-2.2%	-2.0%	-1.1%	-3.1%	-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	-1.1%	-1.0%	-0.9%	-1.1%	-1.0%	-0.9%	-1.1%	-0.9%	-0.5%	-0.9%
Long Island	-0.3%	-0.3%	-0.2%	-0.1%	-0.5%	-0.5%	-0.4%	-0.2%	-0.4%	-0.4%
<b>NYCA Total</b>	<b>-0.8%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.9%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.7%</b>

Projected Changes in SO2 Cost (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0.00)	(0.00)	(0.01)	(0.04)	(0.05)	(0.04)	(0.01)	(0.02)	(0.05)	(0.03)
Genesee	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Central	(0.00)	(0.00)	(0.00)	0.00	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
North	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Mohawk Valley	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Hudson Valley	(0.01)	(0.02)	(0.04)	(0.06)	(0.03)	(0.04)	(0.02)	(0.07)	(0.06)	(0.07)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Long Island	(0.00)	(0.00)	0.00	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
<b>NYCA Total</b>	<b>(0.02)</b>	<b>(0.04)</b>	<b>(0.06)</b>	<b>(0.11)</b>	<b>(0.10)</b>	<b>(0.10)</b>	<b>(0.05)</b>	<b>(0.12)</b>	<b>(0.14)</b>	<b>(0.12)</b>

Projected Changes in SO2 Emissions (%) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	-0.1%	-0.1%	-0.2%	-1.0%	-1.1%	-0.8%	-0.3%	-0.5%	-1.0%	-0.7%
Genesee	-0.6%	-1.6%	-0.8%	-0.6%	-0.5%	-0.4%	-1.2%	-1.7%	-1.4%	-0.7%
Central	-1.4%	-4.9%	-6.2%	0.3%	-5.2%	-2.9%	-3.5%	-5.4%	-4.5%	-2.7%
North	-2.9%	-4.9%	-6.5%	-3.5%	-2.9%	-4.4%	-3.1%	-5.6%	-5.0%	-2.8%
Mohawk Valley	-15.5%	-0.3%	-0.3%	-0.1%	-0.5%	-0.4%	-0.3%	-0.3%	-0.4%	-0.1%
Capital	-1.5%	-1.2%	-1.1%	-0.8%	-1.0%	-0.9%	-0.9%	-0.7%	-0.7%	-0.5%
Hudson Valley	-1.1%	-1.4%	-2.3%	-3.5%	-2.1%	-2.2%	-1.0%	-2.9%	-2.3%	-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	-1.4%	-1.2%	-1.3%	-1.5%	-1.2%	-1.9%	-1.5%	-1.5%	-1.3%	-1.4%
Long Island	0.0%	-0.2%	0.0%	-0.3%	-0.5%	-0.5%	-0.4%	-0.1%	-0.3%	-0.4%
<b>NYCA Total</b>	<b>-0.5%</b>	<b>-0.5%</b>	<b>-0.7%</b>	<b>-1.4%</b>	<b>-1.2%</b>	<b>-1.1%</b>	<b>-0.6%</b>	<b>-1.2%</b>	<b>-1.3%</b>	<b>-1.1%</b>

Projected Changes in NOx Cost (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)
Genesee	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Central	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.0)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	(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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.1)
Long Island	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
<b>NYCA Total</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.3)</b>	<b>(0.3)</b>

Projected Changes in NOx Emissions (%) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	-0.1%	-0.1%	-0.1%	-0.4%	-0.7%	-0.3%	-0.2%	-0.2%	-0.4%	-0.4%
Genesee	-0.7%	-2.5%	-1.2%	-1.2%	-1.1%	-0.6%	-1.8%	-2.7%	-2.1%	-0.9%
Central	-2.5%	-2.1%	-2.5%	-0.2%	-1.8%	-1.2%	-1.4%	-2.1%	-2.1%	-1.3%
North	-0.3%	-0.5%	-0.6%	-0.3%	-0.5%	-0.6%	-0.5%	-0.7%	-0.6%	-0.4%
Mohawk Valley	-0.4%	-0.3%	-0.4%	-0.3%	-0.4%	-0.3%	-0.3%	-0.2%	-0.3%	-0.2%
Capital	-0.9%	-0.8%	-0.6%	-0.6%	-0.8%	-0.9%	-1.0%	-0.9%	-0.9%	-0.8%
Hudson Valley	-1.4%	-2.0%	-2.8%	-3.5%	-2.4%	-1.9%	-1.2%	-3.2%	-2.3%	-2.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.4%	-1.6%	-1.1%	-1.5%	-1.2%	-0.8%	-1.2%	-0.7%	-1.1%	-1.3%
Long Island	-0.1%	-0.2%	-0.1%	-0.1%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%	-0.2%
<b>NYCA Total</b>	<b>-0.6%</b>	<b>-0.6%</b>	<b>-0.6%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.6%</b>	<b>-0.5%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.8%</b>

Projected LBMP \$/MWh - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	39.85	45.40	46.63	48.86	51.17	53.31	55.14	56.92	59.07	61.32
Genesee	41.45	46.81	48.05	50.22	52.60	55.00	56.92	58.76	61.01	63.46
Central	42.76	48.27	49.59	51.80	54.23	56.95	58.99	61.00	63.33	65.90
North	41.01	46.49	47.74	49.88	52.23	54.80	56.80	58.70	60.93	63.40
Mohawk Valley	43.71	49.21	50.55	52.77	55.23	58.06	60.16	62.24	64.63	67.28
Capital	47.59	52.38	53.85	55.82	58.43	61.79	64.04	66.57	69.23	72.07
Hudson Valley	49.92	55.02	56.54	58.60	61.28	64.95	67.41	70.31	73.34	76.44
Millwood	50.83	55.86	57.40	59.43	62.16	65.94	68.46	71.51	74.66	77.86
Dunwoodie	51.09	56.11	57.66	59.69	62.42	66.22	68.76	71.84	75.02	78.24
NY City	51.78	56.81	58.42	60.50	63.26	67.07	69.67	72.82	76.08	79.43
Long Island	54.39	59.78	61.55	63.90	66.86	70.87	73.81	77.13	80.61	84.25
<b>NYCA Average</b>	<b>46.76</b>	<b>52.01</b>	<b>53.45</b>	<b>55.59</b>	<b>58.17</b>	<b>61.36</b>	<b>63.65</b>	<b>66.17</b>	<b>68.90</b>	<b>71.79</b>

Projected Changes in Generator GWh - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(10)	(11)	(11)	(44)	(74)	(36)	(18)	(24)	(41)	(38)
Genesee	(0)	(1)	(1)	(1)	(0)	(0)	(1)	(1)	(1)	(0)
Central	(75)	(71)	(64)	(28)	(40)	(34)	(51)	(49)	(89)	(67)
North	(10)	(18)	(20)	(11)	(23)	(22)	(18)	(23)	(22)	(18)
Mohawk Valley	(3)	(1)	(2)	(1)	(2)	(1)	(1)	(1)	(1)	(1)
Capital	(185)	(152)	(145)	(82)	(108)	(101)	(61)	(80)	(69)	(33)
Hudson Valley	(40)	(32)	(40)	(51)	(28)	(28)	(20)	(61)	(49)	(55)
Millwood	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0	1
Dunwoodie	0	0	0	(0)	0	0	0	(0)	(0)	0
NY City	(242)	(248)	(216)	(267)	(236)	(226)	(287)	(218)	(133)	(243)
Long Island	(20)	(22)	(14)	(10)	(29)	(33)	(29)	(19)	(27)	(26)
<b>NYCA Total</b>	<b>(584)</b>	<b>(556)</b>	<b>(513)</b>	<b>(494)</b>	<b>(540)</b>	<b>(482)</b>	<b>(486)</b>	<b>(476)</b>	<b>(432)</b>	<b>(481)</b>

Projected Changes in Loss Payment (\$M) - CE-NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	0	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	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)
Hudson Valley	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(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	1	1	(0)	1	1	0	0	0	0	1
Long Island	0	0	(0)	0	0	0	0	0	0	0
<b>NYCA Total</b>	<b>(2)</b>	<b>(2)</b>	<b>(4)</b>	<b>(2)</b>	<b>(2)</b>	<b>(4)</b>	<b>(3)</b>	<b>(4)</b>	<b>(4)</b>	<b>(4)</b>

## H.2. Study 2: New Scotland-Pleasant Valley (NS-PV)

### Generic Transmission Solution

Projected Changes in Production Cost (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	8	8	9	16	15	12	11	12	15
Genesee	0	0	0	1	0	0	0	0	1	1
Central	8	8	6	5	7	8	12	13	14	17
North	5	6	5	5	4	7	8	9	9	9
Mohawk Valley	2	1	1	1	1	1	1	1	1	1
Capital	23	18	19	20	19	18	20	20	21	24
Hudson Valley	(12)	(19)	(16)	(17)	(16)	(20)	(23)	(29)	(31)	(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	(74)	(80)	(66)	(69)	(74)	(73)	(81)	(89)	(101)	(123)
Long Island	(17)	(12)	(13)	(9)	(11)	(14)	(14)	(12)	(16)	(12)
<b>Total NYCA</b>	<b>(58)</b>	<b>(69)</b>	<b>(56)</b>	<b>(54)</b>	<b>(53)</b>	<b>(57)</b>	<b>(64)</b>	<b>(76)</b>	<b>(90)</b>	<b>(101)</b>
<b>NYCA-wide</b>	<b>(28)</b>	<b>(26)</b>	<b>(25)</b>	<b>(25)</b>	<b>(27)</b>	<b>(28)</b>	<b>(30)</b>	<b>(31)</b>	<b>(37)</b>	<b>(40)</b>

Projected Changes in Load LBMP Payment (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	18	14	13	13	12	12	13	15	17	18
Genesee	13	11	10	10	10	9	11	12	14	16
Central	21	17	16	16	16	16	17	20	23	26
North	6	6	5	6	5	5	6	7	8	9
Mohawk Valley	9	7	7	7	7	7	7	8	10	11
Capital	19	19	19	18	19	21	22	25	29	32
Hudson Valley	(5)	(4)	(5)	(4)	(5)	(5)	(6)	(7)	(7)	(6)
Millwood	(3)	(3)	(3)	(3)	(3)	(3)	(4)	(4)	(5)	(5)
Dunwoodie	(7)	(6)	(6)	(6)	(6)	(7)	(8)	(9)	(10)	(10)
NY City	(52)	(41)	(46)	(42)	(46)	(53)	(56)	(73)	(74)	(72)
Long Island	(8)	(6)	(6)	(5)	(6)	(8)	(9)	(15)	(15)	(13)
<b>NYCA Total</b>	<b>11</b>	<b>13</b>	<b>4</b>	<b>10</b>	<b>3</b>	<b>(6)</b>	<b>(6)</b>	<b>(21)</b>	<b>(10)</b>	<b>6</b>

Projected Changes in Generator LBMP Payment (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	41	34	32	33	37	35	34	37	42	45
Genesee	6	5	5	5	4	4	5	6	6	7
Central	46	41	36	41	39	42	48	53	61	68
North	15	14	13	13	12	14	16	18	19	21
Mohawk Valley	6	4	4	4	3	4	4	5	5	6
Capital	73	65	68	66	69	71	76	85	94	104
Hudson Valley	(16)	(22)	(18)	(19)	(18)	(23)	(26)	(34)	(36)	(38)
Millwood	(13)	(10)	(11)	(10)	(12)	(13)	(13)	(16)	(17)	(17)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(86)	(92)	(85)	(83)	(91)	(94)	(103)	(118)	(129)	(146)
Long Island	(22)	(16)	(16)	(11)	(14)	(18)	(19)	(22)	(26)	(21)
<b>NYCA Total</b>	<b>50</b>	<b>23</b>	<b>27</b>	<b>38</b>	<b>30</b>	<b>23</b>	<b>22</b>	<b>11</b>	<b>20</b>	<b>29</b>

Projected Changes in Congestion Demand (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0
Genesee	0	1	0	0	0	(0)	(0)	(0)	(0)	(0)
Central	1	1	1	1	1	1	1	2	2	2
North	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	1	5	6	4	6	7	7	9	10	11
Hudson Valley	(20)	(16)	(15)	(15)	(15)	(16)	(17)	(21)	(23)	(25)
Millwood	(8)	(6)	(6)	(6)	(6)	(6)	(7)	(8)	(9)	(10)
Dunwoodie	(16)	(13)	(13)	(12)	(13)	(13)	(14)	(17)	(19)	(21)
NY City	(128)	(100)	(99)	(99)	(101)	(106)	(115)	(143)	(157)	(169)
Long Island	(42)	(33)	(30)	(30)	(30)	(32)	(36)	(47)	(52)	(56)
<b>NYCA Total</b>	<b>(213)</b>	<b>(162)</b>	<b>(156)</b>	<b>(159)</b>	<b>(159)</b>	<b>(166)</b>	<b>(182)</b>	<b>(228)</b>	<b>(251)</b>	<b>(269)</b>

