



# **2013 Congestion Assessment and Resource Integration Study**

## **CARIS – Phase 1**

## **Appendices B-J**

November 19, 2013

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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 *Economic Planning Process Manual - Congestion Assessment And Resource Integration Studies Manual*<sup>1</sup>.

### B.1. Phase 1 – Study Phase

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

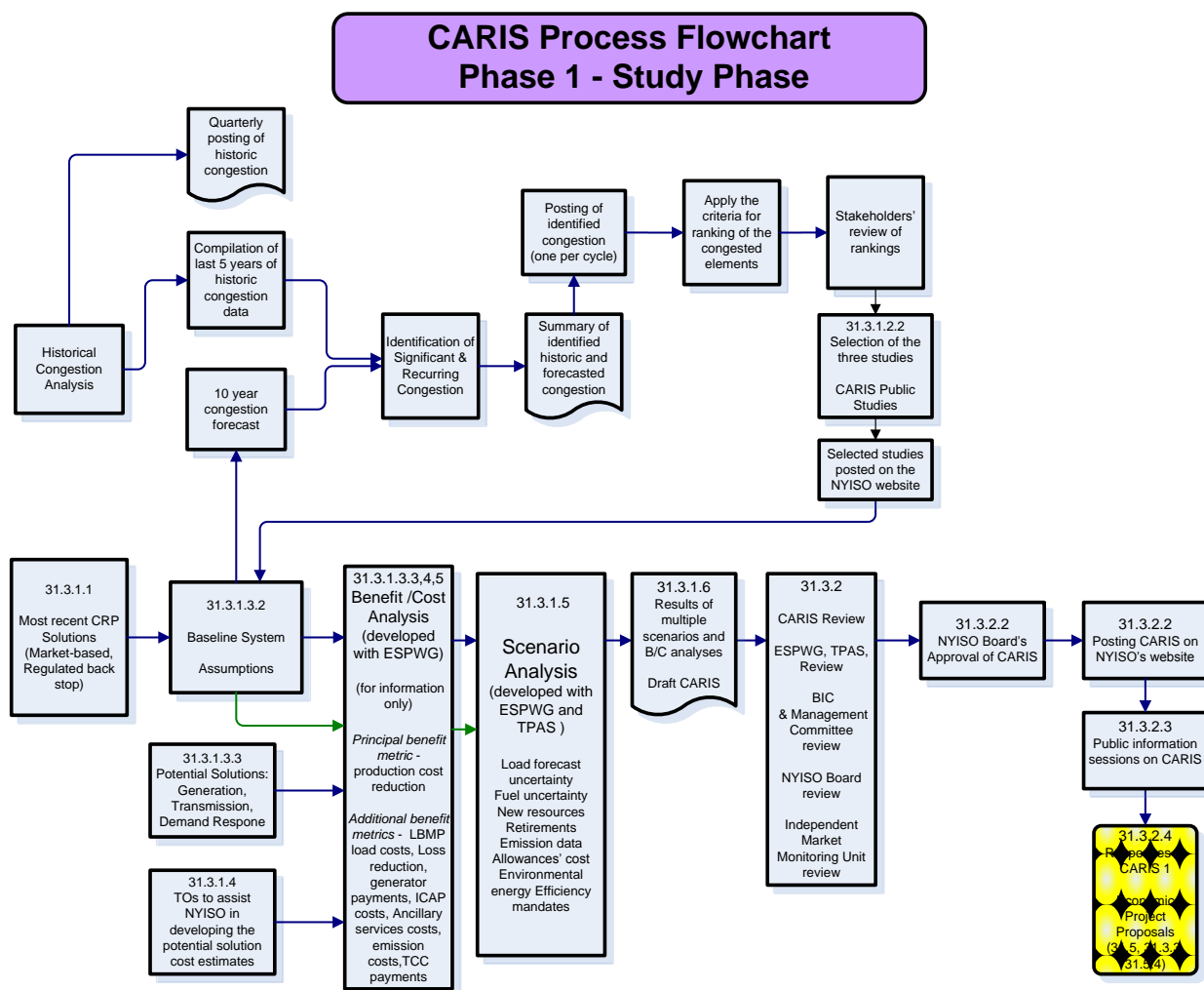


Figure B-1: Phase 1 or Study Phase of the CARIS Process

<sup>1</sup>[http://www.nyiso.com/public/webdocs/markets\\_operations/documents/Manuals\\_and\\_Guides/Manuals/Planning/Economic\\_Planning\\_Process\\_Manual\\_Final\\_12-05-12.pdf](http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/Economic_Planning_Process_Manual_Final_12-05-12.pdf)

## B.2. Phase 2 – Projects Phase

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

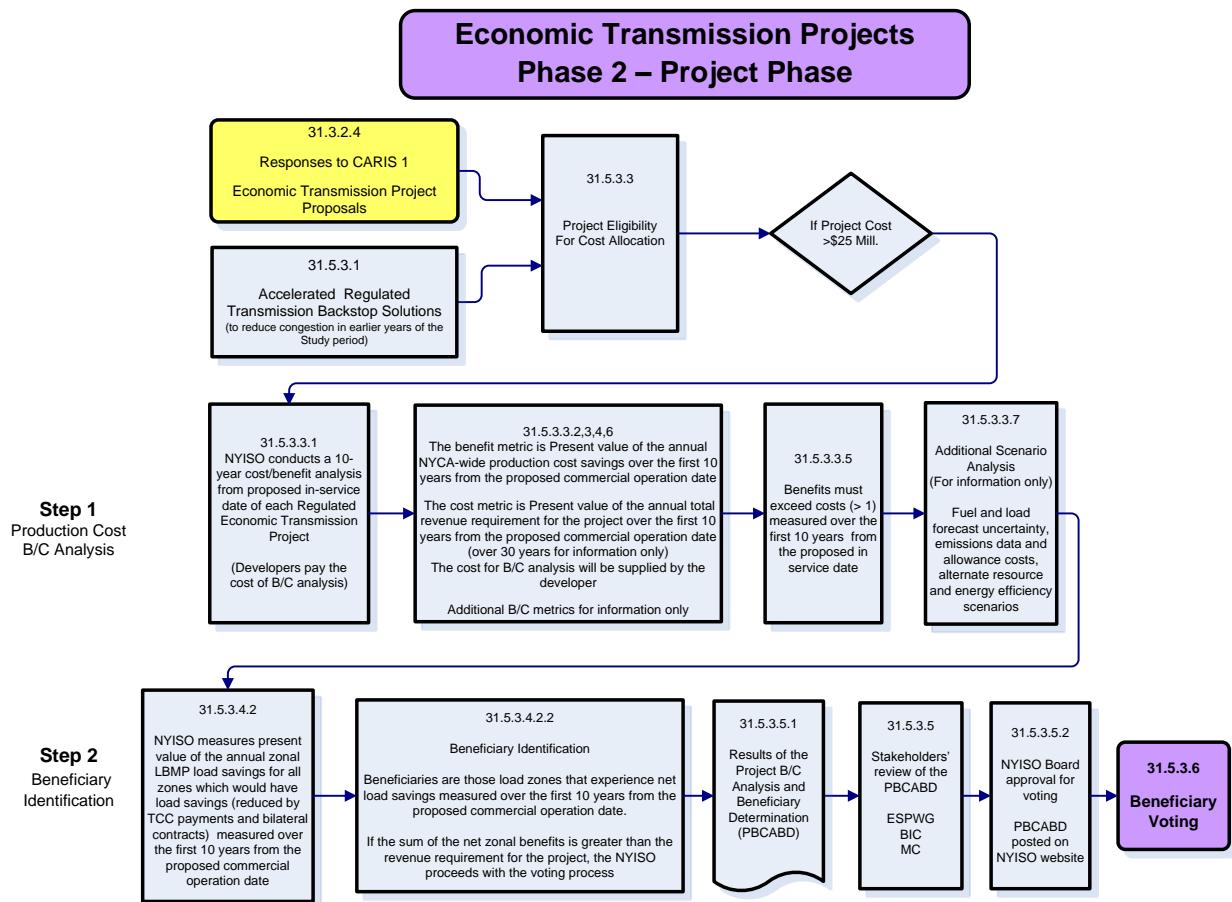


Figure B-2: Phase 2 – Project Phase of the CARIS process

## Voting, Cost Allocation, and Cost Recovery

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

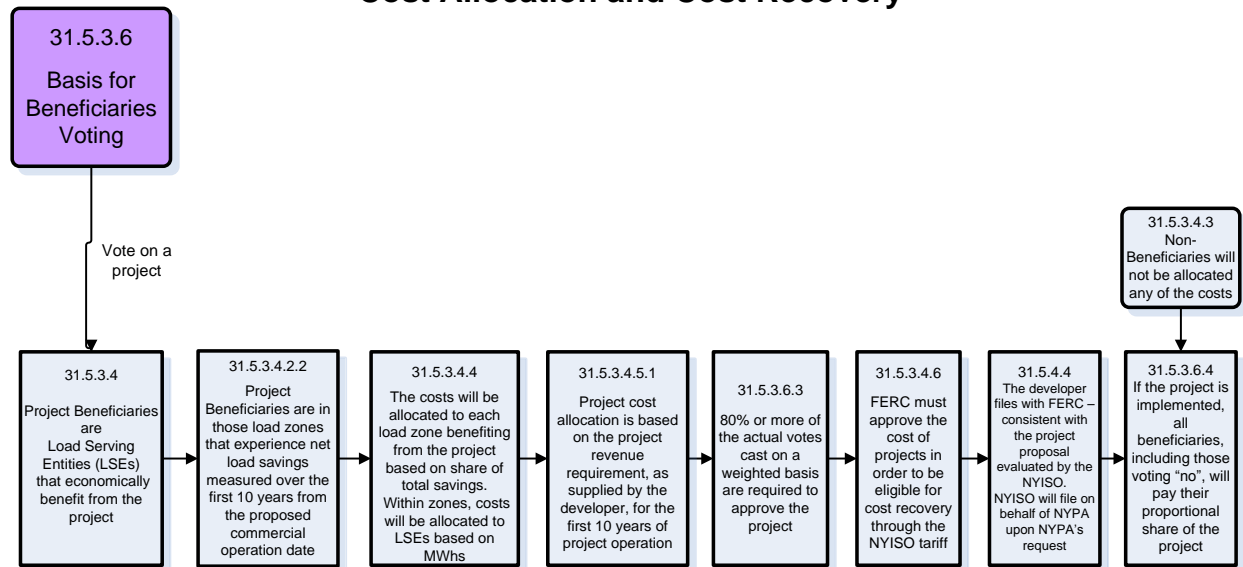


Figure B-3: Voting, Cost Allocation, and Cost Recovery of the CARIS process

## Appendix C – Baseline System Assumptions and Methodology

### C.1. CARIS Model - Base Case Modeling Assumptions for 2013-2022

Implementing the CARIS requires understanding and utilizing a significant amount of data. As described in Section 31.3.1 of Attachment Y, the CARIS will align with the Reliability Planning Process, and the Study Period for the CARIS shall be the same ten-year Study Period covered by the most recently approved CRP. The CARIS will assume a reliable system throughout the Study Period, based first upon the solutions identified in the most recently completed and approved CRP.

The data utilized in the base case simulations for 2013 CARIS Phase 1 is largely derived from the 2012 CRP, 2013 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.

Detailed descriptions of key data used in the 2013 CARIS are listed below. The data was developed based on the NYISO's Tariff requirements and procedures and in collaboration with stakeholders at ESPWG.

Table C-1: 2011 and 2013 CARIS Base Case Assumptions Matrix Comparison

Parameter	Assumptions from 2011 CARIS Phase 1	Modeling for 2013 CARIS Base Cases
Peak Load	Based on 2011 Gold Book	Based on 2013 Load & Capacity Data Report ("Gold Book") Baseline Forecast of Non-Coincident Peak Demand , including impacts of statewide Energy Efficiency programs (Table 1-2b)
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	2002 Load Shape. Energy Forecast Baseline Forecast of Annual Energy, including impacts of statewide Energy Efficiency programs (Table 1-2a)



<b>Parameter</b>	<b>Assumptions from 2011 CARIS Phase 1</b>	<b>Modeling for 2013 CARIS Base Cases</b>
	future	
Load Uncertainty Model	Base Level Forecast will be used. Other load uncertainty levels not evaluated.	Only Base Level Forecast utilized; the impact of energy or peak forecasts may be utilized in scenarios
Generating Unit Capacities	Updated to 2011 Gold Book	Updated to reflect 2013 Gold Book winter and summer DMNC values
New Units	Updated as per 2011 Gold Book (Application of inclusion rules and procedures)	Updated as per 2013 Gold Book (Application of inclusion rules identified in CRPP Manual, Section 4.1 and procedures)
Wind Resource Modeling	Updated as per 2011 Gold Book and latest Wind Study as appropriate	Units and capacities updated as per 2013 Gold Book. Wind resources are modeled based on unit capacities and synthesized wind shapes developed as part of 2010 Wind Study.
Non-NYPA Hydro Capacity Modeling	Updated as per 2011 Gold Book	Updated as per 2013 Gold Book; unit output is modeled consistent with historic levels.
Special Case Resources	N/A for model	Not utilized in MAPS production cost modeling; incorporated in ICAP Metric calculation
EDRP Resources	N/A for model	N/A for production cost modeling
External Capacity – Purchases and Wheel-Throughs	Modeled based on experience with market operations	Flows across schedulable and non-schedulable transmission lines are based on economics.
Retirements	Updated as per 2011 Gold Book (Application of inclusion	Updated as per 2013 Gold Book (Application of inclusion

Parameter	Assumptions from 2011 CARIS Phase 1	Modeling for 2013 CARIS Base Cases
	rules)	rules; specific assumptions concerning mothball announcement post-CRP; units with completed studies indicating that the unit is required for reliability are retained in the Base Case; units whose studies are pending are retained in the Base Case; others are excluded from the Base Case )
Generator Outages	Scheduled to levelize reserves; as per the maintenance schedules in long term adequacy studies.	Same
Gas Turbines Ambient Derate	Reflected only in summer/winter ratings.	Same. Modeling utilizes summer and winter DMNC ratings for all units.
Environmental Modeling Externalities Allowances	Any impacts assumed in CRP carried forward.  Limits on emissions done through allowances, not hard limits.  Allowance cost from Chicago Climate Futures Exchange.	Allowance costs based on projected RGGI costs.  SO <sub>2</sub> and NO <sub>x</sub> consistent with 2011 CARIS2 Assumptions.  SO <sub>2</sub> based on the CAIR price (\$2.50 / Ton) escalated until 2016, at which point EPA-forecasted CSAPR prices were assumed to take effect as a proxy for MATS.  NO <sub>x</sub> based on the CAIR price (\$60/Ton) escalated

Parameter	Assumptions from 2011 CARIS Phase 1	Modeling for 2013 CARIS Base Cases
		at rate consistent with natural gas price forecast.
Commitment and Dispatch Options	Each Balancing Authority commits to serve its own load, firm transactions, and potential transfers	Same
	Hurdle rates – flat	Same
Operating Reserves	Operating Reserves as per NYCA requirements.	Same
Fuel Price Forecast	NYISO to calibrate monthly forecast based on public information and historical data; weekly forecast utilized.	<p>Bases updated to more heavily weight recent trends (2008-0.075, 2009-0.12, 2010-0.175, 2011-0.255, 2012-0.375); a third natural gas region added, encompassing zones F – I. The natural gas price forecast reflects near-term supply infusions into downstate region associated with the Spectra pipeline.</p> <p>Fuel oil and coal price forecasts are developed utilizing the EIA's annual forecast of national delivered prices. Regional bases are derived using EIA Form 923 data. The seasonality for fuel oils is based on analysis of daily prices provided by MMA. Coal has no seasonality.</p>

<b>Parameter</b>	<b>Assumptions from 2011 CARIS Phase 1</b>	<b>Modeling for 2013 CARIS Base Cases</b>
Cost Curve Development (including heat rates and emission costs)	<p>Allowances from Chicago Climate Futures Exchange, Heat Rate development under discussion. Unit specific heat rates are confidential and not disclosed.</p> <p>Developed from vendor supplied data and fuel input data matched with MWh data for NYCA.</p>	<p>CO2 Allowance costs based on projected RGGI costs with 2.5% annual growth beyond 2020.</p> <p>Utilizing SO2 and NOx allowance costs developed for 2011 CARIS 2 database. Current values are escalated based on forecasted natural gas price increases.</p> <p>Unit heat rates developed from vendor supplied data and fuel input data matched with MWh data for NYCA.</p>
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	Scheduling checked to conform to historical operations.	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	<p>Based on historical congestion, planning study results, NERC book of flowgates, PROBE/SCUC list of active/potential constraints, operational limits.</p> <p>Transfer limit analysis done in RNA/CRP for critical</p>	Data from the results of internal and external planning studies; vendor-supplied data; operational voltage studies; operational limits; transfer limit analysis for critical interfaces.

Parameter	Assumptions from 2011 CARIS Phase 1	Modeling for 2013 CARIS Base Cases
Unit Sensitive Voltage	interfaces. External system limits from input from neighboring systems.	
New Transmission Capability	Updated as per 2011 Gold Book (Application of base case inclusion rules)	Updated as per 2013 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	Power flow data from CRP, “production” data developed by NYISO with vendor and neighbor input. Fuel forecasts developed utilizing same methodology as NYCA fuel forecasts.
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 <ul style="list-style-type: none"> <li>- NYISO</li> <li>- ISONE</li> <li>- IESO</li> <li>- PJM Classic &amp; AP,AEP,CE,DLCO, DAY, VP</li> </ul> <u>Proxy Bus Injection:</u> HQ-NYISO, HQ-NE-ISO, NB-NEISO, HQ - IESO <u>Transmission Only/Zeroed</u>	Same



Parameter	Assumptions from 2011 CARIS Phase 1	Modeling for 2013 CARIS Base Cases
	CSC optimized subject to “cost of use”	CSC (0MW, +330MW) optimized subject to “cost of use”

Detailed descriptions of key data used in the 2013 CARIS are listed below. 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

CARIS Base Case load forecasts, from the 2013 Gold Book baseline forecast, are presented in Table C-2 and Table C-3. Table C-2 presents the Annual Zonal Energy in Gigawatt-hours and Table C-3 presents summer non-coincident peak demand in MW.

Table C-2: Annual Zonal Energy (GWh)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	15,788	15,835	15,922	15,997	16,010	16,012	16,019	16,033	16,033	16,038
Genesee	10,071	10,073	10,076	10,083	10,080	10,080	10,080	10,085	10,081	10,081
Central	16,152	16,196	16,269	16,337	16,383	16,426	16,475	16,525	16,576	16,626
North	6,701	6,789	6,835	6,850	6,866	6,874	6,868	6,871	6,889	6,895
Mohawk Valley	8,036	8,048	8,122	8,182	8,188	8,184	8,188	8,192	8,199	8,203
Capital	11,712	11,716	11,803	11,872	11,926	11,978	12,028	12,077	12,126	12,173
Hudson Valley	10,054	10,106	10,152	10,201	10,238	10,263	10,306	10,333	10,351	10,370
Millwood	2,922	2,938	2,951	2,976	2,976	2,993	3,007	3,029	3,038	3,053
Dunwoodie	6,086	6,114	6,148	6,195	6,199	6,229	6,261	6,308	6,325	6,358
NY City	53,762	54,016	54,310	54,732	54,762	55,032	55,309	55,727	55,878	56,172
Long Island	22,572	22,821	22,983	23,379	23,426	23,632	23,931	24,319	24,581	24,946
NYCA Total	163,856	164,652	165,571	166,804	167,054	167,703	168,472	169,499	170,077	170,915

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

Year	A	B	C	D	E	F	G	H	I	J	K
2013	2,657	2,084	2,904	868	1,466	2,368	2,277	688	1,433	11,485	5,515
2014	2,688	2,116	2,941	887	1,481	2,395	2,316	699	1,454	11,658	5,566
2015	2,716	2,139	2,969	897	1,501	2,431	2,348	704	1,475	11,832	5,609
2016	2,734	2,158	2,996	903	1,515	2,458	2,376	715	1,496	12,006	5,688
2017	2,743	2,172	3,012	906	1,519	2,480	2,398	721	1,511	12,137	5,713
2018	2,749	2,187	3,032	910	1,523	2,502	2,418	729	1,527	12,266	5,760
2019	2,755	2,199	3,045	910	1,527	2,520	2,439	737	1,542	12,419	5,827
2020	2,763	2,213	3,064	911	1,531	2,540	2,456	744	1,559	12,572	5,902
2021	2,769	2,224	3,079	915	1,537	2,558	2,472	751	1,574	12,725	5,979
2022	2,776	2,236	3,099	917	1,542	2,577	2,488	759	1,587	12,833	6,060
2023	2,783	2,249	3,113	916	1,548	2,598	2,504	762	1,594	12,920	6,149

## 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.





from HQ to NYISO and HQ to ISO-NE are modeled. The HQ to NYISO capacity modeled is 1310 MW. External areas surrounding the above areas are only modeled to capture the impact of loop flows.

Table C-4 lists the aggregate additions, retirements and rerates for the external control areas by fuel source as reported by the external control areas in their planning documents.

Table C-4: Unit Additions, Retirements and Rerates

System	Year	Source	Additions	Retirements	Rerates
PJM	2011	Coal	700	512	85
		Fossil Fuel	1,290	586	12
		Landfill Gas/Bio	56	-	-
		Nuclear	-	-	567
		Solar	94	-	-
		Wind	581	-	-
	2012	Coal	614	5,972	-
		Fossil Fuel	1,589	1,076	63
		Landfill Gas/Bio	16	16	-
		Nuclear	-	-	228
		Solar	255	-	-
		Wind	1,198	-	-
	2013	Coal	-	233	65
		Fossil Fuel	6	197	-
		Hydro	23	-	-
		Landfill Gas/Bio	211	2	-
		Nuclear	-	-	177
		Solar	13	-	143
		Wind	862	-	-
	2014	Coal	272	754	-
		Fossil Fuel	1,335	115	-
		Hydro	158	-	-
		Solar	17	-	638
		Wind	170	-	-
	2015	Coal	-	7,829	-
		Fossil Fuel	1,953	1,398	-
		Solar	-	-	106
		Wind	599	-	-
	2016	Fossil Fuel	2,034	-	33
		Solar	10	-	2
	2017	Fossil Fuel	-	-	60
		Landfill Gas/Bio	6	-	-
		Solar	-	-	20
	2018	Nuclear	1,570	-	-
		Solar	-	-	20
IESO	2011	Coal	-	940	-
		Wind	543	-	-
	2012	Fossil Fuel	344	-	-
		Hydro	36	-	-
		Nuclear	1,540	-	-
		Wind	19	-	-
	2013	Coal	-	1,897	-
		Wind	102	-	-
	2014	Coal	-	1,446	-
	2015	Hydro	-	-	649
ISO-NE	2011	Coal	-	128	-
		Fossil Fuel	822	-	-
		Wind	117	-	-
	2012	Fossil Fuel	130	-	-
		Wind	150	-	-
	2013	Hydro	-	6	-
	2014	Coal	-	308	-
		Fossil Fuel	-	437	-
	2015	Fossil Fuel	-	21	-
		Landfill Gas/Bio	-	3	-
	2016	Landfill Gas/Bio	-	19	-

Table C-5: External Area Capacity Values

SUMMER CAPACITY (MW)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>IESO</b>	<b>34,552</b>	<b>32,655</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>	<b>31,858</b>
Combined Cycle	5,940	5,940	5,940	5,940	5,940	5,940	5,940	5,940	5,940	5,940
Combustion Turbine	458	458	458	458	458	458	458	458	458	458
Conventional Hydro	7,764	7,764	8,413	8,413	8,413	8,413	8,413	8,413	8,413	8,413
Other Steam Turbines	88	88	88	88	88	88	88	88	88	88
Pumped Storage Hydro	175	175	175	175	175	175	175	175	175	175
Steam Turbine (Coal)	3,343	1,446	0	0	0	0	0	0	0	0
Steam Turbine (Nuclear)	12,959	12,959	12,959	12,959	12,959	12,959	12,959	12,959	12,959	12,959
Steam Turbine (Oil and Gas)	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018
Wind	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807	1,807
<b>ISO-NE</b>	<b>33,404</b>	<b>33,398</b>	<b>32,654</b>	<b>32,630</b>	<b>32,611</b>	<b>32,611</b>	<b>32,611</b>	<b>32,611</b>	<b>32,611</b>	<b>32,611</b>
Combined Cycle	12,019	12,019	12,019	12,019	12,019	12,019	12,019	12,019	12,019	12,019
Combustion Turbine	2,794	2,794	2,794	2,794	2,794	2,794	2,794	2,794	2,794	2,794
Conventional Hydro	1,948	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942	1,942
Internal Combustion Engine	188	188	188	185	185	185	185	185	185	185
Landfill Gas	96	96	96	93	74	74	74	74	74	74
Other Steam Turbines	978	978	978	978	978	978	978	978	978	978
Pumped Storage Hydro	1,705	1,705	1,705	1,705	1,705	1,705	1,705	1,705	1,705	1,705
Steam Turbine (Coal)	2,462	2,462	2,154	2,154	2,154	2,154	2,154	2,154	2,154	2,154
Steam Turbine (Nuclear)	4,716	4,716	4,716	4,716	4,716	4,716	4,716	4,716	4,716	4,716
Steam Turbine (Oil and Gas)	5,971	5,971	5,534	5,515	5,515	5,515	5,515	5,515	5,515	5,515
Wind	528	528	528	528	528	528	528	528	528	528
<b>NYISO</b>	<b>39,256</b>	<b>38,678</b>	<b>38,678</b>	<b>39,027</b>	<b>39,027</b>	<b>39,123</b>	<b>39,123</b>	<b>39,123</b>	<b>39,423</b>	<b>39,423</b>
Combined Cycle	8,927	8,927	8,927	9,427	9,427	9,927	9,927	9,927	9,927	9,927
Combustion Turbine	4,880	4,880	4,880	4,804	4,804	4,400	4,400	4,400	4,700	4,700
Conventional Hydro	4,750	4,750	4,750	4,750	4,750	4,750	4,750	4,750	4,750	4,750
Internal Combustion Engine	60	60	60	60	60	60	60	60	60	60
Landfill Gas	98	98	98	98	98	98	98	98	98	98
Other Steam Turbines	297	297	297	297	297	297	297	297	297	297
Pumped Storage Hydro	1,407	1,407	1,407	1,407	1,407	1,407	1,407	1,407	1,407	1,407
Solar	32	32	32	32	32	32	32	32	32	32
Steam Turbine (Coal)	1,995	1,545	1,545	1,470	1,470	1,470	1,470	1,470	1,470	1,470
Steam Turbine (Nuclear)	5,431	5,431	5,431	5,431	5,431	5,431	5,431	5,431	5,431	5,431
Steam Turbine (Oil and Gas)	9,650	9,522	9,522	9,522	9,522	9,522	9,522	9,522	9,522	9,522
Wind	1,730	1,730	1,730	1,730	1,730	1,730	1,730	1,730	1,730	1,730
<b>PJM</b>	<b>192,549</b>	<b>194,172</b>	<b>196,003</b>	<b>188,854</b>	<b>188,920</b>	<b>190,490</b>	<b>190,490</b>	<b>190,490</b>	<b>190,490</b>	<b>190,490</b>
Combined Cycle	25,825	27,160	28,822	30,856	30,916	30,916	30,916	30,916	30,916	30,916
Combustion Turbine	31,272	31,250	31,421	30,673	30,673	30,673	30,673	30,673	30,673	30,673
Conventional Hydro	2,657	2,688	2,837	2,837	2,837	2,837	2,837	2,837	2,837	2,837
Internal Combustion Engine	572	569	574	560	560	560	560	560	560	560
Landfill Gas	480	478	478	478	485	485	485	485	485	485
Other Steam Turbines	1,838	1,838	1,838	1,838	1,838	1,838	1,838	1,838	1,838	1,838
Pumped Storage Hydro	5,162	5,162	5,162	5,162	5,162	5,162	5,162	5,162	5,162	5,162
Solar	1,483	1,520	1,520	1,530	1,530	1,530	1,530	1,530	1,530	1,530
Steam Turbine (Coal)	73,846	73,885	73,131	65,302	65,302	65,302	65,302	65,302	65,302	65,302
Steam Turbine (Nuclear)	34,311	34,348	34,348	34,348	34,348	35,918	35,918	35,918	35,918	35,918
Steam Turbine (Oil and Gas)	8,165	8,165	8,165	7,562	7,562	7,562	7,562	7,562	7,562	7,562
Wind	6,938	7,108	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707
<b>Grand Total</b>	<b>299,761</b>	<b>298,903</b>	<b>299,194</b>	<b>292,369</b>	<b>292,416</b>	<b>294,082</b>	<b>294,082</b>	<b>294,082</b>	<b>294,382</b>	<b>294,382</b>

Table C-6: External Area Forecasted Load Values

Year	IESO		ISO-NE		PJM	
	Peak, MW*	Energy, MWh	Peak, MW*	Energy, MWh	Peak, MW*	Energy, MWh
2013	23,505	138,206,936	27,850	137,039,997	156,621	816,152,994
2014	22,997	133,908,650	28,290	138,904,999	159,680	833,172,996
2015	22,771	131,731,166	28,825	140,894,999	163,225	852,513,986
2016	22,748	131,834,105	29,350	142,800,005	166,184	871,878,992
2017	22,590	129,965,019	29,790	144,475,000	168,252	881,524,993
2018	22,707	130,368,964	30,160	145,940,000	169,829	890,913,002
2019	23,008	132,555,801	30,525	147,259,993	171,528	899,125,009
2020	23,143	134,163,185	30,860	148,530,001	173,378	911,993,998
2021	23,372	135,339,240	31,205	149,774,998	175,138	920,291,017
2022	23,474	135,878,550	31,515	151,004,998	176,864	930,178,995

Note: \*Peak, MW is area coincident peak

### 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. Both commitment and dispatch hurdle rates are held constant throughout the 2013-2022 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 granted Unforced Capacity Deliverability Rights (UDRs) or firm withdrawal rights on controllable tie-lines were specifically modeled, namely on the NYISO controllable 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 315 MW in both directions. 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-7 lists the proxy bus location for each interface.

Table C-7: Interchange LMP Proxy Bus

Interface	Proxy bus
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
Northport Norwalk Cable	Norwalk Harbor

#### 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 represent minimum, intermediary, and maximum power levels where generating units can be simulated to operate on a sustained basis. Each power point is tied to a point on the heat rate curve allowing incremental heat rates to be determined for each unit. The power points and incremental heat rates are developed on a Summer/Winter basis.

## 5. External Areas Fuel Forecasts

Table C-8 shows the regional bases expressed as a multiple of the U.S. national average annual price for each fuel. Figures C-2 through C-5 illustrate forecasted fuel price prices for external areas from which weekly fuel price forecasts were developed.

Table C-8: External Areas Fuel Forecast Regional Multiplier

	PJM- East	PJM- West	ISONE	IESO
Fuel Oil #2	0.970	1.070	0.960	1.100
Fuel Oil #6	0.970	1.070	0.960	1.100
Natural Gas	1.103	0.985	1.220	1.033
Coal	1.460	1.070	1.550	1.200

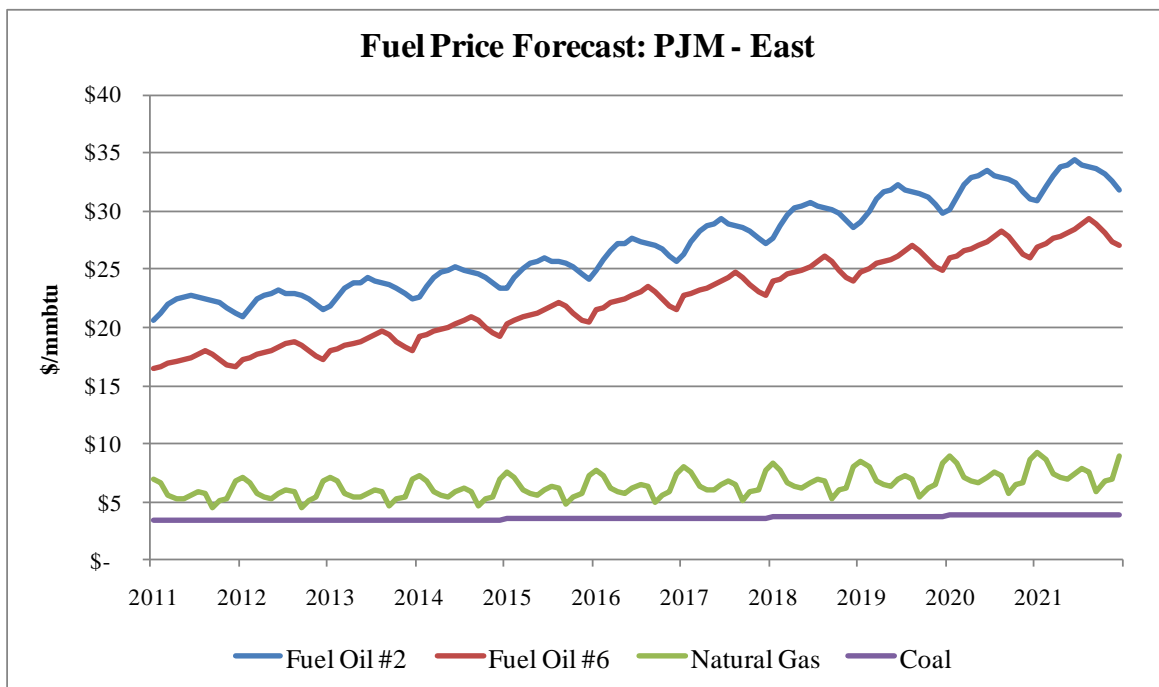


Figure C-2: Forecasted Fuel Prices for PJM East (nominal \$)

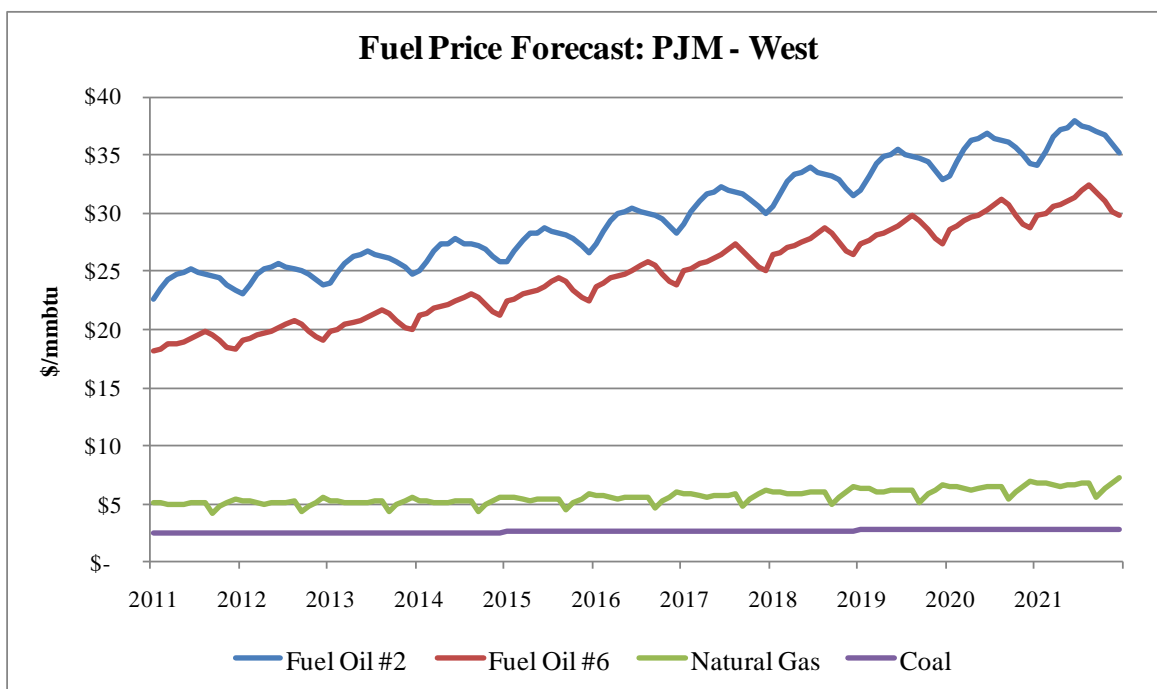


Figure C-3: Forecasted Fuel Prices for PJM West (nominal \$)

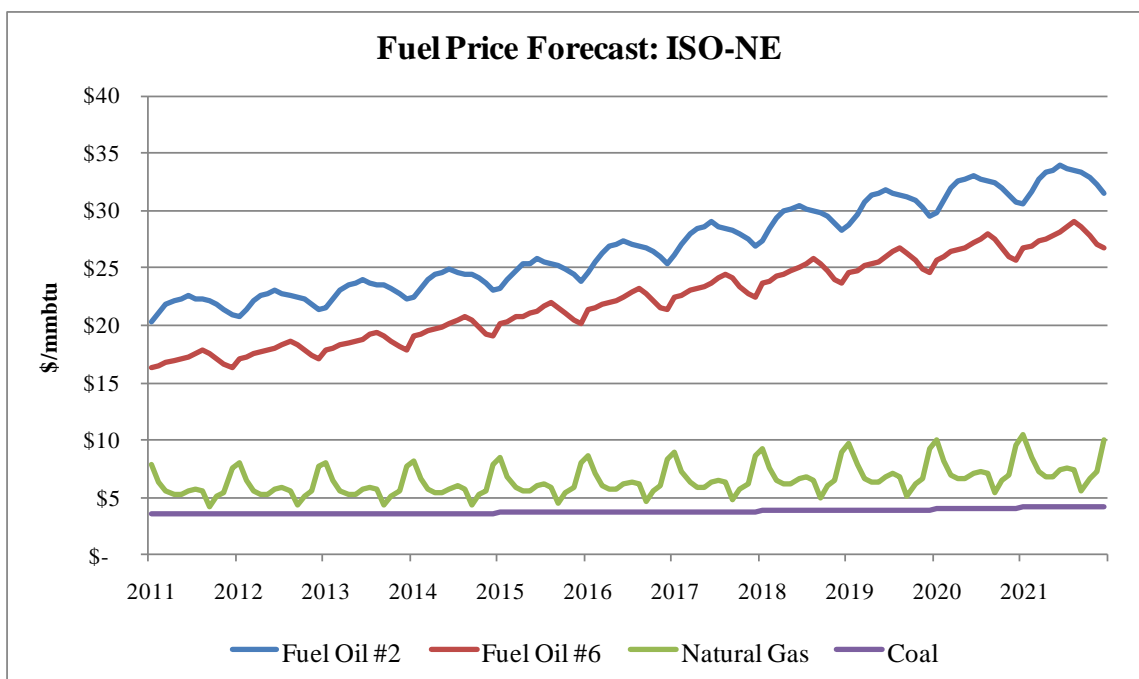


Figure C-4: Forecasted Fuel Prices for ISO-NE (nominal \$)



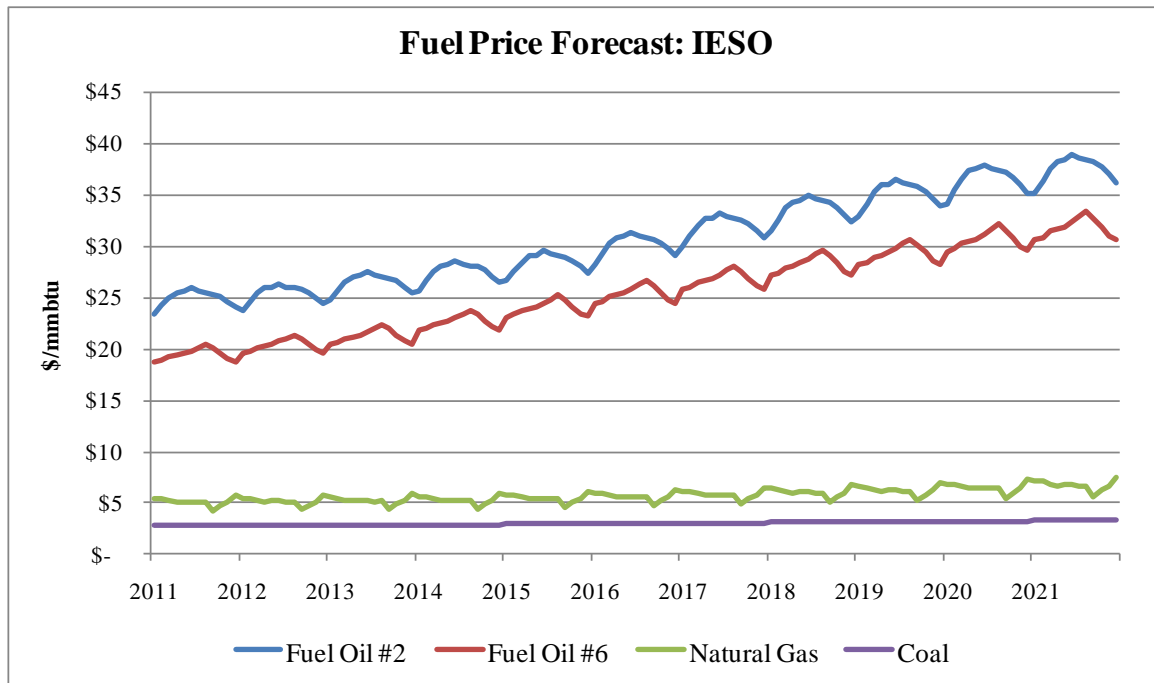


Figure C-5: Forecasted Fuel Prices for IESO (nominal \$)

### Fuel Switching

Fuel switching capability is widespread within NYCA. In the NYCA, 47.5% of the 2013 generating capacity, or 18,010 MW, has the ability to burn either oil or gas. The production-cost simulation model selects the economic fuel based on weekly production costs for units with dual-fuel capability. 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 by the TOs 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 generation levels and support system voltage. Some new combined cycle gas turbine units in these zones have the

ability to “auto-swap” 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 auto-swap capability, the amount of oil used in steam units to satisfy minimum oil burn criteria has decreased

Unlike the previous CARIS cycles, minimum oil burn rules have not been explicitly modeled in the production simulations for the 2013 CARIS. Minimum oil burn units are committed and dispatched in the NYISO markets using the cost of the most economic fuel. Any cost incurred from firing oil when it is not economic to do so is recovered outside the market. Consequently, the minimum oil burn program does not affect LBMPs or any derivative metric (Demand Congestion, Load, Payment, etc.) and is more appropriately accounted for outside the GE-MAPS simulation. The amount of oil burned, and the associated production cost, is dependent upon zonal load levels which remain constant in the generation and transmission solutions, and change less than ten percent in the demand response and energy efficiency solutions. Combining of the prevalence of auto-swap capable combined cycle units, the decreased cost of meeting the minimum oil burn criteria and the relatively minor changes in load provides strong evidence that the change in production cost because of minimum oil burn is negligible.

### **Generation Maintenance**

Generation maintenance modeling was consistent with previous CARIS cycles as described below.

Levels of generation unavailability were developed based on historic 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 outage 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). These outage duration periods were fixed for each of the study years 2013 through 2022.

## **6. Generic Solution Cost Matrix**

The NYISO defines generic solutions to alleviate congestion for each resource type (generation, transmission, demand response, and energy efficiency), as required by the Tariff, Attachment Y, Section 31.3.1.3.3. The costs of each solution must be estimated to report B/C ratios in CARIS Phase 1 for each generic solution. The NYISO, in consultation with its stakeholders, estimates a high, mid and low cost for each solution type in CARIS Phase 1. This establishes a broader range of costs in order to provide more useful information to developers and other interested parties. 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. 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.

Each high, mid and low cost estimate for the generic solutions was accomplished by using the appropriate generic solution 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.

Transmission cost estimates are based on information provided by the Transmission Owners, which accounted for considerations such as zonal-specific construction parameters (e.g., spatial limitations in downstate zones). As part of this process the 2011 CARIS Phase 1 cost estimates were reviewed and updated by the Transmission Owners. The estimates for the upstate geographic area remained the same as used in the 2011 CARIS Phase 1. The updated costs used in this 2013 CARIS Phase 1 were presented to NYISO stakeholders for discussion at ESPWG.

Generation costs estimates were based on available NYISO consultant estimates for developing new combined cycle units in Zones F, G 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.

The 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-9: Transmission Cost Matrix

<b>Base Case Modeling Assumptions for 2013-2022 CARIS Phase 1</b> <b>Generic Transmission Cost Matrix</b> <b>Order of Magnitude Unit Prices</b> <i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>							
		Transmission				Substation	
Cost Range	Zone	Line System Voltage (kV)	Block Capacity (MVA)	Construction Type	Transmission Cost (\$/Mile)	Line Terminal Addition per Substation (\$M)	System Upgrade Facilities (\$M)
High	Zone A-G	345	1000	Overhead	\$7.30	\$9	\$9
Mid	Zone A-G	345	1000	Overhead	\$5	\$6	\$6
Low	Zone A-G	345	1000	Overhead	\$2	\$3	\$3

**Assumptions:**

- 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.
- Lines constructed within Zones A through G will be comprised of single circuit AC overhead construction.
- Lines constructed within Zones H through K will be comprised of AC underground cable construction.
- The transmission line will be interconnected into an existing 345kV substation for Zones A-J and 138kV for Zone K.
- 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.
- The line can be permitted and constructed utilizing the shortest distance between the two selected substations.
- 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.
- 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.
- Estimates include costs for material, construction labor, engineering labor, permits, testing and commissioning. The estimates do not include Allowance of Funds During Construction (AFDC).
- 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.
- The substation line terminal costs include a range to account for necessary protection and communication equipment.
- System Upgrade Facilities costs include a range to account for line terminal relay upgrades and replacement of overdutied breakers.
- 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-10: Generation Cost Matrix

**Base Case Modeling Assumptions for 2013-2022 CARIS Phase 1**  
**Generic Generation Cost Matrix**  
**Order of Magnitude Unit Costs**  
**(Estimates should not be assumed reflective or predictive of actual project costs)**

Cost Range	Plant Location	Plant Block Size Capacity (MW)	Plant Cost per Block Size* (\$M)
High	Zone F	330	\$523
Mid	Zone F	330	\$427
Low	Zone F	330	\$330
High	Zone G	330	\$579
Mid	Zone G	330	\$472
Low	Zone G	330	\$366

**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 1 x 1 x1 Siemens SGT6-5000F(5) with selective catalytic reduction (SCRs), total generation 330MW.
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.
6. The generator lead will be rated 345kV, 1673A, 1000MVA. The generator lead will be built with overhead construction.
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.
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-11: Generator Cost per Unit - 2013 Price Level

GENERATOR COST PER UNIT - 2013 Demand Curve Reset Cost Estimates (\$M)						
Zone	Size	Combined Cycle	EPC Costs	Non-EPC Costs	Total	Unit Cost \$/kW
Zone F (Capital)	330 MW	1 x 1 x 1 SGT6-5000F(5)	\$352	\$75	\$427	\$1,293
Zone G (Hudson Valley - Dutchess)	330 MW	1 x 1 x 1 SGT6-5000F(5)	\$386	\$86	\$472	\$1,431

Table C-12: Demand Response and Energy Efficiency Cost Matrix

Base Case Modeling Assumptions for 2013-2022 CARIS Phase 1			
Generic Demand Response Cost Matrix			
Order of Magnitude Unit Costs			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
Cost Range	Zone	Portfolio Type	Per-Unit (\$/MW)
High	Zone F-J	Demand Response	\$0.33
Mid	Zone F-J	Demand Response	\$0.23
Low	Zone F-J	Demand Response	\$0.17
High	Zone F	Energy Efficiency	\$1.50
Mid	Zone F	Energy Efficiency	\$1.20
Low	Zone F	Energy Efficiency	\$0.90
High	Zone G	Energy Efficiency	\$2.10
Mid	Zone G	Energy Efficiency	\$1.70
Low	Zone G	Energy Efficiency	\$1.30
High	Zone J	Energy Efficiency	\$4
Mid	Zone J	Energy Efficiency	\$3.20
Low	Zone J	Energy Efficiency	\$2.40
<i>Note: 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.</i>			

## 7. Derivation of Energy Efficiency and Demand Response Cost Assumptions

The NYISO develops base, high and low cost ranges for energy efficiency and demand response resources. The resources are denominated in units of 100 MW for each resource. Since these are not the typical cost units for energy efficiency or demand response measures, this section will describe the sources used to develop the costs and the translation from the given costs to the costs of the resources per 100 MW.

Energy efficiency costs were derived from the NY-PSC's October 2011 EEPS Order. This Order provides budgets and MWh energy goals which can be used to obtain \$/MWh values for National Grid, Orange and Rockland, Consolidated Edison and other state utilities.

For purposes of CARIS, the NYISO needed costs by zone, not by utility. In order to translate the costs to zones, the NYISO chose the costs of the utility or utilities that were predominant in each zone. The NYISO used National Grid's costs for Zone F, Central Hudson's and Orange & Rockland's costs for Zone G, and Consolidated Edison's costs for Zones H, I and J. Costs for Zone K would be based on LIPA's energy efficiency program costs, which were unavailable. Instead, the NYISO estimated that costs in Zone K would be somewhat lower than costs in neighboring Zone J.

It was also required to translate costs per unit of energy to costs per unit of peak demand. For this purpose, the NYISO used the 2013 -2018 cumulative energy and summer peak demand projections of energy efficiency obtained from the 2013 Gold Book forecast (Table I-2f). A typical calculation for Zone J is as follows:

Zone J Energy Efficiency Cost Derivation - \$Millions per 100 MW

$$(\$ \text{ Per MWh} ) * (\text{MWh forecast}) / (\text{MW forecast}) * (100 \text{ MW}) / (\$1,000,000/\$ \text{Million}) =$$

$$(\$530 \text{ per MWh}) * (1,757,000 \text{ MWh}) / (290 \text{ MW}) * (100 \text{ MW}) / (\$1,000,000/\$ \text{Million}) =$$

$$\$321 \text{ Million per 100 MW}$$

The demand response cost estimates relied upon costs obtained from a study in the public domain by the Georgia Institute of Technology, **Regional Costs of Demand Response Programs In the NEEM Model**<sup>2</sup>. This report contained estimates of demand response from various different sources. NYISO staff reviewed this report and selected costs for demand response metering and associated equipment reported in a study by KEMA<sup>3</sup>. The Georgia study excerpted demand response costs from the KEMA study for two customer classes, residential and commercial/industrial, as reported in Figure 2, page 6. The KEMA study provided low and high ranges of costs per installation or account.

Using this information, the NYISO developed DR costs per 100 MW in a series of steps.

1. Develop Demand Response cost ranges on a per account basis.
2. Estimate the typical kW for residential, commercial and industrial accounts, and the expected demand response impact available per account. Also, obtain the total number of such accounts across New York state for each customer class using EIA information.
3. From the total amount of demand response resources currently registered in the NYISO SCR program, estimate the MW impact of these resources by

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<sup>2</sup> **Regional Costs of Demand Response Programs In the NEEM Model**, Alexander M Smith of Oak Ridge National Laboratory, for Georgia Institute of Technology, School of Public Policy, August 2011.

<sup>3</sup> KEMA, Inc. (2009) California solar initiative: For metering, monitoring and reporting market photovoltaic systems in California. Accessed June 18, 2011 from <http://www.energy.ca.gov/2009publications/CPUC-1000-2009-030/CPUC-1000-2009-030.pdf>

customer class. Then, using the per kW impacts by class from step 2, estimate the number of demand response accounts for each class.

4. Using the cost per account from step 2 and the number of demand response accounts from step 3, determine the total cost of demand response meters in millions of dollars.
5. Using the total cost from step 4 and the total MW from step 3, determine the cost per MW by class and in total. Then by multiplying by 100, obtain the demand response cost in units of millions of dollars per 100 MW.

This approach combines information from a variety of sources specific to New York to arrive at a class-weighted average cost for demand response resources consistent with the total amount of such resources currently available in New York.



Table C-13: Demand Response Unit Cost Derivation

2013 CARIS Study - DR Cost Derivation				
(1) - DR Cost Data				
DR Costs, KEMA (2009)	Residential	Commercial	Industrial	
Low	\$600	\$2,500	\$5,000	
Medium	\$750	\$3,500	\$7,500	
High	\$900	\$5,000	\$10,000	
(2) - Use Per Account Data				
Use Per Account - LFEE	Residential	Commercial	Industrial	
Typical kW/Acct	1.7	15.7	614.9	
DR kW/Acct	5	50	2000	
DR kW Impact	3	7	250	
Total NYCA Accounts	6,954,916	1,038,260	8,364	
(3) - Top-Down Estimate of Current DR Accounts				
	Residential	Commercial	Industrial	Total
Estimate of MW by Sector	50	600	800	1450
NYCA UCAP is 1070 MW. ICAP with a 75% derate is 1425 MW. (1070/1450 = .74% is consistent)				
Note: Con-Ed has 25 MW of residential AC duty cycling DR; LIPA has 30 MW				
Estimated DR Accts	16,667	85,714	3,200	105,581
percent of total accounts - none>100%	0.2%	8.3%	38.3%	
(4) - Top-Down Estimate of NYCA Wide Costs				
Estimated DR Cost --- for Current Total NYCA DR Capability (\$M)				
Estimated Capital Costs - \$M	Residential	Commercial	Industrial	Total
Low	\$10	\$214	\$16	\$240
Medium	\$13	\$300	\$24	\$337
High	\$15	\$429	\$32	\$476
(5) - Estimate of Costs per 100 MW				
Estimated DR Costs --- Per 100 MW Impact				
Estimation of Accounts Needed	Residential	Commercial	Industrial	Total
100 MW Installed DR	3.4	41.4	55.2	100
DR Accounts Needed	1130	5910	220	7260
Percent of Available, per 100 MW needed	0.0%	0.6%	4.3%	
DR Costs: \$M per 100 MW	Residential	Commercial	Industrial	Total
Low	\$0.7	\$14.8	\$1.1	\$16.6
Medium	\$0.8	\$20.7	\$1.7	\$23.2
High	\$1.0	\$29.6	\$2.2	\$32.8

## **Appendix D – Overview of CARIS Modeling**

### **D.1. Model Overview (CROS, MAPS)**

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The NYISO primarily employs two software tools to construct the fifteen-year time-series of congestion and production costs. The NYISO utilizes Congestion Reporting for Off-Line SCUC (“CROS”) to develop the five-year historic values and General Electric’s Market Analysis and Portfolio Simulation (“MAPS”) to construct the ten-year projected values. In each case the software performs a security constrained economic commitment and dispatch and calculates the minimum hourly production cost of supply resources to meet the load.

#### **CROS**

CROS software, developed by the NYISO, is an off-line version of the NYISO’s day-ahead unit-commitment software (“SCUC”) and was adopted in 2012 as the tool utilized to conduct the NYISO’s historic congestion analysis. The results of the 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.

CROS first uses actual submitted generator parameters, hourly bids and network statuses, including transmission outages, to perform a security constrained economic commitment. The software then 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. The constrained and unconstrained results are compared to derive the change in bid production costs, demand congestion, load payments and generation payments due to system constraints. 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.

#### **MAPS**

In conducting the 2013 CARIS analysis and developing projected congestion and production costs (as well as other metrics), the NYISO utilized GE MAPS Version 12.407E (“MAPS”) as the production cost simulation software. MAPS software mimics the operation of the NYISO Day-Ahead electricity market by simulating security constrained unit commitment (SCUC) and economic dispatch (SCED) 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.

The major difference between the projected MAPS results and historic CROS results is that MAPS does not simulate: (a) virtual bidding; (b) transmission outages; (c) 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 2013 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:

- Spinning reserves and thermal unit commitment options;
- Transmission interface transfer limits, contingencies and nomograms;
- Commitment and dispatch hurdle rates;
- Generator incremental heat rates, variable O&M, startup costs, installed reserve margin, and emissions rates;
- 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. Discrepancies noted by GE were corrected by NYISO as necessary. All of these changes were accomplished before the finalization of the 2013 CARIS base case.

## Benchmark Summary

The final 2013 CARIS Phase 1 benchmark results are listed in Table D-1 to D10 below for the 2011 benchmark year. The results were presented to NYISO stakeholders for discussion at ESPWG.

Table D-1: Zonal Load Payment Summary (Million \$ - Nominal)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	614	579
Genessee	414	383
Central	681	628
North	227	221
Mohawk Valley	338	285
Capital	538	494
Hudson Valley	524	467
Millwood	159	141
Dunwoodie	327	300
NY City	2,994	2,645
Long Island	1,468	1,179
<b>NYCA</b>	<b>8,284</b>	<b>7,323</b>

Table D-2: Zonal Generator Payment Summary (Million \$ - Nominal)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	949	838
Genessee	292	164
Central	1,200	1,206
North	373	345
Mohawk Valley	127	159
Capital	833	805
Hudson Valley	249	131
Millwood	863	806
Dunwoodie	13	0
NY City	1,325	1,056
Long Island	817	439
<b>NYCA</b>	<b>7,040</b>	<b>5,949</b>

Table D-3: Zonal Demand Congestion Summary (Million \$ - Nominal)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	9	12
Genessee	4	4
Central	9	12
North	0	0
Mohawk Valley	6	6
Capital	39	49
Hudson Valley	64	56
Millwood	22	19
Dunwoodie	44	39
NY City	538	358
Long Island	401	208
<b>NYCA</b>	<b>1,137</b>	<b>762</b>

Table D-4: Top 4 Constraint Congestion Summary (Million \$ - Nominal)

<b>Zone</b>	<b>SCUC</b>	<b>Final Benchmark</b>
CENTRAL EAST	364.1	321.5
LEEDS - PLEASANT VALLEY	157.0	165.1
NEW SCOTLAND LEEDS	144.5	80.9
DUNWOODIE SHORE ROAD	229.5	27.2

Table D-5: Zonal LBMP Summary (\$/MWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	36.98	38.27
Genesee	39.16	38.48
Central	40.22	39.57
North	38.25	37.95
Mohawk Valley	41.30	39.94
Capital	44.35	43.69
Hudson Valley	47.87	45.95
Millwood	48.31	46.65
Dunwoodie	48.39	46.74
NY City	51.46	47.45
Long Island	58.02	49.72
NYCA Average	44.94	43.13

Table D-6: Zonal Generation Summary (GWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	22,755	22,308
Genesee	4,629	4,428
Central	27,792	31,655
North	8,941	9,095
Mohawk Valley	3,610	4,236
Capital	18,105	18,940
Hudson Valley	1,814	2,469
Millwood	17,422	17,411
Dunwoodie	1	4
NY City	23,315	20,961
Long Island	11,728	8,102
NYCA	140,112	139,609

Table D-7: Zonal Load Summary (GWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
West	16,017	15,857
Genesee	10,040	10,076
Central	16,167	16,224
North	5,903	5,916
Mohawk Valley	7,752	7,777
Capital	11,435	11,320
Hudson Valley	10,066	10,105
Millwood	2,978	2,990
Dunwoodie	6,208	6,229
NY City	54,060	54,210
Long Island	22,704	22,773
<b>NYCA</b>	<b>163,330</b>	<b>163,475</b>

Table D-8: Zonal Import Summary (GWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
PJM - NYISO	5,645	5,221
LINDEN VFT	1,195	982
NEPTUNE	4,295	3,487
HTP	0	0
ISONE - NYISO	1,051	953
CROSS SOUND CABLE	2,213	1,447
NORTHPORT NORWALK		
CABLE	987	1,031
IMO-NYISO	4,704	6,529
HQ-NYISO CHAT	6,921	7,065
HQ - NYISO CEDARS	457	459
<b>TOTAL IMPORTS</b>	<b>27,468</b>	<b>27,173</b>

Table D-9: Zonal Export Summary (GWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
PJM - NYISO	323	826
LINDEN VFT	103	53
NEPTUNE	1	0
HTP	0	0
ISONE - NYISO	1,999	1,767
CROSS SOUND CABLE	0	0
NORTHPORT NORWALK		
CABLE	3	34
IMO-NYISO	90	13
HQ-NYISO CHAT	236	229
HQ - NYISO CEDARS	29	22
<b>TOTAL EXPORTS</b>	<b>2,784</b>	<b>2,944</b>

Table D-10: Net Import Summary (GWh)

<b>Zone</b>	<b>Actual</b>	<b>Final Benchmark</b>
PJM - NYISO	5,322	4,395
LINDEN VFT	1,092	929
NEPTUNE	4,293	3,487
HTP	-	-
ISONE - NYISO	(947)	(814)
CROSS SOUND CABLE	2,213	1,447
NORTHPORT NORWALK		
CABLE	984	997
IMO-NYISO	4,614	6,516
HQ-NYISO CHAT	6,684	6,836
HQ - NYISO CEDARS	428	437
<b>TOTAL NET IMPORTS</b>	<b>24,683</b>	<b>24,229</b>
IMO-MISO LOOPFLOW	(1,311)	(895)



## **Appendix E –Detailed Results of 2013 CARIS Phase 1**

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

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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**

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 any potential market responses from supply and demand 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.

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

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

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

Congestion payments can be hedged with TCCs. The difference between the total congestion payment and the congestion payment associated with TCCs is the unhedged congestion payment reported in the NYISO’s quarterly historic congestion analysis reports. For the historic analysis, it was assumed that all

TCCs are owned by load and are available for hedging the congestion payments. A positive number indicate that congestion increases the cost paid by load.

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

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

- **LBMP Components** – The LBMP congestion component will equal zero when there are no transmission constraints, and the unconstrained generation will sell more energy at a price that is higher on the generator's incremental cost curve. The unconstrained generator bid price will be lower than the bid price of the out of merit generator dispatched in the transmission limited case. The result is a likely increase in the LBMP energy component as the LBMP congestion component decreases. The LBMP loss component will also change depending on the location and prices of the generation unbottled when constraints are relieved. Ancillary service costs (e.g., reserves) also affect LBMPs, as generators trade-off between selling ancillary services or energy.
- **Load payments due to congestion** are hedged with TCCs based on the assumption that all TCCs were credited to load. The TCC auction cost is not accounted for since it is part of the Transmission Service Charge (TSC).
- **TCC shortfall** – In the event of a TCC shortfall (or surplus), the load pays for the imbalance. As transmission constraints are relieved, the imbalance changes. While the shortfall may be compensated for elsewhere in the TSC, from a congestion impact perspective this is considered a load cost. Although the NYISO OATT describes details of the allocation of shortfall by transmission owner, for purposes of this analysis the shortfall is stated for the NYCA only.

- Rate Schedule 1 imbalances – In accordance with the NYISO OATT, imbalances of energy payments and loss payments are a component of the OATT-defined Rate Schedule 1 payments. Relieving or eliminating transmission constraints affects these payments, and is thus considered a congestion impact in this analysis. Like shortfall, this analysis states the Rate Schedule 1 effect for the NYCA only.

A positive number indicates that congestion increased the load payments.

## 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 (2008-2012) by Zone (nominal \$M)

Zone	2008	2009	2010	2011	2012
West	(25)	(14)	(1)	(5)	6
Genessee	(9)	4	6	6	3
Central	18	8	11	10	8
North	(2)	(3)	(1)	0	0
Mohawk Valley	10	4	5	5	3
Capital	143	53	62	47	34
Hudson Valley	175	57	73	78	39
Millwood	78	16	23	20	10
Dunwoodie	124	41	49	45	24
NY City	1403	503	560	548	261
Long Island	624	274	350	405	377
NYCA Total	2,612	977	1,141	1,169	765

Notes: Reported values do not deduct TCCs

NYCA totals represent the sum of absolute values

DAM data include Virtual Bidding & planned Transmission outages

Table E-2: Historic Generator Payments (2008-2012) by Zone (nominal \$M)

Zone	2008	2009	2010	2011	2012
West	1,701	835	1,035	949	644
Genessee	476	273	334	292	203
Central	1,825	1,062	1,280	1,200	1,076
North	779	393	406	373	288
Mohawk Valley	234	107	110	127	89
Capital	1,175	593	788	833	702
Hudson Valley	532	214	207	249	179
Millwood	1,725	773	887	863	666
Dunwoodie	39	28	11	13	14
NY City	2,405	1,125	1,369	1,325	1,086
Long Island	1,286	516	782	817	720
NYCA Total	12,178	5,919	7,209	7,040	5,670

Notes: Reported values are exclusive of BPCG and Ancillary Services.

Table E-3: Historic Load Payments (2008-2012) by Zone (nominal \$M)

Zone	2008	2009	2010	2011	2012
West	1,061	511	629	661	593
Genessee	754	435	520	483	350
Central	1,060	569	726	735	732
North	474	193	183	233	200
Mohawk Valley	469	256	313	307	238
Capital	1,008	508	578	572	459
Hudson Valley	1,114	496	630	716	515
Millwood	385	132	168	164	114
Dunwoodie	706	315	375	358	256
NY City	5,919	2,753	3,305	3,160	2,270
Long Island	2,535	1,231	1,577	1,593	1,298
NYCA Total	15,485	7,397	9,005	8,982	7,026

### E.1.2. Metrics Assessment

#### CARIS Metrics

In conducting the CARIS analysis, seven metrics are used. The primary metric is the production cost metric. 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 of 7.33% 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 solution case proxy bus LBMP values.

## **2. Demand\$ Congestion Metric**

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**

This metric measures the change in NYCA generation payments plus net imports. The NYCA generation payments are calculated by measuring only the LBMP payments (energy, congestion, losses). Thus, total generator payments are estimated for this information metric as the sum of the LBMP payments to NYCA generators plus the payments for net imports.

Generator payment by zone 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 for NYCA generators 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 Payment Metric

The TCC payment metric is calculated differently for Phase 1 than it is calculated for Phase 2 of the CARIS process, as described in the NYISO Tariff. In this CARIS Phase 1, the TCC Payment is calculated as (Demand Congestion Costs + Export Congestion Costs) – (Supply Congestion Costs + Import Congestion Costs). This is not a measure of the Transmission Owners' TCC auction revenues.

## 6. ICAP Metric

The Installed Capacity (ICAP) savings metric quantifies the potential NYISO ICAP market savings created by a generation, transmission, energy efficiency, or demand response project.

The ICAP savings calculation<sup>4</sup> consists of two steps, which are performed for each NYISO capacity zone<sup>5</sup>. In the first step, the MW impact of a generic solution is determined through Loss of Load Expectation (LOLE) analysis, where LOLE is the resource adequacy criterion. The MW impact is indicative of reduced installed capacity requirement made possible by the congestion mitigation solutions. A transmission solution that enables better utilization of the existing generating resources in the State will allow a lower IRM and lower LCR. Generation solutions, depending on their location in the NYCA, will contribute as an ICAP source and may reduce the IRM and LCR requirements. For DR and EE, the reduced load downstream of congestion will lower both the overall ICAP and the LCR requirements. The ICAP reduction can be larger than the nameplate of the solution. Using year 2022, the ICAP MW impact for each study area resulting from the application of generic solutions is calculated. This represents the potential reduction in ICAP procurement obligations and the associated ICAP costs.

Second, the ICAP cost reduction benefit is translated to a dollar amount through two pricing variations for each of the years of the ten year study period. For Variant 1, the ISO measured the cost impact of a solution for each planning year by: (i) forecasting the cost per megawatt-year of Installed Capacity under the assumption that the solution is not in place, based on the latest available Summer and Winter ICAP Demand Curves and the amount of Installed Capacity available in the NYCA, and (ii) multiplying that forecasted cost per megawatt-year by the sum of the megawatt impact. For Variant 2, the ISO measured the cost impact of a solution for each planning year by: (i) forecasting the cost per megawatt-year of Installed Capacity under the assumption that the solution is in place, based on the latest available Summer and Winter ICAP Demand Curves and the amount of Installed Capacity available in the NYCA; (ii) subtracting that forecasted

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<sup>4</sup> 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

([http://www.nyiso.com/public/webdocs/markets\\_operations/documents/Manuals\\_and\\_Guides/Manuals/Operations/icap\\_mnl.pdf](http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/icap_mnl.pdf))

<sup>5</sup> At the time the 2013 CARIS Base Case and assumptions were finalized, the NYISO had three separate capacity zones: New York City (NYC), Long Island (LI), and the New York Control Area (NYCA). Capacity 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.



cost per megawatt-year from the forecasted cost per megawatt-year of Installed Capacity calculated in Variant 1 (without the solution in place); and (iii) multiplying that difference by fifty percent (50%) of the assumed amount of NYCA Installed Capacity available. The ICAP cost metrics are indicative measures of the additional potential benefits resulting from the implementation of a CARIS solution. The metrics are not precise determinants of future capacity prices and are calculated for the purpose of providing additional information.

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

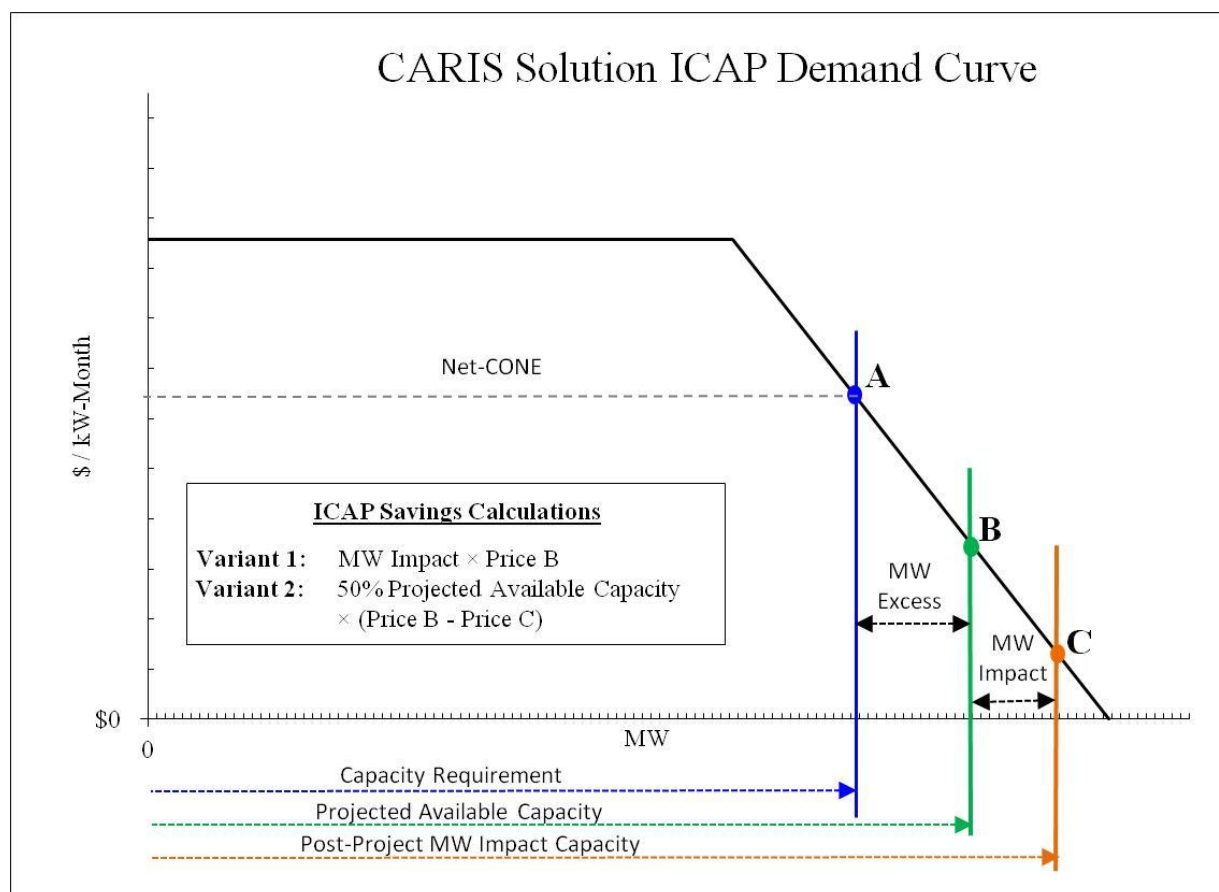


Figure E-1: CARIS ICAP Demand Curve

The MW Impact calculation from the first step described above uses the GE-MARS base case for LOLE calculations, which is based upon the 2012 Comprehensive Reliability Plan (CRP). Updates were made to capacity resources contained in the production cost simulation base case to match the CRP assumptions. A series of project cases were created to simulate transmission, generation, demand response, and energy efficiency projects. Each type of project was modeled with different changes to the MARS topology to accurately represent the effect of the project on the system.

To simulate the three transmission project cases, the following changes to interface transfer limits were made, as indicated in Table E-4.

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

<b>MARS Interface &amp; Limit (MW)</b>	<b>Base Case</b>	<b>Study 1: Central East - New Scotland - Pleasant Valley</b>	<b>Study 2: Central East</b>	<b>Study 3: New Scotland - Pleasant Valley</b>
Central East	3350	3975	3900	3425
F to G	3475	4275	3375	4275
UPNY SENY	5425	6625	5225	6625
Total East	6750	7375	7300	6825

To simulate the generation project cases, capacity was added at downstream of the congested element, as indicated in Table E-5.

Table E-5: MARS Capacity Additions for Generation Solution ICAP Calculations

<b>Study</b>	<b>Generation Bus Location</b>	<b># Units</b>	<b>Unit Size (MW)</b>	<b>Total Capacity Addition (MW)</b>
Study 1: Central East - New Scotland - Pleasant Valley	Pleasant Valley	4	330	1320
Study 2: Central East	New Scotland	2	330	660
Study 3: New Scotland - Pleasant Valley	Pleasant Valley	4	330	1320

Energy efficiency project cases were modeled by reducing the load forecast downstream of the congested element, as indicated in Table E-6.

Table E-6: MARS Load Reductions for Energy Efficiency Solution ICAP Calculations

<b>Zone &amp; Load Reduction Amount (MW)</b>	<b>Study 1: Central East - New Scotland - Pleasant Valley</b>	<b>Study 2: Central East</b>	<b>Study 3: New Scotland - Pleasant Valley</b>
F	200	200	-
G	200	200	200
J	800	200	1000

The demand response project cases were created by adding SCRs downstream of the congested element, as indicated in Table E-7.

**Table E-7: MARS SCR Capacity Additions for  
Demand Response Solution ICAP Calculations**

<b>Zone &amp; SCR Addition Amount (MW)</b>	<b>Study 1: Central East - New Scotland - Pleasant Valley</b>	<b>Study 2: Central East</b>	<b>Study 3: New Scotland - Pleasant Valley</b>
F	200	200	-
G	200	200	200
J	800	200	1000

After the base case and project cases were simulated and LOLE value 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 2022 study year are presented in Table E-8.

**Table E-8: ICAP MW Impact**

<b>Study</b>	<b>Solution Type</b>	<b>2022 MW Impact (MW)</b>		
		<b>NYC</b>	<b>LI</b>	<b>NYCA</b>
Study 1: Central East - New Scotland - Pleasant Valley	Transmission	208	107	770
	Generation	415	214	1,580
	Energy Efficiency	433	223	1,600
	Demand Response	422	218	1,560
Study 2: Central East	Transmission	(85)	(44)	(315)
	Generation	-	-	-
	Energy Efficiency	198	102	730
	Demand Response	189	98	700
Study 3: New Scotland - Pleasant Valley	Transmission	206	106	760
	Generation	415	214	1,580
	Energy Efficiency	463	239	1,710
	Demand Response	455	234	1,680

The MW Impact calculation for the Central East study generation solution was 0 MW as the CRIS value was assumed to be 0 MW. New generation capacity built at the New Scotland bus would not be awarded CRIS rights without paying a potentially significant System Deliverability Upgrade (SDU) cost.

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-9 and E-10 below.

The two ICAP cost variants are indicative of a range of the potential benefits to load resulting from the implementation of a CARIS solution. The metrics are not precise determinants of future capacity prices and are calculated for the purpose of providing additional information. The results of the metric calculations are in Table E-9 and Table E-10 below.

Table E-9: ICAP Costs Savings - Variant 1

CARIS I 2013 ICAP Variant #1 Savings Calculations (2013 Present Value M\$)													
Study	Solution	Capacity Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10-Year Total
Study #1: CE-NS-PV	Transmission	NYCA:	30	41	47	47	49	50	52	54	52	52	474
		NYC:	24	18	21	16	17	17	19	20	20	20	195
		LI:	6	6	7	7	7	7	7	8	7	7	70
		<b>Total:</b>	<b>59</b>	<b>66</b>	<b>75</b>	<b>71</b>	<b>73</b>	<b>75</b>	<b>78</b>	<b>82</b>	<b>79</b>	<b>80</b>	<b>739</b>
	Generation	NYCA:	61	85	97	97	100	103	107	110	106	107	973
		NYC:	48	37	43	33	35	35	38	41	40	41	389
		LI:	11	13	13	14	14	15	15	15	15	15	140
		<b>Total:</b>	<b>120</b>	<b>134</b>	<b>153</b>	<b>144</b>	<b>149</b>	<b>152</b>	<b>160</b>	<b>166</b>	<b>160</b>	<b>163</b>	<b>1,501</b>
	Energy Efficiency	NYCA:	62	86	98	98	102	104	108	111	107	109	985
		NYC:	50	38	44	34	36	36	40	42	42	42	406
		LI:	12	13	14	15	15	15	16	16	15	16	146
		<b>Total:</b>	<b>124</b>	<b>137</b>	<b>156</b>	<b>147</b>	<b>153</b>	<b>156</b>	<b>163</b>	<b>170</b>	<b>164</b>	<b>167</b>	<b>1,536</b>
	Demand Response	NYCA:	60	84	95	95	99	102	105	109	105	106	960
		NYC:	49	37	43	33	35	35	39	41	40	41	395
		LI:	11	13	14	14	14	15	15	16	15	15	142
		<b>Total:</b>	<b>121</b>	<b>134</b>	<b>152</b>	<b>143</b>	<b>149</b>	<b>152</b>	<b>159</b>	<b>166</b>	<b>160</b>	<b>162</b>	<b>1,498</b>
Study #2: CE	Transmission	NYCA:	(12)	(17)	(19)	(19)	(20)	(21)	(21)	(22)	(21)	(21)	(194)
		NYC:	(10)	(8)	(9)	(7)	(7)	(7)	(8)	(8)	(8)	(8)	(80)
		LI:	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(29)
		<b>Total:</b>	<b>(24)</b>	<b>(27)</b>	<b>(31)</b>	<b>(29)</b>	<b>(30)</b>	<b>(31)</b>	<b>(32)</b>	<b>(33)</b>	<b>(32)</b>	<b>(33)</b>	<b>(302)</b>
	Generation	NYCA:	0	0	0	0	0	0	0	0	0	0	0
		NYC:	0	0	0	0	0	0	0	0	0	0	0
		LI:	0	0	0	0	0	0	0	0	0	0	0
		<b>Total:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	Energy Efficiency	NYCA:	28	39	45	45	46	48	49	51	49	50	449
		NYC:	23	18	20	16	17	17	18	19	19	19	186
		LI:	5	6	6	7	7	7	7	7	7	7	67
		<b>Total:</b>	<b>56</b>	<b>63</b>	<b>71</b>	<b>67</b>	<b>70</b>	<b>71</b>	<b>75</b>	<b>78</b>	<b>75</b>	<b>76</b>	<b>701</b>
	Demand Response	NYCA:	27	38	43	43	44	46	47	49	47	48	431
		NYC:	22	17	19	15	16	16	17	19	18	19	177
		LI:	5	6	6	6	6	7	7	7	7	7	64
		<b>Total:</b>	<b>54</b>	<b>60</b>	<b>68</b>	<b>64</b>	<b>67</b>	<b>68</b>	<b>71</b>	<b>74</b>	<b>72</b>	<b>73</b>	<b>672</b>
Study #3: NS-PV	Transmission	NYCA:	29	41	46	46	48	50	51	53	51	52	468
		NYC:	24	18	21	16	17	17	19	20	20	20	193
		LI:	6	6	7	7	7	7	7	8	7	7	69
		<b>Total:</b>	<b>59</b>	<b>65</b>	<b>74</b>	<b>70</b>	<b>73</b>	<b>74</b>	<b>78</b>	<b>81</b>	<b>78</b>	<b>79</b>	<b>730</b>
	Generation	NYCA:	61	85	97	97	100	103	107	110	106	107	973
		NYC:	48	37	43	33	35	35	38	41	40	41	389
		LI:	11	13	13	14	14	15	15	15	15	15	140
		<b>Total:</b>	<b>120</b>	<b>134</b>	<b>153</b>	<b>144</b>	<b>149</b>	<b>152</b>	<b>160</b>	<b>166</b>	<b>160</b>	<b>163</b>	<b>1,501</b>
	Energy Efficiency	NYCA:	66	92	105	105	109	111	115	119	115	116	1,053
		NYC:	54	41	47	37	39	39	42	45	44	45	434
		LI:	13	14	15	16	16	16	17	17	16	17	156
		<b>Total:</b>	<b>132</b>	<b>147</b>	<b>167</b>	<b>157</b>	<b>163</b>	<b>166</b>	<b>174</b>	<b>182</b>	<b>175</b>	<b>178</b>	<b>1,642</b>
	Demand Response	NYCA:	65	90	103	103	107	109	113	117	113	114	1,034
		NYC:	53	40	47	36	38	38	42	45	44	45	426
		LI:	12	14	15	15	15	16	16	17	16	16	153
		<b>Total:</b>	<b>130</b>	<b>144</b>	<b>164</b>	<b>154</b>	<b>160</b>	<b>163</b>	<b>171</b>	<b>178</b>	<b>172</b>	<b>175</b>	<b>1,613</b>

Table E-10: ICAP Costs Savings - Variant 2

CARIS I 2013 ICAP Variant #2 Savings Calculations (2013 Present Value M\$)													
Study	Solution	Capacity Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10-Year Total
Study #1: CE-NS-PV	Transmission	NYCA:	366	340	319	301	283	266	250	234	222	208	2,789
		NYC:	145	124	130	105	99	93	104	97	92	86	1,075
		LI:	39	44	42	38	37	35	33	31	29	28	357
		<b>Total:</b>	<b>550</b>	<b>509</b>	<b>491</b>	<b>444</b>	<b>419</b>	<b>394</b>	<b>387</b>	<b>363</b>	<b>343</b>	<b>322</b>	<b>4,221</b>
	Generation	NYCA:	617	698	654	617	580	546	513	481	455	428	5,588
		NYC:	289	242	251	212	199	188	193	194	183	172	2,124
		LI:	78	81	84	71	71	69	65	60	60	55	693
		<b>Total:</b>	<b>984</b>	<b>1,021</b>	<b>989</b>	<b>900</b>	<b>851</b>	<b>803</b>	<b>770</b>	<b>736</b>	<b>698</b>	<b>655</b>	<b>8,406</b>
	Energy Efficiency	NYCA:	622	707	662	625	587	553	519	487	461	433	5,656
		NYC:	301	250	258	219	205	193	198	203	191	180	2,198
		LI:	82	84	87	73	74	72	67	62	61	56	718
		<b>Total:</b>	<b>1,005</b>	<b>1,040</b>	<b>1,006</b>	<b>917</b>	<b>866</b>	<b>818</b>	<b>784</b>	<b>752</b>	<b>713</b>	<b>669</b>	<b>8,572</b>
	Demand Response	NYCA:	612	689	645	609	573	539	506	475	449	422	5,521
		NYC:	294	243	252	213	200	189	194	197	186	175	2,143
		LI:	80	82	85	72	72	70	66	61	60	55	704
		<b>Total:</b>	<b>986</b>	<b>1,015</b>	<b>983</b>	<b>894</b>	<b>845</b>	<b>798</b>	<b>766</b>	<b>734</b>	<b>695</b>	<b>653</b>	<b>8,368</b>
Study #2: CE	Transmission	NYCA:	(150)	(139)	(130)	(123)	(116)	(109)	(102)	(96)	(91)	(85)	(1,141)
		NYC:	(59)	(57)	(53)	(43)	(40)	(43)	(42)	(40)	(38)	(35)	(450)
		LI:	(16)	(19)	(17)	(16)	(15)	(14)	(14)	(13)	(12)	(11)	(148)
		<b>Total:</b>	<b>(225)</b>	<b>(215)</b>	<b>(201)</b>	<b>(182)</b>	<b>(171)</b>	<b>(166)</b>	<b>(158)</b>	<b>(148)</b>	<b>(140)</b>	<b>(132)</b>	<b>(1,739)</b>
	Generation	NYCA:	0	0	0	0	0	0	0	0	0	0	0
		NYC:	0	0	0	0	0	0	0	0	0	0	0
		LI:	0	0	0	0	0	0	0	0	0	0	0
		<b>Total:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
	Energy Efficiency	NYCA:	347	323	302	285	268	252	237	222	210	198	2,644
		NYC:	138	119	124	100	94	88	99	93	87	82	1,023
		LI:	37	42	40	37	36	33	31	29	28	26	340
		<b>Total:</b>	<b>522</b>	<b>483</b>	<b>466</b>	<b>422</b>	<b>397</b>	<b>374</b>	<b>367</b>	<b>344</b>	<b>326</b>	<b>306</b>	<b>4,008</b>
	Demand Response	NYCA:	333	309	290	273	257	242	227	213	202	190	2,535
		NYC:	132	114	118	96	90	84	94	88	84	78	978
		LI:	36	41	39	36	34	32	30	28	27	25	327
		<b>Total:</b>	<b>500</b>	<b>464</b>	<b>447</b>	<b>404</b>	<b>381</b>	<b>358</b>	<b>352</b>	<b>330</b>	<b>312</b>	<b>293</b>	<b>3,841</b>
Study #3: NS-PV	Transmission	NYCA:	361	336	314	297	279	262	247	231	219	206	2,753
		NYC:	143	123	129	104	98	92	103	96	91	86	1,065
		LI:	39	44	42	38	37	35	33	31	29	27	353
		<b>Total:</b>	<b>544</b>	<b>503</b>	<b>485</b>	<b>439</b>	<b>414</b>	<b>389</b>	<b>382</b>	<b>358</b>	<b>339</b>	<b>319</b>	<b>4,171</b>
	Generation	NYCA:	617	698	654	617	580	546	513	481	455	428	5,588
		NYC:	289	242	251	212	199	188	193	194	183	172	2,124
		LI:	78	81	84	71	71	69	65	60	60	55	693
		<b>Total:</b>	<b>984</b>	<b>1,021</b>	<b>989</b>	<b>900</b>	<b>851</b>	<b>803</b>	<b>770</b>	<b>736</b>	<b>698</b>	<b>655</b>	<b>8,406</b>
	Energy Efficiency	NYCA:	648	756	707	668	628	591	555	521	493	463	6,028
		NYC:	322	266	273	234	219	207	211	215	205	192	2,344
		LI:	87	89	92	78	78	76	71	66	65	60	764
		<b>Total:</b>	<b>1,057</b>	<b>1,111</b>	<b>1,073</b>	<b>979</b>	<b>926</b>	<b>873</b>	<b>837</b>	<b>801</b>	<b>763</b>	<b>715</b>	<b>9,135</b>
	Demand Response	NYCA:	641	743	695	656	617	580	545	512	484	455	5,926
		NYC:	317	262	269	230	216	203	207	212	201	189	2,304
		LI:	86	88	90	77	77	75	70	65	64	59	749
		<b>Total:</b>	<b>1,043</b>	<b>1,092</b>	<b>1,054</b>	<b>962</b>	<b>909</b>	<b>858</b>	<b>822</b>	<b>788</b>	<b>749</b>	<b>703</b>	<b>8,980</b>

## CARIS Base Case Metrics Results

When comparing historic CROS 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 CROS, 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-11 through E-24. Table E-11 below presents the summation of the NYCA zonal base case results for the ten-year study period (except for NYCA-wide production costs).

Table E-11: Projected CARIS Base Case Results 2013-2022 (nominal \$M)

Base Case Summary	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NYCA-Wide Production Costs (\$M)	3,880	3,983	4,078	4,786	4,950	5,370	5,607	6,229	6,410	7,007
NYCA Demand\$ Congestion (\$M)	643	673	749	634	757	784	906	771	929	907
Load LBMP Payments (\$M)	7,012	7,268	7,610	8,818	9,293	9,921	10,420	11,708	12,356	13,306
Generator LBMP Payments (\$M)	5,582	5,677	5,946	6,954	7,264	7,733	8,130	9,803	10,345	11,207
Load Payment Losses (\$M)	306	282	282	338	344	376	408	494	532	578
SO2 Costs (\$M)	0.05	0.03	0.03	8.54	9.21	12.96	16.28	22.20	23.21	28.14
SO2 Emission Short Tons	16,366	10,801	10,295	8,053	8,097	10,165	11,727	14,651	14,521	16,490
CO2 Costs (\$M)	64.2	114.7	163.5	226.0	278.7	301.0	317.3	509.5	538.8	598.2
CO2 Emission Short Tons	32,731	30,999	30,613	31,573	30,801	31,648	32,421	37,625	37,639	39,269
NOX Costs (\$M)	1.0	0.9	1.0	1.0	1.0	1.1	1.3	1.6	1.7	1.9
NOX Emission Short Tons	21,842	19,729	19,585	19,216	18,970	19,530	20,304	22,972	22,685	23,896
NYCA Avg. LBMP (\$/MWh)	41.2	42.5	44.1	50.9	53.4	56.8	59.1	66.2	69.3	74.2

Table E-12: Projected Production Costs (2013-2022) by Zone (nominal \$M)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	208	165	172	190	203	233	279	374	382	444
Genesee	42	42	44	46	45	46	45	54	58	58
Central	437	421	432	463	468	486	506	615	638	670
North	22	24	18	21	19	18	19	41	40	51
Mohawk Valley	27	26	24	30	27	28	29	41	43	47
Capital	679	666	675	748	775	795	859	1,083	1,146	1,234
Hudson Valley	30	35	35	36	40	39	44	61	91	100
Millwood	96	96	96	97	97	98	98	99	99	100
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1,120	1,175	1,236	1,544	1,607	1,818	1,879	2,197	2,273	2,470
Long Island	412	427	448	513	537	567	596	696	750	809
<b>Total NYCA</b>	<b>3,074</b>	<b>3,077</b>	<b>3,180</b>	<b>3,688</b>	<b>3,819</b>	<b>4,127</b>	<b>4,353</b>	<b>5,261</b>	<b>5,519</b>	<b>5,982</b>
Imports	1,060	1,167	1,210	1,480	1,591	1,759	1,814	1,775	1,848	2,014
Exports	253	261	312	382	459	516	561	807	957	989
<b>NYCA + Imports - Exports</b>	<b>3,880</b>	<b>3,983</b>	<b>4,078</b>	<b>4,786</b>	<b>4,950</b>	<b>5,370</b>	<b>5,607</b>	<b>6,229</b>	<b>6,410</b>	<b>7,007</b>

Total IESO	1,130	1,012	899	1,207	1,140	1,279	1,364	1,681	1,619	2,025
Total PJM	18,000	18,624	19,748	22,993	24,013	25,068	26,190	33,387	35,390	37,856
Total ISONE	3,316	3,458	3,716	4,217	4,504	4,847	5,117	5,630	6,003	6,367
<b>Total System</b>	<b>25,521</b>	<b>26,171</b>	<b>27,543</b>	<b>32,105</b>	<b>33,476</b>	<b>35,320</b>	<b>37,024</b>	<b>45,959</b>	<b>48,531</b>	<b>52,230</b>

Table E-13: Projected Load Payments (2013-2022) by Zone (nominal \$M)

<b>Zone</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>2021</b>	<b>2022</b>
West	592	618	656	772	810	854	884	1,014	1,061	1,137
Genesee	372	386	401	476	497	527	547	623	647	699
Central	609	634	661	786	822	878	914	1,035	1,084	1,171
North	243	254	265	314	327	349	361	411	428	462
Mohawk Valley	281	291	304	361	377	402	416	472	492	530
Capital	500	520	549	634	675	723	757	829	879	944
Hudson Valley	443	459	480	550	582	620	651	725	764	819
Millwood	130	135	141	161	170	182	191	213	225	242
Dunwoodie	275	284	297	340	358	382	402	450	475	510
NY City	2,478	2,559	2,674	3,059	3,230	3,447	3,633	4,065	4,305	4,622
Long Island	1,090	1,129	1,182	1,366	1,444	1,558	1,664	1,871	1,995	2,170
<b>Total-NYCA</b>	<b>7,012</b>	<b>7,268</b>	<b>7,610</b>	<b>8,818</b>	<b>9,293</b>	<b>9,921</b>	<b>10,420</b>	<b>11,708</b>	<b>12,356</b>	<b>13,306</b>

Table E-14: Projected Generator Payments (2013-2022) by Zone (nominal \$M)

<b>Zone</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>2021</b>	<b>2022</b>
West	665	651	682	801	838	902	966	1,175	1,213	1,352
Genesee	189	196	220	242	249	284	271	316	355	355
Central	1,100	1,085	1,154	1,277	1,356	1,347	1,441	1,770	1,864	1,967
North	341	354	361	428	442	469	485	575	593	649
Mohawk Valley	163	167	170	204	208	222	229	271	280	305
Capital	793	784	798	901	933	960	1,035	1,320	1,413	1,540
Hudson Valley	44	49	50	53	58	58	64	85	121	133
Millwood	777	798	827	942	990	1,048	1,095	1,221	1,279	1,363
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1,073	1,137	1,205	1,548	1,606	1,825	1,888	2,280	2,368	2,602
Long Island	437	456	481	559	584	619	657	790	857	940
<b>Total-NYCA</b>	<b>5,582</b>	<b>5,677</b>	<b>5,946</b>	<b>6,954</b>	<b>7,264</b>	<b>7,733</b>	<b>8,130</b>	<b>9,803</b>	<b>10,345</b>	<b>11,207</b>



Table E-15: Projected Generator GWh (2013-2022)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	17,912	16,813	16,758	16,721	16,752	17,096	17,681	18,888	18,788	19,453
Genesee	5,234	5,229	5,629	5,235	5,183	5,581	5,141	5,283	5,708	5,285
Central	33,888	32,211	33,217	31,891	32,651	31,335	32,678	32,916	34,147	32,956
North	9,365	9,395	9,237	9,247	9,179	9,143	9,154	9,486	9,431	9,550
Mohawk Valley	4,441	4,381	4,303	4,358	4,269	4,269	4,267	4,428	4,411	4,444
Capital	18,996	17,977	17,357	17,011	16,501	15,856	16,437	19,537	19,891	20,257
Hudson Valley	857	929	900	838	859	811	851	1,041	1,403	1,431
Millwood	17,706	17,720	17,708	17,772	17,708	17,723	17,706	17,772	17,708	17,723
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	22,398	23,070	23,400	26,964	26,382	28,511	28,074	30,913	30,128	31,180
Long Island	8,717	8,828	8,923	9,141	9,018	8,906	8,942	9,827	10,048	10,260
<b>Total-NYCA</b>	<b>139,514</b>	<b>136,552</b>	<b>137,433</b>	<b>139,178</b>	<b>138,503</b>	<b>139,229</b>	<b>140,930</b>	<b>150,091</b>	<b>151,662</b>	<b>152,538</b>
Total IESO	146,562	144,658	143,463	142,689	141,469	141,027	143,082	145,042	146,745	146,413
Total PJM	819,285	840,280	859,129	888,749	900,260	909,915	916,672	916,447	923,374	933,137
Total ISONE	125,389	126,425	127,486	128,751	129,076	130,039	131,201	135,781	136,846	138,175
Total HQ *	18,839	18,767	18,776	18,852	18,809	18,827	18,839	18,844	18,785	18,791
<b>Total System</b>	<b>1,249,589</b>	<b>1,266,682</b>	<b>1,286,286</b>	<b>1,318,219</b>	<b>1,328,115</b>	<b>1,339,037</b>	<b>1,350,724</b>	<b>1,366,205</b>	<b>1,377,413</b>	<b>1,389,054</b>

Table E-16: Projected Loss Payments (2013-2022) by Zone (nominal \$M)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(11)	(13)	(12)	(13)	(14)	(19)	(17)	(9)	(7)	(10)
Genesee	(4)	(3)	(4)	(3)	(3)	(5)	(5)	(3)	(4)	(4)
Central	6	6	6	10	10	10	11	15	16	18
North	(4)	(5)	(5)	(5)	(5)	(6)	(6)	(7)	(7)	(7)
Mohawk Valley	5	4	5	6	6	7	7	9	9	10
Capital	16	15	16	20	22	25	26	25	27	29
Hudson Valley	26	25	25	29	29	33	35	41	44	47
Millwood	8	8	8	9	9	10	11	13	14	15
Dunwoodie	17	16	16	19	19	21	22	27	28	31
NY City	172	159	158	182	185	203	219	261	281	304
Long Island	74	70	70	84	87	97	105	122	131	145
<b>Total-NYCA</b>	<b>306</b>	<b>282</b>	<b>282</b>	<b>338</b>	<b>344</b>	<b>376</b>	<b>408</b>	<b>494</b>	<b>532</b>	<b>578</b>

Table E-17: Projected SO<sub>2</sub> Emission Costs (2013-2022) by Zone (nominal \$M)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.03	0.02	0.02	5.99	6.65	8.95	11.87	16.47	16.70	20.84
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	0.01	2.40	2.41	3.84	4.22	5.50	6.27	7.01
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	0.03	0.03	0.03	0.03	0.04	0.04	0.05
Hudson Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04
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	0.09	0.09	0.10	0.11	0.13	0.13	0.14
Long Island	0.00	0.00	0.00	0.03	0.03	0.04	0.04	0.05	0.05	0.06
<b>Total-NYCA</b>	<b>0.05</b>	<b>0.03</b>	<b>0.03</b>	<b>8.54</b>	<b>9.21</b>	<b>12.96</b>	<b>16.28</b>	<b>22.20</b>	<b>23.21</b>	<b>28.14</b>

Table E-18: Projected SO<sub>2</sub> Emission Tons (2013-2022) by Zone

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	8,055	4,941	4,830	4,640	4,802	6,028	7,502	9,796	9,406	11,136
Genesee	0	0	0	0	0	0	0	0	0	0
Central	6,871	4,419	4,025	1,962	1,851	2,689	2,777	3,384	3,641	3,857
North	3	3	3	3	3	3	3	4	4	4
Mohawk Valley	3	3	3	3	3	3	3	3	3	3
Capital	363	361	360	360	358	357	358	365	364	365
Hudson Valley	225	226	226	227	225	225	226	228	231	244
Millwood	356	356	356	356	356	356	356	356	356	356
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	56	58	58	66	65	69	69	76	75	80
Long Island	433	434	434	436	434	434	434	440	439	445
<b>Total-NYCA</b>	<b>16,366</b>	<b>10,801</b>	<b>10,295</b>	<b>8,053</b>	<b>8,097</b>	<b>10,165</b>	<b>11,727</b>	<b>14,651</b>	<b>14,521</b>	<b>16,490</b>

Table E-19: Projected CO<sub>2</sub> Emission Costs (2013-2022) by Zone (nominal \$M)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	8.6	11.3	16.0	20.8	26.7	32.2	39.8	67.5	69.2	84.7
Genesee	0.4	0.8	1.1	1.5	1.7	1.6	1.6	3.0	3.2	3.5
Central	9.1	15.4	21.2	26.5	31.0	33.3	34.3	55.3	58.3	63.7
North	0.5	1.1	1.1	1.5	1.5	1.3	1.4	4.3	4.2	5.4
Mohawk Valley	0.6	1.1	1.4	2.2	2.2	2.3	2.3	4.2	4.4	4.9
Capital	15.1	27.2	37.9	49.8	60.7	60.3	64.7	101.8	109.4	118.7
Hudson Valley	0.7	1.6	2.2	2.6	3.4	3.2	3.6	6.4	9.6	10.5
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	20.3	39.3	57.9	87.1	109.1	123.6	124.9	202.1	210.3	230.3
Long Island	8.8	17.0	24.9	34.1	42.3	43.2	44.7	65.0	70.2	76.5
<b>Total-NYCA</b>	<b>64.2</b>	<b>114.7</b>	<b>163.5</b>	<b>226.0</b>	<b>278.7</b>	<b>301.0</b>	<b>317.3</b>	<b>509.5</b>	<b>538.8</b>	<b>598.2</b>

Table E-20: Projected CO<sub>2</sub> Emission 1000 Tons (2013-2022) by Zone

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	4,108	2,831	2,781	2,698	2,751	3,204	3,841	4,951	4,809	5,526
Genesee	203	201	184	196	177	157	155	220	223	228
Central	4,365	3,875	3,686	3,429	3,198	3,307	3,310	4,059	4,052	4,156
North	250	267	186	191	157	132	137	314	291	356
Mohawk Valley	313	280	248	278	230	226	223	308	305	322
Capital	7,219	6,830	6,589	6,444	6,257	5,993	6,234	7,467	7,594	7,742
Hudson Valley	349	397	379	336	350	316	344	468	664	682
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	11,730	12,054	12,235	13,574	13,311	14,008	13,857	15,060	14,815	15,251
Long Island	4,196	4,264	4,327	4,427	4,371	4,304	4,319	4,778	4,886	5,006
<b>Total-NYCA</b>	<b>32,731</b>	<b>30,999</b>	<b>30,613</b>	<b>31,573</b>	<b>30,801</b>	<b>31,648</b>	<b>32,421</b>	<b>37,625</b>	<b>37,639</b>	<b>39,269</b>

Table E-21: Projected NOx Emission Costs 2013-2022) by Zone (nominal \$M)

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.3	0.2	0.2	0.3	0.3	0.3	0.4	0.6	0.6	0.8
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	0.1	0.1	0.1	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hudson Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Millwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NY City	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Long Island	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
<b>Total-NYCA</b>	<b>1.0</b>	<b>0.9</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.1</b>	<b>1.3</b>	<b>1.6</b>	<b>1.7</b>	<b>1.9</b>

Table E-22: Projected NOx in Tons (2013-2022) by Zone

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	5,574	3,942	3,836	3,845	3,815	4,464	5,175	6,446	6,212	7,118
Genesee	382	385	375	378	368	354	355	390	390	394
Central	3,835	3,268	3,117	2,632	2,559	2,741	2,769	3,170	3,197	3,302
North	167	170	154	156	149	145	146	179	174	186
Mohawk Valley	310	291	272	285	260	260	260	303	299	308
Capital	1,283	1,266	1,251	1,248	1,236	1,223	1,235	1,315	1,318	1,332
Hudson Valley	449	467	464	444	448	435	447	511	535	542
Millwood	1,391	1,391	1,391	1,391	1,391	1,391	1,391	1,391	1,391	1,391
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	3,548	3,606	3,736	3,808	3,750	3,554	3,553	4,088	4,013	4,109
Long Island	4,905	4,943	4,989	5,027	4,994	4,961	4,973	5,179	5,155	5,212
<b>Total-NYCA</b>	<b>21,842</b>	<b>19,729</b>	<b>19,585</b>	<b>19,216</b>	<b>18,970</b>	<b>19,530</b>	<b>20,304</b>	<b>22,972</b>	<b>22,685</b>	<b>23,896</b>

Table E-23: Projected System Congestion Rents (nominal \$M)

Congestion Rent	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NYCA	535	616	709	677	817	834	916	781	955	886

Table E-24: Projected Zonal LBMP \$/MWh (2013-2022) by Zone

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	37.82	39.35	41.47	48.42	50.69	53.43	55.28	63.33	66.22	70.88
Genesee	36.90	38.25	39.66	46.75	48.71	51.66	53.52	60.97	63.29	68.19
Central	38.51	39.87	41.38	48.77	50.86	54.21	56.19	63.51	66.25	71.24
North	36.44	37.66	39.00	46.01	47.91	51.03	52.75	60.18	62.47	67.37
Mohawk Valley	38.46	39.75	41.17	48.42	50.48	53.81	55.73	63.15	65.74	70.78
Capital	42.16	43.71	45.71	52.31	55.43	58.93	61.43	66.99	70.57	75.34
Hudson Valley	43.62	44.81	46.50	53.00	55.81	59.22	61.80	68.65	72.10	76.98
Millwood	44.16	45.32	47.00	53.41	56.25	59.66	62.30	69.17	72.70	77.54
Dunwoodie	44.19	45.33	47.01	53.40	56.23	59.61	62.26	69.16	72.70	77.52
NY City	44.51	45.63	47.31	53.67	56.52	59.96	62.66	69.63	73.25	78.16
Long Island	46.31	47.35	49.15	55.87	58.87	62.84	66.07	73.24	77.08	82.45
<b>NYCA Avg. LBMP</b>	<b>41.19</b>	<b>42.46</b>	<b>44.12</b>	<b>50.91</b>	<b>53.43</b>	<b>56.76</b>	<b>59.09</b>	<b>66.18</b>	<b>69.31</b>	<b>74.22</b>

## E.2. Selection of Three Studies

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 descending order based on the calculated present value of Demand\$ congestion. Initially, the top five 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 the 10-year study period. The primary constraint will be assessed for grouping with a new element if the new element is electrically adjacent to the primary element. 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 change in production cost savings is also used as a guideline to stop the grouping process. For example, new elements will not be grouped if the production cost savings are just marginally higher. In addition, a significant declining trend in congestion over an identified congested element in the later years of the study period will also eliminate that element from the rankings. The study selection procedures provide the NYISO with flexibility for grouping, assessing and recommending the three studies provided that the grouping process for each CARIS is reviewed with ESPWG. It is expected that the three groupings/elements with the most production cost savings will be 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-25 shows the Demand Congestion for the base case and the relaxation cases over the 10-year study period.