Projected Changes in CO2 Cost (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.3	1.5	1.7	2.5	5.0	5.3	3.9	3.7	4.6	5.7
Genesee	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Central	0.3	1.4	1.1	1.1	1.6	1.9	2.9	3.3	3.7	4.2
North	0.1	0.5	0.6	0.7	0.7	1.1	1.3	1.5	1.6	1.6
Mohawk Valley	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2
Capital	0.5	1.6	2.1	2.5	2.6	2.7	3.1	3.2	3.5	3.9
Hudson Valley	(0.3)	(2.4)	(2.4)	(2.8)	(2.7)	(3.9)	(4.4)	(6.4)	(6.9)	(7.9)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(1.5)	(7.1)	(6.9)	(8.4)	(9.8)	(10.5)	(11.9)	(13.7)	(15.8)	(19.8)
Long Island	(0.4)	(1.1)	(1.4)	(1.1)	(1.5)	(2.1)	(2.1)	(1.8)	(2.6)	(2.0)
<b>NYCA Total</b>	<b>(1)</b>	<b>(5)</b>	<b>(5)</b>	<b>(5)</b>	<b>(4)</b>	<b>(5)</b>	<b>(7)</b>	<b>(10)</b>	<b>(12)</b>	<b>(14)</b>

Projected Changes in CO2 Emissions (%) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1.3%	1.7%	1.6%	2.1%	3.8%	3.5%	2.4%	2.1%	2.4%	2.8%
Genesee	111.4%	61.2%	63.0%	90.6%	84.1%	96.5%	132.1%	141.7%	181.8%	158.4%
Central	4.1%	4.1%	2.7%	2.3%	2.8%	2.8%	3.9%	4.2%	4.3%	4.6%
North	45.7%	45.3%	43.1%	31.7%	25.5%	34.3%	39.3%	44.1%	48.1%	43.5%
Mohawk Valley	85.7%	27.5%	23.3%	15.9%	14.8%	23.1%	25.7%	37.9%	27.5%	41.3%
Capital	3.0%	2.0%	2.1%	2.1%	1.9%	1.7%	1.8%	1.7%	1.8%	1.8%
Hudson Valley	-5.7%	-16.9%	-14.1%	-15.7%	-13.8%	-15.2%	-14.5%	-16.9%	-15.8%	-15.8%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-5.9%	-5.4%	-4.4%	-4.4%	-4.5%	-3.9%	-4.2%	-4.5%	-4.8%	-5.6%
Long Island	-3.7%	-2.3%	-2.5%	-1.6%	-1.9%	-2.2%	-2.1%	-1.7%	-2.2%	-1.6%
<b>NYCA Total</b>	<b>-1.0%</b>	<b>-1.4%</b>	<b>-1.0%</b>	<b>-0.9%</b>	<b>-0.6%</b>	<b>-0.7%</b>	<b>-0.9%</b>	<b>-1.1%</b>	<b>-1.2%</b>	<b>-1.3%</b>

Projected Changes in SO<sub>2</sub> Cost (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.03	0.13	0.12	0.15	0.19	0.17	0.18	0.17	0.20	0.23
Genesee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
North	0.01	0.03	0.03	0.03	0.02	0.03	0.04	0.04	0.04	0.04
Mohawk Valley	0.01	0.00	0.00	0.00	(0.00)	0.00	0.00	0.00	0.00	0.01
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hudson Valley	(0.03)	(0.24)	(0.19)	(0.18)	(0.15)	(0.20)	(0.20)	(0.32)	(0.32)	(0.37)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Long Island	(0.02)	(0.04)	(0.05)	(0.03)	(0.03)	(0.06)	(0.05)	(0.02)	(0.04)	(0.01)
<b>NYCA Total</b>	<b>0.00</b>	<b>(0.10)</b>	<b>(0.08)</b>	<b>(0.03)</b>	<b>0.04</b>	<b>(0.05)</b>	<b>(0.01)</b>	<b>(0.12)</b>	<b>(0.10)</b>	<b>(0.10)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1.6%	2.7%	2.5%	3.3%	4.5%	3.7%	3.9%	3.5%	4.0%	4.7%
Genesee	9.0%	7.0%	6.7%	10.5%	8.8%	7.5%	8.4%	9.0%	9.7%	11.1%
Central	3.6%	24.0%	13.7%	13.1%	14.7%	13.7%	20.6%	19.5%	18.3%	15.3%
North	30.3%	28.0%	23.2%	21.6%	17.1%	17.4%	22.5%	17.8%	20.8%	19.3%
Mohawk Valley	225.4%	144.4%	1.9%	1.1%	-0.2%	139.1%	139.9%	431.8%	143.0%	190.7%
Capital	5.4%	4.0%	3.8%	3.8%	3.6%	3.3%	3.5%	3.5%	3.6%	3.8%
Hudson Valley	-3.0%	-13.1%	-10.6%	-11.5%	-9.6%	-10.7%	-9.7%	-12.7%	-11.5%	-12.2%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-7.9%	-8.1%	-6.5%	-6.3%	-6.4%	-6.0%	-6.3%	-7.4%	-8.5%	-9.4%
Long Island	-3.1%	-2.1%	-2.6%	-1.5%	-1.6%	-3.0%	-2.3%	-0.9%	-1.7%	-0.6%
<b>NYCA Total</b>	<b>0.1%</b>	<b>-1.2%</b>	<b>-1.0%</b>	<b>-0.4%</b>	<b>0.5%</b>	<b>-0.6%</b>	<b>-0.1%</b>	<b>-1.2%</b>	<b>-1.0%</b>	<b>-0.9%</b>

Projected Changes in NO<sub>x</sub> Cost (\$M) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.1	0.1	0.1	0.2	0.4	0.4	0.2	0.2	0.2	0.3
Genesee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mohawk Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Hudson Valley	(0.2)	(0.3)	(0.3)	(0.5)	(0.4)	(0.6)	(0.6)	(0.8)	(0.8)	(0.9)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)	(0.3)	(0.4)
Long Island	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
<b>NYCA Total</b>	<b>(0.1)</b>	<b>(0.3)</b>	<b>(0.3)</b>	<b>(0.4)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.5)</b>	<b>(0.6)</b>	<b>(0.7)</b>	<b>(0.7)</b>



Projected Changes in NOx Emissions (%) – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1.1%	1.3%	1.3%	1.6%	3.1%	2.9%	1.8%	1.6%	1.8%	2.2%
Genesee	24.7%	16.6%	12.8%	19.0%	16.4%	13.7%	14.9%	15.9%	15.8%	21.8%
Central	7.4%	8.4%	5.2%	5.0%	5.4%	5.1%	7.5%	7.7%	7.7%	7.7%
North	2.8%	2.9%	2.6%	2.4%	2.0%	2.8%	3.3%	3.2%	3.4%	3.1%
Mohawk Valley	5.1%	2.9%	2.7%	2.1%	1.8%	2.3%	2.4%	2.5%	2.2%	2.5%
Capital	3.4%	2.9%	2.9%	2.6%	2.9%	3.2%	3.4%	3.8%	3.9%	4.3%
Hudson Valley	-7.5%	-19.1%	-15.9%	-17.5%	-16.1%	-17.6%	-17.3%	-19.2%	-18.1%	-18.0%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-7.3%	-6.5%	-6.0%	-5.2%	-5.3%	-5.0%	-5.7%	-5.5%	-6.9%	-7.6%
Long Island	-2.0%	-1.2%	-1.5%	-1.0%	-1.1%	-1.4%	-1.3%	-1.0%	-1.3%	-0.8%
<b>NYCA Total</b>	<b>-0.8%</b>	<b>-1.5%</b>	<b>-1.4%</b>	<b>-1.1%</b>	<b>-0.5%</b>	<b>-0.9%</b>	<b>-1.3%</b>	<b>-1.7%</b>	<b>-1.8%</b>	<b>-1.7%</b>

Projected LBMP \$/MWh – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	40.93	46.29	47.54	49.66	51.95	54.14	56.08	57.97	60.22	62.55
Genesee	42.59	47.76	49.01	51.10	53.45	55.89	57.93	59.90	62.25	64.86
Central	43.95	49.29	50.63	52.75	55.17	58.00	60.12	62.29	64.76	67.51
North	42.19	47.46	48.73	50.84	53.15	55.78	57.86	59.90	62.24	64.89
Mohawk Valley	44.86	50.19	51.55	53.70	56.14	59.07	61.25	63.47	65.99	68.81
Capital	49.22	54.19	55.73	57.46	60.21	63.82	66.21	69.06	71.97	75.06
Hudson Valley	49.69	54.95	56.48	58.43	61.12	64.86	67.31	70.16	73.12	76.28
Millwood	50.15	55.36	56.91	58.86	61.57	65.37	67.86	70.76	73.78	76.98
Dunwoodie	50.37	55.58	57.13	59.08	61.80	65.62	68.13	71.05	74.08	77.30
NY City	51.20	56.43	58.01	59.96	62.73	66.58	69.14	72.13	75.27	78.65
Long Island	54.27	59.73	61.55	63.74	66.75	70.81	73.69	76.90	80.27	83.96
<b>NYCA Average</b>	<b>47.22</b>	<b>52.48</b>	<b>53.94</b>	<b>55.96</b>	<b>58.55</b>	<b>61.81</b>	<b>64.14</b>	<b>66.69</b>	<b>69.45</b>	<b>72.44</b>

Projected Changes in Generator GWh – NS-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	146	164	156	186	308	291	199	180	205	232
Genesee	7	5	5	8	7	6	7	7	7	8
Central	202	168	123	104	140	148	199	211	220	254
North	101	107	100	92	77	115	128	131	131	124
Mohawk Valley	34	13	11	9	8	10	11	13	10	13
Capital	481	329	366	381	345	299	318	291	304	315
Hudson Valley	(211)	(311)	(249)	(252)	(217)	(273)	(292)	(379)	(387)	(401)
Millwood	0	0	0	0	0	0	1	0	0	(2)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,150)	(1,206)	(975)	(990)	(1,009)	(946)	(983)	(1,028)	(1,107)	(1,289)
Long Island	(234)	(151)	(167)	(109)	(128)	(157)	(147)	(118)	(156)	(109)
<b>NYCA Total</b>	<b>(624)</b>	<b>(881)</b>	<b>(630)</b>	<b>(571)</b>	<b>(468)</b>	<b>(506)</b>	<b>(558)</b>	<b>(693)</b>	<b>(772)</b>	<b>(856)</b>

Projected Changes in Loss Payment: (\$M) – NS-PV Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(3)	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(4)
Genesee	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(2)	(2)	(2)
Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
North	(0)	(1)	(1)	(1)	(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	2	2	2
Hudson Valley	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Millwood	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
NY City	(6)	(8)	(10)	(9)	(9)	(11)	(11)	(11)	(10)	(9)
Long Island	(1)	(2)	(3)	(3)	(3)	(4)	(4)	(4)	(4)	(3)
<b>NYCA Total</b>	<b>(14)</b>	<b>(18)</b>	<b>(21)</b>	<b>(20)</b>	<b>(21)</b>	<b>(25)</b>	<b>(24)</b>	<b>(24)</b>	<b>(24)</b>	<b>(23)</b>

## Generic Generation Solution

Projected Changes in Production Cost (\$M) - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	0	(2)	(6)	(5)	(9)	(6)	(15)	(14)	(5)
Genesee	(0)	(0)	(0)	0	0	0	0	0	0	0
Central	(3)	(1)	0	(4)	(3)	(8)	(8)	(9)	(13)	(16)
North	(1)	(1)	(2)	(2)	(3)	(4)	(3)	(4)	(3)	(3)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(20)	(19)	(17)	(19)	(19)	(17)	(13)	(10)	(9)	(6)
Hudson Valley	201	247	258	274	290	321	330	344	357	371
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(110)	(140)	(135)	(125)	(137)	(156)	(176)	(183)	(185)	(207)
Long Island	(18)	(15)	(15)	(14)	(16)	(18)	(16)	(13)	(20)	(17)
<b>NYCA Total</b>	<b>48</b>	<b>72</b>	<b>88</b>	<b>104</b>	<b>106</b>	<b>109</b>	<b>107</b>	<b>110</b>	<b>112</b>	<b>116</b>
<b>NYCA-wide</b>	<b>(27)</b>	<b>(36)</b>	<b>(35)</b>	<b>(39)</b>	<b>(43)</b>	<b>(54)</b>	<b>(57)</b>	<b>(59)</b>	<b>(66)</b>	<b>(72)</b>

Projected Changes in Load LBMP Payment (\$M) -NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	3	4	2	2	2	1	0	4	6	5
Genesee	2	3	1	1	1	(0)	(0)	2	3	3
Central	3	3	0	0	(0)	(2)	(2)	2	3	3
North	1	1	0	(0)	(0)	(1)	(1)	0	1	1
Mohawk Valley	1	1	(0)	(0)	(1)	(2)	(1)	0	1	1
Capital	(1)	(2)	(3)	(4)	(2)	(4)	(5)	(3)	(3)	(1)
Hudson Valley	(12)	(12)	(14)	(14)	(14)	(17)	(17)	(19)	(17)	(19)
Millwood	(4)	(4)	(5)	(5)	(5)	(6)	(6)	(7)	(6)	(7)
Dunwoodie	(10)	(9)	(10)	(10)	(10)	(12)	(12)	(14)	(13)	(14)
NY City	(72)	(68)	(73)	(78)	(74)	(93)	(93)	(108)	(100)	(109)
Long Island	(13)	(13)	(13)	(12)	(9)	(14)	(14)	(21)	(13)	(17)
<b>NYCA Total</b>	<b>(103)</b>	<b>(97)</b>	<b>(115)</b>	<b>(121)</b>	<b>(112)</b>	<b>(151)</b>	<b>(150)</b>	<b>(163)</b>	<b>(139)</b>	<b>(156)</b>

Projected Changes in Generator LBMP Payment (\$M) -NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	7	2	(2)	(1)	(8)	(5)	(7)	(4)	3
Genesee	1	1	0	0	0	(1)	(0)	1	2	1
Central	(0)	4	0	(5)	(6)	(14)	(14)	(10)	(11)	(13)
North	0	1	(2)	(1)	(3)	(5)	(4)	(3)	(2)	(2)
Mohawk Valley	1	1	0	0	(0)	(0)	(0)	0	1	1
Capital	(15)	(18)	(17)	(19)	(17)	(19)	(15)	(8)	(4)	4
Hudson Valley	215	274	286	304	323	361	371	386	404	420
Millwood	(19)	(19)	(20)	(21)	(20)	(26)	(26)	(28)	(28)	(30)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(133)	(164)	(165)	(156)	(165)	(195)	(214)	(227)	(223)	(246)
Long Island	(25)	(21)	(20)	(19)	(20)	(24)	(23)	(26)	(26)	(27)
<b>NYCA Total</b>	<b>30</b>	<b>65</b>	<b>64</b>	<b>80</b>	<b>90</b>	<b>70</b>	<b>70</b>	<b>79</b>	<b>109</b>	<b>110</b>

Projected Changes in Congestion Demand (\$M) - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(2)	(2)
Genesee	0	(0)	0	0	0	(0)	(0)	(0)	(1)	(0)
Central	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
North	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(3)	(6)	(4)	(4)	(3)	(3)	(4)	(5)	(5)	(3)
Hudson Valley	(14)	(15)	(14)	(14)	(13)	(15)	(15)	(20)	(19)	(21)
Millwood	(5)	(5)	(5)	(5)	(5)	(6)	(6)	(7)	(7)	(8)
Dunwoodie	(11)	(11)	(10)	(10)	(10)	(11)	(11)	(15)	(14)	(16)
NY City	(84)	(85)	(77)	(81)	(76)	(87)	(89)	(119)	(116)	(125)
Long Island	(19)	(20)	(14)	(12)	(10)	(11)	(12)	(26)	(19)	(24)
<b>NYCA Total</b>	<b>(137)</b>	<b>(144)</b>	<b>(126)</b>	<b>(127)</b>	<b>(118)</b>	<b>(136)</b>	<b>(139)</b>	<b>(195)</b>	<b>(185)</b>	<b>(199)</b>

Projected Changes in CO2 Cost (\$M) -NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.5)	(1.7)	(1.9)	(3.4)	(2.4)	(6.0)	(6.0)	(2.4)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.2)	(0.2)	(0.0)	(0.6)	(0.5)	(1.3)	(1.6)	(1.9)	(2.9)	(3.7)
North	(0.0)	(0.1)	(0.2)	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.6)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.4)	(1.8)	(1.9)	(2.4)	(2.8)	(2.7)	(2.1)	(1.7)	(1.5)	(1.1)
Hudson Valley	3.7	21.4	26.7	32.8	38.6	46.1	48.8	51.4	54.5	58.7
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(2.3)	(12.7)	(14.6)	(15.4)	(18.6)	(23.3)	(27.5)	(29.3)	(30.2)	(34.8)
Long Island	(0.4)	(1.4)	(1.6)	(1.8)	(2.2)	(2.7)	(2.4)	(2.2)	(3.3)	(3.0)
<b>NYCA Total</b>	<b>0</b>	<b>5</b>	<b>8</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>13</b>

Projected Changes in CO2 Emissions (%) - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.5%	-1.4%	-1.5%	-2.3%	-1.4%	-3.3%	-3.1%	-1.2%
Genesee	-2.1%	-12.2%	-17.9%	6.5%	13.2%	17.1%	21.6%	18.1%	36.3%	30.3%
Central	-2.6%	-0.5%	-0.1%	-1.3%	-0.9%	-1.9%	-2.2%	-2.4%	-3.4%	-4.0%
North	-8.3%	-8.3%	-16.4%	-9.1%	-15.7%	-16.5%	-15.9%	-18.2%	-17.1%	-15.0%
Mohawk Valley	8.0%	-4.5%	-4.1%	-4.3%	-5.0%	-6.4%	-5.9%	-4.7%	-3.0%	-4.1%
Capital	-2.7%	-2.2%	-1.9%	-2.0%	-2.0%	-1.7%	-1.2%	-0.9%	-0.8%	-0.5%
Hudson Valley	66.8%	148.3%	158.4%	185.2%	198.0%	180.8%	161.1%	134.8%	124.2%	116.7%
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-9.2%	-9.8%	-9.3%	-8.2%	-8.5%	-8.7%	-9.6%	-9.6%	-9.1%	-9.7%
Long Island	-4.1%	-3.0%	-2.8%	-2.6%	-2.9%	-2.8%	-2.4%	-2.0%	-2.7%	-2.3%
<b>NYCA Total</b>	<b>0.4%</b>	<b>1.3%</b>	<b>1.6%</b>	<b>1.9%</b>	<b>1.9%</b>	<b>1.6%</b>	<b>1.5%</b>	<b>1.1%</b>	<b>1.0%</b>	<b>1.3%</b>

Projected Changes in SO2 Cost (\$M) – NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	0.0	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.6)	(0.7)	(0.6)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Long Island	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	(0.0)
<b>NYCA Total</b>	<b>(0.2)</b>	<b>(0.4)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.5)</b>	<b>(0.7)</b>	<b>(0.6)</b>	<b>(0.8)</b>	<b>(0.9)</b>	<b>(0.8)</b>

Projected Changes in SO2 Emissions (%) – NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.8%	-2.5%	-2.1%	-4.2%	-2.6%	-2.4%	-2.6%	-1.9%
Genesee	-0.3%	-1.4%	-1.7%	0.4%	0.9%	0.9%	1.0%	0.8%	1.5%	1.9%
Central	-4.0%	-3.7%	-2.4%	-4.8%	-2.8%	-3.5%	-5.7%	-8.1%	-9.0%	-10.5%
North	-10.1%	-11.2%	-17.6%	-12.1%	-11.8%	-14.1%	-13.3%	-14.9%	-11.9%	-13.7%
Mohawk Valley	38.9%	-0.9%	-0.8%	0.2%	-3.4%	-1.5%	-1.5%	-1.3%	-1.0%	0.1%
Capital	-3.4%	-3.3%	-2.9%	-3.1%	-2.8%	-2.6%	-1.9%	-1.5%	-1.3%	-0.8%
Hudson Valley	-15.9%	-18.4%	-17.1%	-18.7%	-17.6%	-21.4%	-19.9%	-22.8%	-24.0%	-21.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-11.2%	-13.6%	-13.0%	-11.0%	-11.4%	-12.4%	-13.8%	-14.8%	-15.2%	-15.5%
Long Island	-3.8%	-3.1%	-3.2%	-3.1%	-3.2%	-3.2%	-2.3%	-1.5%	-3.2%	-1.6%
<b>NYCA Total</b>	<b>-5.3%</b>	<b>-4.8%</b>	<b>-5.1%</b>	<b>-6.0%</b>	<b>-5.7%</b>	<b>-7.8%</b>	<b>-6.8%</b>	<b>-7.8%</b>	<b>-8.8%</b>	<b>-7.8%</b>

Projected Changes in NOx Cost (\$M) – NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.0	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.4)	(0.3)	(0.1)
Genesee	0.0	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.3)	(0.2)	(0.2)	(0.3)	(0.2)	(0.4)	(0.4)	(0.6)	(0.7)	(0.8)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)
Long Island	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.2)	(0.1)
<b>NYCA Total</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(2)</b>	<b>(2)</b>	<b>(2)</b>

Projected Changes in NOx Emissions (%) - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.3%	-0.9%	-1.1%	-1.5%	-1.0%	-2.8%	-2.6%	-0.8%
Genesee	0.1%	-1.7%	-2.6%	0.7%	1.6%	1.5%	1.6%	1.4%	2.5%	3.4%
Central	-4.8%	-2.0%	-1.3%	-2.1%	-1.6%	-2.2%	-2.9%	-3.9%	-4.5%	-5.3%
North	-0.6%	-0.7%	-1.3%	-0.9%	-1.3%	-1.6%	-1.5%	-1.7%	-1.4%	-1.4%
Mohawk Valley	-0.1%	-0.5%	-0.4%	-0.4%	-0.5%	-0.6%	-0.5%	-0.3%	-0.2%	-0.3%
Capital	-1.2%	-1.2%	-1.0%	-1.3%	-1.4%	-1.8%	-1.4%	-1.0%	-1.0%	-0.5%
Hudson Valley	-13.1%	-11.3%	-8.9%	-9.6%	-7.5%	-11.3%	-11.9%	-15.2%	-16.8%	-15.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-13.0%	-12.7%	-12.1%	-10.8%	-10.9%	-11.1%	-12.7%	-12.4%	-12.6%	-12.4%
Long Island	-2.4%	-1.8%	-1.8%	-1.7%	-1.8%	-1.8%	-1.4%	-1.2%	-1.8%	-1.3%
<b>NYCA Total</b>	<b>-3.9%</b>	<b>-3.0%</b>	<b>-2.8%</b>	<b>-2.9%</b>	<b>-2.9%</b>	<b>-3.6%</b>	<b>-3.6%</b>	<b>-4.7%</b>	<b>-5.1%</b>	<b>-4.3%</b>

Projected LBMP \$/MWh - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	40.03	45.65	46.83	48.94	51.30	53.40	55.24	57.25	59.45	61.65
Genesee	41.61	47.03	48.21	50.26	52.65	55.00	56.94	59.05	61.33	63.69
Central	42.91	48.47	49.70	51.79	54.24	56.89	58.95	61.20	63.55	66.11
North	41.15	46.70	47.87	49.89	52.24	54.74	56.76	58.89	61.13	63.57
Mohawk Valley	43.81	49.36	50.61	52.70	55.18	57.93	60.05	62.35	64.76	67.38
Capital	47.77	52.51	53.96	55.77	58.51	61.76	64.04	66.70	69.42	72.36
Hudson Valley	49.11	54.20	55.70	57.59	60.35	63.81	66.27	69.11	72.11	75.14
Millwood	49.75	54.79	56.31	58.17	60.97	64.50	67.02	69.94	73.04	76.13
Dunwoodie	49.99	55.03	56.56	58.41	61.23	64.79	67.32	70.25	73.38	76.49
NY City	50.85	55.94	57.52	59.37	62.24	65.84	68.43	71.45	74.68	77.92
Long Island	54.05	59.46	61.26	63.49	66.63	70.54	73.47	76.64	80.20	83.76
<b>NYCA Avg.</b>	<b>46.46</b>	<b>51.74</b>	<b>53.14</b>	<b>55.13</b>	<b>57.78</b>	<b>60.84</b>	<b>63.14</b>	<b>65.71</b>	<b>68.46</b>	<b>71.29</b>

Projected Changes in Generator GWh - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	2	(34)	(105)	(108)	(162)	(107)	(269)	(248)	(82)
Genesee	(0)	(1)	(1)	0	1	1	2	1	1	2
Central	(101)	(16)	7	(73)	(57)	(136)	(144)	(142)	(212)	(246)
North	(18)	(20)	(39)	(26)	(47)	(56)	(52)	(55)	(47)	(43)
Mohawk Valley	1	(2)	(2)	(3)	(3)	(4)	(3)	(2)	(1)	(2)
Capital	(456)	(398)	(341)	(345)	(342)	(295)	(190)	(142)	(83)	(31)
Hudson Valley	4,303	5,052	5,120	5,293	5,351	5,709	5,649	5,646	5,637	5,622
Millwood	0	0	0	0	0	0	1	0	0	1
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,891)	(2,299)	(2,172)	(1,952)	(2,029)	(2,209)	(2,421)	(2,393)	(2,311)	(2,446)
Long Island	(265)	(206)	(202)	(188)	(201)	(210)	(177)	(150)	(205)	(171)
<b>NYCA Total</b>	<b>1,578</b>	<b>2,111</b>	<b>2,336</b>	<b>2,602</b>	<b>2,566</b>	<b>2,637</b>	<b>2,560</b>	<b>2,494</b>	<b>2,531</b>	<b>2,603</b>