Table E-25: Demand Congestion Results for Relaxation of Top Congested Elements

\$ Demand Congestion (2013 \$M)	Type	Base Case	10 YEAR RELAXATION							
			CENTRAL EAST (CE)	LEEDS PV (LPV)	DUNWOODIE SHORE ROAD (DSR)	GREENWOOD	NEW SCOTLAND LEEDS (NSL)	CE + NSL + LPV	NSL + LPV	CE + NSL
CENTRAL EAST	Base	\$ 2,923	\$ -	\$ 3,380	\$ 2,960	\$ 2,969	\$ 2,947	\$ -	\$ 3,550	\$ -
LEEDS PLEASANT VALLEY	Contingency	\$ 955	\$ 1,117	\$ -	\$ 999	\$ 903	\$ 1,006	\$ -	\$ -	\$ 1,201
DUNWOODIE SHORE ROAD	Both	\$ 208	\$ 229	\$ 225	\$ -	\$ 203	\$ 210	\$ 259	\$ 233	\$ 230
GREENWOOD	Both	\$ 52	\$ 60	\$ 53	\$ 52	\$ -	\$ 52	\$ 63	\$ 55	\$ 60
NEW SCOTLAND LEEDS	Contingency	\$ 78	\$ 128	\$ 412	\$ 81	\$ 74	\$ -	\$ -	\$ -	\$ -

Figure E-2 shows the change in production cost when the top congested elements are relieved. The NYISO presented the ranking and grouping analysis to ESPWG stakeholders and recommended three studies based upon the highest production cost savings: Central East-New Scotland-Pleasant Valley, New Scotland-Pleasant Valley, and Central East. The recommendation was based upon these groupings meeting the NYISO's grouping and ranking guidelines. Central East – New Scotland grouping was dropped because its production saving is only marginally higher than that of Central East itself. Similarly, the remaining ranked elements showed only a marginal increase in production cost savings and were not recommended for this CARIS. After discussion with ESPWG, the NYISO selected the three recommended studies for the 2013 CARIS Phase 1.

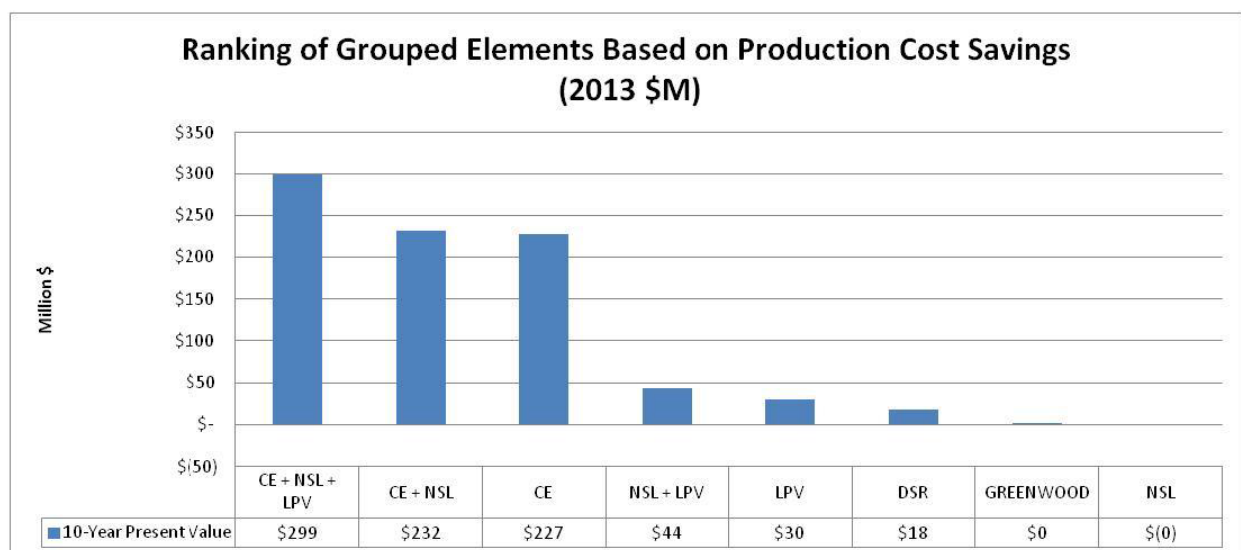


Figure E-2: Production Cost Savings Due to Relaxation

### E.3 Generic Solutions

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 (2013). 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, transmission solution in 1986 MVA block sizes, generation solution in 330MW block sizes, energy efficiency in 200MW block sizes and demand response in 200MW block sizes 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

- Transmission: 345 kV line from Edic to New Scotland to Pleasant Valley, 150 Miles
- Generation: 1320 MW Plant at Pleasant Valley
- Demand Response : 200 MW in Zone F; 200 MW in Zone G; 800 MW in Zone J
- Energy Efficiency : 200 MW in Zone F; 200 MW in Zone G; 800 MW in Zone J

Table E-26 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-26: Change in Number of Congested Hours  
(Solution Case – Base Case)

Study	Solution	Constraint	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Study #1: CE-NS-PV	Transmission	CENTRAL EAST	(249)	(675)	(719)	(808)	(960)	(1,044)	(938)	(424)	(456)	(471)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	549	563	577	509	364	178	223	216	198	215
		GREENWOOD	(3)	16	(415)	71	59	84	35	1	61	73
		HUNTLEY PACKARD	(397)	(422)	(424)	(321)	(298)	(271)	(325)	(361)	(381)	(325)
		NEW SCOTLAND LEEDS	(392)	(266)	(240)	(104)	(76)	(24)	(63)	(253)	(190)	(437)
		LEEDS PLEASANT VALLEY	(1,913)	(1,620)	(1,577)	(1,055)	(1,013)	(845)	(978)	(1,343)	(1,434)	(948)
		MOTTHAVEN RAINEY	264	230	143	19	22	7	11	39	35	33
		RAINEY VERNON	238	169	197	38	89	71	70	44	107	78
		VOLNEY SCRIBA	(581)	(788)	(548)	(474)	(394)	(522)	(590)	(454)	(540)	(452)
	Generation	CENTRAL EAST	(60)	44	91	68	42	(36)	37	34	(20)	5
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	472	452	502	324	287	225	251	171	203	242
		GREENWOOD	53	(34)	(33)	(41)	(4)	3	8	(30)	29	0
		HUNTLEY PACKARD	(63)	(126)	(116)	(10)	(66)	26	(79)	162	136	160
		NEW SCOTLAND LEEDS	(344)	(141)	(157)	(83)	(46)	(22)	(49)	(198)	(131)	(289)
		LEEDS PLEASANT VALLEY	(1,094)	(865)	(920)	(635)	(628)	(504)	(594)	(989)	(1,124)	(838)
		MOTTHAVEN RAINEY	375	214	153	53	27	33	22	64	73	99
		RAINEY VERNON	495	472	350	137	109	70	132	175	306	295
		VOLNEY SCRIBA	16	(25)	(1)	97	26	46	75	39	(5)	51
	Energy Efficiency	CENTRAL EAST	(238)	(207)	(138)	(132)	(135)	(215)	(211)	(221)	(191)	(233)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	1	0
		DUNWOODIE SHORE ROAD	248	334	359	256	356	247	208	177	100	162
		GREENWOOD	(570)	(614)	(599)	(462)	(444)	(339)	(405)	(203)	(163)	(86)
		HUNTLEY PACKARD	115	(15)	(44)	24	10	(36)	(87)	86	41	105
		NEW SCOTLAND LEEDS	(95)	(74)	(16)	(43)	(12)	(10)	(14)	(84)	(47)	(23)
		LEEDS PLEASANT VALLEY	(207)	(209)	(226)	(179)	(161)	(125)	(139)	(177)	(170)	(138)
		MOTTHAVEN RAINEY	(17)	(32)	(40)	(6)	(8)	0	(2)	0	1	0
		RAINEY VERNON	274	20	(55)	32	5	(8)	(21)	75	(69)	(32)
		VOLNEY SCRIBA	64	(1)	19	78	85	74	42	(4)	45	46
	Demand Response	CENTRAL EAST	(37)	(55)	(17)	54	(8)	(3)	(21)	20	(6)	2
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	24	(126)	(33)	(7)	45	4	28	(7)	(3)	(30)
		GREENWOOD	(44)	(3,996)	(75)	14	(35)	(23)	(62)	(9)	25	33
		HUNTLEY PACKARD	8	29	(15)	(4)	14	57	36	10	22	58
		NEW SCOTLAND LEEDS	(27)	(24)	(10)	10	16	0	24	7	(9)	19
		LEEDS PLEASANT VALLEY	20	(107)	20	(13)	(22)	(27)	(23)	(25)	(3)	(11)
		MOTTHAVEN RAINEY	3	7	8	(1)	(4)	0	0	1	1	0
		RAINEY VERNON	3	(1,127)	(55)	(8)	0	(10)	1	(27)	0	3
		VOLNEY SCRIBA	(3)	(89)	14	29	22	19	23	8	9	4

## Study 2: Central East

- Transmission: 345 kV line from Edic to New Scotland, 85 Miles
- Generation: 660 MW Plant at New Scotland
- Demand Response : 200 MW in Zone F; 200 MW in Zone G; 200 MW in Zone J
- Energy Efficiency : 200 MW in Zone F; 200 MW in Zone G; 200 MW in Zone J

Table E-27 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-27: Change in Number of Congested Hours  
(Solution Case – Base Case)**

Study	Solution	Constraint	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Study #2: CE	Transmission	CENTRAL EAST	(1,119)	(1,267)	(1,353)	(1,298)	(1,457)	(1,577)	(1,585)	(1,174)	(1,367)	(1,174)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	31	39	(33)	22	46	(33)	20	(32)	(66)	(57)
		GREENWOOD	(44)	4	(24)	70	53	102	31	22	9	29
		HUNTLEY PACKARD	(18)	(99)	(142)	(25)	(105)	(119)	(133)	(62)	(187)	(33)
		NEW SCOTLAND LEEDS	378	373	251	277	183	134	298	409	563	334
		LEEDS PLEASANT VALLEY	198	176	288	206	347	329	317	215	243	280
		MOTTHAVEN RAINEY	(9)	(12)	(5)	0	4	5	(1)	0	0	0
		RAINEY VERNON	35	22	19	1	(21)	72	27	10	16	(11)
		VOLNEY SCRIBA	(262)	(402)	(267)	(274)	(118)	(271)	(352)	(206)	(200)	(250)
	Generation	CENTRAL EAST	(323)	(286)	(271)	(202)	(273)	(340)	(435)	(403)	(605)	(554)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	(93)	(57)	(183)	(67)	(43)	(49)	(34)	(140)	(218)	(142)
		GREENWOOD	(1)	(24)	(24)	(3)	(9)	13	(32)	1	(8)	22
		HUNTLEY PACKARD	224	86	135	123	63	141	77	278	234	273
		NEW SCOTLAND LEEDS	210	253	179	153	159	88	152	303	474	400
		LEEDS PLEASANT VALLEY	356	285	383	215	281	337	275	431	574	412
		MOTTHAVEN RAINEY	(13)	(13)	(13)	1	(8)	1	(2)	0	1	0
		RAINEY VERNON	100	97	53	19	29	15	50	65	72	106
		VOLNEY SCRIBA	218	228	221	163	192	206	178	176	152	195
	Energy Efficiency	CENTRAL EAST	(198)	(210)	(134)	(110)	(173)	(231)	(190)	(166)	(187)	(244)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	143	213	183	142	196	126	96	101	26	73
		GREENWOOD	(100)	(143)	(180)	(51)	(82)	(80)	(106)	(35)	(43)	(2)
		HUNTLEY PACKARD	52	9	(32)	(2)	6	21	(40)	(31)	39	74
		NEW SCOTLAND LEEDS	(49)	(38)	(2)	(1)	19	(5)	11	(22)	4	56
		LEEDS PLEASANT VALLEY	21	(20)	9	(20)	2	42	6	(27)	34	34
		MOTTHAVEN RAINEY	15	0	(3)	1	(2)	1	1	0	(1)	0
		RAINEY VERNON	103	(36)	18	23	(8)	14	38	1	(9)	16
		VOLNEY SCRIBA	29	19	13	82	73	86	59	7	50	52
	Demand Response	CENTRAL EAST	(15)	(14)	9	41	20	12	(60)	11	6	11
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	13	8	(25)	(3)	25	2	(3)	19	(14)	(24)
		GREENWOOD	(28)	(7)	31	8	(21)	16	(3,618)	(13)	(14)	(11)
		HUNTLEY PACKARD	1	(24)	5	(7)	7	65	6	3	41	(4)
		NEW SCOTLAND LEEDS	(20)	(14)	(7)	4	25	(3)	(16)	(4)	(20)	10
		LEEDS PLEASANT VALLEY	2	13	75	5	(1)	(10)	(97)	(17)	(12)	1
		MOTTHAVEN RAINEY	3	(3)	0	(6)	(3)	0	8	1	1	0
		RAINEY VERNON	(17)	(34)	159	15	4	(13)	(562)	(22)	(6)	18
		VOLNEY SCRIBA	(10)	(24)	(61)	8	36	10	14	9	5	(6)





### Study 3: New Scotland - Pleasant Valley

- Transmission: 345 kV line from Edic to New Scotland, 65 Miles
- Generation: 1320 MW Plant at Pleasant Valley
- Demand Response : 200 MW in Zone G; 1000 MW in Zone J
- Energy Efficiency : 200 MW in Zone G; 1000 MW in Zone J

Table E-28 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-28: Change in Number of Congested Hours  
(Solution Case – Base Case)

Study	Solution	Constraint	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Study #3: NS-PV	Transmission	CENTRAL EAST	1,177	748	709	469	396	329	388	648	628	608
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	427	449	411	164	200	104	119	216	150	155
		GREENWOOD	13	9	(18)	31	(3)	31	(21)	(16)	13	13
		HUNTLEY PACKARD	(178)	(259)	(260)	(123)	(123)	(29)	(79)	(114)	(138)	(69)
		NEW SCOTLAND LEEDS	(392)	(266)	(240)	(104)	(76)	(24)	(63)	(253)	(192)	(437)
		LEEDS PLEASANT VALLEY	(1,913)	(1,620)	(1,577)	(1,055)	(1,013)	(845)	(978)	(1,343)	(1,434)	(948)
		MOTTHAVEN RAINEY	171	125	76	14	9	5	9	13	8	18
		RAINEY VERNON	200	158	154	22	45	42	33	50	66	75
		VOLNEY SCRIBA	(269)	(321)	(284)	(85)	(70)	(86)	(78)	(153)	(205)	(96)
	Generation	CENTRAL EAST	(60)	44	91	68	42	(36)	37	34	(20)	5
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	472	452	502	324	287	225	251	171	203	242
		GREENWOOD	53	(34)	(33)	(41)	(4)	3	8	(30)	29	0
		HUNTLEY PACKARD	(63)	(126)	(116)	(10)	(66)	26	(79)	162	136	160
		NEW SCOTLAND LEEDS	(344)	(141)	(157)	(83)	(46)	(22)	(49)	(198)	(131)	(289)
		LEEDS PLEASANT VALLEY	(1,094)	(865)	(920)	(635)	(628)	(504)	(594)	(989)	(1,124)	(838)
		MOTTHAVEN RAINEY	375	214	153	53	27	33	22	64	73	99
		RAINEY VERNON	495	472	350	137	109	70	132	175	306	295
		VOLNEY SCRIBA	16	(25)	(1)	97	26	46	75	39	(5)	51
	Energy Efficiency	CENTRAL EAST	(99)	(41)	45	37	(14)	(107)	(32)	(60)	(41)	(46)
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	291	331	402	251	340	261	205	206	162	162
		GREENWOOD	(796)	(845)	(789)	(620)	(551)	(474)	(535)	(192)	(187)	(152)
		HUNTLEY PACKARD	75	(46)	(95)	(17)	18	(32)	(84)	75	58	92
		NEW SCOTLAND LEEDS	(138)	(101)	(125)	(68)	(36)	(15)	(31)	(121)	(106)	(119)
		LEEDS PLEASANT VALLEY	(348)	(314)	(395)	(303)	(301)	(273)	(335)	(379)	(391)	(254)
		MOTTHAVEN RAINEY	(23)	(35)	(49)	(6)	(7)	0	(2)	0	(1)	0
		RAINEY VERNON	178	(1)	(26)	27	(46)	(10)	8	68	(55)	(73)
		VOLNEY SCRIBA	12	(48)	(27)	42	28	59	17	(13)	12	21
	Demand Response	CENTRAL EAST	(7)	28	27	17	32	24	(9)	(118)	15	12
		MOTTHAVEN DUNWOODIE	0	0	0	0	0	0	0	0	0	0
		DUNWOODIE SHORE ROAD	25	(123)	(22)	(21)	40	13	31	(41)	3	(27)
		GREENWOOD	(70)	(4,047)	(129)	(10)	(66)	(6)	(76)	(4,569)	31	60
		HUNTLEY PACKARD	23	(2)	3	5	0	59	12	(111)	37	46
		NEW SCOTLAND LEEDS	(21)	(20)	(13)	15	4	6	(6)	17	9	23
		LEEDS PLEASANT VALLEY	28	(87)	9	(26)	(33)	(32)	(41)	(33)	(6)	(16)
		MOTTHAVEN RAINEY	7	4	(1)	(2)	(1)	0	0	8	1	1
		RAINEY VERNON	(1)	(1,146)	(74)	(1)	(15)	12	34	(318)	(20)	(13)
		VOLNEY SCRIBA	2	(111)	1	33	47	39	13	5	8	10

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

Table E-29: Generic Solution Costs for Each Study (\$M)

Generic Solution Cost Summary (\$M)			
Studies	Study 1: Central East-New Scotland-Pleasant Valley	Study 2: Central East	Study 3: New Scotland - Pleasant Valley
Transmission			
Substation Terminals	Edic to New Scotland to Pleasant Valley	Edic to New Scotland	New Scotland to Pleasant Valley
Miles (# of terminals)	150 (3)	85 (2)	65(2)
High	1,131	648	502
Mid	774	443	343
Low	312	179	139
Generation			
Substation Terminal	Pleasant Valley	New Scotland	Pleasant Valley
# of 330 Blocks	4	2	4
High	2,316	1,046	2,316
Mid	1,889	853	1,889
Low	1,463	661	1,463
DR			
Zone	F, G and J	F, G and J	G and J
# of 200 MW Blocks	6	3	6
High	394	197	394
Mid	278	139	278
Low	199	100	199
EE			
Zone	F, G and J	F, G and J	G and J
# of 200 MW Blocks	6	3	6
High	3,920	1,520	4,420
Mid	3,140	1,220	3,540
Low	2,360	920	2,660

Table E-30: Generic Solutions for Study 1: Central East to New Scotland to Pleasant Valley

Generic Solution			
Study 1: Central East-New Scotland-Pleasant Valley			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
Transmission Solution: Edic to New Scotland to Pleasant Valley			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Transmission Line (Miles)	150	\$7.30	\$1,095.00
Substation Line Terminal	3	\$9	\$27.00
System Upgrade	1	\$9	\$9.00
<b>Total High Transmission Solution Cost</b>			<b>\$1,131</b>
<b>Mid</b>			
Transmission Line (Miles)	150	\$5	\$750.00
Substation Line Terminal	3	\$6	\$18.00
System Upgrade	1	\$6	\$6.00
<b>Total Mid Transmission Solution Cost</b>			<b>\$774</b>
<b>Low</b>			
Transmission Line (Miles)	150	\$2	\$300.00
Substation Line Terminal	3	\$3	\$9.00
System Upgrade	1	\$3	\$3.00
<b>Total Low Transmission Solution Cost</b>			<b>\$312</b>
Generation Solution: Pleasant Valley			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Plant in Zone G (330 MW Blocks)	4	\$579	\$2,316
<b>Total High Generation Solution Cost</b>			<b>\$2,316</b>
<b>Mid</b>			
Plant in Zone G (330 MW Blocks)	4	\$472	\$1,889
<b>Total Mid Generation Solution Cost</b>			<b>\$1,889</b>
<b>Low</b>			
Plant in Zone G (330 MW Blocks)	4	\$366	\$1,463
<b>Total Low Generation Solution Cost</b>			<b>\$1,463</b>
Demand Response Solution: Zones F, G and J			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone F	1	\$66	\$66
Zone G	1	\$66	\$66
Zone J	4	\$66	\$262
<b>Total High Demand Response Solution Costs</b>			<b>\$394</b>
<b>Mid</b>	(# 200 Blocks)		
Zone F	1	\$46	\$46
Zone G	1	\$46	\$46
Zone J	4	\$46	\$186
<b>Total Mid Demand Response Solution Costs</b>			<b>\$278</b>
<b>Low</b>	(# 200 Blocks)		
Zone F	1	\$33	\$33
Zone G	1	\$33	\$33
Zone J	4	\$33	\$133
<b>Total Low Demand Response Solution Costs</b>			<b>\$199</b>
Energy Efficiency Solution: Zones F, G and J			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone F	1	\$300	\$300
Zone G	1	\$420	\$420
Zone J	4	\$800	\$3,200
<b>Total High Energy Efficiency Solution Costs</b>			<b>\$3,920</b>
<b>Mid</b>	(# 200 Blocks)		
Zone F	1	\$240	\$240
Zone G	1	\$340	\$340
Zone J	4	\$640	\$2,560
<b>Total Mid Energy Efficiency Solution Costs</b>			<b>\$3,140</b>
<b>Low</b>	(# 200 Blocks)		
Zone F	1	\$180	\$180
Zone G	1	\$260	\$260
Zone J	4	\$480	\$1,920
<b>Total Low Energy Efficiency Solution Costs</b>			<b>\$2,360</b>

Table E-31: Generic Solutions for Study 2: Central East

Generic Solution			
Study 2: Central East			
(Estimates should not be assumed reflective or predictive of actual project costs)			
Transmission Solution: Edic to New Scotland			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Transmission Line (Miles)	85	\$7.30	\$620.50
Substation Line Terminal	2	\$9	\$18.00
System Upgrade	1	\$9	\$9.00
<b>Total High Transmission Solution Cost</b>			<b>\$648</b>
<b>Mid</b>			
Transmission Line (Miles)	85	\$5	\$425.00
Substation Line Terminal	2	\$6	\$12.00
System Upgrade	1	\$6	\$6.00
<b>Total Mid Transmission Solution Cost</b>			<b>\$443</b>
<b>Low</b>			
Transmission Line (Miles)	85	\$2	\$170.00
Substation Line Terminal	2	\$3	\$6.00
System Upgrade	1	\$3	\$3.00
<b>Total Low Transmission Solution Cost</b>			<b>\$179</b>
Generation Solution: New Scotland			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Plant in Zone G (330 MW Blocks)	2	\$523	\$1,046
<b>Total High Generation Solution Cost</b>			<b>\$1,046</b>
<b>Mid</b>			
Plant in Zone G (330 MW Blocks)	2	\$427	\$853
<b>Total Mid Generation Solution Cost</b>			<b>\$853</b>
<b>Low</b>			
Plant in Zone G (330 MW Blocks)	2	\$330	\$661
<b>Total Low Generation Solution Cost</b>			<b>\$661</b>
Demand Response Solution: Zones F, G and J			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone F	1	\$66	\$66
Zone G	1	\$66	\$66
Zone J	1	\$66	\$66
<b>Total High Demand Response Solution Costs</b>			<b>\$197</b>
<b>Mid</b>	(# 200 Blocks)		
Zone F	1	\$46	\$46
Zone G	1	\$46	\$46
Zone J	1	\$46	\$46
<b>Total Mid Demand Response Solution Costs</b>			<b>\$139</b>
<b>Low</b>	(# 200 Blocks)		
Zone F	1	\$33	\$33
Zone G	1	\$33	\$33
Zone J	1	\$33	\$33
<b>Total Low Demand Response Solution Costs</b>			<b>\$100</b>
Energy Efficiency Solution: Zones F, G and J			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone F	1	\$300	\$300
Zone G	1	\$420	\$420
Zone J	1	\$800	\$800
<b>Total High Energy Efficiency Solution Costs</b>			<b>\$1,520</b>
<b>Mid</b>	(# 200 Blocks)		
Zone F	1	\$240	\$240
Zone G	1	\$340	\$340
Zone J	1	\$640	\$640
<b>Total Mid Energy Efficiency Solution Costs</b>			<b>\$1,220</b>
<b>Low</b>	(# 200 Blocks)		
Zone F	1	\$180	\$180
Zone G	1	\$260	\$260
Zone J	1	\$480	\$480
<b>Total Low Energy Efficiency Solution Costs</b>			<b>\$920</b>

Table E-32: Generic Solutions for Study 3: New Scotland-Pleasant Valley

Generic Solution			
Study 3: New Scotland-Pleasant Valley			
<i>(Estimates should not be assumed reflective or predictive of actual project costs)</i>			
<b>Transmission Solution: Edic to New Scotland</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Transmission Line (Miles)	65	\$7.30	\$474.50
Substation Line Terminal	2	\$9	\$18.00
System Upgrade	1	\$9	\$9.00
<b>Total High Transmission Solution Cost</b>			<b>\$502</b>
<b>Mid</b>			
Transmission Line (Miles)	65	\$5	\$325.00
Substation Line Terminal	2	\$6	\$12.00
System Upgrade	1	\$6	\$6.00
<b>Total Mid Transmission Solution Cost</b>			<b>\$343</b>
<b>Low</b>			
Transmission Line (Miles)	65	\$2	\$130.00
Substation Line Terminal	2	\$3	\$6.00
System Upgrade	1	\$3	\$3.00
<b>Total Low Transmission Solution Cost</b>			<b>\$139</b>
<b>Generation Solution: New Scotland</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>			
Plant in Zone G (330 MW Blocks)	4	\$579	\$2,316
<b>Total High Generation Solution Cost</b>			<b>\$2,316</b>
<b>Mid</b>			
Plant in Zone G (330 MW Blocks)	4	\$472	\$1,889
<b>Total Mid Generation Solution Cost</b>			<b>\$1,889</b>
<b>Low</b>			
Plant in Zone G (330 MW Blocks)	4	\$366	\$1,463
<b>Total Low Generation Solution Cost</b>			<b>\$1,463</b>
<b>Demand Response Solution: Zones G and J</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone G	1	\$66	\$66
Zone J	5	\$66	\$328
<b>Total High Demand Response Solution Costs</b>			<b>\$394</b>
<b>Mid</b>	(# 200 Blocks)		
Zone G	1	\$46	\$46
Zone J	5	\$46	\$232
<b>Total Mid Demand Response Solution Costs</b>			<b>\$278</b>
<b>Low</b>	(# 200 Blocks)		
Zone G	1	\$33	\$33
Zone J	5	\$33	\$166
<b>Total Low Demand Response Solution Costs</b>			<b>\$199</b>
<b>Energy Efficiency Solution: Zones G and J</b>			
Cost Range	Quantity	Unit Pricing (\$M)	Total (\$M)
<b>High</b>	(# 200 Blocks)		
Zone G	1	\$420	\$420
Zone J	5	\$800	\$4,000
<b>Total High Energy Efficiency Solution Costs</b>			<b>\$4,420</b>
<b>Mid</b>	(# 200 Blocks)		
Zone G	1	\$340	\$340
Zone J	5	\$640	\$3,200
<b>Total Mid Energy Efficiency Solution Costs</b>			<b>\$3,540</b>
<b>Low</b>	(# 200 Blocks)		
Zone G	1	\$260	\$260
Zone J	5	\$480	\$2,400
<b>Total Low Energy Efficiency Solution Costs</b>			<b>\$2,660</b>

## **Appendix F – Economic Planning Process Manual - Congestion Assessment and Resource Integration Studies (link)**

[http://www.nyiso.com/public/webdocs/markets\\_operations/documents/Manuals\\_and\\_Guides/Manuals/Planning/Economic\\_Planning\\_Process\\_Manual\\_Final\\_12-05-12.pdf](http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Planning/Economic_Planning_Process_Manual_Final_12-05-12.pdf)

## **Appendix G - 2012 RNA and CRP Reports (link)**

The 2012 RNA and CRP reports can be found through the following links:

[http://www.nyiso.com/public/webdocs/markets\\_operations/services/planning/Planning\\_Studies/Reliability\\_Planning\\_Studies/Reliability\\_Assessment\\_Documents/2012\\_RNA\\_Final\\_Report\\_9-18-12\\_PDF.pdf](http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2012_RNA_Final_Report_9-18-12_PDF.pdf)

[http://www.nyiso.com/public/webdocs/markets\\_operations/services/planning/Planning\\_Studies/Reliability\\_Planning\\_Studies/Reliability\\_Assessment\\_Documents/2012\\_Comprehensive\\_Reliability\\_Plan\\_Final\\_Report.pdf](http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Planning_Studies/Reliability_Planning_Studies/Reliability_Assessment_Documents/2012_Comprehensive_Reliability_Plan_Final_Report.pdf)



## **Appendix H - Generic Solution Results – Additional Details**

Tables below present the CARIS metrics results for each of the three studies. The CARIS metrics are calculated as the change between the base case values and the change case values after each of the respective generic solutions have been added to the base case. 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 (2013-2022) by zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	15	15	18	15	16	22	16	17	22	17
Genessee	1	1	2	1	1	1	2	2	2	2
Central	23	29	28	28	35	37	43	32	35	40
North	5	3	5	4	4	4	4	7	6	7
Mohawk Valley	2	3	3	3	4	4	5	5	6	5
Capital	(18)	(11)	(16)	(20)	(24)	(30)	(37)	(26)	(29)	(35)
Hudson Valley	(8)	(5)	(5)	(3)	(4)	(5)	(4)	(6)	(6)	(5)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(53)	(48)	(43)	(35)	(44)	(45)	(45)	(55)	(67)	(68)
Long Island	(5)	(5)	(7)	(57)	(30)	(6)	(5)	(8)	(9)	(8)
<b>Total NYCA</b>	<b>(37)</b>	<b>(18)</b>	<b>(15)</b>	<b>(64)</b>	<b>(41)</b>	<b>(17)</b>	<b>(23)</b>	<b>(32)</b>	<b>(39)</b>	<b>(45)</b>
Imports	16	5	7	60	28	19	13	19	20	27
Exports	10	14	18	27	17	32	25	16	15	16
<b>NYCA + Imports - Exports</b>	<b>(32)</b>	<b>(27)</b>	<b>(27)</b>	<b>(30)</b>	<b>(31)</b>	<b>(29)</b>	<b>(35)</b>	<b>(28)</b>	<b>(34)</b>	<b>(34)</b>
Total IESO	30	17	13	17	13	17	21	28	29	39
Total PJM	2	3	(8)	23	3	6	(1)	17	5	5
Total ISONE	(22)	(20)	(24)	(11)	(14)	(31)	(29)	(30)	(28)	(26)
<b>Total System</b>	<b>(28)</b>	<b>(18)</b>	<b>(34)</b>	<b>(35)</b>	<b>(40)</b>	<b>(25)</b>	<b>(32)</b>	<b>(17)</b>	<b>(34)</b>	<b>(27)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	15	19	21	15	19	18	22	18	21	17
Genessee	12	15	17	12	15	15	18	13	17	15
Central	12	16	19	11	18	15	18	13	17	13
North	8	10	11	8	10	10	12	8	10	9
Mohawk Valley	11	13	15	12	15	15	17	14	17	16
Capital	6	6	4	2	1	1	3	6	6	5
Hudson Valley	(5)	(4)	(5)	(5)	(4)	(4)	(4)	(6)	(6)	(6)
Milwood	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)
Dunwoodie	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(7)	(7)	(6)
NY City	(43)	(38)	(44)	(42)	(44)	(39)	(42)	(59)	(55)	(53)
Long Island	(7)	(6)	(9)	14	2	(8)	(10)	(11)	(11)	(11)
<b>Total-NYCA</b>	<b>1</b>	<b>24</b>	<b>21</b>	<b>21</b>	<b>24</b>	<b>16</b>	<b>26</b>	<b>(15)</b>	<b>7</b>	<b>(4)</b>
Export	10	14	18	27	17	32	25	16	15	16
<b>NYCA+Export</b>	<b>11</b>	<b>38</b>	<b>39</b>	<b>47</b>	<b>41</b>	<b>48</b>	<b>51</b>	<b>1</b>	<b>22</b>	<b>12</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	35	42	48	35	44	48	51	40	54	45
Genessee	7	9	10	6	9	9	10	8	10	8
Central	166	186	184	190	204	239	268	220	279	254
North	17	18	20	15	17	18	21	19	22	20
Mohawk Valley	8	10	11	8	11	11	12	11	13	11
Capital	(2)	4	(1)	(10)	(13)	(21)	(24)	(11)	(14)	(25)
Hudson Valley	(9)	(6)	(5)	(4)	(4)	(5)	(4)	(6)	(7)	(6)
Milwood	(12)	(10)	(12)	(10)	(12)	(11)	(12)	(14)	(14)	(14)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(73)	(69)	(66)	(60)	(68)	(65)	(67)	(91)	(100)	(101)
Long Island	(8)	(9)	(11)	(51)	(28)	(10)	(9)	(14)	(14)	(12)
<b>Total-NYCA</b>	<b>128</b>	<b>175</b>	<b>177</b>	<b>120</b>	<b>159</b>	<b>212</b>	<b>246</b>	<b>161</b>	<b>229</b>	<b>181</b>
Import	16	5	7	60	28	19	13	19	20	27
<b>NYCA+Import</b>	<b>144</b>	<b>180</b>	<b>184</b>	<b>180</b>	<b>187</b>	<b>232</b>	<b>259</b>	<b>180</b>	<b>249</b>	<b>208</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(1)	(0)	2	1	(1)	(1)	4	3	2
Genessee	1	1	3	3	3	2	2	3	3	3
Central	(7)	(7)	(6)	(6)	(3)	(8)	(9)	(6)	(6)	(7)
North	0	0	1	1	1	0	0	1	1	1
Mohawk Valley	(2)	(1)	(1)	(1)	(0)	(1)	(2)	(1)	(1)	(1)
Capital	(10)	(13)	(16)	(12)	(17)	(19)	(21)	(10)	(15)	(14)
Hudson Valley	(17)	(18)	(20)	(14)	(17)	(18)	(21)	(16)	(19)	(17)
Milwood	(6)	(6)	(7)	(5)	(6)	(6)	(7)	(6)	(7)	(6)
Dunwoodie	(12)	(13)	(14)	(10)	(12)	(12)	(14)	(12)	(14)	(12)
NY City	(101)	(112)	(121)	(86)	(105)	(106)	(129)	(103)	(122)	(105)
Long Island	(31)	(37)	(43)	(7)	(25)	(37)	(47)	(31)	(40)	(34)
<b>Total-NYCA</b>	<b>(184)</b>	<b>(207)</b>	<b>(224)</b>	<b>(134)</b>	<b>(180)</b>	<b>(206)</b>	<b>(248)</b>	<b>(176)</b>	<b>(217)</b>	<b>(189)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.7	1.2	2.0	2.1	2.7	3.6	2.7	2.9	4.5	3.6
Genessee	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Central	0.6	1.4	1.9	2.0	3.0	3.1	3.5	3.2	3.8	4.1
North	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.7	0.7	0.8
Mohawk Valley	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.5
Capital	(0.3)	(0.2)	(0.6)	(0.9)	(1.3)	(1.8)	(2.2)	(1.7)	(1.9)	(2.5)
Hudson Valley	(0.2)	(0.2)	(0.3)	(0.2)	(0.3)	(0.4)	(0.4)	(0.6)	(0.6)	(0.4)
Milwood	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	(0.9)	(1.5)	(1.8)	(1.6)	(2.6)	(2.3)	(2.3)	(4.9)	(6.2)	(6.2)
Long Island	(0.1)	(0.2)	(0.4)	(4.6)	(2.7)	(0.5)	(0.4)	(0.7)	(0.8)	(0.7)
<b>Total-NYCA</b>	<b>0.1</b>	<b>0.8</b>	<b>1.3</b>	<b>(2.7)</b>	<b>(0.4)</b>	<b>2.5</b>	<b>1.8</b>	<b>(0.4)</b>	<b>0.3</b>	<b>(0.7)</b>

Projected Changes in CO2 Emissions (%)(2013-2022) by Zone – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	4.2%	5.5%	6.1%	5.0%	5.0%	5.5%	3.4%	2.2%	3.2%	2.1%
Genessee	3.9%	3.3%	4.9%	2.2%	3.7%	3.8%	5.3%	3.7%	3.0%	2.6%
Central	3.3%	4.5%	4.5%	3.9%	4.8%	4.6%	5.0%	2.9%	3.2%	3.2%
North	12.8%	6.8%	13.9%	9.9%	11.1%	11.5%	11.9%	8.3%	8.3%	6.9%
Mohawk Valley	4.6%	6.4%	6.8%	4.7%	7.4%	7.5%	8.3%	6.2%	6.7%	5.2%
Capital	-0.9%	-0.4%	-0.8%	-0.9%	-1.1%	-1.5%	-1.7%	-0.8%	-0.9%	-1.0%
Hudson Valley	-13.7%	-7.0%	-6.9%	-3.9%	-5.0%	-5.8%	-5.2%	-4.6%	-3.0%	-2.1%
Milwood	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	-2.5%	-2.1%	-1.8%	-1.1%	-1.4%	-1.2%	-1.2%	-1.3%	-1.5%	-1.4%
Long Island	-0.6%	-0.6%	-0.8%	-6.7%	-3.2%	-0.6%	-0.4%	-0.6%	-0.6%	-0.5%
<b>Total-NYCA</b>	<b>-0.2%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>-0.7%</b>	<b>-0.2%</b>	<b>0.2%</b>	<b>0.1%</b>	<b>-0.1%</b>	<b>0.0%</b>	<b>-0.1%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.7	0.8	1.1	0.8	0.7	1.1	0.9
Genessee	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	0.3	0.3	0.3	0.4	0.3	0.4	0.4
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.0</b>	<b>1.1</b>	<b>1.4</b>	<b>1.2</b>	<b>1.0</b>	<b>1.5</b>	<b>1.2</b>

Projected Changes in SO2 Emissions (%)(2013-2022) by Zone – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	8.2%	12.2%	14.1%	11.8%	11.8%	12.0%	6.9%	4.0%	6.7%	4.2%
Genessee	8.0%	8.0%	8.7%	4.2%	9.5%	11.1%	11.1%	11.1%	7.4%	7.1%
Central	4.6%	10.5%	11.7%	12.4%	11.0%	8.0%	8.5%	5.5%	5.6%	5.2%
North	9.2%	5.2%	7.9%	5.8%	5.8%	5.0%	5.7%	6.8%	6.5%	5.9%
Mohawk Valley	3.1%	3.6%	3.7%	2.5%	3.7%	3.8%	4.2%	3.8%	3.8%	3.1%
Capital	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.2%	-0.2%	-0.2%
Hudson Valley	-0.2%	-0.3%	-0.3%	-0.4%	-0.1%	0.2%	-0.1%	-0.6%	-0.3%	-2.0%
Milwood	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	-6.0%	-5.0%	-4.3%	-2.8%	-3.3%	-2.8%	-2.7%	-3.4%	-3.4%	-4.0%
Long Island	-0.1%	-0.1%	-0.1%	-1.2%	-0.5%	-0.1%	-0.1%	-0.1%	-0.2%	-0.6%
<b>Total-NYCA</b>	<b>5.9%</b>	<b>9.9%</b>	<b>11.2%</b>	<b>9.7%</b>	<b>9.4%</b>	<b>9.2%</b>	<b>6.4%</b>	<b>3.9%</b>	<b>5.7%</b>	<b>4.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	6.0%	6.9%	8.3%	7.0%	7.5%	8.3%	4.9%	3.6%	4.8%	2.8%
Genessee	2.3%	1.6%	2.3%	1.4%	1.8%	1.9%	2.8%	2.6%	2.2%	1.8%
Central	4.8%	6.8%	6.7%	5.1%	5.2%	4.7%	5.1%	3.6%	4.6%	3.9%
North	7.3%	4.1%	6.2%	4.4%	4.3%	3.8%	4.1%	5.4%	5.0%	4.7%
Mohawk Valley	3.9%	5.4%	5.5%	4.5%	5.6%	5.7%	6.0%	6.0%	6.8%	5.3%
Capital	-0.1%	0.2%	0.0%	-0.1%	-0.1%	-0.3%	-0.5%	-0.2%	-0.1%	-0.3%
Hudson Valley	-10.7%	-5.0%	-4.9%	-3.7%	-3.3%	-3.6%	-3.6%	-3.9%	-2.4%	-1.5%
Milwood	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	-9.5%	-9.2%	-7.3%	-5.2%	-5.9%	-4.9%	-4.5%	-5.1%	-5.6%	-5.0%
Long Island	-0.3%	-0.5%	-0.7%	-6.4%	-3.2%	-0.5%	-0.4%	-0.7%	-0.6%	-0.4%
<b>Total-NYCA</b>	<b>0.7%</b>	<b>0.7%</b>	<b>1.2%</b>	<b>-0.6%</b>	<b>0.3%</b>	<b>1.6%</b>	<b>1.1%</b>	<b>0.5%</b>	<b>1.0%</b>	<b>0.5%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.93	1.16	1.26	0.94	1.12	1.06	1.28	0.99	1.20	0.92
Genessee	1.04	1.38	1.53	1.09	1.36	1.31	1.53	1.09	1.39	1.15
Central	0.72	0.97	1.10	0.65	0.98	0.79	0.95	0.62	0.83	0.60
North	1.16	1.45	1.56	1.13	1.39	1.44	1.64	1.15	1.44	1.21
Mohawk Valley	0.99	1.25	1.38	1.00	1.27	1.21	1.40	1.00	1.27	1.06
Capital	0.18	0.17	(0.03)	(0.09)	(0.32)	(0.33)	(0.25)	0.15	0.06	0.01
Hudson Valley	(0.56)	(0.41)	(0.49)	(0.44)	(0.55)	(0.50)	(0.51)	(0.64)	(0.62)	(0.65)
Milwood	(0.80)	(0.65)	(0.74)	(0.61)	(0.74)	(0.68)	(0.74)	(0.90)	(0.89)	(0.87)
Dunwoodie	(0.76)	(0.61)	(0.71)	(0.59)	(0.72)	(0.65)	(0.71)	(0.86)	(0.86)	(0.83)
NY City	(0.69)	(0.56)	(0.66)	(0.56)	(0.68)	(0.61)	(0.67)	(0.81)	(0.77)	(0.77)
Long Island	(0.31)	(0.22)	(0.36)	0.58	0.04	(0.33)	(0.38)	(0.37)	(0.39)	(0.39)
<b>NYCA Avg. LBMP</b>	<b>0.17</b>	<b>0.36</b>	<b>0.35</b>	<b>0.28</b>	<b>0.29</b>	<b>0.25</b>	<b>0.32</b>	<b>0.13</b>	<b>0.24</b>	<b>0.13</b>

Projected Changes in Generator GWh (2013-2022) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	404	357	386	296	298	389	321	246	350	264
Genessee	29	25	33	15	24	22	28	30	26	22
Central	535	632	620	537	643	641	710	493	535	551
North	120	69	95	70	64	55	61	97	89	91
Mohawk Valley	53	64	62	48	62	62	66	71	76	62
Capital	(321)	(145)	(270)	(294)	(329)	(429)	(520)	(306)	(326)	(392)
Hudson Valley	(143)	(85)	(78)	(42)	(53)	(56)	(54)	(65)	(62)	(46)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,059)	(917)	(790)	(552)	(703)	(640)	(626)	(712)	(844)	(812)
Long Island	(91)	(89)	(113)	(950)	(442)	(84)	(66)	(92)	(94)	(78)
<b>Total-NYCA</b>	<b>(473)</b>	<b>(90)</b>	<b>(56)</b>	<b>(872)</b>	<b>(436)</b>	<b>(41)</b>	<b>(80)</b>	<b>(240)</b>	<b>(252)</b>	<b>(338)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(4.8)	(4.0)	(4.3)	(4.6)	(4.5)	(5.2)	(5.6)	(6.0)	(6.5)	(6.6)
Genessee	(2.3)	(1.9)	(2.0)	(2.2)	(2.2)	(2.6)	(2.8)	(3.0)	(3.1)	(3.2)
Central	(1.9)	(1.7)	(1.8)	(2.0)	(2.0)	(2.4)	(2.4)	(2.8)	(2.8)	(3.0)
North	(0.7)	(0.6)	(0.6)	(0.6)	(0.6)	(0.7)	(0.8)	(0.9)	(1.0)	(1.0)
Mohawk Valley	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.4)	(0.3)	(0.3)
Capital	(1.0)	(1.1)	(0.9)	(1.4)	(1.3)	(1.4)	(1.1)	(1.8)	(1.6)	(1.7)
Hudson Valley	(2.6)	(2.4)	(2.3)	(3.2)	(3.0)	(3.4)	(3.4)	(4.6)	(4.5)	(5.1)
Milwood	(0.8)	(0.8)	(0.8)	(1.0)	(1.0)	(1.1)	(1.1)	(1.5)	(1.5)	(1.7)
Dunwoodie	(1.7)	(1.5)	(1.5)	(2.0)	(2.0)	(2.2)	(2.2)	(3.1)	(2.9)	(3.4)
NY City	(13.8)	(12.3)	(12.2)	(17.7)	(16.7)	(18.9)	(18.5)	(26.1)	(24.7)	(29.0)
Long Island	(5.8)	(5.4)	(5.0)	(5.9)	(6.3)	(7.7)	(7.7)	(11.2)	(10.7)	(12.7)
<b>Total-NYCA</b>	<b>(35.5)</b>	<b>(31.9)</b>	<b>(31.6)</b>	<b>(41.0)</b>	<b>(39.7)</b>	<b>(45.7)</b>	<b>(45.7)</b>	<b>(61.3)</b>	<b>(59.6)</b>	<b>(67.8)</b>