Projected Changes in Loss Payment (\$M) - NS-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	1	1	2	2	2	2	2	2	2
Genesee	0	0	0	1	1	1	1	1	1	1
Central	0	0	0	0	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	0	0	0	0	0	0	0	0	0	(0)
Hudson Valley	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(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	3	2	1	1	0	1	1	2	3
Long Island	1	1	0	0	0	(0)	0	0	1	1
<b>NYCA Total</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

## Generic DR/EE Solution

Projected Changes in Production Cost (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	0	(0)	(1)	(3)	(1)	0	(0)	(2)	(1)
Genesee	(0)	(0)	0	0	0	0	0	(0)	(0)	0
Central	(3)	(2)	(2)	(1)	(1)	(1)	(2)	(0)	(4)	(3)
North	(0)	(0)	(1)	(0)	(1)	(0)	(0)	(1)	(1)	(0)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(4)	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1
Hudson Valley	(3)	(3)	(3)	(4)	(4)	(4)	(3)	(7)	(5)	(5)
Millwood	0	0	0	0	0	0	0	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(20)	(22)	(20)	(22)	(21)	(23)	(25)	(26)	(21)	(31)
Long Island	(3)	(3)	(2)	(2)	(4)	(4)	(4)	(3)	(4)	(4)
<b>NYCA Total</b>	<b>(33)</b>	<b>(34)</b>	<b>(31)</b>	<b>(32)</b>	<b>(35)</b>	<b>(34)</b>	<b>(37)</b>	<b>(38)</b>	<b>(38)</b>	<b>(43)</b>
<b>NYCA-wide</b>	<b>(49)</b>	<b>(53)</b>	<b>(52)</b>	<b>(56)</b>	<b>(59)</b>	<b>(62)</b>	<b>(65)</b>	<b>(65)</b>	<b>(69)</b>	<b>(74)</b>

Projected Changes in Load LBMP Payment (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	1	(0)	(0)	1	(1)	(0)	(1)	0	1
Genesee	0	0	(0)	(0)	1	(1)	(0)	(1)	0	0
Central	0	1	(0)	(0)	1	(2)	(0)	(1)	0	(0)
North	0	0	(0)	(0)	0	(0)	(0)	(0)	0	(0)
Mohawk Valley	(0)	0	(0)	(0)	0	(1)	(0)	(1)	0	(0)
Capital	(0)	(1)	(1)	(1)	(0)	(2)	(1)	(2)	(1)	(1)
Hudson Valley	(28)	(30)	(30)	(31)	(32)	(35)	(36)	(38)	(38)	(40)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(1)
Dunwoodie	(25)	(27)	(28)	(28)	(29)	(32)	(33)	(35)	(35)	(38)
NY City	(15)	(15)	(13)	(13)	(11)	(22)	(17)	(25)	(16)	(22)
Long Island	(3)	(4)	(4)	(3)	(3)	(6)	(3)	(8)	(2)	(6)
<b>NYCA Total</b>	<b>(73)</b>	<b>(77)</b>	<b>(77)</b>	<b>(77)</b>	<b>(72)</b>	<b>(103)</b>	<b>(93)</b>	<b>(113)</b>	<b>(92)</b>	<b>(107)</b>

Projected Changes in Generator LBMP Payment (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1	1	(1)	(1)	(1)	(2)	0	(1)	(1)	(0)
Genesee	0	0	0	(0)	0	(0)	(0)	(0)	0	0
Central	(3)	(1)	(2)	(2)	(1)	(4)	(4)	(3)	(4)	(3)
North	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)	(0)	(0)
Mohawk Valley	0	0	(0)	(0)	0	(0)	(0)	(0)	0	(0)
Capital	(3)	(3)	(3)	(2)	(1)	(5)	(1)	(3)	(2)	2
Hudson Valley	(5)	(4)	(4)	(5)	(4)	(5)	(5)	(9)	(6)	(7)
Millwood	(4)	(4)	(4)	(3)	(3)	(5)	(4)	(6)	(4)	(5)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(25)	(28)	(27)	(26)	(26)	(33)	(33)	(38)	(27)	(41)
Long Island	(5)	(6)	(4)	(4)	(5)	(7)	(6)	(7)	(5)	(7)
<b>NYCA Total</b>	<b>(44)</b>	<b>(45)</b>	<b>(45)</b>	<b>(43)</b>	<b>(40)</b>	<b>(62)</b>	<b>(54)</b>	<b>(69)</b>	<b>(48)</b>	<b>(62)</b>

Projected Changes in Congestion Demand (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	0	(0)	0	(0)	(0)	0	(0)	(0)	(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	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Hudson Valley	(5)	(5)	(4)	(4)	(5)	(5)	(5)	(7)	(6)	(7)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(5)	(5)	(4)	(4)	(4)	(5)	(5)	(6)	(6)	(7)
NY City	(15)	(17)	(11)	(11)	(14)	(15)	(16)	(21)	(17)	(21)
Long Island	(3)	(5)	(3)	(2)	(4)	(3)	(3)	(6)	(3)	(5)
<b>NYCA Total</b>	<b>(30)</b>	<b>(35)</b>	<b>(24)</b>	<b>(22)</b>	<b>(28)</b>	<b>(31)</b>	<b>(32)</b>	<b>(42)</b>	<b>(34)</b>	<b>(43)</b>

Projected Changes in CO2 Cost (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.0	(0.0)	(0.3)	(1.0)	(0.3)	0.1	(0.1)	(0.6)	(0.4)
Genesee	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)	0.0
Central	(0.1)	(0.3)	(0.3)	(0.1)	(0.2)	(0.2)	(0.5)	0.0	(0.9)	(0.7)
North	(0.0)	(0.0)	(0.1)	(0.0)	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.1)	(0.3)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	0.1
Hudson Valley	(0.1)	(0.4)	(0.6)	(0.8)	(0.8)	(0.9)	(0.8)	(1.9)	(1.5)	(1.3)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.4)	(2.0)	(2.2)	(2.7)	(2.8)	(3.3)	(3.8)	(4.1)	(3.1)	(5.1)
Long Island	(0.1)	(0.3)	(0.2)	(0.3)	(0.5)	(0.6)	(0.6)	(0.4)	(0.6)	(0.6)
<b>NYCA Total</b>	<b>(1)</b>	<b>(3)</b>	<b>(4)</b>	<b>(4)</b>	<b>(6)</b>	<b>(6)</b>	<b>(6)</b>	<b>(7)</b>	<b>(7)</b>	<b>(8)</b>

Projected Changes in CO2 Emissions (%) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	0.0%	-0.3%	-0.8%	-0.2%	0.0%	0.0%	-0.3%	-0.2%
Genesee	-3.5%	-12.1%	4.7%	3.7%	5.3%	8.7%	0.6%	-14.5%	-3.0%	7.8%
Central	-1.1%	-0.8%	-0.6%	-0.2%	-0.4%	-0.3%	-0.6%	0.0%	-1.1%	-0.8%
North	-1.3%	-2.7%	-4.5%	-1.8%	-3.8%	-0.6%	-1.9%	-3.4%	-2.7%	-0.5%
Mohawk Valley	6.9%	-1.7%	-1.5%	-1.2%	-1.3%	-0.4%	-1.0%	-0.8%	-1.4%	-0.3%
Capital	-0.5%	-0.4%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	-0.2%	0.1%
Hudson Valley	-1.8%	-2.7%	-3.4%	-4.5%	-4.0%	-3.5%	-2.7%	-5.0%	-3.3%	-2.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.7%	-1.5%	-1.4%	-1.4%	-1.3%	-1.2%	-1.3%	-1.3%	-0.9%	-1.4%
Long Island	-0.7%	-0.6%	-0.4%	-0.4%	-0.6%	-0.6%	-0.6%	-0.4%	-0.5%	-0.5%
<b>NYCA Total</b>	<b>-0.9%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.9%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.8%</b>

Projected Changes in SO2 Cost (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.00	0.01	(0.00)	(0.02)	(0.03)	(0.02)	0.01	0.00	(0.03)	(0.01)
Genesee	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	(0.00)	(0.00)	0.00
Central	(0.00)	(0.00)	(0.00)	0.00	(0.00)	(0.00)	(0.00)	0.00	(0.00)	(0.00)
North	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Mohawk Valley	0.00	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Hudson Valley	(0.02)	(0.04)	(0.05)	(0.07)	(0.06)	(0.06)	(0.05)	(0.12)	(0.09)	(0.07)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Long Island	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
<b>NYCA Total</b>	<b>(0.02)</b>	<b>(0.04)</b>	<b>(0.07)</b>	<b>(0.11)</b>	<b>(0.11)</b>	<b>(0.10)</b>	<b>(0.06)</b>	<b>(0.13)</b>	<b>(0.14)</b>	<b>(0.10)</b>



Projected Changes in SO<sub>2</sub> Emissions (%) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.1%	0.1%	-0.1%	-0.5%	-0.8%	-0.6%	0.2%	0.0%	-0.6%	-0.3%
Genesee	-0.3%	-1.2%	0.4%	0.3%	0.4%	0.6%	0.0%	-0.9%	-0.2%	0.5%
Central	-0.9%	-3.1%	-2.3%	0.5%	-2.3%	-1.0%	-2.6%	1.6%	-3.7%	-1.8%
North	-0.6%	-1.8%	-3.8%	-0.6%	-1.3%	-2.1%	-1.8%	-3.2%	-1.0%	-0.6%
Mohawk Valley	29.5%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%	0.5%
Capital	-0.6%	-0.5%	-0.3%	-0.3%	-0.3%	-0.4%	-0.3%	-0.2%	-0.3%	0.1%
Hudson Valley	-1.4%	-2.0%	-3.0%	-4.4%	-3.6%	-3.3%	-2.3%	-4.8%	-3.2%	-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	-2.0%	-1.9%	-1.9%	-1.9%	-1.5%	-2.2%	-2.4%	-2.2%	-2.4%	-2.0%
Long Island	-0.3%	-0.4%	-0.3%	-0.6%	-0.7%	-0.6%	-0.6%	-0.1%	-0.3%	-0.4%
<b>NYCA Total</b>	<b>-0.4%</b>	<b>-0.5%</b>	<b>-0.8%</b>	<b>-1.3%</b>	<b>-1.3%</b>	<b>-1.2%</b>	<b>-0.7%</b>	<b>-1.3%</b>	<b>-1.3%</b>	<b>-0.9%</b>

Projected Changes in NO<sub>x</sub> Cost (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.00	0.00	(0.00)	(0.02)	(0.08)	(0.02)	0.00	(0.01)	(0.03)	(0.02)
Genesee	(0.00)	(0.00)	0.00	0.00	0.00	0.00	(0.00)	(0.00)	(0.00)	0.00
Central	(0.02)	(0.01)	(0.02)	(0.00)	(0.02)	(0.01)	(0.02)	0.01	(0.04)	(0.02)
North	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mohawk Valley	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Hudson Valley	(0.04)	(0.05)	(0.08)	(0.13)	(0.12)	(0.11)	(0.10)	(0.22)	(0.13)	(0.14)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.03)	(0.04)	(0.05)	(0.08)	(0.06)	(0.07)	(0.07)	(0.07)	(0.09)	(0.08)
Long Island	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)
<b>NYCA Total</b>	<b>(0.10)</b>	<b>(0.13)</b>	<b>(0.17)</b>	<b>(0.27)</b>	<b>(0.33)</b>	<b>(0.25)</b>	<b>(0.24)</b>	<b>(0.31)</b>	<b>(0.33)</b>	<b>(0.29)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	0.0%	-0.2%	-0.6%	-0.1%	0.0%	-0.1%	-0.2%	-0.1%
Genesee	-0.1%	-1.9%	0.6%	0.4%	0.6%	0.9%	0.0%	-1.4%	-0.2%	0.8%
Central	-1.4%	-1.3%	-1.1%	0.0%	-0.9%	-0.4%	-1.0%	0.5%	-1.7%	-0.9%
North	-0.1%	-0.2%	-0.3%	-0.1%	-0.2%	-0.1%	-0.2%	-0.3%	-0.2%	0.0%
Mohawk Valley	0.0%	-0.2%	-0.2%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.0%
Capital	-0.3%	-0.3%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.2%	-0.3%	0.0%
Hudson Valley	-1.9%	-3.2%	-3.7%	-4.6%	-4.2%	-3.6%	-2.9%	-5.3%	-3.0%	-2.8%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.9%	-2.1%	-2.0%	-1.9%	-1.6%	-1.5%	-1.6%	-1.5%	-1.9%	-1.7%
Long Island	-0.4%	-0.3%	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	-0.2%	-0.3%	-0.3%
<b>NYCA Total</b>	<b>-0.6%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.9%</b>	<b>-0.7%</b>	<b>-0.6%</b>	<b>-0.8%</b>	<b>-0.8%</b>	<b>-0.7%</b>

Projected LBMP \$/MWh – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	39.88	45.47	46.74	48.87	51.28	53.37	55.24	57.00	59.17	61.44
Genesee	41.49	46.89	48.17	50.25	52.71	55.06	57.03	58.85	61.13	63.57
Central	42.80	48.36	49.72	51.83	54.35	57.02	59.11	61.09	63.47	66.02
North	41.03	46.55	47.84	49.89	52.33	54.86	56.89	58.76	61.03	63.48
Mohawk Valley	43.74	49.29	50.67	52.79	55.34	58.13	60.27	62.32	64.76	67.38
Capital	47.81	52.71	54.23	56.07	58.75	62.06	64.42	66.95	69.67	72.52
Hudson Valley	49.85	54.99	56.60	58.54	61.29	64.92	67.40	70.25	73.31	76.36
Millwood	50.72	55.78	57.42	59.34	62.13	65.86	68.39	71.38	74.56	77.69
Dunwoodie	50.95	56.00	57.64	59.56	62.35	66.11	68.66	71.67	74.87	78.03
NY City	51.67	56.72	58.45	60.40	63.22	67.00	69.60	72.70	75.98	79.26
Long Island	54.35	59.74	61.58	63.83	66.84	70.82	73.79	77.06	80.55	84.14
<b>NYCA Average</b>	<b>46.75</b>	<b>52.04</b>	<b>53.55</b>	<b>55.58</b>	<b>58.24</b>	<b>61.38</b>	<b>63.71</b>	<b>66.19</b>	<b>68.95</b>	<b>71.81</b>

Projected Changes in Generator GWh – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	4	1	(3)	(20)	(58)	(15)	3	(4)	(24)	(16)
Genesee	(0)	(1)	0	0	0	0	1	(1)	(0)	1
Central	(60)	(40)	(33)	(20)	(21)	(20)	(35)	(9)	(62)	(46)
North	(3)	(6)	(11)	(5)	(11)	(2)	(6)	(10)	(7)	(1)
Mohawk Valley	2	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(1)	(0)
Capital	(79)	(72)	(52)	(27)	(26)	(26)	(1)	(21)	(18)	30
Hudson Valley	(57)	(50)	(55)	(62)	(55)	(54)	(48)	(98)	(71)	(60)
Millwood	0	(0)	(0)	(0)	(0)	0	1	(1)	(0)	1
Dunwoodie	0	0	0	(0)	0	0	0	(0)	(0)	0
NY City	(344)	(352)	(328)	(327)	(299)	(303)	(335)	(326)	(230)	(352)
Long Island	(46)	(42)	(29)	(32)	(40)	(43)	(43)	(28)	(36)	(36)
<b>NYCA Total</b>	<b>(583)</b>	<b>(563)</b>	<b>(511)</b>	<b>(494)</b>	<b>(511)</b>	<b>(463)</b>	<b>(465)</b>	<b>(499)</b>	<b>(450)</b>	<b>(480)</b>

Projected Changes in Loss Payment (\$M) – NS-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2
Genesee	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Central	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1
North	(0.0)	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Mohawk Valley	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	(0.0)
Capital	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hudson Valley	(2.1)	(2.2)	(2.4)	(2.4)	(2.5)	(2.8)	(2.8)	(2.9)	(3.0)	(3.1)
Millwood	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Dunwoodie	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.8)	(2.8)	(2.9)	(3.0)	(3.2)
NY City	(0.5)	(0.3)	(1.0)	(0.5)	(0.6)	(1.1)	(0.6)	(0.9)	(0.8)	(0.6)
Long Island	(0.1)	(0.0)	(0.4)	(0.2)	(0.2)	(0.4)	(0.2)	(0.4)	(0.2)	(0.2)
<b>NYCA Total</b>	<b>(5)</b>	<b>(4)</b>	<b>(6)</b>	<b>(5)</b>	<b>(5)</b>	<b>(7)</b>	<b>(6)</b>	<b>(7)</b>	<b>(7)</b>	<b>(7)</b>

### H.3. Study 3: Leeds – Pleasant Valley (L-PV)

#### Generic Transmission Solution

Projected Changes in Production Cost (\$M) – L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	4	5	5	6	13	11	8	7	9	10
Genesee	0	0	0	0	0	0	0	0	0	0
Central	7	8	7	7	8	9	10	10	13	16
North	4	5	5	5	4	6	7	7	7	6
Mohawk Valley	1	1	1	0	0	0	0	0	0	0
Capital	19	14	14	13	13	11	13	13	14	16
Hudson Valley	(8)	(14)	(12)	(12)	(11)	(13)	(15)	(22)	(22)	(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	(56)	(54)	(52)	(55)	(56)	(56)	(67)	(62)	(78)	(89)
Long Island	(13)	(9)	(9)	(5)	(8)	(11)	(11)	(9)	(11)	(9)
<b>NYCA Total</b>	<b>(41)</b>	<b>(44)</b>	<b>(42)</b>	<b>(40)</b>	<b>(38)</b>	<b>(42)</b>	<b>(55)</b>	<b>(54)</b>	<b>(67)</b>	<b>(70)</b>
<b>NYCA-wide</b>	<b>(22)</b>	<b>(18)</b>	<b>(18)</b>	<b>(19)</b>	<b>(21)</b>	<b>(21)</b>	<b>(23)</b>	<b>(22)</b>	<b>(28)</b>	<b>(30)</b>

Projected Changes in Load LBMP Payment (\$M) – L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	14	10	9	9	9	9	11	10	13	12
Genesee	10	7	7	7	7	7	9	8	10	10
Central	16	12	10	12	12	12	14	13	16	16
North	4	3	3	3	3	3	4	3	4	4
Mohawk Valley	7	5	4	5	5	5	6	5	6	6
Capital	19	16	16	15	16	17	19	20	22	24
Hudson Valley	1	(1)	(1)	(1)	(1)	(1)	0	(2)	0	(1)
Millwood	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(2)	(3)
Dunwoodie	(3)	(4)	(4)	(4)	(4)	(4)	(4)	(6)	(5)	(7)
NY City	(21)	(29)	(31)	(27)	(29)	(31)	(26)	(48)	(42)	(47)
Long Island	2	(5)	(4)	(2)	(2)	(3)	(2)	(10)	(6)	(10)
<b>NYCA Total</b>	<b>47</b>	<b>11</b>	<b>7</b>	<b>16</b>	<b>14</b>	<b>11</b>	<b>29</b>	<b>(10)</b>	<b>16</b>	<b>5</b>

Projected Changes in Generator LBMP Payment (\$M) – L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	29	23	21	24	29	27	27	25	31	30
Genesee	5	3	3	3	3	3	4	4	4	4
Central	35	29	26	31	28	31	36	34	43	44
North	11	9	9	9	8	10	12	12	13	12
Mohawk Valley	4	2	2	2	2	2	3	2	3	3
Capital	75	61	63	60	64	65	73	79	90	97
Hudson Valley	(9)	(16)	(14)	(13)	(11)	(14)	(16)	(25)	(24)	(25)
Millwood	(6)	(7)	(7)	(6)	(8)	(8)	(6)	(11)	(9)	(11)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(57)	(65)	(64)	(63)	(65)	(67)	(74)	(81)	(90)	(103)
Long Island	(13)	(13)	(12)	(7)	(9)	(12)	(12)	(16)	(15)	(16)
<b>NYCA Total</b>	<b>73</b>	<b>27</b>	<b>27</b>	<b>40</b>	<b>42</b>	<b>38</b>	<b>45</b>	<b>22</b>	<b>46</b>	<b>34</b>

Projected Changes in Congestion Demand (\$M) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	2	1	0	0	(0)	(1)	(1)	(2)	(3)	(4)
Genesee	1	1	1	1	1	1	0	(1)	(2)	(2)
Central	2	2	2	2	2	3	3	3	4	4
North	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	0	0	0	0	0	0	0	1	1	1
Capital	8	8	9	7	8	9	10	11	12	14
Hudson Valley	(9)	(9)	(7)	(8)	(8)	(8)	(8)	(10)	(10)	(11)
Millwood	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(5)	(5)	(6)
Dunwoodie	(10)	(9)	(8)	(8)	(8)	(8)	(9)	(11)	(11)	(12)
NY City	(74)	(66)	(61)	(63)	(66)	(66)	(70)	(87)	(93)	(98)
Long Island	(23)	(21)	(18)	(18)	(18)	(18)	(22)	(28)	(29)	(33)
<b>NYCA Total</b>	<b>(106)</b>	<b>(96)</b>	<b>(85)</b>	<b>(91)</b>	<b>(93)</b>	<b>(93)</b>	<b>(102)</b>	<b>(129)</b>	<b>(138)</b>	<b>(146)</b>

Projected Changes in CO2 Cost (\$M) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.2	1.0	1.1	1.8	4.2	4.1	2.8	2.4	3.3	3.7
Genesee	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1
Central	0.3	1.1	1.1	1.4	1.5	2.0	2.2	2.4	3.2	3.9
North	0.1	0.5	0.5	0.6	0.5	0.9	1.1	1.2	1.2	1.1
Mohawk Valley	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Capital	0.4	1.2	1.5	1.6	1.7	1.6	1.9	2.1	2.3	2.7
Hudson Valley	(0.2)	(1.9)	(2.0)	(2.0)	(1.7)	(2.5)	(3.1)	(5.3)	(5.3)	(5.3)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(1.1)	(4.6)	(5.4)	(6.6)	(7.3)	(8.0)	(10.0)	(9.4)	(12.1)	(14.2)
Long Island	(0.3)	(0.9)	(1.0)	(0.6)	(1.1)	(1.7)	(1.7)	(1.4)	(1.7)	(1.5)
<b>NYCA Total</b>	<b>(1)</b>	<b>(4)</b>	<b>(4)</b>	<b>(4)</b>	<b>(2)</b>	<b>(4)</b>	<b>(7)</b>	<b>(8)</b>	<b>(9)</b>	<b>(9)</b>

Projected Changes in CO2 Emissions (%) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.7%	1.1%	1.0%	1.4%	3.2%	2.7%	1.7%	1.3%	1.7%	1.8%
Genesee	74.2%	48.0%	71.3%	72.3%	61.3%	85.8%	88.1%	87.8%	150.9%	102.5%
Central	3.7%	3.4%	2.6%	2.8%	2.7%	3.0%	3.0%	3.0%	3.8%	4.3%
North	38.2%	37.3%	37.6%	28.1%	21.2%	28.4%	33.1%	36.4%	36.3%	30.6%
Mohawk Valley	57.7%	17.6%	17.4%	11.9%	10.0%	12.4%	13.7%	14.8%	12.9%	12.4%
Capital	2.4%	1.5%	1.5%	1.4%	1.2%	1.0%	1.1%	1.1%	1.2%	1.3%
Hudson Valley	-3.7%	-13.1%	-11.6%	-11.3%	-8.8%	-10.0%	-10.3%	-13.9%	-12.1%	-10.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-4.5%	-3.6%	-3.4%	-3.5%	-3.4%	-3.0%	-3.5%	-3.1%	-3.7%	-4.0%
Long Island	-2.9%	-1.9%	-1.8%	-0.9%	-1.5%	-1.8%	-1.7%	-1.2%	-1.5%	-1.2%
<b>NYCA Total</b>	<b>-0.7%</b>	<b>-0.9%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.3%</b>	<b>-0.5%</b>	<b>-0.8%</b>	<b>-0.9%</b>	<b>-0.9%</b>	<b>-0.9%</b>

Projected Changes in SO2 Cost (\$M) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.02	0.08	0.08	0.11	0.16	0.11	0.14	0.12	0.15	0.15
Genesee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
North	0.01	0.03	0.02	0.02	0.02	0.02	0.04	0.03	0.04	0.03
Mohawk Valley	0.01	0.00	0.00	0.00	(0.00)	0.00	0.00	0.00	0.00	0.00
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hudson Valley	(0.02)	(0.20)	(0.17)	(0.14)	(0.09)	(0.14)	(0.16)	(0.30)	(0.27)	(0.25)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Long Island	(0.01)	(0.03)	(0.03)	(0.02)	(0.02)	(0.05)	(0.05)	(0.01)	(0.03)	(0.02)
<b>NYCA Total</b>	<b>(0.00)</b>	<b>(0.11)</b>	<b>(0.09)</b>	<b>(0.02)</b>	<b>0.07</b>	<b>(0.04)</b>	<b>(0.02)</b>	<b>(0.16)</b>	<b>(0.10)</b>	<b>(0.07)</b>