## Generic Generation Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(21)	(6)	(10)	(6)	(4)	(1)	(6)	(35)	(14)	(23)
Genessee	(2)	(2)	(2)	(2)	(1)	(1)	(1)	(2)	(2)	(2)
Central	(8)	(8)	(7)	(10)	(7)	(7)	(8)	(7)	(9)	(5)
North	(6)	(6)	(4)	(3)	(2)	(2)	(1)	(8)	(7)	(9)
Mohawk Valley	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Capital	(37)	(31)	(31)	(37)	(35)	(34)	(38)	(41)	(53)	(48)
Hudson Valley	260	244	223	254	246	229	258	421	444	489
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(90)	(82)	(67)	(68)	(68)	(56)	(65)	(118)	(134)	(157)
Long Island	(6)	(9)	(9)	(10)	(13)	(12)	(11)	(16)	(18)	(17)
<b>Total NYCA</b>	<b>88</b>	<b>98</b>	<b>89</b>	<b>116</b>	<b>114</b>	<b>115</b>	<b>127</b>	<b>193</b>	<b>205</b>	<b>226</b>
Imports	(58)	(68)	(46)	(54)	(56)	(52)	(53)	(61)	(48)	(63)
Exports	54	54	64	87	81	83	100	186	218	236
<b>NYCA + Imports - Exports</b>	<b>(25)</b>	<b>(24)</b>	<b>(21)</b>	<b>(25)</b>	<b>(22)</b>	<b>(19)</b>	<b>(27)</b>	<b>(53)</b>	<b>(60)</b>	<b>(74)</b>
Total IESO	(21)	(10)	(3)	(4)	(1)	(3)	(1)	(16)	(9)	(14)
Total PJM	(45)	(60)	(66)	(82)	(94)	(94)	(99)	(131)	(143)	(159)
Total ISONE	(42)	(43)	(50)	(61)	(46)	(49)	(63)	(106)	(109)	(126)
<b>Total System</b>	<b>(21)</b>	<b>(16)</b>	<b>(29)</b>	<b>(31)</b>	<b>(27)</b>	<b>(30)</b>	<b>(36)</b>	<b>(59)</b>	<b>(56)</b>	<b>(74)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	(3)	(2)	(7)	(5)	(3)	(5)	(4)	(7)	(9)
Genessee	1	(0)	(0)	(4)	(2)	(2)	(2)	(5)	(5)	(6)
Central	(0)	(2)	(2)	(6)	(1)	2	(2)	(9)	(8)	(12)
North	(0)	(1)	(1)	(3)	(2)	(1)	(2)	(4)	(3)	(4)
Mohawk Valley	(1)	(2)	(1)	(3)	(2)	(1)	(3)	(5)	(5)	(6)
Capital	(1)	(2)	(2)	(5)	(5)	(3)	(4)	(10)	(14)	(17)
Hudson Valley	(11)	(11)	(11)	(12)	(12)	(9)	(12)	(20)	(22)	(24)
Milwood	(4)	(4)	(4)	(4)	(4)	(3)	(4)	(6)	(7)	(8)
Dunwoodie	(8)	(8)	(8)	(8)	(8)	(7)	(8)	(13)	(15)	(15)
NY City	(62)	(63)	(69)	(70)	(71)	(57)	(72)	(114)	(124)	(130)
Long Island	(9)	(12)	(15)	(16)	(15)	(9)	(14)	(25)	(30)	(35)
<b>Total-NYCA</b>	<b>(93)</b>	<b>(107)</b>	<b>(116)</b>	<b>(137)</b>	<b>(127)</b>	<b>(94)</b>	<b>(129)</b>	<b>(215)</b>	<b>(241)</b>	<b>(265)</b>
Export	54	54	64	87	81	83	100	186	218	236
<b>NYCA+Export</b>	<b>(38)</b>	<b>(54)</b>	<b>(51)</b>	<b>(50)</b>	<b>(46)</b>	<b>(11)</b>	<b>(29)</b>	<b>(30)</b>	<b>(23)</b>	<b>(29)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(15)	(4)	(8)	(11)	(6)	(4)	(7)	(42)	(21)	(30)
Genessee	(2)	(2)	(2)	(4)	(2)	(2)	(2)	(5)	(5)	(5)
Central	(9)	(9)	(16)	(38)	(21)	(22)	(33)	(23)	(28)	(31)
North	(5)	(6)	(5)	(7)	(5)	(4)	(4)	(12)	(10)	(14)
Mohawk Valley	(2)	(2)	(2)	(4)	(2)	(2)	(3)	(4)	(4)	(5)
Capital	(38)	(33)	(32)	(44)	(40)	(37)	(43)	(55)	(73)	(74)
Hudson Valley	284	267	242	278	269	252	284	468	497	551
Milwood	(18)	(18)	(18)	(18)	(19)	(15)	(19)	(30)	(33)	(34)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(119)	(112)	(103)	(108)	(109)	(89)	(106)	(186)	(211)	(238)
Long Island	(12)	(15)	(18)	(19)	(21)	(17)	(19)	(29)	(36)	(37)
<b>Total-NYCA</b>	<b>65</b>	<b>65</b>	<b>39</b>	<b>25</b>	<b>45</b>	<b>59</b>	<b>49</b>	<b>81</b>	<b>76</b>	<b>82</b>
Import	(58)	(68)	(46)	(54)	(56)	(52)	(53)	(61)	(48)	(63)
<b>NYCA+Import</b>	<b>7</b>	<b>(2)</b>	<b>(7)</b>	<b>(29)</b>	<b>(11)</b>	<b>7</b>	<b>(4)</b>	<b>20</b>	<b>28</b>	<b>19</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(2)	(2)	(1)	(1)	(0)	(1)	1	(1)	(3)
Genessee	(0)	0	(0)	(0)	0	0	0	(1)	(1)	(1)
Central	(1)	(1)	(1)	1	3	5	2	(1)	(0)	(2)
North	(0)	(0)	0	(0)	(0)	0	(0)	(0)	0	(0)
Mohawk Valley	(1)	(1)	(1)	(0)	0	1	(0)	(1)	(1)	(1)
Capital	(1)	(1)	(1)	(0)	(3)	(0)	(1)	(3)	(9)	(10)
Hudson Valley	(10)	(9)	(10)	(6)	(9)	(6)	(8)	(12)	(15)	(16)
Milwood	(4)	(3)	(3)	(2)	(3)	(2)	(3)	(4)	(5)	(5)
Dunwoodie	(7)	(7)	(7)	(5)	(6)	(5)	(6)	(9)	(11)	(10)
NY City	(63)	(59)	(62)	(42)	(56)	(41)	(56)	(76)	(92)	(92)
Long Island	(9)	(10)	(12)	(4)	(8)	(3)	(7)	(8)	(15)	(18)
<b>Total-NYCA</b>	<b>(97)</b>	<b>(94)</b>	<b>(99)</b>	<b>(59)</b>	<b>(83)</b>	<b>(51)</b>	<b>(80)</b>	<b>(113)</b>	<b>(150)</b>	<b>(159)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.9)	(0.3)	(1.1)	(0.7)	(0.5)	(0.1)	(0.6)	(7.3)	(3.0)	(4.4)
Genessee	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.3)	(0.2)	(0.2)
Central	(0.3)	(0.6)	(0.7)	(0.9)	(0.8)	(0.7)	(0.7)	(1.1)	(1.2)	(0.8)
North	(0.2)	(0.3)	(0.3)	(0.2)	(0.2)	(0.2)	(0.1)	(0.9)	(0.8)	(1.1)
Mohawk Valley	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.1)	(0.2)	(0.2)	(0.3)	(0.3)
Capital	(0.8)	(1.2)	(1.8)	(2.3)	(2.5)	(2.4)	(2.7)	(3.5)	(4.5)	(4.1)
Hudson Valley	6.0	10.3	12.9	17.3	19.8	17.8	20.0	40.3	43.0	47.8
Milwood	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	(1.6)	(2.7)	(2.9)	(3.3)	(3.8)	(3.0)	(3.4)	(10.9)	(12.8)	(14.8)
Long Island	(0.2)	(0.4)	(0.6)	(0.7)	(1.1)	(1.0)	(0.9)	(1.5)	(1.7)	(1.6)
<b>Total-NYCA</b>	<b>1.9</b>	<b>4.7</b>	<b>5.3</b>	<b>8.9</b>	<b>10.6</b>	<b>10.1</b>	<b>11.4</b>	<b>14.7</b>	<b>18.5</b>	<b>20.5</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-5.5%	-1.4%	-3.5%	-1.7%	-1.0%	-0.2%	-0.8%	-5.4%	-2.1%	-2.6%
Genessee	-6.0%	-6.4%	-5.0%	-4.2%	-3.0%	-2.5%	-2.6%	-4.3%	-3.4%	-3.0%
Central	-1.8%	-1.8%	-1.6%	-1.7%	-1.3%	-1.1%	-1.0%	-1.0%	-1.0%	-0.7%
North	-16.0%	-14.4%	-14.7%	-8.2%	-7.7%	-7.4%	-3.8%	-9.9%	-9.1%	-9.8%
Mohawk Valley	-5.4%	-4.7%	-5.0%	-4.3%	-3.6%	-3.0%	-3.5%	-2.5%	-2.9%	-2.5%
Capital	-2.5%	-2.2%	-2.3%	-2.3%	-2.1%	-2.0%	-2.1%	-1.7%	-2.1%	-1.7%
Hudson Valley	408.8%	327.4%	295.9%	333.9%	292.1%	279.6%	280.3%	316.1%	224.5%	228.5%
Milwood	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	-4.2%	-3.7%	-2.9%	-2.3%	-2.3%	-1.7%	-1.9%	-2.8%	-3.1%	-3.3%
Long Island	-0.9%	-1.1%	-1.2%	-1.1%	-1.3%	-1.2%	-1.0%	-1.2%	-1.3%	-1.1%
<b>Total-NYCA</b>	<b>1.0%</b>	<b>1.5%</b>	<b>1.2%</b>	<b>1.5%</b>	<b>1.4%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.4%</b>	<b>1.7%</b>	<b>1.6%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.2)	(0.1)	0.0	(0.1)	(2.0)	(0.8)	(1.1)
Genessee	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	(0.3)	(0.3)	(0.2)	(0.0)	(0.5)	(0.3)	(0.3)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.5)</b>	<b>(0.4)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(2.4)</b>	<b>(1.0)</b>	<b>(1.4)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-12.4%	-1.5%	-8.4%	-3.0%	-1.4%	0.1%	-1.2%	-12.0%	-4.6%	-5.2%
Genessee	-16.0%	-16.0%	-13.0%	-12.5%	-9.5%	-5.6%	-5.6%	-11.1%	-7.4%	-7.1%
Central	-9.2%	-8.8%	-8.9%	-11.6%	-10.2%	-5.4%	-0.8%	-8.0%	-3.8%	-4.3%
North	-11.6%	-10.7%	-8.5%	-4.9%	-4.1%	-3.6%	-1.8%	-8.2%	-7.3%	-8.8%
Mohawk Valley	-3.1%	-2.5%	-2.6%	-2.8%	-1.9%	-1.9%	-1.9%	-1.7%	-2.1%	-1.7%
Capital	-0.4%	-0.4%	-0.4%	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.3%
Hudson Valley	7.1%	6.3%	5.3%	5.2%	5.0%	4.4%	4.8%	7.1%	6.0%	2.4%
Milwood	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	-9.7%	-8.7%	-7.0%	-5.8%	-5.0%	-3.9%	-4.6%	-7.0%	-7.4%	-9.5%
Long Island	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.5%	-1.1%
<b>Total-NYCA</b>	<b>-9.9%</b>	<b>-4.3%</b>	<b>-7.4%</b>	<b>-4.5%</b>	<b>-3.1%</b>	<b>-1.3%</b>	<b>-0.9%</b>	<b>-9.8%</b>	<b>-3.9%</b>	<b>-4.6%</b>



Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	(0.0)	(0.0)	0.0	0.0	0.0	(0.1)	(0.0)	(0.0)
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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)	(0.1)	(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>Total-NYCA</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-7.6%	-1.1%	-5.6%	-1.8%	-0.9%	0.4%	-0.4%	-8.1%	-2.5%	-3.7%
Genessee	-4.0%	-4.3%	-3.2%	-2.7%	-2.1%	-1.3%	-1.6%	-3.2%	-2.4%	-2.2%
Central	-4.4%	-4.2%	-3.6%	-3.8%	-3.0%	-2.3%	-1.3%	-3.0%	-2.2%	-2.1%
North	-9.1%	-8.5%	-6.5%	-3.9%	-3.1%	-2.5%	-1.4%	-6.7%	-5.9%	-7.2%
Mohawk Valley	-6.8%	-5.1%	-4.8%	-4.0%	-3.2%	-2.6%	-2.4%	-2.7%	-3.0%	-2.9%
Capital	-1.6%	-1.4%	-1.2%	-1.2%	-1.0%	-1.0%	-1.0%	-1.2%	-1.4%	-1.5%
Hudson Valley	26.2%	22.9%	18.7%	19.7%	17.1%	14.5%	16.6%	27.1%	24.6%	26.5%
Milwood	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	-12.4%	-12.5%	-11.4%	-9.3%	-9.5%	-7.0%	-7.3%	-11.3%	-10.9%	-11.3%
Long Island	-0.7%	-0.9%	-1.0%	-1.0%	-1.4%	-1.3%	-1.0%	-1.4%	-1.3%	-1.2%
<b>Total-NYCA</b>	<b>-4.7%</b>	<b>-3.2%</b>	<b>-3.9%</b>	<b>-2.8%</b>	<b>-2.6%</b>	<b>-1.6%</b>	<b>-1.6%</b>	<b>-4.6%</b>	<b>-2.8%</b>	<b>-3.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.09	(0.20)	(0.14)	(0.42)	(0.32)	(0.23)	(0.34)	(0.29)	(0.41)	(0.60)
Genessee	(0.01)	(0.09)	(0.09)	(0.41)	(0.27)	(0.22)	(0.32)	(0.51)	(0.48)	(0.61)
Central	(0.07)	(0.17)	(0.15)	(0.37)	(0.17)	0.01	(0.24)	(0.60)	(0.53)	(0.73)
North	(0.02)	(0.11)	(0.10)	(0.43)	(0.28)	(0.22)	(0.34)	(0.53)	(0.45)	(0.57)
Mohawk Valley	(0.15)	(0.23)	(0.20)	(0.47)	(0.31)	(0.19)	(0.37)	(0.71)	(0.65)	(0.82)
Capital	(0.15)	(0.26)	(0.24)	(0.44)	(0.50)	(0.31)	(0.45)	(0.79)	(1.09)	(1.29)
Hudson Valley	(1.00)	(0.95)	(0.96)	(1.01)	(1.01)	(0.80)	(1.04)	(1.63)	(1.82)	(1.97)
Milwood	(1.19)	(1.12)	(1.13)	(1.14)	(1.14)	(0.93)	(1.19)	(1.82)	(2.03)	(2.14)
Dunwoodie	(1.12)	(1.07)	(1.10)	(1.11)	(1.11)	(0.89)	(1.15)	(1.76)	(1.94)	(2.02)
NY City	(1.01)	(0.99)	(1.02)	(1.03)	(1.04)	(0.82)	(1.07)	(1.63)	(1.75)	(1.85)
Long Island	(0.39)	(0.47)	(0.52)	(0.56)	(0.52)	(0.35)	(0.53)	(0.81)	(0.99)	(1.10)
<b>NYCA Avg. LBMP</b>	<b>(0.46)</b>	<b>(0.51)</b>	<b>(0.51)</b>	<b>(0.67)</b>	<b>(0.61)</b>	<b>(0.45)</b>	<b>(0.64)</b>	<b>(1.01)</b>	<b>(1.10)</b>	<b>(1.25)</b>

Projected Changes in Generator GWh (2013-2022) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(407)	(85)	(176)	(78)	(41)	(2)	(27)	(498)	(183)	(254)
Genessee	(47)	(49)	(36)	(31)	(20)	(16)	(15)	(37)	(31)	(28)
Central	(195)	(196)	(167)	(188)	(112)	(109)	(129)	(101)	(132)	(65)
North	(150)	(142)	(101)	(59)	(45)	(37)	(21)	(118)	(100)	(132)
Mohawk Valley	(71)	(53)	(50)	(49)	(33)	(28)	(30)	(33)	(38)	(34)
Capital	(868)	(710)	(709)	(688)	(602)	(533)	(579)	(595)	(753)	(642)
Hudson Valley	6,591	5,977	5,099	5,102	4,631	3,997	4,355	6,738	6,804	7,149
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,973)	(1,704)	(1,302)	(1,194)	(1,133)	(874)	(978)	(1,620)	(1,757)	(1,970)
Long Island	(133)	(173)	(176)	(163)	(188)	(169)	(143)	(190)	(213)	(184)
<b>Total-NYCA</b>	<b>2,748</b>	<b>2,864</b>	<b>2,382</b>	<b>2,651</b>	<b>2,457</b>	<b>2,230</b>	<b>2,432</b>	<b>3,546</b>	<b>3,597</b>	<b>3,839</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE-NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2.1	1.4	1.0	1.3	1.4	1.1	1.3	3.9	3.0	3.7
Genessee	1.0	0.6	0.5	0.5	0.5	0.4	0.5	1.7	1.1	1.5
Central	0.6	0.4	0.3	0.3	0.4	0.5	0.3	0.8	0.7	0.8
North	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.7	0.5	0.7
Mohawk Valley	0.1	0.0	(0.0)	(0.1)	0.0	0.1	(0.0)	(0.0)	(0.0)	(0.0)
Capital	0.2	0.4	0.4	0.5	0.4	0.5	0.8	0.3	0.6	0.5
Hudson Valley	(1.0)	(0.8)	(1.0)	(1.2)	(0.9)	(0.8)	(0.9)	(2.1)	(1.8)	(1.9)
Milwood	(0.3)	(0.3)	(0.3)	(0.4)	(0.3)	(0.3)	(0.3)	(0.6)	(0.6)	(0.6)
Dunwoodie	(0.5)	(0.4)	(0.5)	(0.7)	(0.5)	(0.4)	(0.4)	(1.1)	(0.9)	(0.9)
NY City	(1.7)	(0.9)	(2.6)	(3.7)	(1.6)	(1.5)	(1.4)	(5.4)	(3.0)	(2.8)
Long Island	(1.3)	(0.8)	(1.2)	(1.8)	(0.9)	(0.8)	(0.8)	(2.8)	(2.0)	(2.0)
<b>Total-NYCA</b>	<b>(0.5)</b>	<b>0.1</b>	<b>(3.1)</b>	<b>(5.1)</b>	<b>(1.3)</b>	<b>(1.0)</b>	<b>(0.8)</b>	<b>(4.7)</b>	<b>(2.2)</b>	<b>(1.2)</b>

## Generic DR Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(3)	(5)	(2)	(0)	(0)	0	(2)	(4)	(0)	(2)
Genessee	0	(0)	(0)	(0)	0	(0)	0	(0)	(0)	(0)
Central	1	0	(0)	(0)	(3)	(3)	(1)	(1)	(2)	0
North	1	0	1	0	1	(0)	0	0	(0)	1
Mohawk Valley	0	0	0	(0)	0	(0)	0	(0)	0	(0)
Capital	(1)	(1)	(1)	(3)	1	0	1	(3)	(2)	(3)
Hudson Valley	0	0	1	1	1	1	1	1	2	4
Milwood	0	0	0	0	0	0	0	0	0	(0)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	3	5	3	5	7	8	10	8	9	12
Long Island	(0)	2	1	1	(1)	2	2	(0)	0	1
<b>Total NYCA</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>9</b>	<b>11</b>	<b>1</b>	<b>6</b>	<b>12</b>
Imports	(2)	(3)	(1)	(3)	(5)	(5)	(9)	(1)	(4)	(5)
Exports	2	5	6	4	2	7	3	1	3	10
<b>NYCA + Imports - Exports</b>	<b>(4)</b>	<b>(6)</b>	<b>(5)</b>	<b>(3)</b>	<b>(2)</b>	<b>(2)</b>	<b>(1)</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Total IESO	1	2	1	0	(1)	0	(2)	(3)	(2)	1
Total PJM	(2)	2	5	(3)	(12)	(10)	(10)	8	(5)	(9)
Total ISONE	2	(5)	(0)	(3)	2	(3)	2	(0)	(3)	(5)
<b>Total System</b>	<b>2</b>	<b>(0)</b>	<b>8</b>	<b>(2)</b>	<b>(6)</b>	<b>(4)</b>	<b>1</b>	<b>6</b>	<b>(4)</b>	<b>(1)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(2)	1	(1)	(0)	1	2	1	1	(1)
Genessee	0	(1)	0	(1)	(0)	0	1	0	0	(0)
Central	1	(2)	(0)	(0)	4	1	2	1	1	(2)
North	0	(1)	(0)	(1)	(0)	0	0	(0)	0	(1)
Mohawk Valley	0	(1)	(0)	(0)	0	0	1	0	0	(1)
Capital	(0)	(1)	(0)	(0)	(1)	1	0	0	(1)	(3)
Hudson Valley	(2)	(3)	(2)	(3)	(3)	(2)	(2)	(3)	(4)	(6)
Milwood	(0)	(1)	(0)	(1)	(1)	(0)	(0)	(1)	(1)	(1)
Dunwoodie	(0)	(1)	(1)	(1)	(2)	(0)	(1)	(1)	(2)	(3)
NY City	(6)	(11)	(5)	(11)	(12)	(2)	(6)	(9)	(14)	(20)
Long Island	(1)	(4)	(2)	(4)	(4)	(2)	(4)	(5)	(8)	(10)
<b>Total-NYCA</b>	<b>(7)</b>	<b>(27)</b>	<b>(10)</b>	<b>(24)</b>	<b>(20)</b>	<b>(1)</b>	<b>(8)</b>	<b>(16)</b>	<b>(28)</b>	<b>(47)</b>
Export	2	5	6	4	2	7	3	1	3	10
<b>NYCA+Export</b>	<b>(5)</b>	<b>(22)</b>	<b>(4)</b>	<b>(20)</b>	<b>(17)</b>	<b>6</b>	<b>(4)</b>	<b>(15)</b>	<b>(25)</b>	<b>(37)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(2)	(6)	(1)	(2)	(0)	1	(0)	(3)	0	(3)
Genessee	0	(0)	(0)	(0)	(0)	0	1	(0)	(0)	(1)
Central	1	(5)	(1)	(8)	(7)	(5)	(5)	(5)	(8)	(5)
North	1	(1)	0	(1)	0	(0)	1	0	0	(0)
Mohawk Valley	0	(1)	(0)	(0)	0	(0)	0	(0)	0	(1)
Capital	(1)	(0)	1	(2)	2	3	4	(1)	(1)	(6)
Hudson Valley	0	(0)	0	0	0	1	1	0	1	2
Milwood	(1)	(3)	(1)	(2)	(4)	(1)	(2)	(2)	(3)	(5)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	1	(1)	(1)	(4)	(2)	7	5	1	(5)	(4)
Long Island	(1)	(0)	0	(2)	(3)	1	(1)	(3)	(5)	(5)
<b>Total-NYCA</b>	<b>(1)</b>	<b>(19)</b>	<b>(3)</b>	<b>(22)</b>	<b>(13)</b>	<b>6</b>	<b>5</b>	<b>(14)</b>	<b>(22)</b>	<b>(28)</b>
Import	(2)	(3)	(1)	(3)	(5)	(5)	(9)	(1)	(4)	(5)
<b>NYCA+Import</b>	<b>(3)</b>	<b>(22)</b>	<b>(4)</b>	<b>(26)</b>	<b>(19)</b>	<b>2</b>	<b>(4)</b>	<b>(15)</b>	<b>(26)</b>	<b>(33)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	1	0	0	1	1	1	0	0
Genessee	(0)	(0)	0	0	0	0	(0)	0	0	(0)
Central	(0)	(0)	(0)	2	4	0	0	0	0	(1)
North	0	0	0	(0)	0	(0)	(0)	(0)	0	(0)
Mohawk Valley	(0)	0	(0)	0	1	0	(0)	0	(0)	(0)
Capital	(0)	2	1	1	(0)	1	(0)	1	(0)	(1)
Hudson Valley	(1)	(0)	(0)	(1)	(2)	(1)	(3)	(2)	(3)	(4)
Milwood	(0)	(0)	(0)	(0)	(1)	(0)	(1)	(1)	(1)	(1)
Dunwoodie	(1)	(0)	(0)	(0)	(1)	(1)	(2)	(1)	(2)	(2)
NY City	(6)	(1)	(0)	(3)	(9)	(4)	(14)	(10)	(17)	(19)
Long Island	(2)	2	(0)	(1)	(3)	(3)	(7)	(6)	(9)	(10)
<b>Total-NYCA</b>	<b>(11)</b>	<b>2</b>	<b>1</b>	<b>(2)</b>	<b>(10)</b>	<b>(6)</b>	<b>(26)</b>	<b>(17)</b>	<b>(33)</b>	<b>(38)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.1)	(0.4)	(0.3)	0.0	0.0	0.2	(0.3)	(0.7)	(0.1)	(0.4)
Genessee	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	(0.4)	(0.4)	(0.2)	(0.1)	(0.2)	(0.1)
North	0.0	0.0	0.1	0.0	0.1	(0.0)	0.0	0.0	(0.0)	0.1
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)	(0.1)	(0.2)	0.1	(0.0)	0.0	(0.3)	(0.3)	(0.3)
Hudson Valley	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5
Milwood	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	0.2	0.1	0.4	0.5	0.5	0.6	0.7	0.7	1.0
Long Island	(0.0)	0.1	0.1	0.1	(0.0)	0.2	0.1	(0.0)	0.1	0.2
<b>Total-NYCA</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>0.4</b>	<b>0.3</b>	<b>0.5</b>	<b>0.4</b>	<b>(0.4)</b>	<b>0.3</b>	<b>0.9</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-0.8%	-1.7%	-0.9%	0.1%	0.0%	0.2%	-0.4%	-0.5%	-0.1%	-0.2%
Genessee	0.3%	0.0%	-0.2%	-0.2%	0.6%	0.0%	1.0%	-0.3%	-0.3%	-0.2%
Central	0.2%	0.1%	-0.1%	0.0%	-0.6%	-0.6%	-0.2%	-0.1%	-0.2%	0.0%
North	1.4%	0.9%	2.2%	0.4%	1.6%	-1.2%	0.8%	0.0%	-0.4%	0.7%
Mohawk Valley	0.1%	0.2%	0.2%	-0.1%	0.1%	-0.7%	0.1%	-0.3%	0.2%	-0.2%
Capital	-0.1%	0.0%	-0.1%	-0.2%	0.1%	0.0%	0.0%	-0.1%	-0.1%	-0.1%
Hudson Valley	0.5%	0.2%	1.1%	1.8%	1.1%	1.5%	1.6%	0.8%	1.1%	2.2%
Milwood	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%	0.1%	0.2%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%
Long Island	-0.1%	0.3%	0.1%	0.1%	-0.1%	0.2%	0.1%	0.0%	0.0%	0.1%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.1	(0.2)	(0.2)	(0.0)	(0.1)
Genessee	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	(0.1)	(0.3)	(0.1)	0.1	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.0)</b>	<b>(0.2)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-2.1%	-4.4%	-2.1%	0.2%	0.1%	0.6%	-1.2%	-1.2%	-0.1%	-0.5%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Central	1.0%	1.5%	-0.5%	1.7%	-5.1%	-6.2%	-1.4%	0.8%	0.0%	-0.5%
North	0.9%	0.6%	1.3%	0.3%	0.7%	-0.7%	0.4%	0.0%	-0.3%	0.5%
Mohawk Valley	0.0%	0.0%	0.0%	0.0%	0.0%	-0.4%	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%	-0.1%	-0.1%	-0.3%	-0.1%	0.4%	0.1%	-0.3%	-1.1%	-3.3%
Milwood	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%	0.5%	0.3%	0.5%	0.5%	0.6%	0.6%	0.4%	0.2%	-0.5%
Long Island	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.5%	-0.2%	-0.4%	-1.0%
<b>Total-NYCA</b>	<b>-0.6%</b>	<b>-1.4%</b>	<b>-1.1%</b>	<b>0.6%</b>	<b>-1.1%</b>	<b>-1.3%</b>	<b>-1.1%</b>	<b>-0.6%</b>	<b>-0.1%</b>	<b>-0.5%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(0.0)	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.3%	-2.8%	-1.7%	0.2%	0.1%	1.0%	-0.6%	-0.8%	-0.3%	-0.2%
Genessee	0.1%	0.0%	0.0%	0.0%	0.2%	0.2%	0.4%	-0.2%	-0.2%	0.0%
Central	0.5%	0.4%	-0.2%	0.1%	-1.2%	-1.7%	-0.6%	0.2%	-0.2%	-0.3%
North	0.8%	0.4%	1.0%	0.2%	0.6%	-0.4%	0.3%	0.0%	-0.2%	0.4%
Mohawk Valley	0.0%	0.0%	0.3%	0.1%	0.0%	-0.3%	0.0%	-0.4%	0.0%	-0.3%
Capital	0.0%	0.0%	-0.2%	-0.1%	0.1%	-0.1%	0.1%	0.0%	0.0%	0.0%
Hudson Valley	0.6%	0.0%	0.7%	0.9%	1.0%	0.5%	1.0%	0.7%	1.0%	2.9%
Milwood	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%	-0.4%	0.0%	-0.2%	0.1%	0.7%	1.1%	1.3%	1.0%	1.1%
Long Island	-0.2%	0.1%	0.0%	-0.1%	-0.2%	0.1%	0.0%	-0.3%	-0.4%	0.0%
<b>Total-NYCA</b>	<b>-0.4%</b>	<b>-0.6%</b>	<b>-0.3%</b>	<b>0.0%</b>	<b>-0.1%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.06	(0.11)	0.06	(0.05)	(0.03)	0.06	0.07	0.06	0.03	(0.07)
Genessee	0.03	(0.13)	0.01	(0.07)	(0.04)	0.02	0.04	0.00	0.02	(0.09)
Central	0.03	(0.12)	(0.02)	(0.01)	0.12	0.04	0.08	0.02	0.04	(0.11)
North	0.03	(0.15)	(0.03)	(0.08)	(0.05)	0.01	0.05	(0.01)	0.03	(0.10)
Mohawk Valley	0.03	(0.13)	(0.02)	(0.05)	0.02	0.03	0.05	0.00	0.02	(0.11)
Capital	0.01	(0.04)	0.01	0.00	(0.10)	0.07	(0.02)	0.05	0.00	(0.16)
Hudson Valley	(0.04)	(0.13)	(0.03)	(0.10)	(0.16)	(0.02)	(0.09)	(0.07)	(0.13)	(0.25)
Milwood	(0.05)	(0.14)	(0.04)	(0.11)	(0.18)	(0.04)	(0.12)	(0.09)	(0.17)	(0.29)
Dunwoodie	(0.04)	(0.15)	(0.04)	(0.12)	(0.18)	(0.04)	(0.12)	(0.10)	(0.18)	(0.29)
NY City	(0.04)	(0.14)	(0.03)	(0.10)	(0.15)	(0.02)	(0.09)	(0.08)	(0.12)	(0.24)
Long Island	(0.03)	(0.14)	(0.03)	(0.10)	(0.11)	(0.03)	(0.09)	(0.10)	(0.15)	(0.27)
<b>NYCA Avg. LBMP</b>	<b>(0.00)</b>	<b>(0.13)</b>	<b>(0.01)</b>	<b>(0.07)</b>	<b>(0.08)</b>	<b>0.01</b>	<b>(0.02)</b>	<b>(0.03)</b>	<b>(0.06)</b>	<b>(0.18)</b>

Projected Changes in Generator GWh (2013-2022) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(64)	(96)	(44)	(6)	(4)	(1)	(31)	(66)	(17)	(27)
Genessee	2	(1)	(2)	(1)	3	(1)	5	(2)	(3)	(2)
Central	12	(4)	(14)	(2)	(59)	(48)	(21)	(22)	(25)	(5)
North	13	8	15	3	9	(6)	4	0	(4)	8
Mohawk Valley	0	0	1	(1)	1	(6)	0	(4)	1	(3)
Capital	(18)	(6)	(33)	(51)	22	(4)	8	(61)	(65)	(62)
Hudson Valley	7	4	14	18	12	13	17	10	20	44
Milwood	0	0	0	0	0	0	0	0	0	(1)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	50	86	37	69	76	94	104	85	65	97
Long Island	(8)	41	20	12	(9)	29	16	0	8	21
<b>Total-NYCA</b>	<b>(6)</b>	<b>33</b>	<b>(6)</b>	<b>41</b>	<b>52</b>	<b>71</b>	<b>102</b>	<b>(58)</b>	<b>(20)</b>	<b>71</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE-NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.1	0.2	0.6	(0.0)	0.1	(0.0)	(0.0)	0.1	(0.0)	0.1
Genessee	0.0	0.1	0.2	(0.0)	0.0	(0.0)	(0.0)	0.0	(0.0)	0.1
Central	0.0	0.1	(0.0)	(0.0)	0.1	0.1	0.1	0.0	0.1	0.1
North	(0.0)	(0.0)	0.1	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	(0.1)
Mohawk Valley	0.0	(0.0)	(0.0)	(0.0)	0.0	0.0	0.1	0.0	0.0	0.0
Capital	0.0	(0.1)	(0.1)	0.0	0.0	0.0	0.3	0.1	0.1	0.1
Hudson Valley	(0.1)	(0.3)	(0.3)	(0.2)	(0.0)	(0.1)	0.2	(0.1)	0.0	(0.0)
Milwood	0.0	(0.1)	(0.1)	(0.0)	0.0	0.0	0.1	0.0	0.1	0.0
Dunwoodie	0.0	(0.1)	(0.1)	(0.1)	0.0	0.0	0.2	(0.0)	0.1	0.0
NY City	0.3	(1.1)	(0.4)	(0.3)	0.9	0.6	2.3	0.8	1.9	1.7
Long Island	0.1	(0.5)	(0.4)	(0.4)	0.2	(0.0)	0.7	0.0	0.4	0.2
<b>Total-NYCA</b>	<b>0.6</b>	<b>(1.8)</b>	<b>(0.6)</b>	<b>(1.1)</b>	<b>1.5</b>	<b>0.6</b>	<b>3.7</b>	<b>0.9</b>	<b>2.8</b>	<b>2.2</b>

## Generic EE Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(14)	(5)	(9)	(6)	(8)	(7)	(18)	(15)	(0)	(11)
Genessee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Central	(6)	(6)	(7)	(9)	(9)	(11)	(7)	(9)	(7)	(6)
North	(3)	(4)	(2)	(2)	(1)	(1)	(1)	(4)	(6)	(4)
Mohawk Valley	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(1)	(2)	(2)
Capital	(38)	(41)	(46)	(52)	(50)	(57)	(63)	(47)	(59)	(46)
Hudson Valley	(5)	(5)	(5)	(5)	(4)	(6)	(4)	(4)	(9)	(11)
Milwood	0	0	0	0	0	0	0	0	(0)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(90)	(86)	(82)	(89)	(87)	(99)	(113)	(124)	(110)	(146)
Long Island	(6)	(6)	(7)	(9)	(10)	(8)	(8)	(10)	0	(13)
<b>Total NYCA</b>	<b>(164)</b>	<b>(154)</b>	<b>(161)</b>	<b>(174)</b>	<b>(172)</b>	<b>(192)</b>	<b>(216)</b>	<b>(215)</b>	<b>(194)</b>	<b>(239)</b>
Imports	(42)	(52)	(43)	(48)	(59)	(55)	(50)	(51)	(40)	(41)
Exports	45	47	58	73	78	81	75	109	158	140
<b>NYCA + Imports - Exports</b>	<b>(250)</b>	<b>(254)</b>	<b>(261)</b>	<b>(295)</b>	<b>(309)</b>	<b>(327)</b>	<b>(342)</b>	<b>(376)</b>	<b>(392)</b>	<b>(420)</b>
Total IESO	(7)	(4)	(1)	(3)	(1)	(1)	1	(11)	(7)	(10)
Total PJM	(53)	(55)	(64)	(74)	(81)	(85)	(72)	(87)	(90)	(103)
Total ISONE	(30)	(38)	(40)	(51)	(54)	(52)	(44)	(64)	(52)	(67)
<b>Total System</b>	<b>(255)</b>	<b>(251)</b>	<b>(266)</b>	<b>(302)</b>	<b>(308)</b>	<b>(331)</b>	<b>(331)</b>	<b>(376)</b>	<b>(343)</b>	<b>(418)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(1)	(1)	(4)	(3)	(3)	(1)	(5)	25	(6)
Genessee	(1)	(0)	(0)	(3)	(2)	(1)	0	(4)	16	(3)
Central	(1)	(1)	(1)	(4)	0	(1)	(1)	(7)	10	(7)
North	(0)	0	0	(2)	(1)	(1)	(0)	(3)	11	(2)
Mohawk Valley	(1)	(1)	(1)	(2)	(2)	(1)	(1)	(4)	3	(3)
Capital	(49)	(50)	(52)	(58)	(64)	(66)	(69)	(78)	(53)	(88)
Hudson Valley	(46)	(46)	(48)	(54)	(57)	(58)	(62)	(71)	(78)	(79)
Milwood	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(4)	3	(5)
Dunwoodie	(5)	(5)	(5)	(6)	(7)	(5)	(7)	(9)	5	(10)
NY City	(215)	(219)	(229)	(259)	(275)	(281)	(303)	(349)	(232)	(387)
Long Island	(8)	(9)	(11)	(12)	(14)	(12)	(15)	(20)	(35)	(24)
<b>Total-NYCA</b>	<b>(329)</b>	<b>(334)</b>	<b>(351)</b>	<b>(407)</b>	<b>(427)</b>	<b>(431)</b>	<b>(462)</b>	<b>(554)</b>	<b>(325)</b>	<b>(613)</b>
Export	45	47	58	73	78	81	75	109	158	140
<b>NYCA+Export</b>	<b>(284)</b>	<b>(286)</b>	<b>(294)</b>	<b>(334)</b>	<b>(349)</b>	<b>(350)</b>	<b>(386)</b>	<b>(445)</b>	<b>(167)</b>	<b>(473)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(13)	(4)	(7)	(11)	(10)	(7)	(14)	(23)	22	(16)
Genessee	(1)	(1)	(1)	(3)	(2)	(2)	(0)	(3)	10	(3)
Central	(20)	(11)	(13)	(27)	(29)	(31)	(16)	(32)	4	(23)
North	(3)	(3)	(1)	(4)	(3)	(2)	(1)	(7)	10	(7)
Mohawk Valley	(2)	(1)	(1)	(3)	(1)	(1)	(1)	(3)	3	(3)
Capital	(48)	(49)	(55)	(62)	(62)	(67)	(74)	(66)	(65)	(69)
Hudson Valley	(5)	(6)	(5)	(6)	(5)	(6)	(5)	(7)	(11)	(13)
Milwood	(13)	(12)	(13)	(14)	(16)	(13)	(16)	(20)	(0)	(22)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(107)	(106)	(104)	(121)	(120)	(128)	(149)	(174)	(108)	(204)
Long Island	(9)	(11)	(13)	(15)	(17)	(14)	(16)	(22)	2	(27)
<b>Total-NYCA</b>	<b>(222)</b>	<b>(204)</b>	<b>(213)</b>	<b>(265)</b>	<b>(265)</b>	<b>(272)</b>	<b>(292)</b>	<b>(359)</b>	<b>(134)</b>	<b>(388)</b>
Import	(42)	(52)	(43)	(48)	(59)	(55)	(50)	(51)	(40)	(41)
<b>NYCA+Import</b>	<b>(264)</b>	<b>(255)</b>	<b>(256)</b>	<b>(313)</b>	<b>(324)</b>	<b>(327)</b>	<b>(342)</b>	<b>(410)</b>	<b>(174)</b>	<b>(429)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(1)	(2)	(0)	(1)	(2)	(2)	0	22	(3)
Genessee	(1)	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(1)	(1)
Central	(0)	(1)	(1)	1	4	1	(1)	(1)	4	(2)
North	0	0	(0)	0	0	0	(0)	0	0	0
Mohawk Valley	(0)	(1)	(1)	0	0	(0)	(1)	(0)	0	(1)
Capital	(9)	(10)	(12)	(7)	(12)	(11)	(15)	(10)	(13)	(15)
Hudson Valley	(10)	(10)	(11)	(8)	(11)	(10)	(14)	(12)	(13)	(14)
Milwood	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)
Dunwoodie	(4)	(5)	(5)	(3)	(5)	(4)	(7)	(6)	(6)	(7)
NY City	(53)	(60)	(68)	(48)	(65)	(64)	(91)	(79)	(87)	(98)
Long Island	(5)	(8)	(11)	(2)	(7)	(8)	(16)	(8)	(9)	(15)
<b>Total-NYCA</b>	<b>(84)</b>	<b>(98)</b>	<b>(114)</b>	<b>(68)</b>	<b>(98)</b>	<b>(101)</b>	<b>(150)</b>	<b>(119)</b>	<b>(105)</b>	<b>(159)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.6)	(0.4)	(1.0)	(0.7)	(1.3)	(1.1)	(3.0)	(3.1)	(1.8)	(2.0)
Genessee	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)
Central	(0.2)	(0.4)	(0.6)	(0.8)	(0.9)	(1.2)	(0.9)	(1.1)	(0.9)	(0.8)
North	(0.1)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.1)	(0.4)	(0.6)	(0.5)
Mohawk Valley	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)
Capital	(0.8)	(1.5)	(2.4)	(3.2)	(3.6)	(4.0)	(4.4)	(4.0)	(5.1)	(3.9)
Hudson Valley	(0.1)	(0.2)	(0.3)	(0.3)	(0.4)	(0.5)	(0.3)	(0.5)	(1.0)	(1.1)
Milwood	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)	(2.7)	(3.6)	(4.6)	(4.9)	(5.7)	(6.4)	(11.2)	(10.3)	(12.8)
Long Island	(0.1)	(0.3)	(0.4)	(0.6)	(0.9)	(0.7)	(0.6)	(0.9)	(0.6)	(1.2)
<b>Total-NYCA</b>	<b>(3.6)</b>	<b>(5.8)</b>	<b>(8.7)</b>	<b>(10.6)</b>	<b>(12.2)</b>	<b>(13.5)</b>	<b>(15.9)</b>	<b>(21.5)</b>	<b>(20.5)</b>	<b>(22.6)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.7%	-1.6%	-3.2%	-1.7%	-2.4%	-1.7%	-3.7%	-2.3%	-1.3%	-1.2%
Genessee	-3.5%	-2.0%	-2.1%	-3.1%	-1.5%	-3.6%	-1.4%	-2.5%	-1.7%	-1.9%
Central	-1.3%	-1.5%	-1.4%	-1.5%	-1.5%	-1.8%	-1.3%	-1.0%	-0.8%	-0.6%
North	-7.4%	-8.6%	-7.5%	-5.3%	-4.0%	-4.2%	-3.5%	-4.7%	-7.7%	-4.4%
Mohawk Valley	-3.0%	-2.5%	-2.9%	-2.9%	-1.7%	-2.6%	-1.6%	-1.8%	-1.9%	-2.2%
Capital	-2.5%	-2.8%	-3.2%	-3.2%	-3.0%	-3.3%	-3.4%	-1.9%	-2.3%	-1.6%
Hudson Valley	-8.4%	-7.4%	-7.2%	-6.6%	-5.6%	-7.4%	-4.9%	-3.6%	-5.1%	-5.1%
Milwood	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	-3.9%	-3.6%	-3.3%	-2.8%	-2.7%	-2.6%	-2.9%	-2.9%	-2.4%	-2.9%
Long Island	-0.8%	-0.8%	-0.9%	-0.9%	-1.0%	-0.8%	-0.7%	-0.7%	-0.4%	-0.8%
<b>Total-NYCA</b>	<b>-2.9%</b>	<b>-2.6%</b>	<b>-2.7%</b>	<b>-2.5%</b>	<b>-2.4%</b>	<b>-2.4%</b>	<b>-2.6%</b>	<b>-2.2%</b>	<b>-1.9%</b>	<b>-1.9%</b>



Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.2)	(0.3)	(0.3)	(1.0)	(0.8)	(0.4)	(0.5)
Genessee	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	(0.2)	(0.2)	(0.3)	(0.4)	(0.3)	(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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>(0.7)</b>	<b>(1.4)</b>	<b>(1.1)</b>	<b>(0.5)</b>	<b>(0.7)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-8.3%	-3.3%	-7.6%	-3.9%	-5.2%	-3.6%	-8.4%	-5.0%	-2.7%	-2.3%
Genessee	-8.0%	-4.0%	-4.3%	-8.3%	-4.8%	-11.1%	-5.6%	-7.4%	-3.7%	-3.6%
Central	-5.4%	-7.5%	-4.4%	-7.4%	-6.9%	-8.7%	-9.6%	-4.4%	-3.3%	-2.9%
North	-5.6%	-6.4%	-4.3%	-3.2%	-2.1%	-2.1%	-1.8%	-3.8%	-6.2%	-3.9%
Mohawk Valley	-1.7%	-1.4%	-1.5%	-1.4%	-0.7%	-1.1%	-0.8%	-1.0%	-1.4%	-1.4%
Capital	-0.4%	-0.4%	-0.5%	-0.5%	-0.4%	-0.5%	-0.5%	-0.3%	-0.4%	-0.3%
Hudson Valley	-0.2%	-0.3%	-0.2%	-0.5%	-0.3%	-0.1%	-0.4%	-0.6%	4.0%	-4.5%
Milwood	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	-8.8%	-7.5%	-6.3%	-6.3%	-5.8%	-5.8%	-6.3%	-7.5%	12.2%	-8.2%
Long Island	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%	-0.3%	14.5%	-1.2%
<b>Total-NYCA</b>	<b>-6.4%</b>	<b>-4.7%</b>	<b>-5.3%</b>	<b>-4.1%</b>	<b>-4.8%</b>	<b>-4.5%</b>	<b>-7.7%</b>	<b>-4.4%</b>	<b>-2.0%</b>	<b>-2.4%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Genessee	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	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	(0.0)	0.0	0.0	(0.0)	(0.0)	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-4.4%	-1.7%	-5.3%	-1.3%	-2.5%	-2.5%	-6.8%	-2.9%	-1.9%	-1.4%
Genessee	-2.6%	-1.5%	-1.3%	-2.0%	-1.0%	-2.1%	-0.9%	-1.9%	-0.8%	-1.3%
Central	-3.2%	-3.6%	-2.4%	-2.8%	-2.5%	-3.5%	-3.1%	-2.0%	-1.6%	-1.5%
North	-4.3%	-5.1%	-3.3%	-2.5%	-1.6%	-1.5%	-1.2%	-3.1%	-4.9%	-3.2%
Mohawk Valley	-3.8%	-2.9%	-3.0%	-3.0%	-1.7%	-2.5%	-1.8%	-2.1%	-2.2%	-2.6%
Capital	-1.7%	-1.7%	-2.0%	-1.7%	-1.6%	-1.8%	-1.8%	-1.4%	-1.6%	-1.4%
Hudson Valley	-6.1%	-5.1%	-5.7%	-4.9%	-3.9%	-4.7%	-3.9%	-3.5%	-5.6%	-6.0%
Milwood	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	-9.6%	-9.3%	-8.9%	-8.0%	-8.1%	-7.2%	-7.4%	-10.6%	-5.0%	-9.3%
Long Island	-0.7%	-0.8%	-0.7%	-0.9%	-1.1%	-0.7%	-0.8%	-0.9%	1.0%	-1.1%
<b>Total-NYCA</b>	<b>-3.7%</b>	<b>-3.2%</b>	<b>-3.6%</b>	<b>-2.8%</b>	<b>-3.0%</b>	<b>-2.9%</b>	<b>-3.9%</b>	<b>-3.4%</b>	<b>-1.7%</b>	<b>-2.8%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.01	(0.06)	(0.06)	(0.26)	(0.21)	(0.20)	(0.08)	(0.29)	1.45	(0.38)
Genessee	(0.11)	(0.04)	(0.02)	(0.30)	(0.23)	(0.12)	(0.02)	(0.40)	1.39	(0.34)
Central	(0.10)	(0.07)	(0.06)	(0.25)	(0.08)	(0.11)	(0.07)	(0.43)	0.57	(0.40)
North	(0.07)	0.00	0.01	(0.26)	(0.20)	(0.12)	(0.02)	(0.37)	1.65	(0.30)
Mohawk Valley	(0.15)	(0.10)	(0.09)	(0.32)	(0.22)	(0.17)	(0.11)	(0.49)	0.30	(0.45)
Capital	(0.66)	(0.57)	(0.67)	(0.64)	(0.89)	(0.74)	(0.85)	(1.02)	1.39	(1.20)
Hudson Valley	(0.72)	(0.66)	(0.72)	(0.77)	(0.89)	(0.74)	(0.87)	(1.12)	(1.52)	(1.20)
Milwood	(0.75)	(0.71)	(0.77)	(0.79)	(0.93)	(0.76)	(0.91)	(1.15)	1.35	(1.22)
Dunwoodie	(0.75)	(0.70)	(0.78)	(0.80)	(0.93)	(0.76)	(0.92)	(1.16)	0.82	(1.23)
NY City	(0.78)	(0.76)	(0.85)	(0.88)	(1.03)	(0.93)	(1.11)	(1.37)	1.11	(1.49)
Long Island	(0.36)	(0.33)	(0.43)	(0.39)	(0.48)	(0.39)	(0.51)	(0.62)	(1.12)	(0.68)
<b>NYCA Avg. LBMP</b>	<b>(0.40)</b>	<b>(0.36)</b>	<b>(0.40)</b>	<b>(0.51)</b>	<b>(0.55)</b>	<b>(0.46)</b>	<b>(0.50)</b>	<b>(0.77)</b>	<b>0.67</b>	<b>(0.81)</b>