Projected Changes in SO2 Emissions (%) - L-PV : Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.8%	1.7%	1.6%	2.5%	3.7%	2.5%	3.0%	2.4%	3.0%	3.2%
Genesee	6.2%	5.4%	7.1%	8.5%	6.4%	6.6%	5.7%	5.7%	7.9%	7.3%
Central	3.4%	19.2%	11.4%	15.4%	12.8%	14.4%	14.6%	12.1%	14.9%	14.6%
North	26.3%	22.5%	19.4%	17.2%	13.3%	12.5%	18.4%	14.7%	17.6%	12.9%
Mohawk Valley	149.1%	1.5%	1.4%	0.5%	-0.6%	1.2%	1.4%	1.4%	1.2%	1.0%
Capital	3.7%	2.7%	2.4%	2.2%	1.9%	1.6%	1.8%	1.8%	1.8%	2.1%
Hudson Valley	-2.0%	-10.8%	-9.2%	-8.6%	-6.0%	-7.4%	-7.6%	-11.8%	-9.8%	-8.2%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-6.1%	-5.3%	-5.2%	-4.7%	-4.8%	-4.6%	-5.6%	-5.5%	-7.3%	-6.2%
Long Island	-2.3%	-1.9%	-1.8%	-1.0%	-1.2%	-2.3%	-2.1%	-0.6%	-1.2%	-0.6%
<b>NYCA Total</b>	<b>0.0%</b>	<b>-1.3%</b>	<b>-1.0%</b>	<b>-0.2%</b>	<b>0.8%</b>	<b>-0.5%</b>	<b>-0.2%</b>	<b>-1.6%</b>	<b>-1.0%</b>	<b>-0.6%</b>

Projected Changes in NOx Cost (\$M) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.1	0.1	0.1	0.3	0.3	0.2	0.1	0.2	0.2
Genesee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mohawk Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hudson Valley	(0.1)	(0.2)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.6)	(0.6)	(0.6)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Long Island	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
<b>NYCA Total</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.2)</b>	<b>(0.0)</b>	<b>(0.2)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.5)</b>	<b>(0.5)</b>

Projected Changes in NOx Emissions (%) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.6%	0.9%	0.8%	1.1%	2.6%	2.3%	1.2%	0.9%	1.3%	1.3%
Genesee	15.9%	12.0%	11.7%	14.9%	11.5%	10.5%	8.8%	8.7%	12.3%	13.8%
Central	5.9%	6.6%	4.3%	5.7%	4.8%	5.3%	5.4%	5.0%	6.3%	6.9%
North	2.3%	2.3%	2.3%	2.1%	1.6%	2.3%	2.8%	2.6%	2.6%	2.2%
Mohawk Valley	3.5%	2.2%	2.0%	1.5%	1.2%	1.5%	1.5%	1.5%	1.2%	1.2%
Capital	2.6%	2.2%	2.1%	1.8%	2.0%	2.1%	2.3%	2.5%	2.6%	2.9%
Hudson Valley	-4.8%	-14.1%	-12.6%	-12.1%	-9.7%	-11.5%	-11.9%	-15.2%	-13.3%	-12.1%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-5.4%	-4.7%	-4.5%	-4.3%	-3.9%	-3.9%	-4.2%	-3.8%	-5.0%	-5.2%
Long Island	-1.6%	-1.0%	-1.0%	-0.5%	-0.8%	-1.2%	-1.0%	-0.7%	-0.9%	-0.6%
<b>NYCA Total</b>	<b>-0.6%</b>	<b>-1.1%</b>	<b>-1.1%</b>	<b>-0.7%</b>	<b>0.0%</b>	<b>-0.5%</b>	<b>-1.0%</b>	<b>-1.4%</b>	<b>-1.3%</b>	<b>-1.1%</b>

Projected LBMP \$/MWh - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	40.68	46.03	47.28	49.45	51.75	53.95	55.97	57.68	59.94	62.16
Genesee	42.30	47.46	48.71	50.86	53.20	55.67	57.78	59.54	61.90	64.36
Central	43.65	48.97	50.30	52.49	54.91	57.73	59.92	61.86	64.33	66.92
North	41.76	47.05	48.31	50.47	52.80	55.43	57.56	59.34	61.71	64.18
Mohawk Valley	44.54	49.85	51.21	53.41	55.86	58.79	61.03	63.02	65.55	68.20
Capital	49.33	54.00	55.53	57.32	60.01	63.55	66.01	68.62	71.49	74.46
Hudson Valley	50.20	55.16	56.75	58.72	61.40	65.19	67.76	70.50	73.59	76.66
Millwood	50.68	55.59	57.20	59.16	61.86	65.72	68.32	71.12	74.26	77.38
Dunwoodie	50.90	55.81	57.42	59.38	62.08	65.97	68.58	71.40	74.57	77.70
NY City	51.68	56.62	58.25	60.24	62.98	66.89	69.57	72.45	75.70	79.00
Long Island	54.61	59.82	61.65	63.88	66.89	70.98	73.94	77.06	80.52	84.09
<b>NYCA Average</b>	<b>47.30</b>	<b>52.40</b>	<b>53.87</b>	<b>55.94</b>	<b>58.52</b>	<b>61.81</b>	<b>64.22</b>	<b>66.60</b>	<b>69.42</b>	<b>72.28</b>

Projected Changes in Generator GWh - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	78	107	97	129	257	224	138	112	144	147
Genesee	5	4	6	7	5	5	5	4	5	5
Central	187	145	126	135	142	162	161	165	203	235
North	84	88	87	81	64	95	107	108	100	87
Mohawk Valley	23	9	8	6	5	6	6	6	5	5
Capital	401	265	280	256	241	175	211	206	219	241
Hudson Valley	(135)	(233)	(201)	(180)	(141)	(175)	(201)	(294)	(282)	(269)
Millwood	0	0	0	0	0	0	0	(1)	(1)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(855)	(800)	(756)	(780)	(759)	(724)	(821)	(707)	(852)	(919)
Long Island	(181)	(125)	(119)	(63)	(96)	(121)	(112)	(87)	(102)	(79)
<b>NYCA Total</b>	<b>(393)</b>	<b>(541)</b>	<b>(471)</b>	<b>(408)</b>	<b>(283)</b>	<b>(352)</b>	<b>(505)</b>	<b>(488)</b>	<b>(562)</b>	<b>(546)</b>

Projected Changes in Loss Payment (\$M) - L-PV: Transmission Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(2)	(2)	(1)	(2)	(2)	(2)	(2)	(2)	(3)	(3)
Genesee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
North	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	0	0	0	0	0	0	0	0	0	0
Capital	0	0	0	1	1	1	1	1	1	1
Hudson Valley	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Millwood	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(0)	(1)
Dunwoodie	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
NY City	(2)	(5)	(6)	(5)	(5)	(6)	(6)	(7)	(5)	(6)
Long Island	(0)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
<b>NYCA Total</b>	<b>(6)</b>	<b>(11)</b>	<b>(12)</b>	<b>(12)</b>	<b>(12)</b>	<b>(14)</b>	<b>(14)</b>	<b>(15)</b>	<b>(13)</b>	<b>(14)</b>

## Generic Generation Solution

Projected Changes in Production Cost (\$M) – L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	(0)	0	(2)	(6)	(5)	(9)	(6)	(15)	(14)	(5)
Genesee	(0)	(0)	(0)	0	0	0	0	0	0	0
Central	(3)	(1)	0	(4)	(3)	(8)	(8)	(9)	(13)	(16)
North	(1)	(1)	(2)	(2)	(3)	(4)	(3)	(4)	(3)	(3)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(20)	(19)	(17)	(19)	(19)	(17)	(13)	(10)	(9)	(6)
Hudson Valley	201	247	258	274	290	321	330	344	357	371
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(110)	(140)	(135)	(125)	(137)	(156)	(176)	(183)	(185)	(207)
Long Island	(18)	(15)	(15)	(14)	(16)	(18)	(16)	(13)	(20)	(17)
<b>NYCA Total</b>	<b>48</b>	<b>72</b>	<b>88</b>	<b>104</b>	<b>106</b>	<b>109</b>	<b>107</b>	<b>110</b>	<b>112</b>	<b>116</b>
<b>NYCA-wide</b>	<b>(27)</b>	<b>(36)</b>	<b>(35)</b>	<b>(39)</b>	<b>(43)</b>	<b>(54)</b>	<b>(57)</b>	<b>(59)</b>	<b>(66)</b>	<b>(72)</b>

Projected Changes in Load LBMP Payment (\$M) -L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	3	4	2	2	2	1	0	4	6	5
Genesee	2	3	1	1	1	(0)	(0)	2	3	3
Central	3	3	0	0	(0)	(2)	(2)	2	3	3
North	1	1	0	(0)	(0)	(1)	(1)	0	1	1
Mohawk Valley	1	1	(0)	(0)	(1)	(2)	(1)	0	1	1
Capital	(1)	(2)	(3)	(4)	(2)	(4)	(5)	(3)	(3)	(1)
Hudson Valley	(12)	(12)	(14)	(14)	(14)	(17)	(17)	(19)	(17)	(19)
Millwood	(4)	(4)	(5)	(5)	(5)	(6)	(6)	(7)	(6)	(7)
Dunwoodie	(10)	(9)	(10)	(10)	(10)	(12)	(12)	(14)	(13)	(14)
NY City	(72)	(68)	(73)	(78)	(74)	(93)	(93)	(108)	(100)	(109)
Long Island	(13)	(13)	(13)	(12)	(9)	(14)	(14)	(21)	(13)	(17)
<b>NYCA Total</b>	<b>(103)</b>	<b>(97)</b>	<b>(115)</b>	<b>(121)</b>	<b>(112)</b>	<b>(151)</b>	<b>(150)</b>	<b>(163)</b>	<b>(139)</b>	<b>(156)</b>

Projected Changes in Generator LBMP Payment (\$M) -L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	7	2	(2)	(1)	(8)	(5)	(7)	(4)	3
Genesee	1	1	0	0	0	(1)	(0)	1	2	1
Central	(0)	4	0	(5)	(6)	(14)	(14)	(10)	(11)	(13)
North	0	1	(2)	(1)	(3)	(5)	(4)	(3)	(2)	(2)
Mohawk Valley	1	1	0	0	(0)	(0)	(0)	0	1	1
Capital	(15)	(18)	(17)	(19)	(17)	(19)	(15)	(8)	(4)	4
Hudson Valley	215	274	286	304	323	361	371	386	404	420
Millwood	(19)	(19)	(20)	(21)	(20)	(26)	(26)	(28)	(28)	(30)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(133)	(164)	(165)	(156)	(165)	(195)	(214)	(227)	(223)	(246)
Long Island	(25)	(21)	(20)	(19)	(20)	(24)	(23)	(26)	(26)	(27)
<b>NYCA Total</b>	<b>30</b>	<b>65</b>	<b>64</b>	<b>80</b>	<b>90</b>	<b>70</b>	<b>70</b>	<b>79</b>	<b>109</b>	<b>110</b>

Projected Changes in Congestion Demand (\$M) - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	(0)	(1)	(0)	(1)	(1)	(1)	(1)	(2)	(2)
Genesee	0	(0)	0	0	0	(0)	(0)	(0)	(1)	(0)
Central	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
North	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(3)	(6)	(4)	(4)	(3)	(3)	(4)	(5)	(5)	(3)
Hudson Valley	(14)	(15)	(14)	(14)	(13)	(15)	(15)	(20)	(19)	(21)
Millwood	(5)	(5)	(5)	(5)	(5)	(6)	(6)	(7)	(7)	(8)
Dunwoodie	(11)	(11)	(10)	(10)	(10)	(11)	(11)	(15)	(14)	(16)
NY City	(84)	(85)	(77)	(81)	(76)	(87)	(89)	(119)	(116)	(125)
Long Island	(19)	(20)	(14)	(12)	(10)	(11)	(12)	(26)	(19)	(24)
<b>NYCA Total</b>	<b>(137)</b>	<b>(144)</b>	<b>(126)</b>	<b>(127)</b>	<b>(118)</b>	<b>(136)</b>	<b>(139)</b>	<b>(195)</b>	<b>(185)</b>	<b>(199)</b>

Projected Changes in CO2 Cost (\$M) -L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.5)	(1.7)	(1.9)	(3.4)	(2.4)	(6.0)	(6.0)	(2.4)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.2)	(0.2)	(0.0)	(0.6)	(0.5)	(1.3)	(1.6)	(1.9)	(2.9)	(3.7)
North	(0.0)	(0.1)	(0.2)	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.6)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.4)	(1.8)	(1.9)	(2.4)	(2.8)	(2.7)	(2.1)	(1.7)	(1.5)	(1.1)
Hudson Valley	3.7	21.4	26.7	32.8	38.6	46.1	48.8	51.4	54.5	58.7
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(2.3)	(12.7)	(14.6)	(15.4)	(18.6)	(23.3)	(27.5)	(29.3)	(30.2)	(34.8)
Long Island	(0.4)	(1.4)	(1.6)	(1.8)	(2.2)	(2.7)	(2.4)	(2.2)	(3.3)	(3.0)
<b>NYCA Total</b>	<b>0</b>	<b>5</b>	<b>8</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>10</b>	<b>10</b>	<b>13</b>



Projected Changes in CO2 Emissions (%) - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.5%	-1.4%	-1.5%	-2.3%	-1.4%	-3.3%	-3.1%	-1.2%
Genesee	-2.1%	-12.2%	-17.9%	6.5%	13.2%	17.1%	21.6%	18.1%	36.3%	30.3%
Central	-2.6%	-0.5%	-0.1%	-1.3%	-0.9%	-1.9%	-2.2%	-2.4%	-3.4%	-4.0%
North	-8.3%	-8.3%	-16.4%	-9.1%	-15.7%	-16.5%	-15.9%	-18.2%	-17.1%	-15.0%
Mohawk Valley	8.0%	-4.5%	-4.1%	-4.3%	-5.0%	-6.4%	-5.9%	-4.7%	-3.0%	-4.1%
Capital	-2.7%	-2.2%	-1.9%	-2.0%	-2.0%	-1.7%	-1.2%	-0.9%	-0.8%	-0.5%
Hudson Valley	66.8%	148.3%	158.4%	185.2%	198.0%	180.8%	161.1%	134.8%	124.2%	116.7%
Millwood	-	-	-	-	-	-	-	-	-	-
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-9.2%	-9.8%	-9.3%	-8.2%	-8.5%	-8.7%	-9.6%	-9.6%	-9.1%	-9.7%
Long Island	-4.1%	-3.0%	-2.8%	-2.6%	-2.9%	-2.8%	-2.4%	-2.0%	-2.7%	-2.3%
<b>NYCA Total</b>	<b>0.4%</b>	<b>1.3%</b>	<b>1.6%</b>	<b>1.9%</b>	<b>1.9%</b>	<b>1.6%</b>	<b>1.5%</b>	<b>1.1%</b>	<b>1.0%</b>	<b>1.3%</b>

Projected Changes in SO2 Cost (\$M) – L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	(0.0)	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
Genesee	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	0.0	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.6)	(0.7)	(0.6)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Long Island	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	(0.0)
<b>NYCA Total</b>	<b>(0.2)</b>	<b>(0.4)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.5)</b>	<b>(0.7)</b>	<b>(0.6)</b>	<b>(0.8)</b>	<b>(0.9)</b>	<b>(0.8)</b>

Projected Changes in SO2 Emissions (%) – L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.8%	-2.5%	-2.1%	-4.2%	-2.6%	-2.4%	-2.6%	-1.9%
Genesee	-0.3%	-1.4%	-1.7%	0.4%	0.9%	0.9%	1.0%	0.8%	1.5%	1.9%
Central	-4.0%	-3.7%	-2.4%	-4.8%	-2.8%	-3.5%	-5.7%	-8.1%	-9.0%	-10.5%
North	-10.1%	-11.2%	-17.6%	-12.1%	-11.8%	-14.1%	-13.3%	-14.9%	-11.9%	-13.7%
Mohawk Valley	38.9%	-0.9%	-0.8%	0.2%	-3.4%	-1.5%	-1.5%	-1.3%	-1.0%	0.1%
Capital	-3.4%	-3.3%	-2.9%	-3.1%	-2.8%	-2.6%	-1.9%	-1.5%	-1.3%	-0.8%
Hudson Valley	-15.9%	-18.4%	-17.1%	-18.7%	-17.6%	-21.4%	-19.9%	-22.8%	-24.0%	-21.5%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-11.2%	-13.6%	-13.0%	-11.0%	-11.4%	-12.4%	-13.8%	-14.8%	-15.2%	-15.5%
Long Island	-3.8%	-3.1%	-3.2%	-3.1%	-3.2%	-3.2%	-2.3%	-1.5%	-3.2%	-1.6%
<b>NYCA Total</b>	<b>-5.3%</b>	<b>-4.8%</b>	<b>-5.1%</b>	<b>-6.0%</b>	<b>-5.7%</b>	<b>-7.8%</b>	<b>-6.8%</b>	<b>-7.8%</b>	<b>-8.8%</b>	<b>-7.8%</b>

Projected Changes in NOx Cost (\$M) – L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.0	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.4)	(0.3)	(0.1)
Genesee	0.0	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
North	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Hudson Valley	(0.3)	(0.2)	(0.2)	(0.3)	(0.2)	(0.4)	(0.4)	(0.6)	(0.7)	(0.8)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)
Long Island	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.2)	(0.1)
<b>NYCA Total</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(1)</b>	<b>(2)</b>	<b>(2)</b>	<b>(2)</b>

Projected Changes in NOx Emissions (%) - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	-0.3%	-0.9%	-1.1%	-1.5%	-1.0%	-2.8%	-2.6%	-0.8%
Genesee	0.1%	-1.7%	-2.6%	0.7%	1.6%	1.5%	1.6%	1.4%	2.5%	3.4%
Central	-4.8%	-2.0%	-1.3%	-2.1%	-1.6%	-2.2%	-2.9%	-3.9%	-4.5%	-5.3%
North	-0.6%	-0.7%	-1.3%	-0.9%	-1.3%	-1.6%	-1.5%	-1.7%	-1.4%	-1.4%
Mohawk Valley	-0.1%	-0.5%	-0.4%	-0.4%	-0.5%	-0.6%	-0.5%	-0.3%	-0.2%	-0.3%
Capital	-1.2%	-1.2%	-1.0%	-1.3%	-1.4%	-1.8%	-1.4%	-1.0%	-1.0%	-0.5%
Hudson Valley	-13.1%	-11.3%	-8.9%	-9.6%	-7.5%	-11.3%	-11.9%	-15.2%	-16.8%	-15.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-13.0%	-12.7%	-12.1%	-10.8%	-10.9%	-11.1%	-12.7%	-12.4%	-12.6%	-12.4%
Long Island	-2.4%	-1.8%	-1.8%	-1.7%	-1.8%	-1.8%	-1.4%	-1.2%	-1.8%	-1.3%
<b>NYCA Total</b>	<b>-3.9%</b>	<b>-3.0%</b>	<b>-2.8%</b>	<b>-2.9%</b>	<b>-2.9%</b>	<b>-3.6%</b>	<b>-3.6%</b>	<b>-4.7%</b>	<b>-5.1%</b>	<b>-4.3%</b>

Projected LBMP \$/MWh - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	40.03	45.65	46.83	48.94	51.30	53.40	55.24	57.25	59.45	61.65
Genesee	41.61	47.03	48.21	50.26	52.65	55.00	56.94	59.05	61.33	63.69
Central	42.91	48.47	49.70	51.79	54.24	56.89	58.95	61.20	63.55	66.11
North	41.15	46.70	47.87	49.89	52.24	54.74	56.76	58.89	61.13	63.57
Mohawk Valley	43.81	49.36	50.61	52.70	55.18	57.93	60.05	62.35	64.76	67.38
Capital	47.77	52.51	53.96	55.77	58.51	61.76	64.04	66.70	69.42	72.36
Hudson Valley	49.11	54.20	55.70	57.59	60.35	63.81	66.27	69.11	72.11	75.14
Millwood	49.75	54.79	56.31	58.17	60.97	64.50	67.02	69.94	73.04	76.13
Dunwoodie	49.99	55.03	56.56	58.41	61.23	64.79	67.32	70.25	73.38	76.49
NY City	50.85	55.94	57.52	59.37	62.24	65.84	68.43	71.45	74.68	77.92
Long Island	54.05	59.46	61.26	63.49	66.63	70.54	73.47	76.64	80.20	83.76
<b>NYCA Avg.</b>	<b>46.46</b>	<b>51.74</b>	<b>53.14</b>	<b>55.13</b>	<b>57.78</b>	<b>60.84</b>	<b>63.14</b>	<b>65.71</b>	<b>68.46</b>	<b>71.29</b>

Projected Changes in Generator GWh - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	6	2	(34)	(105)	(108)	(162)	(107)	(269)	(248)	(82)
Genesee	(0)	(1)	(1)	0	1	1	2	1	1	2
Central	(101)	(16)	7	(73)	(57)	(136)	(144)	(142)	(212)	(246)
North	(18)	(20)	(39)	(26)	(47)	(56)	(52)	(55)	(47)	(43)
Mohawk Valley	1	(2)	(2)	(3)	(3)	(4)	(3)	(2)	(1)	(2)
Capital	(456)	(398)	(341)	(345)	(342)	(295)	(190)	(142)	(83)	(31)
Hudson Valley	4,303	5,052	5,120	5,293	5,351	5,709	5,649	5,646	5,637	5,622
Millwood	0	0	0	0	0	0	1	0	0	1
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,891)	(2,299)	(2,172)	(1,952)	(2,029)	(2,209)	(2,421)	(2,393)	(2,311)	(2,446)
Long Island	(265)	(206)	(202)	(188)	(201)	(210)	(177)	(150)	(205)	(171)
<b>NYCA Total</b>	<b>1,578</b>	<b>2,111</b>	<b>2,336</b>	<b>2,602</b>	<b>2,566</b>	<b>2,637</b>	<b>2,560</b>	<b>2,494</b>	<b>2,531</b>	<b>2,603</b>

Projected Changes in Loss Payment (\$M) - L-PV: Generation Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	1	1	2	2	2	2	2	2	2
Genesee	0	0	0	1	1	1	1	1	1	1
Central	0	0	0	0	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	0	0	0	0	0	0	0	0	0	(0)
Hudson Valley	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(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	3	2	1	1	0	1	1	2	3
Long Island	1	1	0	0	0	(0)	0	0	1	1
<b>NYCA Total</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

## Generic DR/EE Solution

Projected Changes in Production Cost (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	0	(0)	(1)	(3)	(1)	0	(0)	(2)	(1)
Genesee	(0)	(0)	0	0	0	0	0	(0)	(0)	0
Central	(3)	(2)	(2)	(1)	(1)	(1)	(2)	(0)	(4)	(3)
North	(0)	(0)	(1)	(0)	(1)	(0)	(0)	(1)	(1)	(0)
Mohawk Valley	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Capital	(4)	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1
Hudson Valley	(3)	(3)	(3)	(4)	(4)	(4)	(3)	(7)	(5)	(5)
Millwood	0	0	0	0	0	0	0	(0)	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(20)	(22)	(20)	(22)	(21)	(23)	(25)	(26)	(21)	(31)
Long Island	(3)	(3)	(2)	(2)	(4)	(4)	(4)	(3)	(4)	(4)
<b>NYCA Total</b>	<b>(33)</b>	<b>(34)</b>	<b>(31)</b>	<b>(32)</b>	<b>(35)</b>	<b>(34)</b>	<b>(37)</b>	<b>(38)</b>	<b>(38)</b>	<b>(43)</b>
<b>NYCA-wide</b>	<b>(49)</b>	<b>(53)</b>	<b>(52)</b>	<b>(56)</b>	<b>(59)</b>	<b>(62)</b>	<b>(65)</b>	<b>(65)</b>	<b>(69)</b>	<b>(74)</b>

Projected Changes in Load LBMP Payment (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	1	(0)	(0)	1	(1)	(0)	(1)	0	1
Genesee	0	0	(0)	(0)	1	(1)	(0)	(1)	0	0
Central	0	1	(0)	(0)	1	(2)	(0)	(1)	0	(0)
North	0	0	(0)	(0)	0	(0)	(0)	(0)	0	(0)
Mohawk Valley	(0)	0	(0)	(0)	0	(1)	(0)	(1)	0	(0)
Capital	(0)	(1)	(1)	(1)	(0)	(2)	(1)	(2)	(1)	(1)
Hudson Valley	(28)	(30)	(30)	(31)	(32)	(35)	(36)	(38)	(38)	(40)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(1)
Dunwoodie	(25)	(27)	(28)	(28)	(29)	(32)	(33)	(35)	(35)	(38)
NY City	(15)	(15)	(13)	(13)	(11)	(22)	(17)	(25)	(16)	(22)
Long Island	(3)	(4)	(4)	(3)	(3)	(6)	(3)	(8)	(2)	(6)
<b>NYCA Total</b>	<b>(73)</b>	<b>(77)</b>	<b>(77)</b>	<b>(77)</b>	<b>(72)</b>	<b>(103)</b>	<b>(93)</b>	<b>(113)</b>	<b>(92)</b>	<b>(107)</b>

Projected Changes in Generator LBMP Payment (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	1	1	(1)	(1)	(1)	(2)	0	(1)	(1)	(0)
Genesee	0	0	0	(0)	0	(0)	(0)	(0)	0	0
Central	(3)	(1)	(2)	(2)	(1)	(4)	(4)	(3)	(4)	(3)
North	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)	(0)	(0)
Mohawk Valley	0	0	(0)	(0)	0	(0)	(0)	(0)	0	(0)
Capital	(3)	(3)	(3)	(2)	(1)	(5)	(1)	(3)	(2)	2
Hudson Valley	(5)	(4)	(4)	(5)	(4)	(5)	(5)	(9)	(6)	(7)
Millwood	(4)	(4)	(4)	(3)	(3)	(5)	(4)	(6)	(4)	(5)
Dunwoodie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
NY City	(25)	(28)	(27)	(26)	(26)	(33)	(33)	(38)	(27)	(41)
Long Island	(5)	(6)	(4)	(4)	(5)	(7)	(6)	(7)	(5)	(7)
<b>NYCA Total</b>	<b>(44)</b>	<b>(45)</b>	<b>(45)</b>	<b>(43)</b>	<b>(40)</b>	<b>(62)</b>	<b>(54)</b>	<b>(69)</b>	<b>(48)</b>	<b>(62)</b>