Projected Changes in Generator GWh (2013-2022) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(278)	(98)	(168)	(89)	(128)	(104)	(252)	(226)	(110)	(119)
Genessee	(28)	(16)	(16)	(22)	(10)	(21)	(9)	(21)	(17)	(17)
Central	(163)	(170)	(187)	(193)	(188)	(212)	(137)	(147)	(116)	(86)
North	(71)	(85)	(51)	(38)	(24)	(21)	(19)	(55)	(85)	(59)
Mohawk Valley	(39)	(28)	(28)	(31)	(15)	(22)	(14)	(22)	(24)	(28)
Capital	(878)	(904)	(1,020)	(993)	(881)	(946)	(1,005)	(722)	(877)	(609)
Hudson Valley	(87)	(91)	(82)	(64)	(61)	(73)	(54)	(53)	(106)	(108)
Milwood	0	0	0	0	0	0	0	0	(25)	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,866)	(1,717)	(1,583)	(1,553)	(1,412)	(1,539)	(1,673)	(1,624)	(1,496)	(1,775)
Long Island	(117)	(115)	(128)	(140)	(150)	(115)	(107)	(116)	(86)	(132)
<b>Total-NYCA</b>	<b>(3,527)</b>	<b>(3,224)</b>	<b>(3,263)</b>	<b>(3,124)</b>	<b>(2,869)</b>	<b>(3,053)</b>	<b>(3,269)</b>	<b>(2,987)</b>	<b>(2,943)</b>	<b>(2,933)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE-NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1.3	0.8	0.7	1.0	1.2	1.0	1.1	2.1	(9.5)	2.0
Genessee	0.6	0.4	0.3	0.4	0.5	0.5	0.6	0.9	(5.8)	0.9
Central	0.4	0.3	0.2	0.3	0.3	0.3	0.5	0.5	(9.9)	0.6
North	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.4	(3.0)	0.3
Mohawk Valley	0.0	0.0	(0.0)	(0.1)	(0.0)	(0.0)	0.0	(0.1)	(5.0)	0.0
Capital	(2.4)	(2.1)	(2.2)	(2.9)	(2.9)	(3.3)	(3.1)	(3.9)	(3.9)	(4.4)
Hudson Valley	(3.1)	(2.7)	(2.7)	(3.4)	(3.3)	(3.6)	(3.5)	(4.6)	(11.0)	(4.7)
Milwood	(0.2)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.1)	(0.3)	(0.3)	(0.2)
Dunwoodie	(0.4)	(0.3)	(0.3)	(0.5)	(0.4)	(0.4)	(0.2)	(0.6)	(4.0)	(0.4)
NY City	(16.5)	(14.7)	(14.3)	(18.2)	(17.6)	(19.2)	(18.2)	(24.2)	(25.4)	(24.9)
Long Island	(1.0)	(0.6)	(0.5)	(1.3)	(0.9)	(1.0)	(0.2)	(1.5)	(19.7)	(0.4)
<b>Total-NYCA</b>	<b>(21.1)</b>	<b>(18.8)</b>	<b>(18.6)</b>	<b>(24.7)</b>	<b>(23.2)</b>	<b>(25.8)</b>	<b>(23.1)</b>	<b>(31.2)</b>	<b>(97.4)</b>	<b>(31.0)</b>

## H.2. Study 2: Central (CE)

### Generic Transmission Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	3	6	12	7	12	13	11	6	10	7
Genessee	0	0	1	1	1	1	1	1	1	1
Central	13	22	19	21	29	25	34	24	25	30
North	1	(0)	1	(0)	(0)	0	(0)	0	0	0
Mohawk Valley	2	2	2	2	3	2	4	4	5	4
Capital	(33)	(36)	(40)	(32)	(43)	(48)	(49)	(42)	(48)	(51)
Hudson Valley	1	(1)	0	1	(0)	1	0	(0)	1	1
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	1	0	0
NY City	4	2	1	(5)	(2)	(26)	(7)	1	(5)	(10)
Long Island	(2)	(2)	(1)	(2)	(3)	(6)	(4)	(2)	(4)	(2)
<b>Total NYCA</b>	<b>(11)</b>	<b>(8)</b>	<b>(5)</b>	<b>(7)</b>	<b>(3)</b>	<b>(37)</b>	<b>(9)</b>	<b>(7)</b>	<b>(14)</b>	<b>(20)</b>
Imports	15	14	20	19	16	41	20	17	23	23
Exports	18	19	27	27	30	28	34	21	29	22
<b>NYCA + Imports - Exports</b>	<b>(13)</b>	<b>(13)</b>	<b>(13)</b>	<b>(15)</b>	<b>(17)</b>	<b>(24)</b>	<b>(23)</b>	<b>(12)</b>	<b>(19)</b>	<b>(18)</b>
Total IESO	11	8	7	9	7	15	11	9	13	18
Total PJM	10	13	7	7	8	(50)	14	33	15	12
Total ISONE	(18)	(20)	(27)	(29)	(33)	(47)	(35)	(35)	(35)	(30)
<b>Total System</b>	<b>(7)</b>	<b>(6)</b>	<b>(19)</b>	<b>(19)</b>	<b>(20)</b>	<b>(119)</b>	<b>(18)</b>	<b>(0)</b>	<b>(20)</b>	<b>(20)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	7	9	10	8	11	7	13	8	7	8
Genessee	5	7	8	5	8	8	10	6	8	6
Central	7	8	10	5	10	7	10	6	9	7
North	5	6	7	5	7	7	9	5	7	5
Mohawk Valley	7	8	9	8	10	10	11	9	11	10
Capital	(12)	(12)	(14)	(13)	(16)	(21)	(20)	(18)	(24)	(21)
Hudson Valley	(2)	(2)	(3)	(3)	(4)	(6)	(4)	(3)	(4)	(4)
Milwood	(0)	(0)	(1)	(1)	(1)	(1)	(1)	(0)	(1)	(0)
Dunwoodie	(1)	(0)	(1)	(1)	(2)	(3)	(1)	(1)	(1)	(1)
NY City	(7)	(5)	(9)	(13)	(15)	(25)	(12)	(7)	(10)	(10)
Long Island	(4)	(2)	(5)	(5)	(6)	(12)	(7)	(3)	(6)	(3)
<b>Total-NYCA</b>	<b>5</b>	<b>18</b>	<b>11</b>	<b>(5)</b>	<b>4</b>	<b>(29)</b>	<b>8</b>	<b>3</b>	<b>(5)</b>	<b>(3)</b>
Export	18	19	27	27	30	28	34	21	29	22
<b>NYCA+Export</b>	<b>23</b>	<b>37</b>	<b>38</b>	<b>22</b>	<b>34</b>	<b>(1)</b>	<b>42</b>	<b>24</b>	<b>24</b>	<b>19</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	13	19	25	16	27	26	30	18	27	18
Genessee	3	4	6	3	6	5	6	4	5	4
Central	73	99	89	109	110	139	160	104	118	129
North	7	8	10	6	10	10	12	8	9	7
Mohawk Valley	5	6	7	5	8	7	9	8	9	7
Capital	(45)	(49)	(57)	(45)	(60)	(72)	(71)	(65)	(79)	(80)
Hudson Valley	1	(1)	0	1	(1)	1	1	(0)	0	1
Milwood	(3)	(2)	(3)	(4)	(5)	(9)	(5)	(2)	(4)	(4)
Dunwoodie	0	0	0	0	0	0	0	1	0	0
NY City	3	2	(3)	(10)	(8)	(36)	(8)	(0)	(7)	(14)
Long Island	(3)	(2)	(3)	(4)	(5)	(10)	(6)	(3)	(6)	(2)
<b>Total-NYCA</b>	<b>54</b>	<b>84</b>	<b>69</b>	<b>77</b>	<b>81</b>	<b>61</b>	<b>127</b>	<b>71</b>	<b>72</b>	<b>65</b>
Import	15	14	20	19	16	41	20	17	23	23
<b>NYCA+Import</b>	<b>69</b>	<b>98</b>	<b>89</b>	<b>96</b>	<b>97</b>	<b>103</b>	<b>148</b>	<b>88</b>	<b>95</b>	<b>88</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(2)	(3)	(2)	(0)	(2)	(6)	(4)	(1)	(3)	1
Genessee	(1)	(0)	0	(0)	(0)	(1)	(1)	0	0	1
Central	(4)	(5)	(4)	(5)	(5)	(9)	(9)	(4)	(4)	(3)
North	0	0	1	0	1	1	0	1	1	1
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(1)	(0)	0
Capital	(18)	(20)	(23)	(18)	(25)	(31)	(32)	(23)	(31)	(25)
Hudson Valley	(7)	(9)	(10)	(8)	(12)	(15)	(14)	(7)	(9)	(7)
Milwood	(2)	(3)	(3)	(2)	(3)	(4)	(4)	(2)	(2)	(2)
Dunwoodie	(4)	(5)	(5)	(4)	(7)	(8)	(8)	(3)	(5)	(3)
NY City	(35)	(44)	(46)	(38)	(58)	(74)	(73)	(29)	(42)	(29)
Long Island	(16)	(19)	(21)	(16)	(25)	(33)	(34)	(13)	(20)	(12)
<b>Total-NYCA</b>	<b>(90)</b>	<b>(109)</b>	<b>(112)</b>	<b>(93)</b>	<b>(136)</b>	<b>(181)</b>	<b>(181)</b>	<b>(82)</b>	<b>(115)</b>	<b>(78)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.2	0.5	1.3	1.0	2.0	2.3	2.0	0.7	2.2	1.5
Genessee	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Central	0.3	1.0	1.2	1.5	2.5	1.9	2.7	2.3	2.5	3.1
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	0.1	0.1	0.2	0.3	0.2	0.3	0.4	0.5	0.3
Capital	(0.6)	(1.3)	(2.0)	(1.7)	(2.9)	(3.3)	(3.2)	(3.3)	(3.8)	(4.0)
Hudson Valley	0.0	(0.0)	0.0	0.1	(0.0)	0.1	0.0	(0.0)	0.1	0.2
Milwood	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	0.1	0.1	(1.0)	(0.0)	0.4	(0.2)	(0.6)
Long Island	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.3)	(0.2)	(0.3)	(0.2)
<b>Total-NYCA</b>	<b>0.1</b>	<b>0.4</b>	<b>0.8</b>	<b>1.0</b>	<b>1.8</b>	<b>(0.1)</b>	<b>1.7</b>	<b>0.4</b>	<b>1.2</b>	<b>0.4</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone -CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1.2%	2.4%	4.0%	2.3%	3.7%	3.6%	2.6%	0.5%	1.6%	0.9%
Genessee	1.0%	1.3%	3.7%	1.3%	3.5%	1.7%	4.0%	1.7%	1.6%	1.5%
Central	1.7%	3.1%	2.8%	2.8%	4.0%	2.9%	3.9%	2.1%	2.2%	2.4%
North	1.8%	-0.9%	1.5%	-1.2%	-0.5%	0.2%	-0.6%	0.1%	0.1%	0.3%
Mohawk Valley	2.7%	3.4%	4.3%	3.5%	5.8%	3.7%	6.6%	4.6%	5.3%	3.3%
Capital	-2.1%	-2.4%	-2.7%	-1.7%	-2.4%	-2.7%	-2.5%	-1.6%	-1.7%	-1.7%
Hudson Valley	1.0%	-1.4%	0.6%	2.0%	-0.5%	1.7%	0.6%	-0.2%	0.6%	0.7%
Milwood	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%	0.2%	0.1%	-0.1%	0.0%	-0.6%	-0.1%	0.1%	0.0%	-0.1%
Long Island	-0.2%	-0.2%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.1%	-0.2%	-0.1%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>0.2%</b>	<b>0.3%</b>	<b>-0.1%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.0%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.3	0.6	0.8	0.6	0.1	0.6	0.4
Genessee	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	0.3	0.4	0.2	0.3	0.3	0.3	0.3
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.6</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>0.4</b>	<b>0.9</b>	<b>0.7</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2.5%	5.7%	9.6%	5.3%	8.8%	8.8%	5.4%	0.8%	3.5%	1.9%
Genessee	4.0%	4.0%	8.7%	4.2%	9.5%	5.9%	11.1%	3.7%	3.7%	3.6%
Central	2.0%	6.9%	6.4%	11.7%	15.6%	5.9%	7.4%	4.7%	4.8%	4.7%
North	1.2%	-0.6%	1.0%	-0.6%	-0.3%	0.4%	-0.4%	0.0%	0.0%	0.3%
Mohawk Valley	1.7%	1.8%	2.2%	1.8%	2.6%	2.3%	3.0%	2.8%	2.8%	2.0%
Capital	-0.4%	-0.3%	-0.4%	-0.2%	-0.3%	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%
Hudson Valley	0.0%	0.1%	-0.2%	-0.1%	-0.1%	0.1%	0.3%	0.0%	0.3%	0.2%
Milwood	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	0.7%	0.5%	0.4%	-0.1%	0.1%	-0.9%	-0.1%	0.1%	0.2%	-0.3%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.6%
<b>Total-NYCA</b>	<b>2.0%</b>	<b>5.4%</b>	<b>7.0%</b>	<b>5.9%</b>	<b>8.8%</b>	<b>6.7%</b>	<b>5.2%</b>	<b>1.6%</b>	<b>3.5%</b>	<b>2.4%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1.7%	3.1%	5.8%	3.7%	5.2%	3.9%	3.8%	0.7%	1.9%	1.4%
Genessee	0.6%	0.6%	1.7%	0.7%	1.6%	0.6%	1.9%	0.8%	1.0%	0.9%
Central	1.0%	2.8%	2.1%	2.6%	3.3%	1.8%	2.7%	1.6%	1.8%	2.1%
North	1.0%	-0.6%	0.7%	-0.6%	-0.2%	0.3%	-0.2%	0.1%	0.0%	0.1%
Mohawk Valley	2.4%	3.1%	3.3%	3.3%	4.6%	1.7%	4.7%	4.7%	5.5%	3.3%
Capital	-1.1%	-1.4%	-1.6%	-1.0%	-1.3%	-1.5%	-1.4%	-1.1%	-1.1%	-1.1%
Hudson Valley	0.9%	-0.8%	0.3%	1.0%	-0.5%	0.7%	0.3%	-0.2%	0.5%	1.4%
Milwood	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	0.7%	1.1%	1.1%	0.4%	0.3%	-0.3%	0.4%	0.9%	0.3%	0.1%
Long Island	-0.2%	0.0%	-0.1%	-0.1%	-0.2%	0.0%	-0.2%	-0.1%	-0.1%	0.0%
<b>Total-NYCA</b>	<b>0.7%</b>	<b>1.2%</b>	<b>1.7%</b>	<b>1.1%</b>	<b>1.5%</b>	<b>1.0%</b>	<b>1.4%</b>	<b>0.6%</b>	<b>0.8%</b>	<b>0.8%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.47	0.59	0.66	0.52	0.72	0.43	0.79	0.50	0.45	0.46
Genessee	0.53	0.74	0.82	0.55	0.84	0.75	0.95	0.57	0.71	0.50
Central	0.40	0.52	0.62	0.29	0.61	0.40	0.60	0.32	0.47	0.30
North	0.71	0.90	0.97	0.73	1.04	1.03	1.22	0.75	0.91	0.70
Mohawk Valley	0.58	0.72	0.82	0.54	0.84	0.76	0.94	0.58	0.73	0.58
Capital	(0.87)	(0.91)	(1.07)	(0.95)	(1.17)	(1.47)	(1.42)	(1.16)	(1.58)	(1.35)
Hudson Valley	(0.19)	(0.16)	(0.22)	(0.28)	(0.35)	(0.53)	(0.36)	(0.22)	(0.30)	(0.29)
Milwood	(0.17)	(0.14)	(0.19)	(0.24)	(0.32)	(0.49)	(0.33)	(0.15)	(0.22)	(0.20)
Dunwoodie	(0.15)	(0.11)	(0.17)	(0.23)	(0.30)	(0.47)	(0.30)	(0.14)	(0.20)	(0.18)
NY City	(0.15)	(0.12)	(0.18)	(0.23)	(0.29)	(0.47)	(0.30)	(0.15)	(0.19)	(0.20)
Long Island	(0.19)	(0.12)	(0.20)	(0.20)	(0.26)	(0.49)	(0.32)	(0.12)	(0.22)	(0.12)
<b>NYCA Avg. LBMP</b>	<b>0.09</b>	<b>0.17</b>	<b>0.17</b>	<b>0.05</b>	<b>0.12</b>	<b>(0.05)</b>	<b>0.13</b>	<b>0.07</b>	<b>0.05</b>	<b>0.02</b>

Projected Changes in Generator GWh (2013-2022) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	130	151	240	147	214	247	237	81	186	121
Genessee	7	10	25	9	22	11	21	15	14	13
Central	317	486	426	402	549	406	579	372	395	428
North	16	(8)	11	(9)	(3)	1	(3)	2	1	4
Mohawk Valley	30	34	38	35	48	29	52	52	58	39
Capital	(720)	(759)	(823)	(518)	(703)	(760)	(724)	(584)	(634)	(620)
Hudson Valley	12	(15)	7	19	(6)	17	6	(4)	9	13
Milwood	0	0	0	0	(0)	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	1	0	0
NY City	102	48	42	(77)	(18)	(379)	(81)	47	(29)	(108)
Long Island	(31)	(30)	(17)	(29)	(34)	(73)	(47)	(22)	(36)	(24)
<b>Total-NYCA</b>	<b>(138)</b>	<b>(84)</b>	<b>(51)</b>	<b>(20)</b>	<b>69</b>	<b>(502)</b>	<b>40</b>	<b>(40)</b>	<b>(35)</b>	<b>(135)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(2.3)	(2.1)	(2.4)	(2.4)	(2.6)	(4.2)	(3.4)	(2.5)	(3.3)	(3.5)
Genessee	(1.0)	(0.9)	(1.1)	(1.1)	(1.3)	(1.7)	(1.7)	(1.1)	(1.5)	(1.6)
Central	(1.0)	(1.0)	(1.1)	(1.2)	(1.3)	(1.6)	(1.5)	(1.6)	(1.6)	(1.8)
North	(0.3)	(0.2)	(0.2)	(0.2)	(0.3)	(0.6)	(0.4)	(0.2)	(0.3)	(0.3)
Mohawk Valley	(0.0)	(0.0)	(0.1)	(0.1)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)
Capital	(1.7)	(1.5)	(1.6)	(2.2)	(2.1)	(2.1)	(2.0)	(3.0)	(2.8)	(2.9)
Hudson Valley	(1.4)	(1.1)	(1.4)	(1.6)	(1.5)	(1.5)	(1.5)	(2.6)	(2.3)	(2.5)
Milwood	(0.4)	(0.3)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.8)	(0.6)	(0.7)
Dunwoodie	(0.8)	(0.7)	(0.8)	(0.9)	(0.8)	(0.8)	(0.8)	(1.6)	(1.3)	(1.5)
NY City	(7.3)	(6.0)	(7.3)	(8.6)	(7.6)	(7.3)	(7.4)	(14.6)	(12.3)	(13.9)
Long Island	(2.9)	(2.3)	(2.9)	(3.5)	(3.0)	(2.6)	(2.7)	(5.9)	(5.0)	(5.7)
<b>Total-NYCA</b>	<b>(19.1)</b>	<b>(16.2)</b>	<b>(19.3)</b>	<b>(22.3)</b>	<b>(20.8)</b>	<b>(22.8)</b>	<b>(21.8)</b>	<b>(34.0)</b>	<b>(31.2)</b>	<b>(34.5)</b>

## Generic Generation Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(12)	(5)	(8)	(6)	(3)	1	(8)	(15)	(8)	(11)
Genessee	(1)	(1)	(0)	(1)	0	(0)	(0)	(1)	(1)	(1)
Central	(6)	(7)	(8)	(7)	(8)	(6)	(6)	(8)	(8)	(7)
North	(4)	(5)	(4)	(3)	(3)	(3)	(2)	(6)	(7)	(9)
Mohawk Valley	(1)	(1)	(1)	(1)	(0)	(0)	(1)	(1)	(1)	(1)
Capital	81	80	71	81	75	68	81	149	161	182
Hudson Valley	0	(1)	0	1	(1)	(1)	1	(1)	(2)	(3)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(10)	(9)	(9)	(10)	(7)	(9)	(9)	(23)	(23)	(35)
Long Island	(2)	(3)	(2)	(3)	(4)	(2)	(4)	(5)	(8)	(8)
<b>Total NYCA</b>	<b>46</b>	<b>47</b>	<b>37</b>	<b>50</b>	<b>48</b>	<b>47</b>	<b>52</b>	<b>89</b>	<b>102</b>	<b>107</b>
Imports	(30)	(30)	(12)	(17)	(16)	(20)	(17)	(28)	(16)	(25)
Exports	19	22	28	40	36	32	42	78	103	107
<b>NYCA + Imports - Exports</b>	<b>(3)</b>	<b>(4)</b>	<b>(3)</b>	<b>(7)</b>	<b>(5)</b>	<b>(5)</b>	<b>(7)</b>	<b>(17)</b>	<b>(18)</b>	<b>(25)</b>
Total IESO	(16)	(7)	(3)	(2)	(3)	(1)	(5)	(13)	(15)	(15)
Total PJM	(5)	(20)	(34)	(32)	(37)	(27)	(18)	(33)	(44)	(54)
Total ISONE	(15)	(19)	(18)	(30)	(18)	(23)	(26)	(49)	(56)	(57)
<b>Total System</b>	<b>9</b>	<b>1</b>	<b>(18)</b>	<b>(14)</b>	<b>(11)</b>	<b>(4)</b>	<b>2</b>	<b>(6)</b>	<b>(13)</b>	<b>(18)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(1)	(5)	(5)	(5)	(7)	(4)	(5)	(9)	(12)	(12)
Genessee	(3)	(3)	(4)	(5)	(5)	(4)	(5)	(8)	(8)	(10)
Central	(2)	(4)	(5)	(5)	(6)	(3)	(5)	(10)	(11)	(13)
North	(1)	(2)	(2)	(2)	(3)	(1)	(2)	(4)	(4)	(5)
Mohawk Valley	(2)	(2)	(2)	(3)	(3)	(2)	(3)	(5)	(5)	(6)
Capital	(9)	(8)	(11)	(11)	(12)	(11)	(13)	(22)	(28)	(31)
Hudson Valley	(2)	(2)	(3)	(4)	(4)	(3)	(3)	(5)	(6)	(8)
Milwood	(0)	(1)	(1)	(1)	(1)	(0)	(0)	(1)	(1)	(2)
Dunwoodie	(0)	(1)	(1)	(2)	(2)	(1)	(1)	(1)	(1)	(3)
NY City	(2)	(8)	(11)	(16)	(13)	(7)	(6)	(11)	(11)	(24)
Long Island	(1)	(3)	(5)	(6)	(5)	(5)	(2)	(5)	(7)	(11)
<b>Total-NYCA</b>	<b>(22)</b>	<b>(39)</b>	<b>(50)</b>	<b>(59)</b>	<b>(59)</b>	<b>(42)</b>	<b>(46)</b>	<b>(80)</b>	<b>(95)</b>	<b>(125)</b>
Export	19	22	28	40	36	32	42	78	103	107
<b>NYCA+Export</b>	<b>(4)</b>	<b>(17)</b>	<b>(22)</b>	<b>(18)</b>	<b>(23)</b>	<b>(10)</b>	<b>(4)</b>	<b>(2)</b>	<b>8</b>	<b>(17)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(14)	(10)	(14)	(13)	(10)	(6)	(14)	(28)	(22)	(27)
Genessee	(2)	(2)	(2)	(3)	(2)	(2)	(2)	(5)	(5)	(6)
Central	(43)	(40)	(46)	(41)	(52)	(50)	(50)	(69)	(71)	(70)
North	(6)	(8)	(7)	(7)	(7)	(5)	(6)	(12)	(14)	(16)
Mohawk Valley	(2)	(2)	(2)	(2)	(2)	(1)	(2)	(4)	(4)	(5)
Capital	66	69	53	68	59	53	61	121	125	146
Hudson Valley	0	(1)	(0)	0	(1)	(1)	1	(2)	(3)	(4)
Milwood	(2)	(3)	(3)	(4)	(5)	(3)	(3)	(4)	(5)	(9)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(8)	(12)	(14)	(19)	(13)	(11)	(10)	(26)	(27)	(48)
Long Island	(1)	(4)	(4)	(7)	(6)	(6)	(5)	(7)	(11)	(13)
<b>Total-NYCA</b>	<b>(11)</b>	<b>(14)</b>	<b>(40)</b>	<b>(29)</b>	<b>(39)</b>	<b>(31)</b>	<b>(29)</b>	<b>(35)</b>	<b>(37)</b>	<b>(53)</b>
Import	(30)	(30)	(12)	(17)	(16)	(20)	(17)	(28)	(16)	(25)
<b>NYCA+Import</b>	<b>(41)</b>	<b>(44)</b>	<b>(52)</b>	<b>(46)</b>	<b>(55)</b>	<b>(51)</b>	<b>(46)</b>	<b>(63)</b>	<b>(54)</b>	<b>(78)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	(1)	(0)	1	(0)	(0)	0	(0)	(2)	(1)
Genessee	(0)	(0)	(1)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
Central	2	1	1	2	2	2	1	2	1	1
North	0	0	0	0	0	0	0	0	0	0
Mohawk Valley	0	0	0	0	0	0	0	1	0	0
Capital	(5)	(4)	(6)	(5)	(5)	(7)	(8)	(11)	(18)	(19)
Hudson Valley	2	1	1	1	2	1	2	4	3	1
Milwood	1	0	1	0	1	0	1	2	2	1
Dunwoodie	2	1	1	1	2	1	2	4	4	3
NY City	16	10	14	12	16	11	20	36	36	27
Long Island	7	4	6	6	8	3	9	15	13	12
<b>Total-NYCA</b>	<b>27</b>	<b>13</b>	<b>17</b>	<b>19</b>	<b>25</b>	<b>11</b>	<b>27</b>	<b>52</b>	<b>38</b>	<b>25</b>



Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.5)	(0.4)	(1.0)	(0.9)	(0.4)	0.1	(1.2)	(3.0)	(1.7)	(2.0)
Genessee	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.2)	(0.1)	(0.1)
Central	(0.2)	(0.4)	(0.6)	(0.7)	(0.8)	(0.7)	(0.6)	(1.2)	(1.2)	(1.2)
North	(0.1)	(0.3)	(0.3)	(0.3)	(0.3)	(0.2)	(0.2)	(0.7)	(0.8)	(1.0)
Mohawk Valley	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)
Capital	1.9	3.5	4.2	5.6	6.2	5.4	6.4	14.5	15.8	18.0
Hudson Valley	0.0	(0.1)	0.0	0.1	(0.0)	(0.1)	0.1	(0.2)	(0.2)	(0.3)
Milwood	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)	(0.2)	(0.3)	(0.4)	(0.2)	(0.6)	(0.2)	(2.0)	(2.1)	(3.2)
Long Island	(0.0)	(0.1)	(0.1)	(0.2)	(0.4)	(0.2)	(0.3)	(0.4)	(0.7)	(0.7)
<b>Total-NYCA</b>	<b>0.8</b>	<b>1.9</b>	<b>1.7</b>	<b>3.2</b>	<b>4.0</b>	<b>3.6</b>	<b>3.8</b>	<b>6.8</b>	<b>8.7</b>	<b>9.4</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone– CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.1%	-1.8%	-3.3%	-2.0%	-0.8%	0.1%	-1.5%	-2.2%	-1.2%	-1.2%
Genessee	-3.1%	-2.5%	-0.9%	-1.7%	-0.2%	-1.0%	-0.9%	-2.5%	-2.3%	-2.0%
Central	-1.2%	-1.4%	-1.4%	-1.3%	-1.3%	-1.0%	-0.9%	-1.1%	-1.0%	-0.9%
North	-10.8%	-12.7%	-14.5%	-8.6%	-9.5%	-9.0%	-6.9%	-7.7%	-10.0%	-9.3%
Mohawk Valley	-1.9%	-2.6%	-1.7%	-1.6%	-0.3%	-0.7%	-1.3%	-0.9%	-1.5%	-1.7%
Capital	6.3%	6.4%	5.5%	5.7%	5.1%	4.5%	4.9%	7.1%	7.2%	7.6%
Hudson Valley	0.4%	-2.0%	0.0%	1.4%	-0.6%	-0.8%	1.4%	-1.3%	-1.2%	-1.4%
Milwood	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%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%	-0.2%	-0.5%	-0.5%	-0.7%
Long Island	-0.2%	-0.3%	-0.2%	-0.3%	-0.4%	-0.2%	-0.4%	-0.3%	-0.5%	-0.5%
<b>Total-NYCA</b>	<b>0.6%</b>	<b>0.7%</b>	<b>0.4%</b>	<b>0.6%</b>	<b>0.6%</b>	<b>0.5%</b>	<b>0.5%</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.8%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.3)	(0.1)	0.0	(0.3)	(0.8)	(0.4)	(0.5)
Genessee	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	(0.3)	(0.0)	(0.1)	(0.1)	(0.2)	(0.3)	(0.3)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.6)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.4)</b>	<b>(1.0)</b>	<b>(0.7)</b>	<b>(0.8)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-6.6%	-3.5%	-8.0%	-5.1%	-1.1%	0.4%	-2.9%	-4.6%	-2.2%	-2.2%
Genessee	-8.0%	-8.0%	-4.3%	-4.2%	0.0%	0.0%	-5.6%	-7.4%	-7.4%	-7.1%
Central	-4.5%	-5.7%	-1.5%	-11.5%	-1.4%	-2.5%	-1.1%	-3.9%	-4.6%	-4.5%
North	-8.0%	-9.6%	-8.5%	-5.2%	-5.2%	-4.3%	-3.2%	-6.3%	-7.9%	-8.3%
Mohawk Valley	-1.4%	-1.4%	-1.1%	-1.1%	-0.4%	-0.4%	-0.8%	-1.0%	-1.4%	-1.0%
Capital	1.5%	1.5%	1.2%	1.2%	1.1%	0.9%	1.0%	1.7%	1.8%	1.9%
Hudson Valley	0.2%	-0.2%	-0.1%	-0.3%	0.1%	0.0%	0.1%	0.2%	-0.4%	-2.0%
Milwood	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	-0.8%	-0.7%	-0.7%	-0.7%	-0.4%	-0.7%	-0.5%	-1.0%	0.2%	-2.3%
Long Island	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-0.3%
<b>Total-NYCA</b>	<b>-5.1%</b>	<b>-3.9%</b>	<b>-4.3%</b>	<b>-5.7%</b>	<b>-1.0%</b>	<b>-0.4%</b>	<b>-2.1%</b>	<b>-4.0%</b>	<b>-2.5%</b>	<b>-2.6%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	(0.0)	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.0)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.4%	-2.4%	-4.9%	-2.6%	-1.0%	0.6%	-2.0%	-3.0%	-1.9%	-1.3%
Genessee	-2.3%	-1.6%	-1.0%	-1.3%	-0.4%	-0.4%	-0.6%	-2.0%	-1.9%	-1.7%
Central	-3.4%	-4.2%	-3.1%	-4.3%	-3.1%	-2.9%	-2.3%	-3.4%	-3.3%	-3.4%
North	-6.2%	-7.5%	-6.5%	-4.0%	-3.7%	-3.0%	-2.5%	-5.1%	-6.4%	-6.7%
Mohawk Valley	-2.2%	-2.5%	-1.4%	-1.5%	0.0%	-0.6%	-0.7%	-0.7%	-1.3%	-1.9%
Capital	3.8%	3.7%	3.0%	3.1%	2.7%	2.1%	2.5%	4.1%	4.3%	4.5%
Hudson Valley	0.5%	-1.0%	-0.4%	0.8%	-0.5%	-0.4%	0.7%	-1.0%	-1.1%	-1.2%
Milwood	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%	0.0%	0.0%	-0.5%	0.2%	-1.0%	0.1%	-1.0%	-0.6%	-1.5%
Long Island	-0.1%	-0.3%	-0.1%	-0.4%	-0.5%	-0.1%	-0.2%	-0.2%	-0.4%	-0.5%
<b>Total-NYCA</b>	<b>-1.4%</b>	<b>-1.2%</b>	<b>-1.4%</b>	<b>-1.2%</b>	<b>-0.6%</b>	<b>-0.4%</b>	<b>-0.7%</b>	<b>-1.4%</b>	<b>-1.1%</b>	<b>-1.1%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.06)	(0.31)	(0.30)	(0.29)	(0.41)	(0.23)	(0.27)	(0.53)	(0.67)	(0.69)
Genessee	(0.25)	(0.27)	(0.34)	(0.37)	(0.44)	(0.29)	(0.37)	(0.63)	(0.68)	(0.81)
Central	(0.14)	(0.21)	(0.27)	(0.28)	(0.35)	(0.16)	(0.27)	(0.54)	(0.61)	(0.73)
North	(0.21)	(0.25)	(0.29)	(0.32)	(0.39)	(0.21)	(0.32)	(0.57)	(0.57)	(0.68)
Mohawk Valley	(0.22)	(0.27)	(0.32)	(0.35)	(0.41)	(0.23)	(0.34)	(0.62)	(0.66)	(0.79)
Capital	(0.67)	(0.59)	(0.76)	(0.72)	(0.81)	(0.74)	(0.88)	(1.43)	(1.90)	(2.04)
Hudson Valley	(0.19)	(0.23)	(0.30)	(0.34)	(0.37)	(0.25)	(0.29)	(0.44)	(0.52)	(0.71)
Milwood	(0.12)	(0.18)	(0.23)	(0.27)	(0.28)	(0.17)	(0.19)	(0.28)	(0.31)	(0.52)
Dunwoodie	(0.10)	(0.17)	(0.22)	(0.26)	(0.27)	(0.15)	(0.17)	(0.25)	(0.28)	(0.48)
NY City	(0.09)	(0.16)	(0.21)	(0.24)	(0.26)	(0.16)	(0.16)	(0.24)	(0.26)	(0.44)
Long Island	(0.08)	(0.14)	(0.19)	(0.18)	(0.20)	(0.17)	(0.12)	(0.22)	(0.30)	(0.37)
<b>NYCA Avg. LBMP</b>	<b>(0.19)</b>	<b>(0.25)</b>	<b>(0.31)</b>	<b>(0.33)</b>	<b>(0.38)</b>	<b>(0.25)</b>	<b>(0.31)</b>	<b>(0.52)</b>	<b>(0.61)</b>	<b>(0.75)</b>

Projected Changes in Generator GWh (2013-2022) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(230)	(105)	(172)	(91)	(29)	22	(87)	(216)	(114)	(122)
Genessee	(25)	(20)	(7)	(13)	(1)	(7)	(5)	(21)	(20)	(17)
Central	(140)	(157)	(186)	(128)	(143)	(93)	(83)	(129)	(116)	(98)
North	(103)	(126)	(100)	(62)	(56)	(45)	(36)	(92)	(109)	(123)
Mohawk Valley	(26)	(29)	(18)	(18)	(4)	(8)	(12)	(14)	(20)	(22)
Capital	2,070	2,010	1,625	1,627	1,428	1,199	1,378	2,400	2,457	2,656
Hudson Valley	4	(25)	2	14	(8)	(8)	12	(18)	(29)	(34)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(246)	(209)	(186)	(185)	(128)	(143)	(147)	(315)	(311)	(452)
Long Island	(35)	(55)	(28)	(48)	(61)	(32)	(52)	(52)	(89)	(77)
<b>Total-NYCA</b>	<b>1,270</b>	<b>1,286</b>	<b>930</b>	<b>1,096</b>	<b>998</b>	<b>884</b>	<b>968</b>	<b>1,543</b>	<b>1,649</b>	<b>1,711</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1.9	1.3	1.1	1.1	1.3	1.0	1.6	3.1	2.7	3.4
Genessee	0.8	0.6	0.5	0.5	0.5	0.4	0.6	1.3	1.1	1.3
Central	0.4	0.4	0.2	0.3	0.3	0.3	0.4	0.8	0.8	0.9
North	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.6	0.6	0.8
Mohawk Valley	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Capital	(0.5)	(0.1)	(0.3)	(0.3)	(0.3)	(0.1)	(0.0)	(0.5)	(0.4)	(0.6)
Hudson Valley	(0.2)	0.2	(0.2)	(0.1)	0.0	0.1	0.2	0.2	0.3	0.6
Milwood	(0.0)	0.1	(0.0)	(0.0)	0.0	0.1	0.0	0.1	0.1	0.2
Dunwoodie	(0.0)	0.2	(0.0)	0.0	0.1	0.1	0.2	0.2	0.4	0.6
NY City	(0.0)	2.0	(0.1)	0.5	1.4	2.1	2.1	2.4	4.5	6.4
Long Island	(0.2)	0.8	(0.1)	0.2	0.5	0.5	0.8	0.9	1.8	2.5
<b>Total-NYCA</b>	<b>2.4</b>	<b>5.9</b>	<b>1.3</b>	<b>2.6</b>	<b>4.2</b>	<b>4.8</b>	<b>6.1</b>	<b>9.1</b>	<b>12.1</b>	<b>16.2</b>

## Generic DR Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(3)	2	2	(0)	0	1	(9)	(1)	(1)	(0)
Genessee	(0)	0	0	(0)	0	0	0	0	(0)	0
Central	0	0	1	(0)	(1)	(1)	(2)	(0)	(1)	0
North	0	0	1	(0)	1	0	0	0	(0)	(0)
Mohawk Valley	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)
Capital	0	3	2	(1)	1	2	(2)	1	(1)	(2)
Hudson Valley	(0)	0	1	1	(0)	0	1	0	1	(0)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	(2)	(8)	3	1	(2)	2	3	(0)	2
Long Island	(0)	1	1	(0)	(0)	1	1	(1)	0	0
<b>Total NYCA</b>	<b>(2)</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>(8)</b>	<b>3</b>	<b>(1)</b>	<b>(0)</b>
Imports	0	(5)	(1)	(0)	(1)	(1)	4	(4)	(2)	(2)
Exports	1	1	4	4	3	2	(1)	3	0	2
<b>NYCA + Imports - Exports</b>	<b>(3)</b>	<b>(2)</b>	<b>(4)</b>	<b>(2)</b>	<b>(2)</b>	<b>(2)</b>	<b>(4)</b>	<b>(4)</b>	<b>(3)</b>	<b>(4)</b>
Total IESO	1	(0)	(0)	1	2	0	(1)	(2)	0	2
Total PJM	(4)	(7)	(1)	(6)	1	(1)	(1)	(0)	(2)	(10)
Total ISONE	2	(2)	(1)	(1)	2	(1)	(0)	(1)	3	4
<b>Total System</b>	<b>(3)</b>	<b>(4)</b>	<b>(1)</b>	<b>(5)</b>	<b>6</b>	<b>(1)</b>	<b>(10)</b>	<b>(1)</b>	<b>0</b>	<b>(4)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	0	0	(1)	(1)	1	1	3	1	(1)
Genessee	0	0	(1)	(1)	(1)	0	2	1	(0)	(0)
Central	0	0	(2)	(0)	1	0	2	2	0	(1)
North	0	0	(0)	(1)	(1)	0	1	1	0	(0)
Mohawk Valley	0	0	(1)	(1)	(0)	0	1	1	0	(0)
Capital	0	(1)	(1)	(1)	(1)	(1)	(1)	1	(1)	(3)
Hudson Valley	(1)	(2)	(1)	(3)	(3)	(2)	(3)	(2)	(3)	(5)
Milwood	0	(0)	0	(1)	(0)	(0)	(0)	0	(0)	(1)
Dunwoodie	0	(0)	0	(1)	(1)	(1)	(1)	(0)	(1)	(2)
NY City	2	(2)	1	(10)	(7)	(6)	(7)	(0)	(5)	(12)
Long Island	1	(1)	(0)	(4)	(3)	(3)	(2)	2	1	1
<b>Total-NYCA</b>	<b>4</b>	<b>(4)</b>	<b>(4)</b>	<b>(25)</b>	<b>(16)</b>	<b>(12)</b>	<b>(8)</b>	<b>7</b>	<b>(7)</b>	<b>(24)</b>
Export	1	1	4	4	3	2	(1)	3	0	2
<b>NYCA+Export</b>	<b>5</b>	<b>(3)</b>	<b>(1)</b>	<b>(22)</b>	<b>(14)</b>	<b>(10)</b>	<b>(9)</b>	<b>9</b>	<b>(7)</b>	<b>(22)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(2)	2	1	(3)	(1)	0	(4)	2	(1)	(0)
Genessee	0	0	(0)	(1)	(0)	0	1	0	(0)	(0)
Central	2	4	10	(5)	(9)	(3)	0	0	(3)	(1)
North	1	0	0	(1)	(0)	0	1	1	(0)	(1)
Mohawk Valley	0	(0)	(0)	(0)	0	(0)	1	0	0	(0)
Capital	2	3	1	(2)	0	1	(1)	4	(1)	(5)
Hudson Valley	(0)	(0)	1	(0)	(1)	0	1	0	1	(1)
Milwood	1	(0)	0	(2)	(2)	(1)	(2)	0	(0)	(3)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	2	(4)	(5)	(5)	(3)	(5)	(2)	2	(6)	(8)
Long Island	0	0	1	(3)	(1)	(1)	(0)	0	0	1
<b>Total-NYCA</b>	<b>5</b>	<b>5</b>	<b>9</b>	<b>(21)</b>	<b>(18)</b>	<b>(8)</b>	<b>(6)</b>	<b>10</b>	<b>(10)</b>	<b>(20)</b>
Import	0	(5)	(1)	(0)	(1)	(1)	4	(4)	(2)	(2)
<b>NYCA+Import</b>	<b>5</b>	<b>1</b>	<b>8</b>	<b>(22)</b>	<b>(19)</b>	<b>(9)</b>	<b>(2)</b>	<b>6</b>	<b>(12)</b>	<b>(22)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(0)	1	0	1	1	(1)	2	1	(0)
Genessee	(0)	(0)	(0)	0	0	(0)	0	(0)	(0)	(0)
Central	(0)	(0)	(1)	2	3	0	(0)	0	0	(1)
North	0	(0)	0	0	0	(0)	(0)	0	0	(0)
Mohawk Valley	(0)	(0)	(0)	0	1	(0)	(0)	0	0	(0)
Capital	1	(0)	1	1	1	(0)	(2)	0	0	(2)
Hudson Valley	(0)	(1)	1	(0)	0	(1)	(3)	(1)	(1)	(3)
Milwood	0	(0)	0	(0)	0	(0)	(1)	(0)	(0)	(1)
Dunwoodie	0	(0)	1	(0)	0	(1)	(2)	(1)	(1)	(2)
NY City	1	(4)	6	(1)	1	(6)	(15)	(5)	(4)	(13)
Long Island	1	(2)	1	(0)	1	(3)	(6)	1	1	0
<b>Total-NYCA</b>	<b>3</b>	<b>(8)</b>	<b>9</b>	<b>1</b>	<b>8</b>	<b>(11)</b>	<b>(29)</b>	<b>(5)</b>	<b>(4)</b>	<b>(20)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.2)	0.2	0.3	(0.0)	0.1	0.1	(1.3)	0.0	(0.2)	0.1
Genessee	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	(0.2)	(0.2)	(0.3)	(0.1)	(0.0)	0.1
North	0.0	0.0	0.1	0.0	0.1	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	0.1	0.1	(0.1)	0.1	0.1	(0.2)	0.1	(0.1)	(0.2)
Hudson Valley	0.0	0.0	0.1	0.1	(0.0)	0.0	0.1	0.0	0.2	0.0
Milwood	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)	(0.1)	(0.8)	0.3	0.0	(0.1)	0.2	0.3	(0.1)	0.2
Long Island	(0.0)	0.1	0.1	(0.0)	0.0	0.1	0.1	(0.1)	0.0	0.0
<b>Total-NYCA</b>	<b>(0.2)</b>	<b>0.2</b>	<b>(0.2)</b>	<b>0.2</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(1.3)</b>	<b>0.3</b>	<b>(0.2)</b>	<b>0.2</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-0.9%	0.7%	0.9%	-0.1%	0.1%	0.2%	-1.6%	0.0%	-0.1%	0.1%
Genessee	-0.3%	0.1%	0.3%	-0.3%	1.0%	0.1%	0.1%	0.0%	-0.1%	0.1%
Central	0.0%	-0.1%	0.1%	0.0%	-0.3%	-0.3%	-0.4%	0.0%	0.0%	0.0%
North	0.9%	0.3%	3.5%	0.0%	1.6%	0.6%	0.9%	0.3%	-0.3%	-0.2%
Mohawk Valley	0.1%	-0.6%	0.4%	-0.1%	0.5%	-0.8%	0.1%	-0.1%	0.2%	-0.2%
Capital	0.0%	0.2%	0.1%	0.0%	0.1%	0.1%	-0.1%	0.0%	0.0%	-0.1%
Hudson Valley	-0.2%	0.2%	1.8%	1.0%	-0.5%	0.5%	0.9%	0.0%	0.8%	0.0%
Milwood	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%	-0.1%	-0.5%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Long Island	-0.1%	0.2%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
<b>Total-NYCA</b>	<b>-0.1%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>-0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.0)	0.0	0.0	(0.4)	0.0	(0.1)	0.1
Genessee	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	0.1	(0.1)	(0.2)	(0.2)	(0.0)	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.6)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-2.2%	1.6%	2.1%	-0.1%	0.1%	0.2%	-3.8%	0.2%	-0.3%	0.3%
Genessee	0.0%	0.0%	0.0%	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%
Central	0.0%	-1.8%	-2.0%	1.9%	-3.1%	-4.0%	-3.1%	-0.2%	0.9%	0.3%
North	0.6%	0.3%	2.0%	0.0%	0.7%	0.4%	0.4%	0.3%	-0.3%	-0.3%
Mohawk Valley	0.0%	-0.4%	0.0%	0.0%	0.4%	-0.4%	0.0%	0.0%	0.3%	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%	-0.1%	0.0%	-0.3%	-0.1%	0.1%	-0.1%	0.0%	-0.5%	-1.6%
Milwood	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%	-2.1%	0.3%	0.0%	-0.1%	-0.1%	0.2%	-0.3%	-0.6%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	-0.2%
<b>Total-NYCA</b>	<b>-1.1%</b>	<b>0.0%</b>	<b>0.2%</b>	<b>0.4%</b>	<b>-0.6%</b>	<b>-0.9%</b>	<b>-3.1%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.2%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.3%	1.2%	1.8%	-0.1%	0.2%	0.9%	-3.0%	0.2%	-0.2%	0.2%
Genessee	-0.2%	0.1%	0.2%	0.0%	0.6%	0.2%	0.3%	0.1%	-0.1%	0.1%
Central	0.1%	-0.3%	-0.1%	0.3%	-0.8%	-1.1%	-1.0%	0.0%	0.1%	0.1%
North	0.5%	0.2%	1.5%	0.0%	0.6%	0.2%	0.3%	0.2%	-0.1%	-0.2%
Mohawk Valley	0.2%	-0.7%	0.6%	0.0%	0.2%	-0.4%	0.0%	0.0%	0.1%	-0.4%
Capital	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	-0.1%	0.0%	0.0%	0.0%
Hudson Valley	0.1%	0.2%	1.0%	0.5%	-0.2%	-0.1%	0.6%	0.0%	0.6%	-0.2%
Milwood	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%	-0.6%	-3.1%	0.0%	-0.4%	-0.3%	0.2%	0.3%	0.3%	0.3%
Long Island	-0.1%	0.0%	0.0%	-0.1%	-0.1%	0.1%	0.1%	-0.1%	-0.1%	0.0%
<b>Total-NYCA</b>	-0.4%	0.1%	-0.2%	0.0%	-0.1%	0.0%	-0.8%	0.1%	0.0%	0.1%

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.04	0.02	0.01	(0.08)	(0.06)	0.06	0.04	0.14	0.09	(0.05)
Genessee	0.02	0.03	(0.05)	(0.10)	(0.10)	0.00	0.11	0.06	0.00	(0.05)
Central	0.02	0.02	(0.09)	(0.04)	0.01	0.02	0.08	0.08	0.03	(0.07)
North	0.02	0.03	(0.06)	(0.09)	(0.10)	0.00	0.09	0.07	0.01	(0.05)
Mohawk Valley	0.03	0.02	(0.06)	(0.08)	(0.05)	0.01	0.07	0.07	0.01	(0.07)
Capital	0.04	0.00	(0.03)	(0.06)	(0.10)	(0.03)	(0.03)	0.07	0.03	(0.12)
Hudson Valley	0.03	(0.01)	0.01	(0.11)	(0.12)	(0.07)	(0.08)	0.02	(0.01)	(0.14)
Milwood	0.02	(0.01)	0.03	(0.11)	(0.12)	(0.08)	(0.10)	0.01	(0.02)	(0.16)
Dunwoodie	0.03	0.00	0.03	(0.11)	(0.12)	(0.08)	(0.09)	0.00	(0.02)	(0.16)
NY City	0.03	(0.01)	0.03	(0.11)	(0.11)	(0.08)	(0.09)	0.02	(0.01)	(0.14)
Long Island	0.04	(0.01)	(0.01)	(0.11)	(0.11)	(0.08)	(0.03)	0.06	0.05	(0.01)
<b>NYCA Avg. LBMP</b>	<b>0.03</b>	<b>0.01</b>	<b>(0.02)</b>	<b>(0.09)</b>	<b>(0.09)</b>	<b>(0.03)</b>	<b>(0.00)</b>	<b>0.05</b>	<b>0.01</b>	<b>(0.09)</b>

Projected Changes in Generator GWh (2013-2022) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(66)	36	46	(9)	7	0	(111)	(6)	(19)	3
Genessee	(2)	1	2	(2)	6	0	(0)	0	(1)	1
Central	(4)	(10)	13	(1)	(24)	(24)	(34)	(3)	(1)	1
North	8	3	24	0	8	3	4	3	(3)	(2)
Mohawk Valley	0	(6)	3	(1)	4	(6)	1	(1)	2	(3)
Capital	10	79	39	(12)	19	18	(26)	5	(29)	(38)
Hudson Valley	(1)	2	21	9	(4)	4	10	0	16	0
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	8	(32)	(118)	42	7	(31)	39	31	(12)	13
Long Island	(8)	25	17	(7)	1	13	6	(5)	5	3
<b>Total-NYCA</b>	<b>(54)</b>	<b>99</b>	<b>44</b>	<b>20</b>	<b>23</b>	<b>(23)</b>	<b>(111)</b>	<b>24</b>	<b>(41)</b>	<b>(22)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.1	(0.0)	0.2	0.0	0.1	0.0	(0.0)	(0.3)	0.0	(0.1)
Genessee	0.1	(0.0)	0.0	(0.0)	(0.1)	(0.0)	0.1	(0.0)	0.0	(0.0)
Central	0.0	0.0	(0.0)	(0.1)	(0.1)	0.0	0.1	(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)	(0.1)	(0.0)	0.0	(0.0)	0.0	0.0
Capital	(0.2)	0.0	(0.1)	(0.1)	(0.1)	(0.0)	0.2	(0.0)	0.1	0.1
Hudson Valley	(0.2)	(0.0)	(0.2)	(0.3)	(0.2)	(0.2)	0.1	(0.1)	(0.1)	0.0
Milwood	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	0.1	0.0	0.0	0.0
Dunwoodie	(0.0)	0.1	(0.1)	(0.1)	(0.0)	(0.1)	0.1	0.0	0.0	0.1
NY City	(0.3)	0.4	(0.3)	(1.0)	(0.3)	(0.4)	0.9	0.3	0.4	1.0
Long Island	(0.3)	0.2	(0.2)	(0.5)	(0.2)	(0.3)	0.4	(0.6)	0.0	0.4
<b>Total-NYCA</b>	<b>(0.8)</b>	<b>0.6</b>	<b>(0.8)</b>	<b>(2.1)</b>	<b>(1.1)</b>	<b>(0.9)</b>	<b>1.9</b>	<b>(0.8)</b>	<b>0.6</b>	<b>1.6</b>