Projected Changes in Congestion Demand (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0	0	(0)	0	(0)	(0)	0	(0)	(0)	(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	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Hudson Valley	(5)	(5)	(4)	(4)	(5)	(5)	(5)	(7)	(6)	(7)
Millwood	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Dunwoodie	(5)	(5)	(4)	(4)	(4)	(5)	(5)	(6)	(6)	(7)
NY City	(15)	(17)	(11)	(11)	(14)	(15)	(16)	(21)	(17)	(21)
Long Island	(3)	(5)	(3)	(2)	(4)	(3)	(3)	(6)	(3)	(5)
<b>NYCA Total</b>	<b>(30)</b>	<b>(35)</b>	<b>(24)</b>	<b>(22)</b>	<b>(28)</b>	<b>(31)</b>	<b>(32)</b>	<b>(42)</b>	<b>(34)</b>	<b>(43)</b>

Projected Changes in CO2 Cost (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.0	(0.0)	(0.3)	(1.0)	(0.3)	0.1	(0.1)	(0.6)	(0.4)
Genesee	(0.0)	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)	0.0
Central	(0.1)	(0.3)	(0.3)	(0.1)	(0.2)	(0.2)	(0.5)	0.0	(0.9)	(0.7)
North	(0.0)	(0.0)	(0.1)	(0.0)	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Capital	(0.1)	(0.3)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	0.1
Hudson Valley	(0.1)	(0.4)	(0.6)	(0.8)	(0.8)	(0.9)	(0.8)	(1.9)	(1.5)	(1.3)
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	(0.4)	(2.0)	(2.2)	(2.7)	(2.8)	(3.3)	(3.8)	(4.1)	(3.1)	(5.1)
Long Island	(0.1)	(0.3)	(0.2)	(0.3)	(0.5)	(0.6)	(0.6)	(0.4)	(0.6)	(0.6)
<b>NYCA Total</b>	<b>(1)</b>	<b>(3)</b>	<b>(4)</b>	<b>(4)</b>	<b>(6)</b>	<b>(6)</b>	<b>(6)</b>	<b>(7)</b>	<b>(7)</b>	<b>(8)</b>

Projected Changes in CO2 Emissions (%) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	0.0%	-0.3%	-0.8%	-0.2%	0.0%	0.0%	-0.3%	-0.2%
Genesee	-3.5%	-12.1%	4.7%	3.7%	5.3%	8.7%	0.6%	-14.5%	-3.0%	7.8%
Central	-1.1%	-0.8%	-0.6%	-0.2%	-0.4%	-0.3%	-0.6%	0.0%	-1.1%	-0.8%
North	-1.3%	-2.7%	-4.5%	-1.8%	-3.8%	-0.6%	-1.9%	-3.4%	-2.7%	-0.5%
Mohawk Valley	6.9%	-1.7%	-1.5%	-1.2%	-1.3%	-0.4%	-1.0%	-0.8%	-1.4%	-0.3%
Capital	-0.5%	-0.4%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	-0.2%	0.1%
Hudson Valley	-1.8%	-2.7%	-3.4%	-4.5%	-4.0%	-3.5%	-2.7%	-5.0%	-3.3%	-2.6%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.7%	-1.5%	-1.4%	-1.4%	-1.3%	-1.2%	-1.3%	-1.3%	-0.9%	-1.4%
Long Island	-0.7%	-0.6%	-0.4%	-0.4%	-0.6%	-0.6%	-0.6%	-0.4%	-0.5%	-0.5%
<b>NYCA Total</b>	<b>-0.9%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.9%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.8%</b>	<b>-0.7%</b>	<b>-0.8%</b>

Projected Changes in SO2 Cost (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.00	0.01	(0.00)	(0.02)	(0.03)	(0.02)	0.01	0.00	(0.03)	(0.01)
Genesee	(0.00)	(0.00)	0.00	0.00	0.00	0.00	0.00	(0.00)	(0.00)	0.00
Central	(0.00)	(0.00)	(0.00)	0.00	(0.00)	(0.00)	(0.00)	0.00	(0.00)	(0.00)
North	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Mohawk Valley	0.00	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Hudson Valley	(0.02)	(0.04)	(0.05)	(0.07)	(0.06)	(0.06)	(0.05)	(0.12)	(0.09)	(0.07)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Long Island	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
<b>NYCA Total</b>	<b>(0.02)</b>	<b>(0.04)</b>	<b>(0.07)</b>	<b>(0.11)</b>	<b>(0.11)</b>	<b>(0.10)</b>	<b>(0.06)</b>	<b>(0.13)</b>	<b>(0.14)</b>	<b>(0.10)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.1%	0.1%	-0.1%	-0.5%	-0.8%	-0.6%	0.2%	0.0%	-0.6%	-0.3%
Genesee	-0.3%	-1.2%	0.4%	0.3%	0.4%	0.6%	0.0%	-0.9%	-0.2%	0.5%
Central	-0.9%	-3.1%	-2.3%	0.5%	-2.3%	-1.0%	-2.6%	1.6%	-3.7%	-1.8%
North	-0.6%	-1.8%	-3.8%	-0.6%	-1.3%	-2.1%	-1.8%	-3.2%	-1.0%	-0.6%
Mohawk Valley	29.5%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%	0.5%
Capital	-0.6%	-0.5%	-0.3%	-0.3%	-0.3%	-0.4%	-0.3%	-0.2%	-0.3%	0.1%
Hudson Valley	-1.4%	-2.0%	-3.0%	-4.4%	-3.6%	-3.3%	-2.3%	-4.8%	-3.2%	-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	-2.0%	-1.9%	-1.9%	-1.9%	-1.5%	-2.2%	-2.4%	-2.2%	-2.4%	-2.0%
Long Island	-0.3%	-0.4%	-0.3%	-0.6%	-0.7%	-0.6%	-0.6%	-0.1%	-0.3%	-0.4%
<b>NYCA Total</b>	<b>-0.4%</b>	<b>-0.5%</b>	<b>-0.8%</b>	<b>-1.3%</b>	<b>-1.3%</b>	<b>-1.2%</b>	<b>-0.7%</b>	<b>-1.3%</b>	<b>-1.3%</b>	<b>-0.9%</b>

Projected Changes in NO<sub>x</sub> Cost (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.00	0.00	(0.00)	(0.02)	(0.08)	(0.02)	0.00	(0.01)	(0.03)	(0.02)
Genesee	(0.00)	(0.00)	0.00	0.00	0.00	0.00	(0.00)	(0.00)	(0.00)	0.00
Central	(0.02)	(0.01)	(0.02)	(0.00)	(0.02)	(0.01)	(0.02)	0.01	(0.04)	(0.02)
North	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mohawk Valley	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Capital	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Hudson Valley	(0.04)	(0.05)	(0.08)	(0.13)	(0.12)	(0.11)	(0.10)	(0.22)	(0.13)	(0.14)
Millwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NY City	(0.03)	(0.04)	(0.05)	(0.08)	(0.06)	(0.07)	(0.07)	(0.07)	(0.09)	(0.08)
Long Island	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)
<b>NYCA Total</b>	<b>(0.10)</b>	<b>(0.13)</b>	<b>(0.17)</b>	<b>(0.27)</b>	<b>(0.33)</b>	<b>(0.25)</b>	<b>(0.24)</b>	<b>(0.31)</b>	<b>(0.33)</b>	<b>(0.29)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0%	0.0%	0.0%	-0.2%	-0.6%	-0.1%	0.0%	-0.1%	-0.2%	-0.1%
Genesee	-0.1%	-1.9%	0.6%	0.4%	0.6%	0.9%	0.0%	-1.4%	-0.2%	0.8%
Central	-1.4%	-1.3%	-1.1%	0.0%	-0.9%	-0.4%	-1.0%	0.5%	-1.7%	-0.9%
North	-0.1%	-0.2%	-0.3%	-0.1%	-0.2%	-0.1%	-0.2%	-0.3%	-0.2%	0.0%
Mohawk Valley	0.0%	-0.2%	-0.2%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.0%
Capital	-0.3%	-0.3%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.2%	-0.3%	0.0%
Hudson Valley	-1.9%	-3.2%	-3.7%	-4.6%	-4.2%	-3.6%	-2.9%	-5.3%	-3.0%	-2.8%
Millwood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dunwoodie	-	-	-	-	-	-	-	-	-	-
NY City	-1.9%	-2.1%	-2.0%	-1.9%	-1.6%	-1.5%	-1.6%	-1.5%	-1.9%	-1.7%
Long Island	-0.4%	-0.3%	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	-0.2%	-0.3%	-0.3%
<b>NYCA Total</b>	<b>-0.6%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.7%</b>	<b>-0.9%</b>	<b>-0.7%</b>	<b>-0.6%</b>	<b>-0.8%</b>	<b>-0.8%</b>	<b>-0.7%</b>

Projected LBMP \$/MWh – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	39.88	45.47	46.74	48.87	51.28	53.37	55.24	57.00	59.17	61.44
Genesee	41.49	46.89	48.17	50.25	52.71	55.06	57.03	58.85	61.13	63.57
Central	42.80	48.36	49.72	51.83	54.35	57.02	59.11	61.09	63.47	66.02
North	41.03	46.55	47.84	49.89	52.33	54.86	56.89	58.76	61.03	63.48
Mohawk Valley	43.74	49.29	50.67	52.79	55.34	58.13	60.27	62.32	64.76	67.38
Capital	47.81	52.71	54.23	56.07	58.75	62.06	64.42	66.95	69.67	72.52
Hudson Valley	49.85	54.99	56.60	58.54	61.29	64.92	67.40	70.25	73.31	76.36
Millwood	50.72	55.78	57.42	59.34	62.13	65.86	68.39	71.38	74.56	77.69
Dunwoodie	50.95	56.00	57.64	59.56	62.35	66.11	68.66	71.67	74.87	78.03
NY City	51.67	56.72	58.45	60.40	63.22	67.00	69.60	72.70	75.98	79.26
Long Island	54.35	59.74	61.58	63.83	66.84	70.82	73.79	77.06	80.55	84.14
<b>NYCA Average</b>	<b>46.75</b>	<b>52.04</b>	<b>53.55</b>	<b>55.58</b>	<b>58.24</b>	<b>61.38</b>	<b>63.71</b>	<b>66.19</b>	<b>68.95</b>	<b>71.81</b>

Projected Changes in Generator GWh – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	4	1	(3)	(20)	(58)	(15)	3	(4)	(24)	(16)
Genesee	(0)	(1)	0	0	0	0	1	(1)	(0)	1
Central	(60)	(40)	(33)	(20)	(21)	(20)	(35)	(9)	(62)	(46)
North	(3)	(6)	(11)	(5)	(11)	(2)	(6)	(10)	(7)	(1)
Mohawk Valley	2	(1)	(1)	(1)	(1)	(0)	(0)	(0)	(1)	(0)
Capital	(79)	(72)	(52)	(27)	(26)	(26)	(1)	(21)	(18)	30
Hudson Valley	(57)	(50)	(55)	(62)	(55)	(54)	(48)	(98)	(71)	(60)
Millwood	0	(0)	(0)	(0)	(0)	0	1	(1)	(0)	1
Dunwoodie	0	0	0	(0)	0	0	0	(0)	(0)	0
NY City	(344)	(352)	(328)	(327)	(299)	(303)	(335)	(326)	(230)	(352)
Long Island	(46)	(42)	(29)	(32)	(40)	(43)	(43)	(28)	(36)	(36)
<b>NYCA Total</b>	<b>(583)</b>	<b>(563)</b>	<b>(511)</b>	<b>(494)</b>	<b>(511)</b>	<b>(463)</b>	<b>(465)</b>	<b>(499)</b>	<b>(450)</b>	<b>(480)</b>

Projected Changes in Loss Payment (\$M) – L-PV: DR/EE Solution

Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
West	0.0	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2
Genesee	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Central	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1
North	(0.0)	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Mohawk Valley	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	(0.0)
Capital	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hudson Valley	(2.1)	(2.2)	(2.4)	(2.4)	(2.5)	(2.8)	(2.8)	(2.9)	(3.0)	(3.1)
Millwood	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Dunwoodie	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.8)	(2.8)	(2.9)	(3.0)	(3.2)
NY City	(0.5)	(0.3)	(1.0)	(0.5)	(0.6)	(1.1)	(0.6)	(0.9)	(0.8)	(0.6)
Long Island	(0.1)	(0.0)	(0.4)	(0.2)	(0.2)	(0.4)	(0.2)	(0.4)	(0.2)	(0.2)
<b>NYCA Total</b>	<b>(5)</b>	<b>(4)</b>	<b>(6)</b>	<b>(5)</b>	<b>(5)</b>	<b>(7)</b>	<b>(6)</b>	<b>(7)</b>	<b>(7)</b>	<b>(7)</b>