## Generic EE Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(14)	(3)	(1)	(4)	(3)	(4)	(12)	(7)	(6)	(7)
Genessee	(1)	(0)	(0)	(1)	0	(1)	(0)	(1)	(0)	(1)
Central	(1)	(3)	(7)	(4)	(5)	(7)	(2)	(3)	(2)	(1)
North	(2)	(2)	(1)	(1)	(1)	(1)	(1)	(3)	(4)	(2)
Mohawk Valley	(1)	(1)	(1)	(1)	(0)	(1)	(0)	(1)	(1)	(1)
Capital	(24)	(24)	(28)	(29)	(29)	(35)	(41)	(35)	(35)	(32)
Hudson Valley	(1)	(3)	(2)	(2)	(3)	(4)	(2)	(1)	(5)	(4)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(33)	(32)	(35)	(36)	(36)	(43)	(44)	(49)	(56)	(61)
Long Island	(3)	(3)	(3)	(4)	(3)	(5)	(4)	(4)	(6)	(7)
<b>Total NYCA</b>	<b>(79)</b>	<b>(71)</b>	<b>(78)</b>	<b>(82)</b>	<b>(80)</b>	<b>(99)</b>	<b>(106)</b>	<b>(103)</b>	<b>(114)</b>	<b>(116)</b>
Imports	(23)	(29)	(22)	(25)	(35)	(25)	(28)	(26)	(19)	(19)
Exports	22	27	29	41	38	41	36	57	63	75
<b>NYCA + Imports - Exports</b>	<b>(125)</b>	<b>(127)</b>	<b>(129)</b>	<b>(148)</b>	<b>(153)</b>	<b>(165)</b>	<b>(171)</b>	<b>(186)</b>	<b>(196)</b>	<b>(210)</b>
Total IESO	(4)	(1)	(0)	(0)	(1)	0	1	(9)	(4)	(3)
Total PJM	(21)	(21)	(23)	(32)	(36)	(40)	(34)	(27)	(34)	(53)
Total ISONE	(19)	(22)	(20)	(30)	(25)	(29)	(24)	(37)	(35)	(34)
<b>Total System</b>	<b>(124)</b>	<b>(115)</b>	<b>(122)</b>	<b>(145)</b>	<b>(143)</b>	<b>(167)</b>	<b>(163)</b>	<b>(175)</b>	<b>(189)</b>	<b>(205)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	1	(1)	(2)	(0)	(1)	1	(2)	(3)	(5)
Genessee	0	0	(0)	(2)	(0)	(1)	1	(1)	(2)	(4)
Central	1	1	(0)	(1)	1	0	2	(1)	(3)	(6)
North	0	1	0	(1)	(0)	(0)	1	(0)	(1)	(2)
Mohawk Valley	(0)	0	(0)	(1)	(0)	(0)	0	(1)	(2)	(3)
Capital	(47)	(48)	(50)	(57)	(61)	(64)	(66)	(72)	(80)	(87)
Hudson Valley	(42)	(43)	(44)	(50)	(53)	(55)	(57)	(64)	(69)	(74)
Milwood	(1)	(1)	(1)	(1)	(2)	(1)	(1)	(2)	(2)	(3)
Dunwoodie	(2)	(3)	(2)	(3)	(3)	(3)	(2)	(3)	(5)	(6)
NY City	(61)	(68)	(65)	(76)	(83)	(82)	(84)	(98)	(113)	(126)
Long Island	(3)	(5)	(4)	(6)	(8)	(7)	(3)	(5)	(12)	(13)
<b>Total-NYCA</b>	<b>(152)</b>	<b>(165)</b>	<b>(168)</b>	<b>(201)</b>	<b>(210)</b>	<b>(214)</b>	<b>(208)</b>	<b>(250)</b>	<b>(291)</b>	<b>(327)</b>
Export	22	27	29	41	38	41	36	57	63	75
<b>NYCA+Export</b>	<b>(129)</b>	<b>(139)</b>	<b>(138)</b>	<b>(160)</b>	<b>(171)</b>	<b>(173)</b>	<b>(172)</b>	<b>(194)</b>	<b>(228)</b>	<b>(252)</b>



Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(10)	(2)	(2)	(7)	(2)	(4)	(8)	(8)	(8)	(14)
Genessee	(0)	(0)	(0)	(1)	(0)	(1)	0	(1)	(1)	(2)
Central	(9)	(5)	(15)	(24)	(18)	(27)	(9)	(20)	(21)	(25)
North	(1)	(1)	(1)	(3)	(1)	(1)	0	(3)	(5)	(5)
Mohawk Valley	(0)	(0)	(0)	(1)	0	(0)	0	(1)	(1)	(3)
Capital	(31)	(30)	(36)	(38)	(38)	(43)	(48)	(47)	(54)	(55)
Hudson Valley	(1)	(3)	(2)	(2)	(3)	(4)	(3)	(3)	(6)	(6)
Milwood	(5)	(6)	(5)	(6)	(8)	(6)	(6)	(7)	(10)	(13)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(39)	(43)	(43)	(50)	(51)	(56)	(56)	(69)	(84)	(94)
Long Island	(4)	(6)	(5)	(8)	(7)	(9)	(5)	(7)	(13)	(14)
<b>Total-NYCA</b>	<b>(102)</b>	<b>(97)</b>	<b>(110)</b>	<b>(141)</b>	<b>(128)</b>	<b>(152)</b>	<b>(134)</b>	<b>(166)</b>	<b>(205)</b>	<b>(231)</b>
Import	(23)	(29)	(22)	(25)	(35)	(26)	(28)	(26)	(19)	(19)
<b>NYCA+Import</b>	<b>(125)</b>	<b>(126)</b>	<b>(132)</b>	<b>(166)</b>	<b>(163)</b>	<b>(177)</b>	<b>(162)</b>	<b>(192)</b>	<b>(223)</b>	<b>(251)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(1)	(1)	(0)	(0)	(1)	(1)	(1)	(1)	(1)
Genessee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
Central	(0)	(1)	(0)	2	2	1	(0)	0	(0)	(1)
North	0	0	0	0	0	0	(0)	0	0	0
Mohawk Valley	(0)	(0)	(0)	0	0	(0)	(0)	(0)	(0)	(0)
Capital	(8)	(9)	(10)	(7)	(10)	(10)	(12)	(9)	(14)	(14)
Hudson Valley	(7)	(8)	(7)	(5)	(8)	(7)	(10)	(8)	(10)	(10)
Milwood	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)	(2)	(2)
Dunwoodie	(2)	(3)	(2)	(1)	(3)	(2)	(3)	(3)	(3)	(3)
NY City	(23)	(31)	(23)	(17)	(31)	(27)	(39)	(30)	(39)	(40)
Long Island	(3)	(6)	(4)	(1)	(6)	(5)	(8)	(2)	(6)	(4)
<b>Total-NYCA</b>	<b>(44)</b>	<b>(60)</b>	<b>(49)</b>	<b>(31)</b>	<b>(58)</b>	<b>(53)</b>	<b>(76)</b>	<b>(53)</b>	<b>(76)</b>	<b>(75)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.6)	(0.3)	(0.2)	(0.6)	(0.6)	(0.6)	(2.0)	(1.5)	(1.2)	(1.3)
Genessee	(0.0)	(0.0)	(0.0)	(0.1)	0.0	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)
Central	(0.1)	(0.3)	(0.5)	(0.3)	(0.6)	(0.8)	(0.3)	(0.4)	(0.2)	(0.1)
North	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.3)	(0.4)	(0.2)
Mohawk Valley	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	(0.1)	(0.0)	(0.1)	(0.1)	(0.2)
Capital	(0.5)	(0.9)	(1.5)	(1.8)	(2.1)	(2.4)	(2.8)	(3.0)	(3.1)	(2.7)
Hudson Valley	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	(0.2)	(0.5)	(0.4)
Milwood	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	(0.5)	(0.9)	(1.5)	(1.7)	(2.0)	(2.5)	(2.4)	(4.3)	(5.0)	(5.4)
Long Island	(0.1)	(0.1)	(0.2)	(0.3)	(0.3)	(0.4)	(0.3)	(0.4)	(0.6)	(0.6)
<b>Total-NYCA</b>	<b>(1.9)</b>	<b>(2.7)</b>	<b>(4.1)</b>	<b>(5.1)</b>	<b>(5.9)</b>	<b>(7.1)</b>	<b>(8.2)</b>	<b>(10.1)</b>	<b>(11.1)</b>	<b>(11.0)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.7%	-1.2%	-0.5%	-1.4%	-1.0%	-1.0%	-2.6%	-1.1%	-0.9%	-0.8%
Genessee	-1.8%	-1.0%	-0.2%	-1.6%	0.0%	-1.7%	-0.2%	-1.1%	-0.7%	-1.1%
Central	-0.3%	-0.8%	-1.2%	-0.6%	-1.0%	-1.1%	-0.4%	-0.4%	-0.1%	-0.1%
North	-4.9%	-5.4%	-4.9%	-3.5%	-2.2%	-2.3%	-2.8%	-3.2%	-4.9%	-2.2%
Mohawk Valley	-1.6%	-1.3%	-1.4%	-1.4%	-0.3%	-1.0%	-0.5%	-0.7%	-0.9%	-1.5%
Capital	-1.6%	-1.6%	-1.9%	-1.8%	-1.7%	-2.0%	-2.2%	-1.5%	-1.4%	-1.1%
Hudson Valley	-2.2%	-4.3%	-2.6%	-2.2%	-3.5%	-4.8%	-2.9%	-1.3%	-2.5%	-1.9%
Milwood	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%	-1.3%	-1.3%	-1.1%	-1.1%	-1.1%	-1.1%	-1.1%	-1.2%	-1.2%
Long Island	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%	-0.3%	-0.3%	-0.4%	-0.4%
<b>Total-NYCA</b>	<b>-1.5%</b>	<b>-1.2%</b>	<b>-1.3%</b>	<b>-1.2%</b>	<b>-1.1%</b>	<b>-1.2%</b>	<b>-1.3%</b>	<b>-1.0%</b>	<b>-1.0%</b>	<b>-0.9%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.2)	(0.1)	(0.2)	(0.7)	(0.4)	(0.3)	(0.3)
Genessee	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	(0.2)	(0.2)	(0.1)	(0.0)	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.4)</b>	<b>(0.8)</b>	<b>(0.4)</b>	<b>(0.2)</b>	<b>(0.3)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-8.5%	-2.7%	-0.6%	-3.3%	-2.1%	-2.2%	-5.9%	-2.2%	-1.9%	-1.5%
Genessee	-4.0%	-4.0%	0.0%	-4.2%	0.0%	-5.6%	0.0%	-3.7%	-3.7%	-3.6%
Central	-1.9%	-5.2%	-2.4%	0.9%	-6.8%	-5.8%	-1.6%	-0.3%	2.1%	0.4%
North	-3.6%	-4.1%	-3.0%	-1.9%	-1.0%	-1.1%	-1.4%	-2.7%	-3.9%	-2.1%
Mohawk Valley	-1.0%	-0.7%	-0.7%	-0.7%	0.0%	-0.4%	-0.4%	-0.3%	-0.7%	-0.7%
Capital	-0.3%	-0.3%	-0.3%	-0.3%	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	-0.2%
Hudson Valley	0.2%	-0.2%	0.1%	-0.4%	-0.2%	0.0%	0.0%	-0.4%	-1.1%	-2.5%
Milwood	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	-3.2%	-2.5%	-2.9%	-2.5%	-2.5%	-2.4%	-2.5%	-2.8%	-3.0%	-4.2%
Long Island	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.6%
<b>Total-NYCA</b>	<b>-5.0%</b>	<b>-3.4%</b>	<b>-1.3%</b>	<b>-1.7%</b>	<b>-2.9%</b>	<b>-2.9%</b>	<b>-4.2%</b>	<b>-1.5%</b>	<b>-0.7%</b>	<b>-1.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	0.0	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	(0.0)	(0.0)	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.0)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-5.1%	-1.4%	-1.0%	-1.5%	-1.0%	-1.5%	-4.4%	-1.6%	-1.4%	-0.9%
Genessee	-1.5%	-0.8%	-0.5%	-1.0%	-0.2%	-1.0%	-0.3%	-1.0%	-0.6%	-0.8%
Central	-1.0%	-2.7%	-1.8%	-1.0%	-2.1%	-2.7%	-0.8%	-0.8%	0.0%	-0.3%
North	-2.8%	-3.2%	-2.2%	-1.6%	-0.9%	-0.8%	-1.0%	-2.2%	-3.1%	-1.7%
Mohawk Valley	-2.1%	-1.6%	-1.0%	-1.5%	-0.4%	-1.1%	-0.6%	-1.0%	-1.1%	-1.9%
Capital	-1.1%	-1.0%	-1.2%	-1.0%	-1.0%	-1.1%	-1.2%	-1.0%	-1.0%	-1.0%
Hudson Valley	-1.5%	-3.1%	-2.5%	-1.6%	-2.3%	-3.0%	-2.2%	-1.3%	-3.2%	-2.3%
Milwood	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	-3.3%	-3.6%	-3.5%	-2.7%	-3.4%	-2.6%	-2.6%	-3.4%	-3.7%	-4.2%
Long Island	-0.4%	-0.4%	-0.4%	-0.5%	-0.5%	-0.6%	-0.3%	-0.4%	-0.4%	-0.6%
<b>Total-NYCA</b>	<b>-2.3%</b>	<b>-1.7%</b>	<b>-1.4%</b>	<b>-1.3%</b>	<b>-1.4%</b>	<b>-1.5%</b>	<b>-1.9%</b>	<b>-1.4%</b>	<b>-1.3%</b>	<b>-1.3%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.10	0.05	(0.05)	(0.12)	(0.04)	(0.06)	0.03	(0.11)	(0.13)	(0.29)
Genessee	0.01	0.04	(0.03)	(0.16)	(0.05)	(0.05)	0.05	(0.07)	(0.17)	(0.32)
Central	0.03	0.03	(0.02)	(0.07)	0.02	0.00	0.05	(0.08)	(0.16)	(0.32)
North	0.04	0.07	0.01	(0.13)	(0.04)	(0.03)	0.06	(0.06)	(0.12)	(0.28)
Mohawk Valley	(0.01)	0.00	(0.04)	(0.14)	(0.07)	(0.06)	0.01	(0.14)	(0.21)	(0.36)
Capital	(0.43)	(0.45)	(0.49)	(0.49)	(0.63)	(0.55)	(0.55)	(0.56)	(0.88)	(1.09)
Hudson Valley	(0.32)	(0.37)	(0.34)	(0.38)	(0.48)	(0.39)	(0.38)	(0.45)	(0.64)	(0.78)
Milwood	(0.31)	(0.37)	(0.32)	(0.35)	(0.45)	(0.36)	(0.36)	(0.43)	(0.60)	(0.72)
Dunwoodie	(0.30)	(0.37)	(0.32)	(0.35)	(0.45)	(0.35)	(0.36)	(0.42)	(0.59)	(0.71)
NY City	(0.32)	(0.39)	(0.34)	(0.37)	(0.49)	(0.41)	(0.41)	(0.46)	(0.63)	(0.76)
Long Island	(0.13)	(0.19)	(0.17)	(0.19)	(0.28)	(0.21)	(0.16)	(0.13)	(0.34)	(0.39)
<b>NYCA Avg. LBMP</b>	<b>(0.15)</b>	<b>(0.18)</b>	<b>(0.19)</b>	<b>(0.25)</b>	<b>(0.27)</b>	<b>(0.22)</b>	<b>(0.18)</b>	<b>(0.26)</b>	<b>(0.41)</b>	<b>(0.55)</b>

Projected Changes in Generator GWh (2013-2022) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(268)	(66)	(38)	(71)	(53)	(55)	(172)	(111)	(79)	(85)
Genessee	(14)	(8)	(2)	(12)	0	(10)	(2)	(9)	(7)	(10)
Central	(31)	(81)	(167)	(95)	(95)	(117)	(41)	(55)	(39)	(22)
North	(46)	(53)	(33)	(25)	(13)	(12)	(15)	(38)	(54)	(30)
Mohawk Valley	(21)	(16)	(13)	(15)	(3)	(9)	(5)	(9)	(12)	(18)
Capital	(568)	(505)	(609)	(554)	(507)	(564)	(633)	(532)	(534)	(424)
Hudson Valley	(25)	(55)	(30)	(22)	(37)	(47)	(31)	(18)	(54)	(40)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(707)	(645)	(664)	(630)	(580)	(676)	(661)	(661)	(731)	(749)
Long Island	(57)	(54)	(59)	(66)	(58)	(70)	(49)	(43)	(68)	(68)
<b>Total-NYCA</b>	<b>(1,737)</b>	<b>(1,481)</b>	<b>(1,615)</b>	<b>(1,489)</b>	<b>(1,345)</b>	<b>(1,560)</b>	<b>(1,607)</b>	<b>(1,476)</b>	<b>(1,577)</b>	<b>(1,446)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – CE: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.9	0.6	0.4	0.7	1.1	0.7	0.8	1.3	1.0	1.4
Genessee	0.5	0.3	0.2	0.3	0.5	0.3	0.4	0.6	0.4	0.6
Central	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.4
North	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.2	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	(2.5)	(2.4)	(2.4)	(3.0)	(3.2)	(3.6)	(3.3)	(3.9)	(4.0)	(4.6)
Hudson Valley	(2.7)	(2.5)	(2.5)	(2.9)	(2.9)	(3.2)	(3.0)	(4.0)	(4.1)	(4.3)
Milwood	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.1	(0.1)	0.0	0.0
Dunwoodie	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	0.2	(0.1)	(0.0)	0.0
NY City	(3.4)	(3.3)	(3.2)	(4.0)	(3.3)	(4.0)	(1.9)	(5.4)	(4.4)	(4.2)
Long Island	0.0	0.0	0.0	(0.1)	0.2	0.2	1.1	(0.1)	0.5	0.6
<b>Total-NYCA</b>	<b>(6.8)</b>	<b>(7.1)</b>	<b>(7.2)</b>	<b>(9.0)</b>	<b>(7.2)</b>	<b>(9.4)</b>	<b>(5.2)</b>	<b>(11.1)</b>	<b>(10.1)</b>	<b>(9.8)</b>

### H.3. Study 3: New Scotland - Pleasant Valley (NS-PV)

#### Generic Transmission Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	8	(2)	3	3	7	1	(1)	5	1
Genessee	0	0	0	(0)	0	0	0	1	0	0
Central	6	6	8	4	6	7	6	4	6	8
North	2	1	2	1	2	1	1	3	2	3
Mohawk Valley	1	0	1	0	1	0	0	1	1	1
Capital	14	22	15	5	9	4	6	13	12	6
Hudson Valley	(7)	(5)	(3)	(3)	(3)	(5)	(4)	(5)	(4)	(3)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(42)	(41)	(34)	(24)	(29)	(23)	(28)	(31)	(41)	(41)
Long Island	(2)	(2)	(4)	(2)	(4)	(1)	(2)	(33)	(4)	(3)
<b>Total NYCA</b>	<b>(28)</b>	<b>(11)</b>	<b>(17)</b>	<b>(16)</b>	<b>(16)</b>	<b>(10)</b>	<b>(19)</b>	<b>(49)</b>	<b>(23)</b>	<b>(28)</b>
Imports	5	(6)	1	1	1	2	(1)	31	2	6
Exports	(7)	(7)	(4)	(7)	(8)	(1)	(11)	(6)	(12)	(11)
<b>NYCA + Imports - Exports</b>	<b>(15)</b>	<b>(10)</b>	<b>(12)</b>	<b>(7)</b>	<b>(7)</b>	<b>(7)</b>	<b>(10)</b>	<b>(12)</b>	<b>(9)</b>	<b>(10)</b>
Total IESO	10	7	4	5	3	5	5	8	8	13
Total PJM	2	(15)	(8)	(3)	(4)	(11)	(9)	15	(4)	(11)
Total ISONE	7	7	4	5	10	4	11	15	9	12
<b>Total System</b>	<b>(9)</b>	<b>(12)</b>	<b>(16)</b>	<b>(8)</b>	<b>(6)</b>	<b>(12)</b>	<b>(12)</b>	<b>(10)</b>	<b>(10)</b>	<b>(14)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	6	5	6	3	3	3	5	6	7	3
Genessee	4	5	6	2	3	2	4	3	5	3
Central	4	5	5	3	5	4	6	4	6	4
North	2	2	3	1	1	1	2	1	3	1
Mohawk Valley	3	3	3	2	3	3	3	3	4	3
Capital	20	18	18	14	14	15	18	21	22	21
Hudson Valley	(1)	(1)	(1)	(1)	(0)	1	1	(0)	1	1
Milwood	(2)	(2)	(2)	(1)	(1)	(1)	(1)	(2)	(1)	(1)
Dunwoodie	(4)	(4)	(3)	(3)	(3)	(2)	(2)	(4)	(3)	(3)
NY City	(30)	(30)	(29)	(26)	(26)	(19)	(21)	(32)	(27)	(26)
Long Island	(3)	(4)	(5)	(5)	(5)	(3)	(3)	18	(3)	(4)
<b>Total-NYCA</b>	<b>(1)</b>	<b>(3)</b>	<b>2</b>	<b>(11)</b>	<b>(6)</b>	<b>3</b>	<b>12</b>	<b>18</b>	<b>15</b>	<b>1</b>
Export	(7)	(7)	(4)	(7)	(8)	(1)	(11)	(6)	(12)	(11)
<b>NYCA+Export</b>	<b>(8)</b>	<b>(10)</b>	<b>(2)</b>	<b>(18)</b>	<b>(15)</b>	<b>2</b>	<b>1</b>	<b>12</b>	<b>3</b>	<b>(10)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	9	16	11	7	9	9	9	2	15	5
Genessee	2	3	3	1	2	1	2	1	3	1
Central	63	62	65	31	30	34	32	41	70	51
North	5	5	6	3	3	2	4	5	6	4
Mohawk Valley	2	2	2	1	2	1	2	1	3	1
Capital	50	54	47	27	34	27	35	47	48	38
Hudson Valley	(7)	(6)	(3)	(3)	(3)	(5)	(3)	(4)	(4)	(3)
Milwood	(7)	(7)	(7)	(5)	(6)	(4)	(4)	(7)	(6)	(6)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(59)	(59)	(50)	(42)	(44)	(35)	(40)	(51)	(59)	(57)
Long Island	(4)	(5)	(6)	(5)	(6)	(3)	(3)	(25)	(5)	(4)
<b>Total-NYCA</b>	<b>53</b>	<b>66</b>	<b>68</b>	<b>14</b>	<b>19</b>	<b>29</b>	<b>32</b>	<b>10</b>	<b>70</b>	<b>30</b>
Import	5	(6)	1	1	1	2	(1)	31	2	6
<b>NYCA+Import</b>	<b>58</b>	<b>59</b>	<b>69</b>	<b>15</b>	<b>20</b>	<b>31</b>	<b>31</b>	<b>41</b>	<b>72</b>	<b>37</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	(0)	(0)	1	0	1	0	4	2	1
Genessee	1	1	1	1	1	1	1	0	1	1
Central	(2)	(2)	(3)	0	1	1	(0)	(0)	(2)	0
North	0	0	0	(0)	0	(0)	(0)	0	(0)	(0)
Mohawk Valley	(1)	(1)	(1)	(0)	(0)	0	(0)	(0)	(1)	(0)
Capital	13	10	9	8	7	8	9	13	11	12
Hudson Valley	(5)	(6)	(6)	(3)	(4)	(2)	(4)	(4)	(5)	(2)
Milwood	(3)	(3)	(3)	(2)	(2)	(1)	(2)	(2)	(3)	(1)
Dunwoodie	(5)	(6)	(6)	(3)	(4)	(3)	(4)	(4)	(5)	(3)
NY City	(47)	(52)	(53)	(30)	(36)	(21)	(36)	(37)	(48)	(29)
Long Island	(10)	(13)	(15)	(6)	(9)	(5)	(9)	15	(12)	(5)
<b>Total-NYCA</b>	<b>(57)</b>	<b>(72)</b>	<b>(77)</b>	<b>(35)</b>	<b>(47)</b>	<b>(21)</b>	<b>(46)</b>	<b>(15)</b>	<b>(63)</b>	<b>(28)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.6	(0.2)	0.4	0.4	0.9	0.2	(0.4)	0.9	0.3
Genessee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Central	0.2	0.3	0.6	0.3	0.5	0.6	0.5	0.4	0.8	1.1
North	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.3
Mohawk Valley	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1
Capital	0.3	0.9	0.9	0.4	0.9	0.4	0.5	1.3	1.2	0.8
Hudson Valley	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.4)	(0.3)	(0.5)	(0.4)	(0.3)
Milwood	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	(0.8)	(1.4)	(1.6)	(1.4)	(1.9)	(1.4)	(1.8)	(3.0)	(3.9)	(4.0)
Long Island	(0.1)	(0.1)	(0.2)	(0.1)	(0.4)	(0.1)	(0.2)	(3.5)	(0.4)	(0.3)
<b>Total-NYCA</b>	<b>(0.4)</b>	<b>0.2</b>	<b>(0.5)</b>	<b>(0.4)</b>	<b>(0.5)</b>	<b>0.2</b>	<b>(0.9)</b>	<b>(5.2)</b>	<b>(1.6)</b>	<b>(2.1)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	2.7%	-0.5%	0.9%	0.8%	1.4%	0.2%	-0.3%	0.6%	0.2%
Genessee	1.1%	1.1%	0.7%	0.0%	0.9%	0.7%	0.5%	0.9%	0.5%	0.6%
Central	0.9%	0.8%	1.5%	0.7%	0.9%	0.9%	0.7%	0.3%	0.6%	0.8%
North	5.7%	2.8%	5.8%	2.9%	4.6%	2.5%	2.7%	4.5%	2.0%	2.7%
Mohawk Valley	1.2%	0.8%	1.2%	0.4%	1.2%	0.4%	0.5%	0.7%	1.0%	0.6%
Capital	1.1%	1.7%	1.2%	0.4%	0.7%	0.3%	0.4%	0.6%	0.6%	0.3%
Hudson Valley	-11.9%	-7.3%	-4.5%	-3.7%	-3.6%	-6.2%	-4.2%	-3.7%	-2.3%	-1.6%
Milwood	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%	-1.8%	-1.5%	-0.9%	-1.0%	-0.7%	-0.8%	-0.8%	-1.0%	-0.9%
Long Island	-0.3%	-0.3%	-0.5%	-0.2%	-0.4%	-0.1%	-0.2%	-2.7%	-0.3%	-0.2%
<b>Total-NYCA</b>	<b>-0.5%</b>	<b>-0.1%</b>	<b>-0.3%</b>	<b>-0.2%</b>	<b>-0.2%</b>	<b>-0.1%</b>	<b>-0.2%</b>	<b>-0.5%</b>	<b>-0.2%</b>	<b>-0.2%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.1	0.1	0.3	0.0	(0.2)	0.2	0.1
Genessee	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	0.1	0.1	0.2	0.0	0.0	0.0	0.3
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>	<b>0.2</b>	<b>0.4</b>	<b>0.1</b>	<b>(0.2)</b>	<b>0.2</b>	<b>0.4</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.1%	5.8%	-1.8%	1.8%	1.9%	2.9%	0.2%	-1.1%	1.3%	0.3%
Genessee	4.0%	4.0%	0.0%	0.0%	4.8%	0.0%	0.0%	3.7%	0.0%	0.0%
Central	0.3%	-1.0%	5.6%	3.8%	2.8%	4.1%	0.9%	0.3%	0.6%	4.2%
North	3.9%	2.0%	3.3%	1.6%	2.4%	1.1%	1.4%	3.5%	1.4%	2.3%
Mohawk Valley	0.7%	0.4%	0.4%	0.4%	0.7%	0.4%	0.4%	0.3%	0.7%	0.3%
Capital	0.2%	0.3%	0.2%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%
Hudson Valley	-0.3%	-0.3%	-0.3%	-0.4%	-0.1%	0.1%	-0.2%	-0.2%	0.0%	0.6%
Milwood	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	-5.1%	-4.4%	-3.8%	-2.3%	-2.4%	-1.7%	-2.0%	-2.3%	-2.3%	-1.8%
Long Island	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-0.5%	-0.1%	-0.1%
<b>Total-NYCA</b>	<b>-0.4%</b>	<b>2.3%</b>	<b>1.3%</b>	<b>1.9%</b>	<b>1.7%</b>	<b>2.8%</b>	<b>0.3%</b>	<b>-0.7%</b>	<b>1.0%</b>	<b>1.2%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Genessee	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	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)	0.0	0.0
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>0.0</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	3.7%	-1.9%	1.3%	0.8%	2.4%	0.4%	0.0%	0.9%	0.2%
Genessee	0.5%	0.5%	0.4%	0.0%	0.6%	0.5%	0.0%	0.8%	0.4%	0.4%
Central	1.7%	1.7%	3.8%	1.6%	1.5%	1.9%	0.8%	0.8%	1.8%	2.0%
North	3.1%	1.7%	2.6%	1.2%	1.8%	0.9%	0.9%	2.8%	1.1%	1.8%
Mohawk Valley	1.0%	0.6%	1.0%	0.3%	0.9%	0.4%	0.1%	0.8%	1.0%	0.6%
Capital	1.5%	1.8%	1.5%	0.8%	1.1%	0.6%	0.8%	1.0%	1.0%	0.6%
Hudson Valley	-8.9%	-6.1%	-3.2%	-3.2%	-2.3%	-4.4%	-2.7%	-2.5%	-1.4%	-1.0%
Milwood	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	-8.8%	-8.5%	-7.0%	-4.8%	-5.1%	-3.9%	-3.6%	-3.8%	-4.2%	-3.4%
Long Island	-0.3%	-0.2%	-0.4%	-0.3%	-0.4%	-0.1%	-0.2%	-3.0%	-0.3%	-0.1%
<b>Total-NYCA</b>	<b>-1.3%</b>	<b>-0.6%</b>	<b>-1.1%</b>	<b>-0.5%</b>	<b>-0.7%</b>	<b>0.0%</b>	<b>-0.5%</b>	<b>-1.2%</b>	<b>-0.3%</b>	<b>-0.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone–NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.38	0.33	0.38	0.16	0.16	0.17	0.26	0.33	0.41	0.14
Genessee	0.35	0.42	0.47	0.19	0.25	0.18	0.32	0.17	0.42	0.16
Central	0.23	0.27	0.28	0.17	0.22	0.18	0.30	0.17	0.30	0.15
North	0.27	0.36	0.37	0.15	0.17	0.16	0.28	0.14	0.37	0.13
Mohawk Valley	0.27	0.32	0.34	0.17	0.22	0.19	0.31	0.19	0.37	0.17
Capital	1.22	1.02	0.98	0.70	0.63	0.70	0.85	1.10	1.16	1.00
Hudson Valley	(0.20)	(0.20)	(0.18)	(0.17)	(0.22)	(0.11)	(0.09)	(0.21)	(0.12)	(0.22)
Milwood	(0.48)	(0.46)	(0.43)	(0.34)	(0.40)	(0.28)	(0.30)	(0.45)	(0.38)	(0.43)
Dunwoodie	(0.46)	(0.43)	(0.42)	(0.33)	(0.39)	(0.26)	(0.29)	(0.44)	(0.37)	(0.40)
NY City	(0.41)	(0.39)	(0.39)	(0.30)	(0.36)	(0.23)	(0.26)	(0.41)	(0.33)	(0.39)
Long Island	(0.09)	(0.12)	(0.17)	(0.13)	(0.18)	(0.09)	(0.10)	0.67	(0.09)	(0.19)
<b>NYCA Avg. LBMP</b>	<b>0.10</b>	<b>0.10</b>	<b>0.11</b>	<b>0.02</b>	<b>0.01</b>	<b>0.06</b>	<b>0.12</b>	<b>0.11</b>	<b>0.16</b>	<b>0.01</b>

Projected Changes in Generator GWh (2013-2022 ) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	37	163	3	59	40	94	24	(20)	66	25
Genessee	8	8	5	(0)	6	4	2	7	5	5
Central	149	110	160	76	107	107	110	59	94	113
North	51	28	40	21	27	12	14	51	21	36
Mohawk Valley	13	8	10	4	10	4	4	7	12	7
Capital	355	541	344	122	199	78	109	216	187	117
Hudson Valley	(122)	(88)	(49)	(36)	(37)	(59)	(43)	(51)	(44)	(33)
Milwood	0	0	(0)	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(848)	(782)	(630)	(413)	(462)	(330)	(398)	(412)	(516)	(511)
Long Island	(43)	(44)	(65)	(26)	(62)	(15)	(26)	(412)	(44)	(32)
<b>Total-NYCA</b>	<b>(400)</b>	<b>(57)</b>	<b>(182)</b>	<b>(193)</b>	<b>(174)</b>	<b>(106)</b>	<b>(203)</b>	<b>(555)</b>	<b>(221)</b>	<b>(273)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) –NS-PV: Transmission Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(1.5)	(1.3)	(1.1)	(1.6)	(1.4)	(1.6)	(1.8)	(2.2)	(2.5)	(2.3)
Genessee	(0.8)	(0.8)	(0.5)	(0.8)	(0.8)	(0.9)	(0.9)	(1.1)	(1.2)	(1.2)
Central	(0.6)	(0.5)	(0.6)	(0.7)	(0.6)	(0.8)	(0.7)	(0.9)	(0.9)	(1.0)
North	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.4)	(0.4)
Mohawk Valley	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)
Capital	0.7	0.6	0.7	0.9	0.8	1.1	1.3	1.2	1.5	1.6
Hudson Valley	(1.2)	(1.0)	(1.2)	(1.6)	(1.5)	(1.6)	(1.5)	(2.3)	(2.1)	(2.5)
Milwood	(0.4)	(0.4)	(0.4)	(0.6)	(0.5)	(0.6)	(0.6)	(0.8)	(0.8)	(0.9)
Dunwoodie	(0.8)	(0.8)	(0.9)	(1.1)	(1.1)	(1.2)	(1.1)	(1.7)	(1.6)	(1.8)
NY City	(6.4)	(5.7)	(7.0)	(9.5)	(8.7)	(10.8)	(9.2)	(14.2)	(12.6)	(15.3)
Long Island	(3.0)	(2.7)	(3.0)	(4.2)	(3.8)	(4.1)	(4.1)	(5.3)	(5.7)	(7.0)
<b>Total-NYCA</b>	<b>(14.4)</b>	<b>(12.9)</b>	<b>(14.4)</b>	<b>(19.5)</b>	<b>(17.9)</b>	<b>(21.0)</b>	<b>(18.9)</b>	<b>(27.7)</b>	<b>(26.3)</b>	<b>(31.2)</b>



## Generic Generation Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(21)	(6)	(10)	(6)	(4)	(1)	(6)	(35)	(14)	(23)
Genessee	(2)	(2)	(2)	(2)	(1)	(1)	(1)	(2)	(2)	(2)
Central	(8)	(8)	(7)	(10)	(7)	(7)	(8)	(7)	(9)	(5)
North	(6)	(6)	(4)	(3)	(2)	(2)	(1)	(8)	(7)	(9)
Mohawk Valley	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Capital	(37)	(31)	(31)	(37)	(35)	(34)	(38)	(41)	(53)	(48)
Hudson Valley	260	244	223	254	246	229	258	421	444	489
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(90)	(82)	(67)	(68)	(68)	(56)	(65)	(118)	(134)	(157)
Long Island	(6)	(9)	(9)	(10)	(13)	(12)	(11)	(16)	(18)	(17)
<b>Total NYCA</b>	<b>88</b>	<b>98</b>	<b>89</b>	<b>116</b>	<b>114</b>	<b>115</b>	<b>127</b>	<b>193</b>	<b>205</b>	<b>226</b>
Imports	(58)	(68)	(46)	(54)	(56)	(52)	(53)	(61)	(48)	(63)
Exports	54	54	64	87	81	83	100	186	218	236
<b>NYCA + Imports - Exports</b>	<b>(25)</b>	<b>(24)</b>	<b>(21)</b>	<b>(25)</b>	<b>(22)</b>	<b>(19)</b>	<b>(27)</b>	<b>(53)</b>	<b>(60)</b>	<b>(74)</b>
Total IESO	(21)	(10)	(3)	(4)	(1)	(3)	(1)	(16)	(9)	(14)
Total PJM	(45)	(60)	(66)	(82)	(94)	(94)	(99)	(131)	(143)	(159)
Total ISONE	(42)	(43)	(50)	(61)	(46)	(49)	(63)	(106)	(109)	(126)
<b>Total System</b>	<b>(21)</b>	<b>(16)</b>	<b>(29)</b>	<b>(31)</b>	<b>(27)</b>	<b>(30)</b>	<b>(36)</b>	<b>(59)</b>	<b>(56)</b>	<b>(74)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	(3)	(2)	(7)	(5)	(3)	(5)	(4)	(7)	(9)
Genessee	1	(0)	(0)	(4)	(2)	(2)	(2)	(5)	(5)	(6)
Central	(0)	(2)	(2)	(6)	(1)	2	(2)	(9)	(8)	(12)
North	(0)	(1)	(1)	(3)	(2)	(1)	(2)	(4)	(3)	(4)
Mohawk Valley	(1)	(2)	(1)	(3)	(2)	(1)	(3)	(5)	(5)	(6)
Capital	(1)	(2)	(2)	(5)	(5)	(3)	(4)	(10)	(14)	(17)
Hudson Valley	(11)	(11)	(11)	(12)	(12)	(9)	(12)	(20)	(22)	(24)
Milwood	(4)	(4)	(4)	(4)	(4)	(3)	(4)	(6)	(7)	(8)
Dunwoodie	(8)	(8)	(8)	(8)	(8)	(7)	(8)	(13)	(15)	(15)
NY City	(62)	(63)	(69)	(70)	(71)	(57)	(72)	(114)	(124)	(130)
Long Island	(9)	(12)	(15)	(16)	(15)	(9)	(14)	(25)	(30)	(35)
<b>Total-NYCA</b>	<b>(93)</b>	<b>(107)</b>	<b>(116)</b>	<b>(137)</b>	<b>(127)</b>	<b>(94)</b>	<b>(129)</b>	<b>(215)</b>	<b>(241)</b>	<b>(265)</b>
Export	54	54	64	87	81	83	100	186	218	236
<b>NYCA+Export</b>	<b>(38)</b>	<b>(54)</b>	<b>(51)</b>	<b>(50)</b>	<b>(46)</b>	<b>(11)</b>	<b>(29)</b>	<b>(30)</b>	<b>(23)</b>	<b>(29)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(15)	(4)	(8)	(11)	(6)	(4)	(7)	(42)	(21)	(30)
Genessee	(2)	(2)	(2)	(4)	(2)	(2)	(2)	(5)	(5)	(5)
Central	(9)	(9)	(16)	(38)	(21)	(22)	(33)	(23)	(28)	(31)
North	(5)	(6)	(5)	(7)	(5)	(4)	(4)	(12)	(10)	(14)
Mohawk Valley	(2)	(2)	(2)	(4)	(2)	(2)	(3)	(4)	(4)	(5)
Capital	(38)	(33)	(32)	(44)	(40)	(37)	(43)	(55)	(73)	(74)
Hudson Valley	284	267	242	278	269	252	284	468	497	551
Milwood	(18)	(18)	(18)	(18)	(19)	(15)	(19)	(30)	(33)	(34)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(119)	(112)	(103)	(108)	(109)	(89)	(106)	(186)	(211)	(238)
Long Island	(12)	(15)	(18)	(19)	(21)	(17)	(19)	(29)	(36)	(37)
<b>Total-NYCA</b>	<b>65</b>	<b>65</b>	<b>39</b>	<b>25</b>	<b>45</b>	<b>59</b>	<b>49</b>	<b>81</b>	<b>76</b>	<b>82</b>
Import	(58)	(68)	(46)	(54)	(56)	(52)	(53)	(61)	(48)	(63)
<b>NYCA+Import</b>	<b>7</b>	<b>(2)</b>	<b>(7)</b>	<b>(29)</b>	<b>(11)</b>	<b>7</b>	<b>(4)</b>	<b>20</b>	<b>28</b>	<b>19</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(2)	(2)	(1)	(1)	(0)	(1)	1	(1)	(3)
Genessee	(0)	0	(0)	(0)	0	0	0	(1)	(1)	(1)
Central	(1)	(1)	(1)	1	3	5	2	(1)	(0)	(2)
North	(0)	(0)	0	(0)	(0)	0	(0)	(0)	0	(0)
Mohawk Valley	(1)	(1)	(1)	(0)	0	1	(0)	(1)	(1)	(1)
Capital	(1)	(1)	(1)	(0)	(3)	(0)	(1)	(3)	(9)	(10)
Hudson Valley	(10)	(9)	(10)	(6)	(9)	(6)	(8)	(12)	(15)	(16)
Milwood	(4)	(3)	(3)	(2)	(3)	(2)	(3)	(4)	(5)	(5)
Dunwoodie	(7)	(7)	(7)	(5)	(6)	(5)	(6)	(9)	(11)	(10)
NY City	(63)	(59)	(62)	(42)	(56)	(41)	(56)	(76)	(92)	(92)
Long Island	(9)	(10)	(12)	(4)	(8)	(3)	(7)	(8)	(15)	(18)
<b>Total-NYCA</b>	<b>(97)</b>	<b>(94)</b>	<b>(99)</b>	<b>(59)</b>	<b>(83)</b>	<b>(51)</b>	<b>(80)</b>	<b>(113)</b>	<b>(150)</b>	<b>(159)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.9)	(0.3)	(1.1)	(0.7)	(0.5)	(0.1)	(0.6)	(7.3)	(3.0)	(4.4)
Genessee	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.3)	(0.2)	(0.2)
Central	(0.3)	(0.6)	(0.7)	(0.9)	(0.8)	(0.7)	(0.7)	(1.1)	(1.2)	(0.8)
North	(0.2)	(0.3)	(0.3)	(0.2)	(0.2)	(0.2)	(0.1)	(0.9)	(0.8)	(1.1)
Mohawk Valley	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.1)	(0.2)	(0.2)	(0.3)	(0.3)
Capital	(0.8)	(1.2)	(1.8)	(2.3)	(2.5)	(2.4)	(2.7)	(3.5)	(4.5)	(4.1)
Hudson Valley	6.0	10.3	12.9	17.3	19.8	17.8	20.0	40.3	43.0	47.8
Milwood	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	(1.6)	(2.7)	(2.9)	(3.3)	(3.8)	(3.0)	(3.4)	(10.9)	(12.8)	(14.8)
Long Island	(0.2)	(0.4)	(0.6)	(0.7)	(1.1)	(1.0)	(0.9)	(1.5)	(1.7)	(1.6)
<b>Total-NYCA</b>	<b>1.9</b>	<b>4.7</b>	<b>5.3</b>	<b>8.9</b>	<b>10.6</b>	<b>10.1</b>	<b>11.4</b>	<b>14.7</b>	<b>18.5</b>	<b>20.5</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-5.5%	-1.4%	-3.5%	-1.7%	-1.0%	-0.2%	-0.8%	-5.4%	-2.1%	-2.6%
Genessee	-6.0%	-6.4%	-5.0%	-4.2%	-3.0%	-2.5%	-2.6%	-4.3%	-3.4%	-3.0%
Central	-1.8%	-1.8%	-1.6%	-1.7%	-1.3%	-1.1%	-1.0%	-1.0%	-1.0%	-0.7%
North	-16.0%	-14.4%	-14.7%	-8.2%	-7.7%	-7.4%	-3.8%	-9.9%	-9.1%	-9.8%
Mohawk Valley	-5.4%	-4.7%	-5.0%	-4.3%	-3.6%	-3.0%	-3.5%	-2.5%	-2.9%	-2.5%
Capital	-2.5%	-2.2%	-2.3%	-2.3%	-2.1%	-2.0%	-2.1%	-1.7%	-2.1%	-1.7%
Hudson Valley	408.8%	327.4%	295.9%	333.9%	292.1%	279.6%	280.3%	316.1%	224.5%	228.5%
Milwood	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	-4.2%	-3.7%	-2.9%	-2.3%	-2.3%	-1.7%	-1.9%	-2.8%	-3.1%	-3.3%
Long Island	-0.9%	-1.1%	-1.2%	-1.1%	-1.3%	-1.2%	-1.0%	-1.2%	-1.3%	-1.1%
<b>Total-NYCA</b>	<b>1.0%</b>	<b>1.5%</b>	<b>1.2%</b>	<b>1.5%</b>	<b>1.4%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.4%</b>	<b>1.7%</b>	<b>1.6%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.2)	(0.1)	0.0	(0.1)	(2.0)	(0.8)	(1.1)
Genessee	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	(0.3)	(0.3)	(0.2)	(0.0)	(0.5)	(0.3)	(0.3)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.5)</b>	<b>(0.4)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(2.4)</b>	<b>(1.0)</b>	<b>(1.4)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-12.4%	-1.5%	-8.4%	-3.0%	-1.4%	0.1%	-1.2%	-12.0%	-4.6%	-5.2%
Genessee	-16.0%	-16.0%	-13.0%	-12.5%	-9.5%	-5.6%	-5.6%	-11.1%	-7.4%	-7.1%
Central	-9.2%	-8.8%	-8.9%	-11.6%	-10.2%	-5.4%	-0.8%	-8.0%	-3.8%	-4.3%
North	-11.6%	-10.7%	-8.5%	-4.9%	-4.1%	-3.6%	-1.8%	-8.2%	-7.3%	-8.8%
Mohawk Valley	-3.1%	-2.5%	-2.6%	-2.8%	-1.9%	-1.9%	-1.9%	-1.7%	-2.1%	-1.7%
Capital	-0.4%	-0.4%	-0.4%	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.3%
Hudson Valley	7.1%	6.3%	5.3%	5.2%	5.0%	4.4%	4.8%	7.1%	6.0%	2.4%
Milwood	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	-9.7%	-8.7%	-7.0%	-5.8%	-5.0%	-3.9%	-4.6%	-7.0%	-7.4%	-9.5%
Long Island	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.5%	-1.1%
<b>Total-NYCA</b>	<b>-9.9%</b>	<b>-4.3%</b>	<b>-7.4%</b>	<b>-4.5%</b>	<b>-3.1%</b>	<b>-1.3%</b>	<b>-0.9%</b>	<b>-9.8%</b>	<b>-3.9%</b>	<b>-4.6%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	(0.0)	(0.0)	0.0	0.0	0.0	(0.1)	(0.0)	(0.0)
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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)	(0.1)	(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>Total-NYCA</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-7.6%	-1.1%	-5.6%	-1.8%	-0.9%	0.4%	-0.4%	-8.1%	-2.5%	-3.7%
Genessee	-4.0%	-4.3%	-3.2%	-2.7%	-2.1%	-1.3%	-1.6%	-3.2%	-2.4%	-2.2%
Central	-4.4%	-4.2%	-3.6%	-3.8%	-3.0%	-2.3%	-1.3%	-3.0%	-2.2%	-2.1%
North	-9.1%	-8.5%	-6.5%	-3.9%	-3.1%	-2.5%	-1.4%	-6.7%	-5.9%	-7.2%
Mohawk Valley	-6.8%	-5.1%	-4.8%	-4.0%	-3.2%	-2.6%	-2.4%	-2.7%	-3.0%	-2.9%
Capital	-1.6%	-1.4%	-1.2%	-1.2%	-1.0%	-1.0%	-1.0%	-1.2%	-1.4%	-1.5%
Hudson Valley	26.2%	22.9%	18.7%	19.7%	17.1%	14.5%	16.6%	27.1%	24.6%	26.5%
Milwood	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	-12.4%	-12.5%	-11.4%	-9.3%	-9.5%	-7.0%	-7.3%	-11.3%	-10.9%	-11.3%
Long Island	-0.7%	-0.9%	-1.0%	-1.0%	-1.4%	-1.3%	-1.0%	-1.4%	-1.3%	-1.2%
<b>Total-NYCA</b>	<b>-4.7%</b>	<b>-3.2%</b>	<b>-3.9%</b>	<b>-2.8%</b>	<b>-2.6%</b>	<b>-1.6%</b>	<b>-1.6%</b>	<b>-4.6%</b>	<b>-2.8%</b>	<b>-3.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.09	(0.20)	(0.14)	(0.42)	(0.32)	(0.23)	(0.34)	(0.29)	(0.41)	(0.60)
Genessee	(0.01)	(0.09)	(0.09)	(0.41)	(0.27)	(0.22)	(0.32)	(0.51)	(0.48)	(0.61)
Central	(0.07)	(0.17)	(0.15)	(0.37)	(0.17)	0.01	(0.24)	(0.60)	(0.53)	(0.73)
North	(0.02)	(0.11)	(0.10)	(0.43)	(0.28)	(0.22)	(0.34)	(0.53)	(0.45)	(0.57)
Mohawk Valley	(0.15)	(0.23)	(0.20)	(0.47)	(0.31)	(0.19)	(0.37)	(0.71)	(0.65)	(0.82)
Capital	(0.15)	(0.26)	(0.24)	(0.44)	(0.50)	(0.31)	(0.45)	(0.79)	(1.09)	(1.29)
Hudson Valley	(1.00)	(0.95)	(0.96)	(1.01)	(1.01)	(0.80)	(1.04)	(1.63)	(1.82)	(1.97)
Milwood	(1.19)	(1.12)	(1.13)	(1.14)	(1.14)	(0.93)	(1.19)	(1.82)	(2.03)	(2.14)
Dunwoodie	(1.12)	(1.07)	(1.10)	(1.11)	(1.11)	(0.89)	(1.15)	(1.76)	(1.94)	(2.02)
NY City	(1.01)	(0.99)	(1.02)	(1.03)	(1.04)	(0.82)	(1.07)	(1.63)	(1.75)	(1.85)
Long Island	(0.39)	(0.47)	(0.52)	(0.56)	(0.52)	(0.35)	(0.53)	(0.81)	(0.99)	(1.10)
<b>NYCA Avg. LBMP</b>	<b>(0.46)</b>	<b>(0.51)</b>	<b>(0.51)</b>	<b>(0.67)</b>	<b>(0.61)</b>	<b>(0.45)</b>	<b>(0.64)</b>	<b>(1.01)</b>	<b>(1.10)</b>	<b>(1.25)</b>

Projected Changes in Generator GWh (2013-2022) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(407)	(85)	(176)	(78)	(41)	(2)	(27)	(498)	(183)	(254)
Genessee	(47)	(49)	(36)	(31)	(20)	(16)	(15)	(37)	(31)	(28)
Central	(195)	(196)	(167)	(188)	(112)	(109)	(129)	(101)	(132)	(65)
North	(150)	(142)	(101)	(59)	(45)	(37)	(21)	(118)	(100)	(132)
Mohawk Valley	(71)	(53)	(50)	(49)	(33)	(28)	(30)	(33)	(38)	(34)
Capital	(868)	(710)	(709)	(688)	(602)	(533)	(579)	(595)	(753)	(642)
Hudson Valley	6,591	5,977	5,099	5,102	4,631	3,997	4,355	6,738	6,804	7,149
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(1,973)	(1,704)	(1,302)	(1,194)	(1,133)	(874)	(978)	(1,620)	(1,757)	(1,970)
Long Island	(133)	(173)	(176)	(163)	(188)	(169)	(143)	(190)	(213)	(184)
<b>Total-NYCA</b>	<b>2,748</b>	<b>2,864</b>	<b>2,382</b>	<b>2,651</b>	<b>2,457</b>	<b>2,230</b>	<b>2,432</b>	<b>3,546</b>	<b>3,597</b>	<b>3,839</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) –NS-PV: Generation Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2.1	1.4	1.0	1.3	1.4	1.1	1.3	3.9	3.0	3.7
Genessee	1.0	0.6	0.5	0.5	0.5	0.4	0.5	1.7	1.1	1.5
Central	0.6	0.4	0.3	0.3	0.4	0.5	0.3	0.8	0.7	0.8
North	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.7	0.5	0.7
Mohawk Valley	0.1	0.0	(0.0)	(0.1)	0.0	0.1	(0.0)	(0.0)	(0.0)	(0.0)
Capital	0.2	0.4	0.4	0.5	0.4	0.5	0.8	0.3	0.6	0.5
Hudson Valley	(1.0)	(0.8)	(1.0)	(1.2)	(0.9)	(0.8)	(0.9)	(2.1)	(1.8)	(1.9)
Milwood	(0.3)	(0.3)	(0.3)	(0.4)	(0.3)	(0.3)	(0.3)	(0.6)	(0.6)	(0.6)
Dunwoodie	(0.5)	(0.4)	(0.5)	(0.7)	(0.5)	(0.4)	(0.4)	(1.1)	(0.9)	(0.9)
NY City	(1.7)	(0.9)	(2.6)	(3.7)	(1.6)	(1.5)	(1.4)	(5.4)	(3.0)	(2.8)
Long Island	(1.3)	(0.8)	(1.2)	(1.8)	(0.9)	(0.8)	(0.8)	(2.8)	(2.0)	(2.0)
<b>Total-NYCA</b>	<b>(0.5)</b>	<b>0.1</b>	<b>(3.1)</b>	<b>(5.1)</b>	<b>(1.3)</b>	<b>(1.0)</b>	<b>(0.8)</b>	<b>(4.7)</b>	<b>(2.2)</b>	<b>(1.2)</b>

## Generic DR Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(4)	(1)	0	(1)	(0)	3	(10)	5	0	(2)
Genessee	0	0	(0)	(0)	0	(0)	0	(0)	(0)	(0)
Central	1	(0)	(1)	(0)	(3)	(4)	2	(2)	(2)	0
North	1	1	1	(0)	0	(0)	0	(0)	(0)	1
Mohawk Valley	0	0	(0)	0	0	(0)	0	(0)	0	(0)
Capital	(1)	(2)	(1)	(3)	(2)	1	1	(2)	(2)	(4)
Hudson Valley	1	1	0	2	1	2	2	1	1	4
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	2	5	4	6	9	10	12	1	17	12
Long Island	0	1	1	1	(0)	1	1	4	1	1
<b>Total NYCA</b>	<b>(1)</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>13</b>	<b>9</b>	<b>6</b>	<b>15</b>	<b>11</b>
Imports	(2)	(5)	(2)	(2)	(2)	(6)	(5)	(1)	(6)	(6)
Exports	1	4	4	4	5	8	5	4	9	5
<b>NYCA + Imports - Exports</b>	<b>(4)</b>	<b>(5)</b>	<b>(3)</b>	<b>(2)</b>	<b>(2)</b>	<b>(1)</b>	<b>(1)</b>	<b>0</b>	<b>0</b>	<b>(1)</b>
Total IESO	1	1	(0)	0	1	2	0	(10)	(2)	(2)
Total PJM	2	4	2	(4)	1	(11)	(8)	(54)	(11)	(1)
Total ISONE	2	(7)	(3)	(5)	(1)	(6)	(1)	(10)	(8)	(3)
<b>Total System</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>(5)</b>	<b>6</b>	<b>(2)</b>	<b>(1)</b>	<b>(69)</b>	<b>(6)</b>	<b>4</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	(1)	1	(1)	(1)	(0)	3	(1)	(0)	0
Genessee	1	(1)	0	(1)	(1)	(0)	2	0	(1)	1
Central	1	(2)	(0)	(0)	3	0	5	2	1	2
North	1	(1)	0	(1)	(1)	(0)	1	(0)	(0)	(0)
Mohawk Valley	1	(1)	0	(0)	0	(0)	1	0	(0)	0
Capital	0	1	1	1	0	2	2	3	0	1
Hudson Valley	(2)	(3)	(2)	(3)	(3)	(2)	(2)	(2)	(5)	(4)
Milwood	(0)	(1)	(0)	(1)	(1)	(0)	(0)	(0)	(1)	(1)
Dunwoodie	(0)	(1)	(0)	(1)	(2)	(1)	(1)	(1)	(2)	(2)
NY City	(5)	(11)	(4)	(11)	(11)	(5)	(4)	(4)	(17)	(12)
Long Island	(1)	(4)	(2)	(4)	(5)	(4)	(4)	(7)	(10)	(10)
<b>Total-NYCA</b>	<b>(2)</b>	<b>(23)</b>	<b>(6)</b>	<b>(22)</b>	<b>(20)</b>	<b>(11)</b>	<b>3</b>	<b>(10)</b>	<b>(37)</b>	<b>(24)</b>
Export	1	4	4	4	5	8	5	4	9	5
<b>NYCA+Export</b>	<b>(1)</b>	<b>(20)</b>	<b>(2)</b>	<b>(18)</b>	<b>(15)</b>	<b>(3)</b>	<b>8</b>	<b>(6)</b>	<b>(28)</b>	<b>(19)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(2)	(2)	1	(3)	(1)	2	(5)	4	(1)	(1)
Genessee	1	0	(0)	(0)	(0)	(0)	1	(0)	(0)	(0)
Central	3	(1)	1	(8)	(10)	(16)	3	(16)	(11)	(3)
North	1	(1)	1	(1)	(1)	(1)	2	(1)	(1)	0
Mohawk Valley	1	(1)	(0)	(0)	0	(0)	1	(0)	(0)	0
Capital	(0)	(0)	2	(1)	(1)	5	6	3	(1)	(3)
Hudson Valley	1	0	(0)	1	(0)	2	2	0	(0)	3
Milwood	(0)	(2)	(1)	(2)	(3)	(2)	(2)	(1)	(3)	(3)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(0)	(2)	0	(4)	(0)	6	8	(5)	1	0
Long Island	(0)	(1)	(1)	(2)	(3)	(1)	(1)	(1)	(6)	(6)
<b>Total-NYCA</b>	<b>3</b>	<b>(10)</b>	<b>2</b>	<b>(21)</b>	<b>(20)</b>	<b>(7)</b>	<b>15</b>	<b>(15)</b>	<b>(24)</b>	<b>(13)</b>
Import	(2)	(5)	(2)	(2)	(2)	(6)	(5)	(1)	(6)	(6)
<b>NYCA+Import</b>	<b>1</b>	<b>(15)</b>	<b>(1)</b>	<b>(23)</b>	<b>(22)</b>	<b>(13)</b>	<b>9</b>	<b>(17)</b>	<b>(30)</b>	<b>(19)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	1	0	1	1	1	1	0	1	0
Genessee	(0)	0	0	0	0	0	0	0	0	0
Central	(0)	(0)	(1)	1	4	1	2	3	2	2
North	(0)	0	0	(0)	0	(0)	(0)	0	0	0
Mohawk Valley	(0)	0	(0)	0	1	0	0	1	0	0
Capital	(1)	2	1	2	1	3	(0)	3	1	0
Hudson Valley	(2)	(0)	(1)	(0)	(1)	(0)	(3)	(1)	(2)	(3)
Milwood	(0)	(0)	(0)	(0)	(0)	(0)	(1)	(0)	(1)	(1)
Dunwoodie	(1)	(0)	(0)	(0)	(1)	(0)	(2)	(1)	(2)	(2)
NY City	(7)	1	(2)	(2)	(4)	(0)	(15)	(5)	(11)	(15)
Long Island	(3)	(0)	(2)	(1)	(2)	(2)	(10)	(7)	(7)	(11)
<b>Total-NYCA</b>	<b>(15)</b>	<b>3</b>	<b>(4)</b>	<b>0</b>	<b>(2)</b>	<b>2</b>	<b>(28)</b>	<b>(6)</b>	<b>(18)</b>	<b>(29)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.2)	(0.1)	0.1	(0.2)	(0.0)	0.6	(1.7)	1.1	(0.0)	(0.2)
Genessee	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	(0.1)	(0.0)	(0.3)	(0.5)	0.1	(0.1)	(0.3)	(0.0)
North	0.0	0.0	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	0.0	0.1
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)	(0.1)	(0.1)	(0.2)	(0.2)	0.1	0.1	(0.2)	(0.2)	(0.4)
Hudson Valley	0.0	0.1	0.0	0.2	0.1	0.2	0.2	0.1	0.1	0.4
Milwood	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	0.2	0.2	0.4	0.6	0.6	0.7	(0.1)	1.5	0.9
Long Island	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.2
<b>Total-NYCA</b>	<b>(0.2)</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>1.0</b>	<b>(0.5)</b>	<b>1.0</b>	<b>1.3</b>	<b>0.9</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone–NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.3%	-0.3%	0.2%	-0.5%	0.0%	0.9%	-2.1%	0.8%	0.0%	-0.1%
Genessee	0.5%	0.3%	-0.4%	-0.1%	0.7%	0.0%	1.2%	-0.5%	-0.1%	-0.3%
Central	0.2%	0.1%	-0.2%	0.0%	-0.5%	-0.7%	0.1%	-0.1%	-0.2%	0.0%
North	1.6%	1.5%	1.9%	-0.6%	0.9%	-1.6%	1.1%	-0.4%	-0.1%	0.6%
Mohawk Valley	0.2%	0.0%	0.0%	0.1%	0.3%	-0.5%	0.3%	-0.3%	0.0%	-0.3%
Capital	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	0.0%	0.0%	-0.1%	-0.1%	-0.2%
Hudson Valley	1.4%	1.8%	0.3%	3.0%	0.8%	2.4%	2.5%	0.7%	0.7%	2.1%
Milwood	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%	0.2%	0.3%	0.3%	0.3%	0.0%	0.4%	0.2%
Long Island	0.0%	0.2%	0.1%	0.1%	0.0%	0.1%	0.1%	0.2%	0.1%	0.1%
<b>Total-NYCA</b>	<b>-0.1%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.1)	0.0	0.2	(0.6)	0.3	0.0	(0.1)
Genessee	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	(0.1)	(0.2)	(0.0)	0.2	(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	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.7)</b>	<b>0.5</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.3%	-0.6%	0.7%	-1.3%	0.0%	2.1%	-5.2%	2.0%	0.0%	-0.3%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Central	0.4%	1.7%	-2.0%	1.7%	-4.2%	-5.8%	-0.7%	2.9%	-1.6%	-0.4%
North	1.2%	0.9%	1.0%	-0.3%	0.3%	-0.7%	0.4%	-0.3%	0.0%	0.5%
Mohawk Valley	0.0%	0.0%	0.0%	0.0%	0.4%	-0.4%	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%	-0.1%	-0.2%	-0.3%	-0.1%	0.0%	0.0%	-0.3%	-1.2%	-2.4%
Milwood	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%	0.3%	0.4%	0.4%	0.7%	0.7%	1.2%	-0.6%	0.8%	-0.2%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.3%	-1.0%
<b>Total-NYCA</b>	<b>-1.5%</b>	<b>0.4%</b>	<b>-0.5%</b>	<b>-0.4%</b>	<b>-1.0%</b>	<b>-0.3%</b>	<b>-3.5%</b>	<b>2.0%</b>	<b>-0.4%</b>	<b>-0.3%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-2.4%	-1.5%	0.5%	-0.6%	-0.1%	1.9%	-3.8%	1.5%	0.0%	-0.1%
Genessee	0.2%	0.1%	-0.2%	0.0%	0.4%	0.1%	0.5%	-0.3%	-0.1%	-0.2%
Central	0.3%	0.6%	-0.5%	0.0%	-1.1%	-1.9%	-0.3%	0.7%	-0.6%	-0.3%
North	0.9%	0.7%	0.9%	-0.3%	0.4%	-0.5%	0.3%	-0.2%	0.0%	0.3%
Mohawk Valley	0.2%	-0.2%	0.0%	0.2%	0.1%	0.0%	0.2%	-0.4%	0.0%	-0.4%
Capital	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.1%	-0.1%	-0.1%	0.0%
Hudson Valley	1.5%	1.5%	0.2%	1.6%	0.8%	1.0%	1.6%	0.8%	0.5%	2.9%
Milwood	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	-0.8%	-0.7%	0.0%	-0.1%	0.1%	1.0%	1.6%	-0.5%	1.9%	1.5%
Long Island	-0.2%	0.1%	0.0%	-0.1%	-0.2%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%
<b>Total-NYCA</b>	<b>-0.7%</b>	<b>-0.3%</b>	<b>0.0%</b>	<b>-0.1%</b>	<b>-0.2%</b>	<b>0.4%</b>	<b>-0.7%</b>	<b>0.4%</b>	<b>0.2%</b>	<b>0.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.10	(0.05)	0.04	(0.04)	(0.06)	(0.03)	0.14	(0.05)	(0.02)	(0.01)
Genessee	0.08	(0.04)	0.03	(0.07)	(0.06)	(0.06)	0.13	(0.03)	(0.06)	(0.02)
Central	0.08	(0.10)	0.01	(0.02)	0.09	(0.01)	0.20	0.07	0.02	0.06
North	0.08	(0.10)	0.02	(0.08)	(0.08)	(0.07)	0.12	(0.06)	(0.06)	(0.02)
Mohawk Valley	0.08	(0.10)	0.02	(0.06)	(0.01)	(0.04)	0.14	0.00	(0.04)	0.00
Capital	0.02	0.01	0.06	0.02	(0.05)	0.07	0.06	0.14	0.01	0.00
Hudson Valley	(0.01)	(0.10)	0.00	(0.10)	(0.14)	(0.06)	(0.07)	(0.02)	(0.15)	(0.15)
Milwood	(0.02)	(0.12)	(0.02)	(0.11)	(0.16)	(0.09)	(0.12)	(0.05)	(0.19)	(0.18)
Dunwoodie	(0.02)	(0.13)	(0.02)	(0.12)	(0.17)	(0.09)	(0.12)	(0.05)	(0.19)	(0.19)
NY City	0.00	(0.12)	(0.01)	(0.09)	(0.13)	(0.07)	(0.07)	(0.03)	(0.14)	(0.14)
Long Island	(0.02)	(0.13)	(0.03)	(0.10)	(0.12)	(0.08)	(0.13)	(0.16)	(0.20)	(0.23)
<b>NYCA Avg. LBMP</b>	<b>0.03</b>	<b>(0.09)</b>	<b>0.01</b>	<b>(0.07)</b>	<b>(0.08)</b>	<b>(0.05)</b>	<b>0.03</b>	<b>(0.02)</b>	<b>(0.09)</b>	<b>(0.08)</b>



Projected Changes in Generator GWh (2013-2022) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(94)	(25)	5	(37)	(8)	46	(147)	64	(12)	(20)
Genessee	4	1	(3)	(1)	4	(1)	6	(5)	(1)	(3)
Central	17	(16)	(38)	(7)	(43)	(61)	20	(44)	(28)	1
North	15	12	13	(4)	5	(8)	5	(4)	(0)	7
Mohawk Valley	2	(1)	(1)	2	3	(4)	2	(4)	(1)	(3)
Capital	(21)	(20)	(35)	(50)	(39)	8	11	(49)	(60)	(73)
Hudson Valley	17	20	5	31	9	23	25	10	14	42
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	28	73	65	72	112	113	119	(17)	166	74
Long Island	2	34	16	14	(2)	14	18	42	14	18
<b>Total-NYCA</b>	<b>(31)</b>	<b>79</b>	<b>26</b>	<b>21</b>	<b>41</b>	<b>131</b>	<b>59</b>	<b>(6)</b>	<b>91</b>	<b>44</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) –NS-PV: DR Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.1	(0.0)	(0.1)	(0.0)	0.1	(0.1)	0.2	(0.6)	(0.1)	(0.0)
Genessee	0.1	0.1	(0.1)	(0.0)	0.0	(0.0)	0.1	(0.1)	(0.1)	0.0
Central	0.0	(0.2)	(0.0)	(0.0)	0.1	0.1	0.1	(0.1)	0.1	0.1
North	(0.0)	(0.1)	(0.0)	0.0	(0.0)	0.0	(0.0)	(0.1)	(0.1)	(0.1)
Mohawk Valley	0.0	(0.1)	0.0	(0.0)	0.0	0.0	0.0	(0.0)	0.0	0.0
Capital	0.1	(0.0)	(0.1)	(0.0)	0.0	(0.1)	0.2	0.1	0.1	0.2
Hudson Valley	(0.0)	(0.3)	(0.2)	(0.2)	(0.1)	(0.1)	0.1	(0.0)	(0.1)	0.0
Milwood	0.0	(0.1)	(0.0)	(0.0)	0.0	(0.0)	0.0	0.0	0.0	0.0
Dunwoodie	0.1	(0.1)	(0.1)	(0.1)	0.0	(0.0)	0.1	0.0	(0.0)	0.1
NY City	0.6	(1.1)	(0.2)	(0.2)	0.6	0.5	2.3	1.8	1.5	2.5
Long Island	0.2	(0.6)	(0.2)	(0.4)	(0.0)	(0.2)	0.6	0.2	(0.1)	0.4
<b>Total-NYCA</b>	<b>1.2</b>	<b>(2.5)</b>	<b>(1.1)</b>	<b>(1.0)</b>	<b>0.7</b>	<b>0.0</b>	<b>3.9</b>	<b>1.2</b>	<b>1.3</b>	<b>3.3</b>

## Generic EE Solution

Projected Changes in Production Costs (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(15)	(4)	(8)	(9)	(9)	(7)	(17)	(19)	(10)	(11)
Genessee	(1)	(1)	(1)	(1)	(0)	(1)	(1)	(1)	(1)	(1)
Central	(5)	(7)	(8)	(9)	(11)	(13)	(7)	(12)	(7)	(5)
North	(2)	(4)	(2)	(1)	(1)	(1)	(1)	(3)	(5)	(3)
Mohawk Valley	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(1)	(2)	(2)
Capital	(30)	(30)	(36)	(43)	(42)	(47)	(50)	(36)	(45)	(41)
Hudson Valley	(7)	(6)	(5)	(6)	(5)	(5)	(5)	(6)	(11)	(10)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(102)	(98)	(94)	(98)	(94)	(106)	(118)	(126)	(136)	(151)
Long Island	(6)	(6)	(7)	(8)	(10)	(9)	(9)	(11)	(13)	(14)
<b>Total NYCA</b>	<b>(169)</b>	<b>(156)</b>	<b>(161)</b>	<b>(176)</b>	<b>(174)</b>	<b>(191)</b>	<b>(209)</b>	<b>(216)</b>	<b>(230)</b>	<b>(240)</b>
Imports	(42)	(53)	(45)	(50)	(58)	(56)	(52)	(51)	(34)	(41)
Exports	39	45	54	67	74	76	76	103	126	136
<b>NYCA + Imports - Exports</b>	<b>(250)</b>	<b>(254)</b>	<b>(260)</b>	<b>(292)</b>	<b>(307)</b>	<b>(323)</b>	<b>(337)</b>	<b>(370)</b>	<b>(390)</b>	<b>(416)</b>
Total IESO	(8)	(3)	(1)	(3)	(1)	(2)	2	(11)	(5)	(8)
Total PJM	(47)	(58)	(65)	(78)	(85)	(94)	(76)	(90)	(86)	(114)
Total ISONE	(26)	(33)	(37)	(46)	(48)	(46)	(43)	(55)	(55)	(57)
<b>Total System</b>	<b>(249)</b>	<b>(251)</b>	<b>(263)</b>	<b>(302)</b>	<b>(308)</b>	<b>(333)</b>	<b>(327)</b>	<b>(372)</b>	<b>(376)</b>	<b>(418)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(1)	(2)	(3)	(2)	(3)	(1)	(3)	(3)	(6)
Genessee	(1)	(0)	(0)	(3)	(1)	(1)	0	(3)	(3)	(3)
Central	(1)	(2)	(2)	(3)	1	(2)	(1)	(5)	(5)	(7)
North	(0)	(0)	(0)	(2)	(1)	(1)	(0)	(2)	(1)	(2)
Mohawk Valley	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(3)	(3)	(3)
Capital	(4)	(4)	(4)	(4)	(5)	(5)	(4)	(7)	(7)	(9)
Hudson Valley	(45)	(47)	(49)	(54)	(56)	(59)	(62)	(71)	(74)	(79)
Milwood	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(4)	(4)	(5)
Dunwoodie	(5)	(6)	(6)	(6)	(6)	(6)	(7)	(10)	(9)	(10)
NY City	(259)	(268)	(282)	(311)	(327)	(344)	(365)	(420)	(435)	(465)
Long Island	(9)	(10)	(13)	(12)	(12)	(13)	(17)	(21)	(22)	(26)
<b>Total-NYCA</b>	<b>(327)</b>	<b>(342)</b>	<b>(362)</b>	<b>(402)</b>	<b>(412)</b>	<b>(437)</b>	<b>(462)</b>	<b>(550)</b>	<b>(567)</b>	<b>(616)</b>
Export	39	45	54	67	74	76	76	103	126	136
<b>NYCA+Export</b>	<b>(288)</b>	<b>(297)</b>	<b>(308)</b>	<b>(335)</b>	<b>(338)</b>	<b>(361)</b>	<b>(386)</b>	<b>(447)</b>	<b>(441)</b>	<b>(480)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(13)	(4)	(6)	(13)	(9)	(8)	(13)	(25)	(14)	(16)
Genessee	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(3)	(2)	(3)
Central	(13)	(7)	(13)	(26)	(22)	(30)	(12)	(28)	(20)	(21)
North	(2)	(3)	(2)	(4)	(2)	(2)	(1)	(5)	(7)	(6)
Mohawk Valley	(1)	(1)	(1)	(2)	(1)	(2)	(1)	(3)	(3)	(3)
Capital	(35)	(33)	(39)	(48)	(47)	(51)	(53)	(46)	(55)	(55)
Hudson Valley	(7)	(7)	(6)	(6)	(6)	(6)	(6)	(8)	(13)	(13)
Milwood	(13)	(14)	(15)	(14)	(15)	(15)	(17)	(21)	(21)	(23)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(120)	(122)	(121)	(132)	(127)	(140)	(155)	(184)	(192)	(211)
Long Island	(10)	(11)	(14)	(14)	(15)	(16)	(18)	(23)	(26)	(29)
<b>Total-NYCA</b>	<b>(215)</b>	<b>(203)</b>	<b>(219)</b>	<b>(261)</b>	<b>(245)</b>	<b>(271)</b>	<b>(277)</b>	<b>(347)</b>	<b>(353)</b>	<b>(381)</b>
Import	(42)	(53)	(45)	(50)	(58)	(56)	(52)	(51)	(34)	(41)
<b>NYCA+Import</b>	<b>(257)</b>	<b>(256)</b>	<b>(263)</b>	<b>(311)</b>	<b>(303)</b>	<b>(327)</b>	<b>(329)</b>	<b>(397)</b>	<b>(387)</b>	<b>(421)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(1)	(2)	(0)	0	(2)	(1)	0	(0)	(2)
Genessee	(1)	(0)	(0)	(0)	0	0	(0)	(0)	(0)	(0)
Central	(1)	(1)	(1)	1	3	0	(1)	(1)	(0)	(1)
North	0	(0)	0	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(1)	(1)	0	0	(0)	(1)	(1)	(1)	(1)
Capital	(3)	(4)	(4)	(1)	(4)	(3)	(5)	(4)	(4)	(6)
Hudson Valley	(10)	(10)	(12)	(8)	(10)	(10)	(13)	(12)	(13)	(14)
Milwood	(2)	(2)	(3)	(2)	(2)	(2)	(3)	(3)	(3)	(3)
Dunwoodie	(4)	(5)	(6)	(3)	(5)	(4)	(6)	(6)	(7)	(7)
NY City	(60)	(66)	(77)	(54)	(71)	(72)	(95)	(93)	(101)	(107)
Long Island	(6)	(8)	(11)	(2)	(6)	(7)	(15)	(10)	(13)	(17)
<b>Total-NYCA</b>	<b>(86)</b>	<b>(98)</b>	<b>(115)</b>	<b>(68)</b>	<b>(95)</b>	<b>(101)</b>	<b>(140)</b>	<b>(129)</b>	<b>(142)</b>	<b>(158)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.6)	(0.3)	(0.9)	(1.3)	(1.4)	(1.1)	(2.7)	(4.1)	(2.1)	(1.9)
Genessee	(0.0)	(0.0)	(0.1)	(0.1)	(0.0)	(0.1)	(0.1)	(0.2)	(0.1)	(0.1)
Central	(0.2)	(0.4)	(0.5)	(0.8)	(1.2)	(1.4)	(0.9)	(1.5)	(0.9)	(0.8)
North	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.3)	(0.6)	(0.4)
Mohawk Valley	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)
Capital	(0.6)	(1.1)	(1.9)	(2.6)	(3.0)	(3.3)	(3.5)	(3.1)	(3.9)	(3.5)
Hudson Valley	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)	(0.4)	(0.7)	(1.1)	(1.1)
Milwood	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	(1.8)	(3.1)	(4.2)	(5.0)	(5.5)	(6.1)	(6.7)	(11.0)	(12.1)	(13.3)
Long Island	(0.1)	(0.2)	(0.4)	(0.6)	(0.8)	(0.8)	(0.7)	(1.0)	(1.2)	(1.3)
<b>Total-NYCA</b>	<b>(3.6)</b>	<b>(5.8)</b>	<b>(8.5)</b>	<b>(11.0)</b>	<b>(12.6)</b>	<b>(13.4)</b>	<b>(15.1)</b>	<b>(21.9)</b>	<b>(22.2)</b>	<b>(22.5)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.7%	-1.4%	-2.7%	-3.1%	-2.7%	-1.7%	-3.4%	-3.0%	-1.5%	-1.1%
Genessee	-2.9%	-1.8%	-2.3%	-2.9%	-1.0%	-3.6%	-2.0%	-2.6%	-2.0%	-1.8%
Central	-1.2%	-1.5%	-1.3%	-1.4%	-1.9%	-2.1%	-1.3%	-1.3%	-0.8%	-0.6%
North	-6.3%	-8.1%	-6.4%	-3.6%	-3.4%	-3.0%	-4.7%	-3.6%	-6.6%	-3.5%
Mohawk Valley	-2.7%	-2.2%	-2.8%	-2.7%	-2.1%	-3.1%	-2.5%	-1.7%	-2.0%	-1.8%
Capital	-2.0%	-2.0%	-2.5%	-2.6%	-2.5%	-2.7%	-2.7%	-1.5%	-1.8%	-1.5%
Hudson Valley	-11.8%	-8.7%	-7.6%	-7.7%	-6.1%	-7.1%	-5.5%	-5.4%	-5.8%	-5.1%
Milwood	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	-4.5%	-4.0%	-3.7%	-3.1%	-2.9%	-2.8%	-3.1%	-2.9%	-3.0%	-3.0%
Long Island	-0.8%	-0.7%	-0.9%	-0.8%	-1.0%	-0.9%	-0.8%	-0.8%	-0.9%	-0.9%
<b>Total-NYCA</b>	<b>-3.0%</b>	<b>-2.6%</b>	<b>-2.7%</b>	<b>-2.6%</b>	<b>-2.4%</b>	<b>-2.4%</b>	<b>-2.6%</b>	<b>-2.2%</b>	<b>-2.1%</b>	<b>-1.9%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.5)	(0.4)	(0.3)	(0.9)	(1.1)	(0.5)	(0.4)
Genessee	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	(0.2)	(0.3)	(0.4)	(0.3)	(0.3)	(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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.6)</b>	<b>(0.7)</b>	<b>(0.8)</b>	<b>(1.3)</b>	<b>(1.5)</b>	<b>(0.8)</b>	<b>(0.7)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-8.5%	-2.6%	-6.3%	-7.5%	-6.1%	-3.8%	-7.7%	-6.7%	-3.2%	-2.1%
Genessee	-8.0%	-4.0%	-4.3%	-8.3%	-4.8%	-11.1%	-5.6%	-7.4%	-3.7%	-3.6%
Central	-4.7%	-6.6%	-1.6%	-6.7%	-11.7%	-10.2%	-7.1%	-5.7%	-3.3%	-2.3%
North	-4.7%	-6.1%	-3.6%	-2.3%	-1.7%	-1.4%	-2.1%	-3.0%	-5.3%	-3.1%
Mohawk Valley	-1.4%	-1.1%	-1.1%	-1.4%	-1.1%	-1.5%	-1.1%	-1.4%	-1.0%	-1.0%
Capital	-0.3%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.3%	-0.3%	-0.3%
Hudson Valley	-0.3%	-0.3%	-0.3%	-0.5%	-0.2%	0.0%	-0.3%	-0.4%	-1.2%	-4.0%
Milwood	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	-9.9%	-8.6%	-8.4%	-6.9%	-6.4%	-6.3%	-6.8%	-7.0%	-6.9%	-8.6%
Long Island	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-1.3%
<b>Total-NYCA</b>	<b>-6.2%</b>	<b>-4.0%</b>	<b>-3.7%</b>	<b>-6.1%</b>	<b>-6.4%</b>	<b>-5.0%</b>	<b>-6.7%</b>	<b>-5.8%</b>	<b>-3.0%</b>	<b>-2.1%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Genessee	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	0.0	(0.0)	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	(0.0)	0.0	0.0	(0.0)	(0.0)	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-4.4%	-0.5%	-4.5%	-3.8%	-3.0%	-2.4%	-6.1%	-4.2%	-2.3%	-1.3%
Genessee	-2.1%	-1.4%	-1.4%	-2.0%	-0.8%	-2.1%	-1.2%	-2.0%	-1.3%	-1.1%
Central	-2.7%	-2.8%	-1.3%	-2.4%	-3.0%	-3.9%	-2.4%	-2.3%	-1.4%	-1.2%
North	-3.6%	-4.7%	-2.8%	-1.8%	-1.4%	-1.1%	-1.7%	-2.4%	-4.2%	-2.6%
Mohawk Valley	-3.4%	-2.6%	-3.2%	-2.9%	-2.0%	-2.8%	-2.5%	-1.6%	-2.3%	-2.4%
Capital	-1.4%	-1.2%	-1.5%	-1.3%	-1.3%	-1.4%	-1.3%	-1.1%	-1.2%	-1.2%
Hudson Valley	-9.6%	-7.0%	-6.2%	-6.5%	-4.2%	-4.1%	-4.2%	-5.1%	-7.6%	-5.9%
Milwood	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	-11.1%	-10.6%	-10.8%	-9.2%	-8.9%	-8.5%	-8.5%	-10.0%	-9.4%	-10.1%
Long Island	-0.6%	-0.7%	-0.7%	-0.8%	-1.0%	-1.0%	-0.9%	-1.1%	-1.0%	-1.1%
<b>Total-NYCA</b>	<b>-3.9%</b>	<b>-3.0%</b>	<b>-3.7%</b>	<b>-3.5%</b>	<b>-3.3%</b>	<b>-3.2%</b>	<b>-3.8%</b>	<b>-3.8%</b>	<b>-3.1%</b>	<b>-2.8%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.02	(0.10)	(0.14)	(0.20)	(0.13)	(0.22)	(0.13)	(0.19)	(0.19)	(0.41)
Genessee	(0.08)	(0.06)	(0.05)	(0.22)	(0.15)	(0.13)	(0.07)	(0.28)	(0.24)	(0.35)
Central	(0.08)	(0.11)	(0.12)	(0.18)	(0.03)	(0.14)	(0.12)	(0.33)	(0.28)	(0.42)
North	(0.05)	(0.04)	(0.06)	(0.23)	(0.16)	(0.14)	(0.08)	(0.29)	(0.22)	(0.34)
Mohawk Valley	(0.12)	(0.14)	(0.14)	(0.26)	(0.16)	(0.20)	(0.16)	(0.39)	(0.34)	(0.46)
Capital	(0.32)	(0.36)	(0.37)	(0.33)	(0.44)	(0.43)	(0.46)	(0.55)	(0.54)	(0.72)
Hudson Valley	(0.70)	(0.71)	(0.78)	(0.73)	(0.81)	(0.78)	(0.89)	(1.11)	(1.09)	(1.23)
Milwood	(0.75)	(0.78)	(0.87)	(0.78)	(0.86)	(0.84)	(0.97)	(1.19)	(1.17)	(1.29)
Dunwoodie	(0.76)	(0.78)	(0.89)	(0.80)	(0.88)	(0.84)	(0.98)	(1.22)	(1.19)	(1.31)
NY City	(0.79)	(0.84)	(0.97)	(0.89)	(1.02)	(1.04)	(1.20)	(1.47)	(1.48)	(1.65)
Long Island	(0.35)	(0.36)	(0.47)	(0.37)	(0.42)	(0.42)	(0.57)	(0.62)	(0.66)	(0.79)
<b>NYCA Avg. LBMP</b>	<b>(0.36)</b>	<b>(0.39)</b>	<b>(0.44)</b>	<b>(0.45)</b>	<b>(0.46)</b>	<b>(0.47)</b>	<b>(0.51)</b>	<b>(0.69)</b>	<b>(0.67)</b>	<b>(0.82)</b>

Projected Changes in Generator GWh (2013-2022) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(271)	(78)	(144)	(161)	(141)	(104)	(235)	(292)	(149)	(123)
Genessee	(23)	(14)	(17)	(21)	(6)	(21)	(12)	(21)	(18)	(16)
Central	(159)	(191)	(199)	(194)	(223)	(236)	(151)	(192)	(114)	(85)
North	(60)	(80)	(44)	(27)	(20)	(16)	(25)	(43)	(72)	(47)
Mohawk Valley	(35)	(26)	(27)	(29)	(18)	(27)	(22)	(21)	(25)	(23)
Capital	(703)	(644)	(797)	(825)	(744)	(784)	(789)	(559)	(686)	(551)
Hudson Valley	(123)	(106)	(87)	(77)	(66)	(70)	(60)	(78)	(121)	(109)
Milwood	0	0	0	0	0	(1)	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(2,094)	(1,946)	(1,789)	(1,687)	(1,539)	(1,631)	(1,741)	(1,707)	(1,733)	(1,825)
Long Island	(113)	(105)	(129)	(124)	(143)	(135)	(119)	(129)	(140)	(144)
<b>Total-NYCA</b>	<b>(3,581)</b>	<b>(3,190)</b>	<b>(3,233)</b>	<b>(3,145)</b>	<b>(2,901)</b>	<b>(3,026)</b>	<b>(3,153)</b>	<b>(3,042)</b>	<b>(3,057)</b>	<b>(2,924)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) –NS-PV: EE Solution

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.9	0.6	0.4	0.9	0.7	0.5	0.7	1.8	1.3	1.3
Genessee	0.4	0.2	0.2	0.4	0.4	0.3	0.5	0.9	0.5	0.7
Central	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.4	0.2	0.3
North	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.2
Mohawk Valley	0.0	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.0)
Capital	0.3	0.3	0.4	0.3	0.5	0.5	0.9	0.3	0.5	0.7
Hudson Valley	(3.2)	(2.9)	(2.9)	(3.8)	(3.6)	(3.8)	(4.0)	(5.0)	(5.1)	(5.2)
Milwood	(0.2)	(0.2)	(0.2)	(0.4)	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.3)
Dunwoodie	(0.5)	(0.5)	(0.5)	(0.8)	(0.6)	(0.8)	(0.6)	(1.0)	(1.0)	(0.8)
NY City	(21.3)	(19.5)	(19.3)	(25.0)	(23.4)	(26.0)	(25.9)	(32.8)	(33.6)	(34.5)
Long Island	(1.6)	(1.3)	(1.3)	(2.7)	(2.1)	(2.2)	(1.6)	(2.9)	(2.8)	(2.0)
<b>Total-NYCA</b>	<b>(24.9)</b>	<b>(23.0)</b>	<b>(23.0)</b>	<b>(31.0)</b>	<b>(28.2)</b>	<b>(31.5)</b>	<b>(30.0)</b>	<b>(38.5)</b>	<b>(40.1)</b>	<b>(39.6)</b>

## Appendix I - Scenario Case Results – Additional Details

### I.1. Case 1: Implementation of Cross-State Air Pollution Rule (CSAPR)

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Case-CSAPR										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	4	(9)	3	11	(0)	(11)	(20)	5	(16)
Genessee	0	4	4	0	1	1	2	1	1	1
Central	0	8	12	(2)	1	(5)	1	(7)	(7)	(5)
North	0	8	10	4	3	5	5	6	8	10
Mohawk Valley	0	4	4	1	1	1	2	1	1	2
Capital	0	41	42	15	19	21	16	18	24	14
Hudson Valley	0	5	3	3	1	2	3	1	1	5
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	51	63	30	31	32	41	47	49	55
Long Island	0	22	24	9	7	10	11	12	12	13
<b>Total NYCA</b>	<b>0</b>	<b>148</b>	<b>153</b>	<b>64</b>	<b>76</b>	<b>65</b>	<b>69</b>	<b>57</b>	<b>95</b>	<b>78</b>
Imports	0	(89)	(96)	(30)	(44)	(37)	(38)	10	6	15
Exports	0	56	50	19	12	10	10	43	74	60
<b>NYCA + Imports - Exports</b>	<b>0</b>	<b>4</b>	<b>7</b>	<b>14</b>	<b>20</b>	<b>18</b>	<b>21</b>	<b>24</b>	<b>27</b>	<b>33</b>
Total IESO	0	47	38	20	14	22	24	37	36	47
Total PJM	0	1,521	1,591	682	747	846	909	833	886	972
Total ISONE	0	51	53	17	31	33	37	38	33	47
<b>Total System</b>	<b>0</b>	<b>1,767</b>	<b>1,835</b>	<b>783</b>	<b>868</b>	<b>966</b>	<b>1,039</b>	<b>965</b>	<b>1,050</b>	<b>1,143</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Case-CSAPR										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	45	48	15	14	19	20	22	15	18
Genessee	0	21	24	6	5	8	10	12	10	11
Central	0	34	37	9	11	16	17	19	15	16
North	0	12	14	3	3	5	6	5	4	4
Mohawk Valley	0	14	16	4	4	6	7	7	6	6
Capital	0	11	13	6	4	5	5	9	7	9
Hudson Valley	0	14	13	5	5	6	7	9	7	8
Milwood	0	4	4	1	1	2	2	2	2	2
Dunwoodie	0	9	8	3	3	4	4	5	4	5
NY City	0	77	69	29	28	34	37	45	40	43
Long Island	0	31	27	13	13	14	16	20	21	18
<b>Total-NYCA</b>	<b>0</b>	<b>273</b>	<b>272</b>	<b>95</b>	<b>93</b>	<b>119</b>	<b>132</b>	<b>155</b>	<b>131</b>	<b>141</b>
Export	0	56	50	19	12	10	10	43	74	60
<b>NYCA+Export</b>	<b>0</b>	<b>329</b>	<b>322</b>	<b>114</b>	<b>104</b>	<b>129</b>	<b>142</b>	<b>198</b>	<b>206</b>	<b>200</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Case-CSAPR										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	36	27	6	8	6	(2)	(13)	5	(16)
Genessee	0	14	16	3	4	5	6	5	6	6
Central	0	69	80	7	(6)	(1)	11	8	8	19
North	0	25	29	8	7	11	13	14	15	16
Mohawk Valley	0	13	14	2	3	4	5	5	4	4
Capital	0	60	65	24	25	28	24	34	36	28
Hudson Valley	0	7	4	3	1	3	3	2	3	6
Milwood	0	23	22	9	8	10	11	11	9	11
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	83	88	38	39	46	57	70	68	74
Long Island	0	33	32	11	10	12	14	18	19	17
<b>Total-NYCA</b>	<b>0</b>	<b>363</b>	<b>377</b>	<b>113</b>	<b>99</b>	<b>124</b>	<b>143</b>	<b>155</b>	<b>173</b>	<b>166</b>
Import	0	(89)	(96)	(30)	(44)	(37)	(38)	10	6	15
<b>NYCA+Import</b>	<b>0</b>	<b>274</b>	<b>281</b>	<b>83</b>	<b>55</b>	<b>87</b>	<b>106</b>	<b>164</b>	<b>179</b>	<b>181</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (nominal \$M) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	8	7	4	4	4	3	3	1	1
Genessee	0	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(0)	(0)
Central	0	0	(1)	(0)	2	1	1	2	1	0
North	0	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	0	(0)	(1)	(0)	0	0	(0)	0	0	0
Capital	0	(11)	(13)	0	(1)	(4)	(6)	(2)	(2)	0
Hudson Valley	0	(6)	(10)	(0)	(0)	(2)	(4)	(2)	(2)	(1)
Milwood	0	(2)	(3)	(0)	(0)	(1)	(1)	(1)	(1)	(0)
Dunwoodie	0	(3)	(6)	(0)	(0)	(1)	(2)	(1)	(1)	(1)
NY City	0	(30)	(57)	(1)	(1)	(11)	(20)	(13)	(11)	(8)
Long Island	0	(13)	(26)	1	1	(5)	(8)	(6)	(0)	(4)
<b>Total-NYCA</b>	<b>0</b>	<b>(58)</b>	<b>(112)</b>	<b>2</b>	<b>3</b>	<b>(20)</b>	<b>(38)</b>	<b>(20)</b>	<b>(16)</b>	<b>(12)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	(0.9)	(2.6)	(0.3)	0.8	(1.5)	(3.6)	(7.3)	(1.8)	(7.3)
Genessee	0.0	0.2	0.3	0.0	0.1	0.0	0.1	0.0	0.1	0.1
Central	0.0	(1.3)	(1.3)	(0.9)	(0.8)	(1.9)	(1.4)	(2.8)	(2.9)	(2.9)
North	0.0	0.4	0.6	0.3	0.3	0.4	0.5	0.6	0.9	1.1
Mohawk Valley	0.0	0.2	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Capital	0.0	1.6	2.3	1.0	1.5	1.6	1.2	1.6	2.2	1.2
Hudson Valley	0.0	0.2	0.2	0.2	0.0	0.2	0.2	(0.0)	0.0	0.4
Milwood	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	1.2	2.3	1.0	0.8	1.0	1.4	3.1	3.1	3.5
Long Island	0.0	0.8	1.3	0.4	0.3	0.5	0.6	0.7	0.7	0.8
<b>Total-NYCA</b>	<b>0.0</b>	<b>2.4</b>	<b>3.2</b>	<b>1.8</b>	<b>3.0</b>	<b>0.3</b>	<b>(1.0)</b>	<b>(3.9)</b>	<b>2.3</b>	<b>(3.0)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	-4.2%	-8.1%	-0.7%	1.5%	-2.3%	-4.5%	-5.4%	-1.3%	-4.3%
Genessee	0.0%	11.9%	11.8%	0.5%	3.0%	1.2%	3.9%	0.5%	1.5%	1.4%
Central	0.0%	-4.1%	-3.1%	-1.7%	-1.2%	-2.8%	-2.0%	-2.5%	-2.5%	-2.3%
North	0.0%	17.2%	29.4%	9.6%	9.0%	15.7%	16.4%	7.1%	10.6%	9.8%
Mohawk Valley	0.0%	8.0%	8.5%	0.3%	0.8%	0.5%	2.4%	1.0%	0.7%	1.1%
Capital	0.0%	3.0%	3.1%	1.0%	1.2%	1.3%	0.9%	0.8%	1.0%	0.5%
Hudson Valley	0.0%	7.6%	3.9%	4.2%	0.6%	2.6%	2.7%	-0.2%	0.1%	2.0%
Milwood	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%	1.9%	2.4%	0.7%	0.7%	0.6%	0.9%	0.9%	0.8%	0.9%
Long Island	0.0%	2.5%	2.6%	0.6%	0.4%	0.6%	0.6%	0.6%	0.5%	0.5%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>1.2%</b>	<b>1.2%</b>	<b>0.5%</b>	<b>0.7%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>-0.3%</b>	<b>0.3%</b>	<b>-0.2%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	5.3	4.8	0.7	1.2	0.5	(0.1)	(0.5)	1.3	(0.2)
Genessee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	0.0	0.8	0.9	(1.0)	(0.9)	(1.6)	(1.6)	(1.7)	(2.0)	(1.9)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Long Island	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>6.2</b>	<b>5.9</b>	<b>(0.3)</b>	<b>0.3</b>	<b>(1.1)</b>	<b>(1.7)</b>	<b>(2.1)</b>	<b>(0.6)</b>	<b>(2.0)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	-17.2%	-27.6%	-2.1%	4.3%	-6.1%	-11.3%	-12.8%	-2.4%	-9.8%
Genessee	0.0%	24.0%	26.1%	0.0%	4.8%	0.0%	5.6%	0.0%	3.7%	3.6%
Central	0.0%	-82.9%	-79.8%	-45.7%	-42.9%	-46.4%	-43.1%	-36.1%	-37.1%	-32.8%
North	0.0%	13.0%	17.4%	5.8%	4.8%	7.1%	7.8%	6.0%	8.4%	8.8%
Mohawk Valley	0.0%	6.1%	5.9%	1.1%	1.5%	1.5%	2.3%	1.7%	1.4%	1.7%
Capital	0.0%	0.5%	0.5%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.1%
Hudson Valley	0.0%	0.6%	0.1%	-0.2%	-0.1%	0.2%	-0.2%	1.4%	1.4%	0.1%
Milwood	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%	4.6%	5.6%	1.4%	1.4%	1.4%	1.7%	2.3%	2.4%	1.6%
Long Island	0.0%	0.4%	0.3%	0.1%	0.0%	0.1%	0.1%	0.2%	0.9%	0.1%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>-41.7%</b>	<b>-44.1%</b>	<b>-12.3%</b>	<b>-7.3%</b>	<b>-15.9%</b>	<b>-17.4%</b>	<b>-16.9%</b>	<b>-10.8%</b>	<b>-14.3%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	3.6	3.0	4.3	5.3	5.6	6.9	8.9	10.0	11.5
Genessee	0.0	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.3	0.3
Central	0.0	1.3	1.5	1.5	1.5	1.7	2.0	3.1	3.3	3.9
North	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3
Mohawk Valley	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4
Capital	0.0	0.9	1.0	1.1	1.1	1.2	1.3	1.5	1.7	1.8
Hudson Valley	0.0	0.5	0.5	0.5	0.5	0.5	0.6	0.8	1.0	1.1
Milwood	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	6.6	7.6	8.0	8.4	8.7	9.3	11.0	11.6	12.4
Long Island	0.0	2.9	3.2	3.4	3.7	3.9	4.2	4.9	5.2	5.7
<b>Total-NYCA</b>	<b>0.0</b>	<b>16.3</b>	<b>17.2</b>	<b>19.3</b>	<b>20.9</b>	<b>22.0</b>	<b>24.7</b>	<b>31.0</b>	<b>33.6</b>	<b>37.4</b>



Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	-5.6%	-15.1%	-1.1%	1.4%	-4.9%	-10.2%	-11.7%	-6.7%	-11.6%
Genessee	0.0%	5.4%	5.2%	-0.3%	0.7%	0.1%	0.9%	-0.1%	0.5%	0.6%
Central	0.0%	-24.6%	-21.9%	-8.6%	-8.0%	-11.8%	-10.5%	-10.1%	-10.1%	-9.3%
North	0.0%	10.6%	13.5%	4.4%	3.6%	5.4%	5.8%	4.7%	6.6%	6.9%
Mohawk Valley	0.0%	5.5%	5.7%	-1.2%	-0.9%	-1.8%	-0.4%	-0.7%	-0.9%	-0.4%
Capital	0.0%	2.3%	2.5%	0.8%	0.8%	0.8%	0.6%	0.6%	0.8%	0.5%
Hudson Valley	0.0%	5.4%	2.1%	1.9%	0.2%	0.7%	0.7%	-1.0%	-0.3%	1.9%
Milwood	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%	1.0%	3.2%	-0.9%	-1.6%	-1.2%	-0.9%	1.0%	-0.7%	-0.4%
Long Island	0.0%	1.6%	1.4%	0.0%	-0.1%	0.3%	0.1%	0.0%	-0.1%	0.1%
<b>Total-NYCA</b>	0.0%	-4.0%	-5.0%	-1.5%	-1.1%	-2.9%	-4.1%	-4.5%	-3.3%	-4.6%

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.00	2.75	2.90	0.91	0.87	1.17	1.23	1.25	0.90	1.05
Genessee	0.00	1.96	2.16	0.55	0.48	0.81	0.95	0.96	0.82	0.91
Central	0.00	2.03	2.20	0.59	0.66	0.93	1.03	0.99	0.81	0.84
North	0.00	1.80	2.01	0.50	0.47	0.74	0.86	0.74	0.60	0.62
Mohawk Valley	0.00	1.83	2.03	0.53	0.55	0.82	0.92	0.84	0.69	0.72
Capital	0.00	0.86	0.95	0.46	0.30	0.37	0.44	0.56	0.41	0.62
Hudson Valley	0.00	1.28	1.26	0.49	0.44	0.54	0.61	0.61	0.50	0.61
Milwood	0.00	1.25	1.21	0.49	0.44	0.53	0.60	0.59	0.48	0.59
Dunwoodie	0.00	1.27	1.21	0.49	0.44	0.54	0.60	0.58	0.48	0.59
NY City	0.00	1.26	1.19	0.49	0.44	0.53	0.61	0.55	0.48	0.57
Long Island	0.00	1.24	1.16	0.54	0.51	0.53	0.61	0.58	0.61	0.54
<b>NYCA Avg. LBMP</b>	<b>0.00</b>	<b>1.59</b>	<b>1.66</b>	<b>0.55</b>	<b>0.51</b>	<b>0.68</b>	<b>0.77</b>	<b>0.75</b>	<b>0.62</b>	<b>0.70</b>

Projected Changes in Generator GWh (2013-2022) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(52)	(260)	(36)	63	(146)	(299)	(491)	(116)	(452)
Genessee	0	97	86	4	21	7	23	5	12	14
Central	0	200	292	(33)	38	(99)	(2)	(132)	(124)	(108)
North	0	175	204	68	53	77	84	84	115	130
Mohawk Valley	0	89	84	2	8	5	20	11	7	14
Capital	0	1,031	1,049	340	381	383	283	283	349	185
Hudson Valley	0	92	48	42	7	21	25	(1)	5	43
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	978	1,186	446	424	445	551	528	555	592
Long Island	0	411	440	105	66	81	94	93	78	83
<b>Total-NYCA</b>	<b>0</b>	<b>3,021</b>	<b>3,130</b>	<b>940</b>	<b>1,061</b>	<b>776</b>	<b>779</b>	<b>380</b>	<b>881</b>	<b>499</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Case-CSAPR

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	6.7	6.3	2.1	2.1	2.7	2.5	4.1	3.1	4.4
Genessee	0.0	1.9	2.0	0.7	0.6	1.0	1.2	2.2	1.8	2.5
Central	0.0	3.0	2.9	1.0	1.0	1.4	1.5	1.9	1.9	2.3
North	0.0	(0.1)	(0.3)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.4)
Mohawk Valley	0.0	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Capital	0.0	(1.2)	(1.0)	(0.7)	(0.6)	(0.8)	(0.5)	(1.3)	(1.2)	(1.1)
Hudson Valley	0.0	(0.0)	(0.0)	(0.2)	0.1	(0.2)	0.1	(0.5)	(0.3)	(0.3)
Milwood	0.0	(0.1)	(0.0)	(0.1)	0.0	(0.1)	0.0	(0.2)	(0.1)	(0.1)
Dunwoodie	0.0	(0.2)	(0.1)	(0.2)	0.0	(0.2)	0.1	(0.4)	(0.3)	(0.3)
NY City	0.0	(2.2)	(0.7)	(1.6)	0.3	(1.6)	0.7	(3.6)	(2.5)	(2.5)
Long Island	0.0	(1.9)	(1.3)	(1.2)	(0.3)	(1.3)	(0.4)	(2.1)	(1.9)	(1.9)
<b>Total-NYCA</b>	<b>0.0</b>	<b>6.2</b>	<b>8.1</b>	<b>(0.1)</b>	<b>3.5</b>	<b>0.9</b>	<b>5.2</b>	<b>0.1</b>	<b>0.4</b>	<b>2.9</b>

## I.2. Case 2: Higher Load Forecast

Projected Changes in Production Costs (2013-2022) by Zone (nominal \$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	12	13	16	22	36	36	48	42	36
Genessee	0	1	1	2	2	3	4	4	5	5
Central	4	7	17	20	30	37	42	41	43	56
North	1	2	4	4	4	4	6	12	14	14
Mohawk Valley	0	1	2	3	3	4	5	7	7	8
Capital	6	18	25	31	40	55	54	54	55	52
Hudson Valley	1	1	2	5	4	5	5	3	11	12
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	15	24	36	57	65	77	97	104	115	147
Long Island	5	10	20	28	35	51	64	82	91	109
<b>Total NYCA</b>	<b>34</b>	<b>76</b>	<b>118</b>	<b>165</b>	<b>207</b>	<b>270</b>	<b>312</b>	<b>353</b>	<b>383</b>	<b>438</b>
Imports	15	33	62	92	124	142	155	164	177	216
Exports	(11)	(14)	(21)	(41)	(48)	(46)	(57)	(122)	(160)	(171)
<b>NYCA + Imports - Exports</b>	<b>60</b>	<b>123</b>	<b>201</b>	<b>299</b>	<b>379</b>	<b>458</b>	<b>524</b>	<b>639</b>	<b>720</b>	<b>826</b>
Total IESO	1	2	5	6	1	6	3	10	11	31
Total PJM	14	28	60	83	123	114	121	195	208	231
Total ISONE	9	18	26	40	51	56	73	88	103	125
<b>Total System</b>	<b>59</b>	<b>124</b>	<b>209</b>	<b>294</b>	<b>382</b>	<b>446</b>	<b>510</b>	<b>645</b>	<b>705</b>	<b>825</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	8	17	28	43	54	65	77	93	105	116
Genessee	5	11	18	29	37	46	53	66	76	85
Central	8	15	26	42	55	70	83	99	116	128
North	1	3	5	6	8	10	12	14	17	17
Mohawk Valley	3	6	11	17	21	27	32	38	44	47
Capital	5	11	17	29	35	42	51	60	68	82
Hudson Valley	5	11	19	30	37	45	54	66	75	83
Milwood	2	3	5	6	8	8	10	13	14	15
Dunwoodie	3	6	9	13	15	17	21	25	28	30
NY City	32	55	85	122	145	163	198	247	277	288
Long Island	14	33	66	95	134	180	233	299	351	422
<b>Total-NYCA</b>	<b>85</b>	<b>170</b>	<b>289</b>	<b>431</b>	<b>549</b>	<b>673</b>	<b>824</b>	<b>1,019</b>	<b>1,171</b>	<b>1,313</b>
Export	(11)	(14)	(21)	(41)	(48)	(46)	(57)	(122)	(160)	(171)
<b>NYCA+Export</b>	<b>75</b>	<b>157</b>	<b>269</b>	<b>390</b>	<b>501</b>	<b>627</b>	<b>767</b>	<b>898</b>	<b>1,011</b>	<b>1,141</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	4	16	21	26	36	52	58	75	79	74
Genessee	1	2	4	5	6	8	10	12	15	14
Central	1	11	33	35	39	47	55	62	90	110
North	2	5	8	9	12	13	17	24	30	27
Mohawk Valley	1	2	4	6	7	9	11	15	17	17
Capital	7	20	28	39	50	65	67	72	79	84
Hudson Valley	1	2	2	5	5	5	6	6	14	16
Milwood	2	4	7	11	11	12	18	20	24	23
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	19	31	48	75	87	105	137	165	185	210
Long Island	7	14	30	41	57	79	107	147	170	203
<b>Total-NYCA</b>	<b>46</b>	<b>108</b>	<b>185</b>	<b>252</b>	<b>310</b>	<b>396</b>	<b>486</b>	<b>599</b>	<b>702</b>	<b>778</b>
<b>Import</b>	<b>15</b>	<b>33</b>	<b>62</b>	<b>92</b>	<b>124</b>	<b>142</b>	<b>155</b>	<b>164</b>	<b>177</b>	<b>216</b>
<b>NYCA+Import</b>	<b>61</b>	<b>141</b>	<b>247</b>	<b>345</b>	<b>433</b>	<b>538</b>	<b>641</b>	<b>763</b>	<b>879</b>	<b>994</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	2	2	4	5	6	8	9	9	11
Genessee	(0)	(0)	(0)	0	0	1	1	1	2	3
Central	1	0	(0)	4	6	9	12	12	17	19
North	0	0	0	0	0	0	0	0	1	0
Mohawk Valley	0	0	(0)	1	1	2	2	2	3	4
Capital	(1)	(0)	(2)	0	(1)	(3)	(2)	(4)	(5)	3
Hudson Valley	0	1	0	2	1	0	2	3	3	5
Milwood	0	0	0	1	0	(0)	0	1	1	1
Dunwoodie	0	1	0	1	0	(0)	1	1	1	2
NY City	5	7	5	15	10	7	18	32	34	39
Long Island	3	8	16	25	40	57	87	116	139	187
<b>Total-NYCA</b>	<b>9</b>	<b>18</b>	<b>22</b>	<b>53</b>	<b>63</b>	<b>78</b>	<b>130</b>	<b>174</b>	<b>204</b>	<b>274</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.1	1.0	1.5	2.0	3.4	5.5	5.8	9.2	8.0	7.1
Genessee	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.5
Central	0.1	0.4	1.3	1.7	3.1	3.4	4.0	4.8	5.2	6.9
North	0.0	0.1	0.2	0.3	0.4	0.3	0.6	1.3	1.6	1.5
Mohawk Valley	0.0	0.0	0.1	0.2	0.3	0.3	0.4	0.7	0.7	0.8
Capital	0.1	0.7	1.3	2.0	3.0	4.0	3.9	4.8	5.0	4.7
Hudson Valley	0.0	0.1	0.1	0.4	0.4	0.4	0.4	0.3	1.1	1.3
Milwood	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	0.7	1.5	2.8	3.9	4.4	5.5	8.5	9.3	12.9
Long Island	0.1	0.4	1.2	1.9	2.8	3.8	4.7	7.5	8.2	9.8
<b>Total-NYCA</b>	<b>0.7</b>	<b>3.5</b>	<b>7.3</b>	<b>11.5</b>	<b>17.4</b>	<b>22.5</b>	<b>25.7</b>	<b>37.6</b>	<b>39.7</b>	<b>45.6</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.5%	4.4%	4.6%	4.9%	6.4%	8.6%	7.3%	6.8%	5.8%	4.2%
Genessee	1.1%	2.0%	3.9%	5.0%	4.8%	7.9%	9.6%	7.2%	8.4%	7.7%
Central	0.6%	1.5%	3.0%	3.3%	4.9%	5.1%	5.9%	4.4%	4.5%	5.4%
North	3.2%	5.3%	11.4%	10.6%	13.9%	12.3%	20.3%	15.2%	18.9%	14.1%
Mohawk Valley	0.7%	1.8%	3.8%	4.5%	6.0%	6.9%	9.1%	8.7%	8.4%	8.3%
Capital	0.4%	1.3%	1.7%	2.0%	2.5%	3.3%	3.0%	2.4%	2.3%	2.0%
Hudson Valley	1.3%	1.9%	2.7%	7.2%	5.8%	6.3%	6.1%	2.2%	5.9%	6.2%
Milwood	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	0.7%	1.0%	1.5%	1.8%	2.0%	2.1%	2.6%	2.3%	2.4%	3.0%
Long Island	0.7%	1.3%	2.4%	2.8%	3.3%	4.5%	5.4%	5.9%	5.9%	6.5%
<b>Total-NYCA</b>	<b>0.6%</b>	<b>1.5%</b>	<b>2.2%</b>	<b>2.6%</b>	<b>3.1%</b>	<b>3.8%</b>	<b>4.1%</b>	<b>3.8%</b>	<b>3.8%</b>	<b>3.9%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.6	1.0	1.7	1.8	2.4	2.0	1.7
Genessee	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	0.6	0.8	0.7	1.1	1.1	1.1	1.5
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.2</b>	<b>1.8</b>	<b>2.4</b>	<b>3.0</b>	<b>3.6</b>	<b>3.1</b>	<b>3.4</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.8%	10.5%	10.6%	10.6%	14.7%	19.0%	15.1%	14.2%	11.7%	8.2%
Genessee	4.0%	4.0%	8.7%	12.5%	9.5%	22.2%	22.2%	18.5%	22.2%	17.9%
Central	0.3%	6.5%	10.3%	22.4%	30.6%	17.6%	25.4%	19.9%	16.8%	21.4%
North	2.4%	4.1%	6.6%	6.5%	7.2%	5.7%	9.6%	12.3%	14.9%	12.7%
Mohawk Valley	0.3%	1.1%	1.8%	2.5%	3.0%	3.4%	4.2%	5.2%	4.8%	4.8%
Capital	0.1%	0.2%	0.3%	0.3%	0.4%	0.5%	0.5%	0.4%	0.4%	0.3%
Hudson Valley	0.3%	0.1%	0.0%	-0.1%	0.3%	0.7%	0.9%	2.0%	2.6%	2.5%
Milwood	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	1.4%	2.3%	3.3%	4.0%	4.5%	4.6%	6.9%	6.1%	8.3%	8.0%
Long Island	0.1%	0.2%	0.4%	0.4%	0.9%	2.1%	3.4%	6.6%	9.0%	11.8%
<b>Total-NYCA</b>	<b>0.5%</b>	<b>7.5%</b>	<b>9.1%</b>	<b>11.7%</b>	<b>15.8%</b>	<b>16.1%</b>	<b>15.9%</b>	<b>14.4%</b>	<b>12.2%</b>	<b>11.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.9%	7.3%	7.4%	6.2%	10.0%	12.9%	12.0%	10.9%	9.1%	5.9%
Genessee	0.7%	1.2%	2.1%	3.1%	2.5%	4.2%	4.7%	5.0%	5.9%	5.4%
Central	0.7%	3.2%	5.5%	6.4%	8.4%	7.0%	9.1%	8.6%	8.4%	11.2%
North	1.9%	3.2%	5.2%	4.8%	5.4%	4.1%	7.0%	10.0%	11.8%	10.0%
Mohawk Valley	0.6%	1.9%	3.7%	4.6%	5.4%	5.8%	7.5%	9.5%	9.7%	10.0%
Capital	0.3%	0.8%	1.1%	1.3%	1.5%	1.7%	1.7%	1.9%	2.0%	1.9%
Hudson Valley	1.3%	2.3%	2.1%	4.8%	4.6%	4.0%	3.9%	2.9%	7.0%	8.4%
Milwood	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	0.9%	2.9%	4.7%	4.6%	5.0%	4.8%	6.4%	5.0%	3.5%	8.9%
Long Island	0.8%	1.1%	2.0%	2.3%	2.9%	4.1%	5.3%	7.0%	7.1%	8.6%
<b>Total-NYCA</b>	<b>0.8%</b>	<b>3.0%</b>	<b>4.0%</b>	<b>4.0%</b>	<b>5.3%</b>	<b>6.2%</b>	<b>7.1%</b>	<b>7.2%</b>	<b>6.5%</b>	<b>7.3%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.17	0.33	0.58	0.79	0.97	1.18	1.46	1.62	1.90	1.91
Genessee	0.13	0.27	0.52	0.70	0.87	1.08	1.28	1.51	1.85	1.85
Central	0.16	0.29	0.49	0.78	1.00	1.32	1.67	1.83	2.27	2.25
North	0.12	0.25	0.48	0.59	0.75	0.95	1.14	1.24	1.54	1.41
Mohawk Valley	0.15	0.27	0.50	0.71	0.89	1.14	1.41	1.57	1.93	1.87
Capital	0.06	0.15	0.24	0.51	0.46	0.49	0.69	0.82	0.98	1.30
Hudson Valley	0.13	0.23	0.40	0.60	0.62	0.72	0.97	1.16	1.34	1.35
Milwood	0.14	0.24	0.42	0.63	0.64	0.72	1.00	1.20	1.38	1.34
Dunwoodie	0.14	0.25	0.42	0.62	0.63	0.73	0.99	1.20	1.37	1.33
NY City	0.16	0.27	0.46	0.69	0.73	0.82	1.15	1.43	1.67	1.57
Long Island	0.15	0.36	0.75	1.10	1.56	2.17	2.97	3.70	4.36	5.23
<b>NYCA Avg. LBMP</b>	<b>0.14</b>	<b>0.26</b>	<b>0.48</b>	<b>0.70</b>	<b>0.83</b>	<b>1.03</b>	<b>1.34</b>	<b>1.57</b>	<b>1.87</b>	<b>1.95</b>

Projected Changes in Generator GWh (2013-2022) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	49	262	268	277	350	547	585	693	601	496
Genessee	9	15	28	38	32	45	55	63	74	70
Central	94	158	357	381	565	636	709	608	629	745
North	31	53	79	75	81	61	104	177	208	189
Mohawk Valley	8	20	35	48	52	58	76	106	101	105
Capital	137	418	511	604	747	944	883	846	845	725
Hudson Valley	13	23	32	72	59	58	62	34	124	131
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	319	484	701	1,020	1,074	1,254	1,509	1,508	1,636	1,904
Long Island	100	189	362	451	531	694	833	948	988	1,091
<b>Total-NYCA</b>	<b>759</b>	<b>1,623</b>	<b>2,373</b>	<b>2,967</b>	<b>3,491</b>	<b>4,297</b>	<b>4,815</b>	<b>4,984</b>	<b>5,205</b>	<b>5,457</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Higher Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	(0.0)	(0.1)	0.0	0.4	(0.1)	(0.1)	0.3	0.4	0.7
Genessee	0.1	0.2	0.4	0.8	1.2	1.3	1.3	2.0	2.3	3.1
Central	0.2	0.3	0.6	1.1	1.5	1.8	2.2	2.9	3.4	3.6
North	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.4)	(0.6)	(0.8)	(0.7)
Mohawk Valley	0.1	0.2	0.3	0.6	0.8	1.0	1.2	1.4	1.6	1.7
Capital	0.2	0.0	0.5	0.9	1.1	1.5	2.3	2.3	2.7	2.8
Hudson Valley	0.3	0.3	0.9	1.2	1.7	2.2	3.0	3.3	3.8	3.8
Milwood	0.1	0.1	0.3	0.3	0.4	0.4	0.6	0.6	0.8	0.6
Dunwoodie	0.2	0.2	0.4	0.4	0.6	0.8	1.1	1.1	1.3	1.0
NY City	2.2	1.6	4.3	4.3	6.2	7.3	10.0	9.9	11.7	8.8
Long Island	1.2	1.6	4.1	5.3	7.7	10.2	13.1	15.4	18.4	19.0
<b>Total-NYCA</b>	<b>4.6</b>	<b>4.3</b>	<b>11.6</b>	<b>14.7</b>	<b>21.3</b>	<b>26.0</b>	<b>34.3</b>	<b>38.6</b>	<b>45.6</b>	<b>44.5</b>

### I.3. Case 3: Lower Load Forecast

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(16)	(13)	(28)	(28)	(24)	(27)	(39)	(44)	(27)	(31)
Genessee	(1)	(2)	(2)	(3)	(2)	(3)	(3)	(4)	(3)	(3)
Central	(4)	(18)	(29)	(31)	(37)	(39)	(37)	(36)	(39)	(37)
North	(2)	(5)	(4)	(3)	(3)	(3)	(3)	(8)	(9)	(9)
Mohawk Valley	(1)	(2)	(4)	(5)	(4)	(5)	(4)	(5)	(6)	(5)
Capital	(13)	(26)	(46)	(54)	(54)	(55)	(59)	(52)	(61)	(46)
Hudson Valley	(1)	(3)	(4)	(6)	(5)	(6)	(4)	(7)	(10)	(12)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(26)	(50)	(76)	(94)	(87)	(107)	(115)	(119)	(128)	(150)
Long Island	(9)	(17)	(28)	(29)	(32)	(36)	(39)	(40)	(47)	(48)
<b>Total NYCA</b>	<b>(73)</b>	<b>(137)</b>	<b>(220)</b>	<b>(253)</b>	<b>(248)</b>	<b>(281)</b>	<b>(303)</b>	<b>(314)</b>	<b>(329)</b>	<b>(343)</b>
Imports	(37)	(74)	(102)	(108)	(124)	(131)	(124)	(127)	(117)	(138)
Exports	11	31	55	74	84	77	86	132	159	170
<b>NYCA + Imports - Exports</b>	<b>(122)</b>	<b>(241)</b>	<b>(377)</b>	<b>(435)</b>	<b>(457)</b>	<b>(489)</b>	<b>(513)</b>	<b>(573)</b>	<b>(604)</b>	<b>(651)</b>
Total IESO	(10)	(8)	(5)	(6)	(6)	(9)	(7)	(19)	(20)	(27)
Total PJM	(40)	(57)	(93)	(124)	(121)	(138)	(127)	(145)	(161)	(185)
Total ISONE	(12)	(32)	(50)	(60)	(67)	(61)	(64)	(84)	(82)	(90)
<b>Total System</b>	<b>(135)</b>	<b>(234)</b>	<b>(369)</b>	<b>(444)</b>	<b>(442)</b>	<b>(490)</b>	<b>(502)</b>	<b>(562)</b>	<b>(592)</b>	<b>(644)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(12)	(28)	(46)	(55)	(59)	(59)	(61)	(70)	(73)	(80)
Genessee	(8)	(16)	(25)	(35)	(37)	(37)	(38)	(44)	(47)	(49)
Central	(13)	(28)	(46)	(58)	(60)	(61)	(63)	(73)	(76)	(82)
North	(5)	(14)	(22)	(23)	(25)	(25)	(25)	(29)	(30)	(32)
Mohawk Valley	(6)	(12)	(21)	(26)	(27)	(27)	(28)	(32)	(34)	(36)
Capital	(11)	(19)	(31)	(37)	(39)	(41)	(44)	(51)	(54)	(59)
Hudson Valley	(10)	(21)	(32)	(36)	(37)	(39)	(43)	(49)	(52)	(55)
Milwood	(3)	(6)	(9)	(11)	(11)	(12)	(13)	(15)	(15)	(16)
Dunwoodie	(6)	(13)	(20)	(23)	(24)	(25)	(27)	(31)	(33)	(35)
NY City	(57)	(119)	(186)	(208)	(218)	(230)	(254)	(294)	(311)	(331)
Long Island	(27)	(62)	(95)	(95)	(98)	(110)	(126)	(149)	(158)	(174)
<b>Total-NYCA</b>	<b>(158)</b>	<b>(337)</b>	<b>(533)</b>	<b>(606)</b>	<b>(636)</b>	<b>(666)</b>	<b>(722)</b>	<b>(838)</b>	<b>(884)</b>	<b>(949)</b>
Export	11	31	55	74	84	77	86	132	159	170
<b>NYCA+Export</b>	<b>(147)</b>	<b>(306)</b>	<b>(478)</b>	<b>(532)</b>	<b>(551)</b>	<b>(588)</b>	<b>(636)</b>	<b>(706)</b>	<b>(726)</b>	<b>(779)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(17)	(20)	(39)	(45)	(44)	(44)	(53)	(69)	(54)	(57)
Genessee	(1)	(4)	(7)	(8)	(9)	(9)	(8)	(10)	(11)	(10)
Central	(9)	(29)	(35)	(40)	(50)	(40)	(58)	(52)	(67)	(67)
North	(3)	(9)	(13)	(14)	(16)	(13)	(14)	(20)	(22)	(22)
Mohawk Valley	(2)	(5)	(8)	(10)	(9)	(10)	(9)	(11)	(12)	(12)
Capital	(16)	(31)	(55)	(65)	(62)	(64)	(68)	(70)	(81)	(70)
Hudson Valley	(1)	(4)	(5)	(7)	(6)	(7)	(5)	(9)	(13)	(15)
Milwood	(4)	(9)	(15)	(15)	(16)	(15)	(18)	(21)	(22)	(23)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(31)	(66)	(102)	(126)	(117)	(138)	(153)	(173)	(184)	(212)
Long Island	(12)	(25)	(40)	(42)	(43)	(50)	(59)	(69)	(78)	(84)
<b>Total-NYCA</b>	<b>(97)</b>	<b>(202)</b>	<b>(318)</b>	<b>(372)</b>	<b>(374)</b>	<b>(390)</b>	<b>(446)</b>	<b>(505)</b>	<b>(544)</b>	<b>(571)</b>
Import	(37)	(74)	(102)	(108)	(124)	(131)	(124)	(127)	(117)	(138)
<b>NYCA+Import</b>	<b>(134)</b>	<b>(277)</b>	<b>(420)</b>	<b>(480)</b>	<b>(498)</b>	<b>(520)</b>	<b>(570)</b>	<b>(632)</b>	<b>(660)</b>	<b>(709)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(2)	(3)	(2)	(2)	(3)	(4)	(3)	(3)	(6)
Genessee	(0)	0	0	(0)	0	0	0	0	(0)	0
Central	(0)	(1)	(2)	(3)	(1)	(2)	(2)	(2)	(2)	(4)
North	(0)	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(0)	(0)	(0)	(1)	(0)	(0)	(1)	(0)	(1)	(1)
Capital	(1)	1	2	4	6	4	3	3	2	2
Hudson Valley	(1)	(2)	(2)	0	1	(0)	(2)	(2)	(3)	(3)
Milwood	(0)	(1)	(1)	(0)	0	(0)	(1)	(1)	(1)	(1)
Dunwoodie	(1)	(2)	(2)	(0)	0	(1)	(2)	(2)	(2)	(2)
NY City	(9)	(16)	(19)	(4)	(1)	(13)	(29)	(31)	(34)	(37)
Long Island	(7)	(12)	(16)	(7)	(5)	(15)	(27)	(33)	(35)	(42)
<b>Total-NYCA</b>	<b>(20)</b>	<b>(34)</b>	<b>(42)</b>	<b>(13)</b>	<b>(0)</b>	<b>(30)</b>	<b>(65)</b>	<b>(71)</b>	<b>(78)</b>	<b>(94)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.8)	(1.0)	(3.1)	(3.6)	(3.6)	(4.2)	(6.3)	(8.9)	(5.3)	(6.0)
Genessee	(0.0)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)	(0.4)	(0.4)	(0.3)
Central	(0.1)	(1.1)	(2.2)	(2.6)	(3.6)	(3.8)	(3.8)	(4.5)	(4.5)	(4.3)
North	(0.1)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.9)	(1.0)	(1.0)
Mohawk Valley	(0.0)	(0.1)	(0.2)	(0.4)	(0.3)	(0.4)	(0.4)	(0.5)	(0.6)	(0.6)
Capital	(0.3)	(1.0)	(2.5)	(3.4)	(4.0)	(4.0)	(4.3)	(4.6)	(5.5)	(4.2)
Hudson Valley	(0.0)	(0.2)	(0.3)	(0.4)	(0.4)	(0.5)	(0.3)	(0.7)	(1.0)	(1.3)
Milwood	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)	(1.5)	(3.3)	(4.9)	(5.1)	(6.3)	(6.5)	(10.6)	(11.4)	(13.3)
Long Island	(0.2)	(0.7)	(1.6)	(2.1)	(2.7)	(2.9)	(3.0)	(3.8)	(4.5)	(4.6)
<b>Total-NYCA</b>	<b>(1.9)</b>	<b>(5.9)</b>	<b>(13.6)</b>	<b>(17.9)</b>	<b>(20.4)</b>	<b>(22.7)</b>	<b>(25.1)</b>	<b>(34.7)</b>	<b>(34.2)</b>	<b>(35.5)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-4.3%	-4.5%	-9.6%	-8.6%	-6.8%	-6.6%	-7.9%	-6.6%	-3.8%	-3.5%
Genessee	-2.1%	-4.6%	-7.0%	-7.3%	-6.5%	-8.6%	-6.9%	-6.5%	-5.8%	-5.0%
Central	-0.8%	-3.5%	-5.2%	-5.0%	-5.9%	-5.7%	-5.6%	-4.1%	-3.8%	-3.4%
North	-4.7%	-10.6%	-14.4%	-9.4%	-10.6%	-9.8%	-9.9%	-9.9%	-11.9%	-9.1%
Mohawk Valley	-2.3%	-4.8%	-8.1%	-8.4%	-7.5%	-9.2%	-8.1%	-5.8%	-7.1%	-5.8%
Capital	-0.9%	-1.8%	-3.3%	-3.4%	-3.3%	-3.3%	-3.3%	-2.2%	-2.5%	-1.8%
Hudson Valley	-1.0%	-4.8%	-6.1%	-8.2%	-6.4%	-7.9%	-4.1%	-5.6%	-5.5%	-6.0%
Milwood	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	-1.2%	-2.1%	-3.1%	-3.0%	-2.7%	-2.9%	-3.0%	-2.7%	-2.8%	-3.0%
Long Island	-1.2%	-2.1%	-3.2%	-3.0%	-3.2%	-3.4%	-3.4%	-2.9%	-3.3%	-3.0%
<b>Total-NYCA</b>	<b>-1.5%</b>	<b>-2.6%</b>	<b>-4.2%</b>	<b>-4.0%</b>	<b>-3.7%</b>	<b>-3.9%</b>	<b>-4.1%</b>	<b>-3.5%</b>	<b>-3.2%</b>	<b>-3.0%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(1.2)	(1.0)	(1.3)	(2.1)	(2.3)	(1.3)	(1.5)
Genessee	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	(0.8)	(0.8)	(0.9)	(1.1)	(1.1)	(0.8)	(0.6)
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	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(2.0)</b>	<b>(1.8)</b>	<b>(2.2)</b>	<b>(3.2)</b>	<b>(3.4)</b>	<b>(2.0)</b>	<b>(2.1)</b>



Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-9.9%	-9.9%	-22.8%	-20.0%	-15.1%	-14.2%	-17.2%	-13.9%	-7.5%	-6.9%
Genessee	-8.0%	-12.0%	-17.4%	-16.7%	-14.3%	-22.2%	-16.7%	-18.5%	-14.8%	-14.3%
Central	-2.1%	-14.2%	-17.4%	-30.6%	-29.9%	-22.2%	-25.3%	-19.5%	-11.7%	-8.5%
North	-3.3%	-7.8%	-8.5%	-5.5%	-5.5%	-4.6%	-4.6%	-8.2%	-9.3%	-8.0%
Mohawk Valley	-1.4%	-2.5%	-4.1%	-4.6%	-3.4%	-4.1%	-3.4%	-3.5%	-4.2%	-3.7%
Capital	-0.2%	-0.3%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.4%	-0.5%	-0.3%
Hudson Valley	0.1%	-0.2%	-0.3%	-0.5%	-0.3%	-0.1%	-0.4%	-0.6%	-1.5%	-5.4%
Milwood	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	-2.6%	-4.3%	-6.7%	-6.7%	-6.0%	-6.3%	-6.7%	-6.7%	-6.5%	-9.1%
Long Island	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%	-0.7%	-0.9%	-1.9%
<b>Total-NYCA</b>	<b>-5.8%</b>	<b>-10.4%</b>	<b>-17.6%</b>	<b>-19.1%</b>	<b>-15.9%</b>	<b>-14.4%</b>	<b>-17.1%</b>	<b>-13.8%</b>	<b>-7.9%</b>	<b>-6.8%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)
Genessee	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	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-5.8%	-4.9%	-14.3%	-10.2%	-8.0%	-8.1%	-11.9%	-10.0%	-5.4%	-4.9%
Genessee	-1.7%	-2.8%	-4.1%	-4.7%	-3.8%	-4.2%	-3.7%	-4.7%	-3.9%	-3.5%
Central	-1.6%	-6.6%	-8.3%	-8.9%	-8.7%	-8.7%	-9.5%	-7.4%	-6.3%	-5.4%
North	-2.7%	-6.2%	-6.3%	-4.3%	-4.1%	-3.4%	-3.5%	-6.6%	-7.6%	-6.7%
Mohawk Valley	-2.9%	-4.8%	-7.5%	-7.9%	-6.5%	-8.1%	-7.3%	-5.9%	-7.3%	-6.0%
Capital	-0.6%	-1.2%	-2.0%	-1.9%	-1.8%	-1.9%	-1.8%	-1.6%	-1.8%	-1.5%
Hudson Valley	-0.9%	-3.5%	-5.1%	-6.5%	-4.4%	-4.9%	-3.4%	-5.4%	-6.6%	-6.9%
Milwood	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	-3.2%	-5.6%	-8.5%	-7.7%	-7.6%	-7.3%	-7.1%	-9.3%	-8.4%	-9.9%
Long Island	-0.9%	-1.5%	-2.5%	-2.8%	-2.9%	-3.0%	-3.3%	-2.8%	-3.4%	-3.2%
<b>Total-NYCA</b>	<b>-2.6%</b>	<b>-3.8%</b>	<b>-6.9%</b>	<b>-6.0%</b>	<b>-5.4%</b>	<b>-5.6%</b>	<b>-6.7%</b>	<b>-6.5%</b>	<b>-5.1%</b>	<b>-5.0%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.11)	(0.55)	(0.95)	(1.06)	(1.27)	(1.11)	(1.16)	(1.24)	(1.32)	(1.50)
Genessee	(0.20)	(0.52)	(0.89)	(1.14)	(1.31)	(1.12)	(1.14)	(1.30)	(1.40)	(1.38)
Central	(0.19)	(0.52)	(0.98)	(1.21)	(1.32)	(1.17)	(1.16)	(1.38)	(1.43)	(1.48)
North	(0.17)	(0.53)	(0.95)	(1.12)	(1.34)	(1.12)	(1.14)	(1.29)	(1.34)	(1.33)
Mohawk Valley	(0.19)	(0.54)	(0.96)	(1.17)	(1.31)	(1.14)	(1.18)	(1.38)	(1.42)	(1.45)
Capital	(0.19)	(0.31)	(0.49)	(0.53)	(0.51)	(0.52)	(0.63)	(0.77)	(0.87)	(0.98)
Hudson Valley	(0.24)	(0.50)	(0.80)	(0.83)	(0.87)	(0.82)	(0.98)	(1.17)	(1.23)	(1.26)
Milwood	(0.25)	(0.54)	(0.85)	(0.86)	(0.90)	(0.85)	(1.04)	(1.23)	(1.28)	(1.31)
Dunwoodie	(0.25)	(0.53)	(0.85)	(0.87)	(0.91)	(0.85)	(1.04)	(1.23)	(1.28)	(1.31)
NY City	(0.26)	(0.57)	(0.91)	(0.91)	(0.98)	(0.96)	(1.18)	(1.39)	(1.46)	(1.51)
Long Island	(0.34)	(0.72)	(1.10)	(1.06)	(1.08)	(1.22)	(1.59)	(1.89)	(1.96)	(2.15)
<b>NYCA Avg. LBMP</b>	<b>(0.22)</b>	<b>(0.53)</b>	<b>(0.88)</b>	<b>(0.98)</b>	<b>(1.07)</b>	<b>(0.99)</b>	<b>(1.11)</b>	<b>(1.30)</b>	<b>(1.36)</b>	<b>(1.42)</b>

Projected Changes in Generator GWh (2013-2022) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(334)	(273)	(547)	(486)	(402)	(440)	(602)	(677)	(396)	(409)
Genessee	(17)	(35)	(49)	(53)	(43)	(50)	(39)	(55)	(50)	(44)
Central	(100)	(440)	(679)	(605)	(687)	(687)	(635)	(562)	(560)	(512)
North	(44)	(105)	(99)	(67)	(62)	(49)	(51)	(117)	(130)	(122)
Mohawk Valley	(30)	(51)	(75)	(88)	(63)	(77)	(67)	(69)	(83)	(71)
Capital	(306)	(585)	(1,050)	(1,084)	(989)	(956)	(988)	(853)	(975)	(677)
Hudson Valley	(12)	(61)	(69)	(80)	(68)	(77)	(45)	(80)	(115)	(128)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(568)	(1,021)	(1,490)	(1,683)	(1,479)	(1,714)	(1,760)	(1,664)	(1,684)	(1,872)
Long Island	(180)	(330)	(503)	(485)	(493)	(517)	(532)	(490)	(554)	(527)
<b>Total-NYCA</b>	<b>(1,591)</b>	<b>(2,901)</b>	<b>(4,561)</b>	<b>(4,632)</b>	<b>(4,287)</b>	<b>(4,568)</b>	<b>(4,720)</b>	<b>(4,566)</b>	<b>(4,548)</b>	<b>(4,363)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Lower Load Forecast

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.5	0.5	0.8	0.6	0.8	0.8	1.0	1.2	0.3	0.5
Genessee	(0.0)	(0.3)	(0.2)	(0.7)	(0.7)	(0.7)	(0.6)	(0.6)	(1.2)	(1.3)
Central	(0.3)	(0.5)	(0.8)	(1.4)	(1.3)	(1.4)	(1.5)	(1.7)	(2.1)	(2.4)
North	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.2
Mohawk Valley	(0.2)	(0.4)	(0.7)	(0.9)	(0.9)	(1.0)	(1.1)	(1.2)	(1.3)	(1.5)
Capital	(0.4)	(0.5)	(0.9)	(1.3)	(1.3)	(1.7)	(1.5)	(1.7)	(1.7)	(2.1)
Hudson Valley	(0.6)	(1.0)	(1.6)	(1.9)	(1.9)	(2.0)	(2.2)	(2.7)	(2.7)	(2.6)
Milwood	(0.2)	(0.3)	(0.5)	(0.6)	(0.6)	(0.6)	(0.7)	(0.9)	(0.9)	(0.8)
Dunwoodie	(0.4)	(0.7)	(1.0)	(1.3)	(1.2)	(1.3)	(1.4)	(1.7)	(1.8)	(1.7)
NY City	(3.9)	(6.7)	(10.3)	(12.5)	(12.0)	(12.9)	(13.6)	(17.3)	(17.9)	(16.8)
Long Island	(1.9)	(4.0)	(5.9)	(6.6)	(6.5)	(7.1)	(7.5)	(9.2)	(9.5)	(9.7)
<b>Total-NYCA</b>	<b>(7.3)</b>	<b>(13.5)</b>	<b>(20.9)</b>	<b>(26.4)</b>	<b>(25.5)</b>	<b>(28.0)</b>	<b>(29.1)</b>	<b>(35.6)</b>	<b>(38.5)</b>	<b>(38.4)</b>

## I.4. Case 4: Higher Natural Gas Prices

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	30	51	52	88	63	88	79	68	79	72
Genessee	(4)	(5)	(4)	(3)	(3)	(2)	(3)	(2)	(3)	(1)
Central	5	4	4	7	1	6	14	57	39	73
North	(9)	(9)	(8)	(5)	(3)	(3)	(4)	(8)	(9)	(11)
Mohawk Valley	(6)	(5)	(5)	(6)	(5)	(7)	(6)	(2)	(5)	(1)
Capital	36	44	47	52	57	68	70	65	71	62
Hudson Valley	(1)	1	2	(2)	(2)	(1)	(1)	2	(0)	1
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	78	61	84	122	142	162	171	147	149	150
Long Island	(29)	16	26	36	39	40	44	42	40	41
<b>Total NYCA</b>	<b>100</b>	<b>157</b>	<b>199</b>	<b>289</b>	<b>289</b>	<b>351</b>	<b>363</b>	<b>369</b>	<b>361</b>	<b>386</b>
Imports	105	89	54	35	41	12	16	17	23	44
Exports	(28)	(1)	(8)	12	11	15	15	(54)	(75)	(65)
<b>NYCA + Imports - Exports</b>	<b>234</b>	<b>247</b>	<b>262</b>	<b>312</b>	<b>319</b>	<b>348</b>	<b>364</b>	<b>440</b>	<b>459</b>	<b>495</b>
Total IESO	39	32	21	38	38	39	54	39	38	81
Total PJM	378	451	486	623	698	742	809	1,000	1,054	1,143
Total ISONE	267	246	293	325	348	383	412	439	471	501
<b>Total System</b>	<b>784</b>	<b>887</b>	<b>999</b>	<b>1,275</b>	<b>1,373</b>	<b>1,515</b>	<b>1,637</b>	<b>1,848</b>	<b>1,924</b>	<b>2,111</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	18	13	32	45	47	57	57	68	62	74
Genessee	15	12	23	30	32	40	38	50	47	56
Central	29	23	41	55	57	70	69	86	81	94
North	10	9	16	22	22	28	27	36	34	40
Mohawk Valley	14	11	19	26	27	33	32	41	39	45
Capital	50	44	52	64	69	69	74	75	75	86
Hudson Valley	37	32	42	51	54	57	61	65	66	72
Milwood	11	10	13	15	16	17	18	19	20	22
Dunwoodie	23	20	26	31	33	35	38	40	41	44
NY City	208	179	233	282	300	317	341	361	373	404
Long Island	115	89	108	131	140	148	159	168	176	192
<b>Total-NYCA</b>	<b>531</b>	<b>442</b>	<b>604</b>	<b>753</b>	<b>798</b>	<b>872</b>	<b>914</b>	<b>1,009</b>	<b>1,013</b>	<b>1,128</b>
Export	(28)	(1)	(8)	12	11	15	15	(54)	(75)	(65)
<b>NYCA+Export</b>	<b>503</b>	<b>441</b>	<b>596</b>	<b>765</b>	<b>809</b>	<b>887</b>	<b>929</b>	<b>955</b>	<b>938</b>	<b>1,063</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	54	58	77	123	102	142	135	152	158	173
Genessee	3	2	8	11	11	17	15	22	20	24
Central	16	19	55	37	58	94	116	159	131	192
North	4	2	13	22	24	32	30	38	34	40
Mohawk Valley	(0)	(1)	4	7	8	10	10	19	15	21
Capital	40	37	51	63	72	77	79	71	73	74
Hudson Valley	0	1	3	(0)	0	1	1	4	3	4
Milwood	65	57	72	88	92	98	103	110	111	118
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	53	22	67	105	128	145	156	132	126	128
Long Island	(20)	9	27	37	42	41	45	44	40	42
<b>Total-NYCA</b>	<b>216</b>	<b>204</b>	<b>376</b>	<b>494</b>	<b>538</b>	<b>657</b>	<b>691</b>	<b>749</b>	<b>710</b>	<b>817</b>
Import	105	89	54	35	41	12	16	17	23	44
<b>NYCA+Import</b>	<b>322</b>	<b>293</b>	<b>430</b>	<b>528</b>	<b>579</b>	<b>669</b>	<b>707</b>	<b>766</b>	<b>733</b>	<b>861</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	(1)	1	2	2	(1)	2	(5)	(5)	(6)
Genessee	2	2	1	1	2	1	1	0	1	1
Central	6	5	4	5	6	5	5	2	3	2
North	0	(0)	0	(0)	0	0	0	0	0	0
Mohawk Valley	2	2	2	2	2	2	2	1	1	1
Capital	30	28	21	23	28	16	22	4	10	7
Hudson Valley	20	18	15	16	18	11	16	4	9	5
Milwood	6	5	5	5	5	3	5	1	3	1
Dunwoodie	12	11	10	10	11	7	10	3	6	3
NY City	113	101	89	89	105	69	95	29	60	32
Long Island	73	54	45	47	55	40	51	20	37	24
<b>Total-NYCA</b>	<b>265</b>	<b>225</b>	<b>194</b>	<b>200</b>	<b>235</b>	<b>154</b>	<b>210</b>	<b>60</b>	<b>126</b>	<b>69</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2.2	5.0	6.7	13.3	11.1	15.8	15.0	15.0	18.3	16.7
Genessee	(0.1)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.6)	(0.4)
Central	0.0	0.3	0.4	(0.3)	(0.5)	(0.0)	0.7	4.1	2.8	6.4
North	(0.3)	(0.5)	(0.6)	(0.4)	(0.4)	(0.3)	(0.5)	(1.1)	(1.2)	(1.5)
Mohawk Valley	(0.2)	(0.3)	(0.4)	(0.6)	(0.6)	(0.7)	(0.6)	(0.6)	(0.9)	(0.6)
Capital	(0.7)	(0.9)	(1.0)	(1.2)	(1.2)	(0.5)	(0.8)	(3.6)	(3.7)	(5.4)
Hudson Valley	(0.1)	(0.1)	(0.0)	(0.3)	(0.3)	(0.3)	(0.3)	(0.2)	(0.6)	(0.5)
Milwood	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)	(1.1)	(1.0)	(0.5)	1.0	1.3	1.5	(5.1)	(5.8)	(7.2)
Long Island	(1.5)	(1.0)	(0.9)	(0.9)	(0.9)	(1.0)	(1.0)	(1.9)	(2.5)	(3.0)
<b>Total-NYCA</b>	<b>(1.1)</b>	<b>1.3</b>	<b>2.9</b>	<b>8.7</b>	<b>7.9</b>	<b>13.8</b>	<b>13.6</b>	<b>6.2</b>	<b>5.8</b>	<b>4.5</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	12.6%	22.2%	21.0%	31.8%	20.8%	24.5%	19.4%	11.1%	13.2%	9.9%
Genessee	-17.1%	-17.8%	-15.0%	-12.2%	-11.7%	-11.3%	-11.3%	-7.5%	-9.2%	-6.1%
Central	0.2%	1.1%	0.9%	-0.5%	-0.7%	-0.1%	1.1%	3.7%	2.4%	5.1%
North	-25.2%	-22.0%	-26.3%	-15.2%	-12.9%	-13.1%	-15.8%	-13.0%	-14.4%	-13.9%
Mohawk Valley	-14.9%	-14.3%	-14.2%	-13.2%	-13.0%	-16.2%	-14.5%	-7.1%	-9.7%	-5.7%
Capital	-2.2%	-1.6%	-1.4%	-1.2%	-1.0%	-0.4%	-0.6%	-1.8%	-1.7%	-2.3%
Hudson Valley	-4.9%	-2.1%	-0.7%	-5.5%	-5.2%	-4.5%	-4.5%	-1.4%	-3.2%	-2.6%
Milwood	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	-1.6%	-2.2%	-1.4%	-1.0%	-0.6%	-0.6%	-0.6%	-1.3%	-1.4%	-1.6%
Long Island	-8.8%	-2.9%	-1.7%	-1.3%	-1.1%	-1.2%	-1.1%	-1.5%	-1.8%	-2.0%
<b>Total-NYCA</b>	<b>-1.1%</b>	<b>0.1%</b>	<b>0.6%</b>	<b>1.5%</b>	<b>0.9%</b>	<b>1.7%</b>	<b>1.5%</b>	<b>0.6%</b>	<b>0.5%</b>	<b>0.4%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	5.7	4.2	6.0	5.9	4.9	5.9	5.4
Genessee	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	2.2	2.6	3.0	3.5	4.1	4.4	5.4
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>7.9</b>	<b>6.8</b>	<b>9.0</b>	<b>9.4</b>	<b>9.0</b>	<b>10.3</b>	<b>10.7</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	36.9%	68.9%	63.8%	93.2%	61.4%	66.4%	50.6%	29.4%	35.1%	25.6%
Genessee	-40.0%	-40.0%	-34.8%	-29.2%	-28.6%	-27.8%	-29.4%	-18.5%	-22.2%	-14.3%
Central	29.4%	67.8%	67.6%	84.7%	99.6%	73.1%	74.2%	72.1%	67.3%	73.8%
North	-18.1%	-16.5%	-15.1%	-9.1%	-6.9%	-6.1%	-7.7%	-10.6%	-11.2%	-12.1%
Mohawk Valley	-9.7%	-8.9%	-7.4%	-7.5%	-6.3%	-7.1%	-6.1%	-3.8%	-5.2%	-3.4%
Capital	-0.4%	-0.3%	-0.2%	-0.2%	-0.1%	0.0%	-0.1%	-0.3%	-0.3%	-0.4%
Hudson Valley	-0.1%	-0.1%	0.1%	-0.4%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-2.0%
Milwood	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	-4.2%	-5.3%	-3.4%	-2.2%	-1.5%	-0.7%	-1.7%	-3.3%	-2.7%	-4.7%
Long Island	-1.4%	-0.4%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.7%
<b>Total-NYCA</b>	<b>30.5%</b>	<b>59.2%</b>	<b>56.3%</b>	<b>74.2%</b>	<b>59.1%</b>	<b>58.7%</b>	<b>50.2%</b>	<b>36.3%</b>	<b>39.6%</b>	<b>34.4%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.1
Genessee	(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	0.1	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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)	(0.0)	(0.0)	(0.0)	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	21.0%	37.1%	35.2%	52.0%	35.8%	38.9%	32.7%	17.9%	22.1%	14.3%
Genessee	-9.8%	-9.8%	-8.4%	-7.1%	-6.8%	-5.6%	-4.9%	-5.2%	-6.3%	-4.5%
Central	9.8%	17.8%	17.8%	10.7%	13.1%	13.9%	15.5%	16.3%	15.5%	18.9%
North	-14.3%	-13.1%	-11.6%	-7.0%	-5.1%	-4.5%	-5.7%	-8.6%	-9.0%	-9.9%
Mohawk Valley	-14.8%	-12.7%	-12.5%	-11.9%	-10.2%	-14.6%	-12.7%	-8.2%	-10.8%	-6.5%
Capital	-1.6%	-1.3%	-1.1%	-0.8%	-0.6%	-0.4%	-0.5%	-1.2%	-1.3%	-1.5%
Hudson Valley	-2.4%	-1.2%	-0.2%	-3.0%	-2.9%	-2.5%	-2.4%	-1.8%	-3.3%	-2.6%
Milwood	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	-6.2%	-7.6%	-3.6%	-3.9%	-2.7%	-3.4%	-2.6%	-5.0%	-5.3%	-5.2%
Long Island	-7.6%	-2.4%	-1.8%	-1.8%	-1.4%	-1.5%	-1.4%	-1.6%	-1.6%	-1.9%
<b>Total-NYCA</b>	<b>3.7%</b>	<b>7.8%</b>	<b>8.1%</b>	<b>10.1%</b>	<b>7.6%</b>	<b>9.4%</b>	<b>9.2%</b>	<b>5.7%</b>	<b>6.4%</b>	<b>5.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1.16	0.88	1.99	2.81	2.92	3.54	3.57	4.20	3.83	4.50
Genessee	1.52	1.27	2.22	2.95	3.08	3.85	3.72	4.79	4.49	5.28
Central	1.82	1.48	2.47	3.38	3.44	4.22	4.13	5.12	4.87	5.59
North	1.56	1.31	2.27	3.09	3.10	4.01	3.89	5.10	4.78	5.61
Mohawk Valley	1.91	1.58	2.57	3.46	3.50	4.34	4.27	5.33	5.06	5.85
Capital	4.17	3.64	4.20	5.18	5.49	5.56	5.94	5.99	6.01	6.74
Hudson Valley	3.64	3.12	3.98	4.88	5.11	5.43	5.75	6.07	6.12	6.66
Milwood	3.73	3.19	4.06	4.97	5.20	5.51	5.86	6.16	6.25	6.74
Dunwoodie	3.73	3.19	4.06	4.96	5.18	5.51	5.85	6.16	6.25	6.73
NY City	3.76	3.23	4.11	5.00	5.22	5.57	5.91	6.25	6.36	6.85
Long Island	4.77	3.69	4.39	5.37	5.67	6.02	6.36	6.62	6.83	7.37
<b>NYCA Avg. LBMP</b>	<b>2.89</b>	<b>2.42</b>	<b>3.30</b>	<b>4.19</b>	<b>4.36</b>	<b>4.87</b>	<b>5.02</b>	<b>5.62</b>	<b>5.53</b>	<b>6.17</b>

Projected Changes in Generator GWh (2013-2022) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	724	901	902	1,453	912	1,320	1,209	921	1,077	936
Genessee	(132)	(135)	(103)	(90)	(77)	(67)	(64)	(61)	(78)	(53)
Central	(479)	(529)	(510)	(470)	(541)	(490)	(388)	83	(182)	243
North	(234)	(218)	(179)	(108)	(75)	(64)	(84)	(152)	(156)	(182)
Mohawk Valley	(182)	(154)	(131)	(135)	(108)	(133)	(115)	(84)	(112)	(71)
Capital	(831)	(625)	(474)	(401)	(307)	(142)	(219)	(690)	(685)	(892)
Hudson Valley	(49)	(26)	(8)	(53)	(52)	(44)	(44)	(16)	(67)	(53)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(637)	(993)	(631)	(429)	(166)	(118)	(118)	(631)	(669)	(852)
Long Island	(1,215)	(440)	(254)	(182)	(146)	(173)	(163)	(257)	(339)	(363)
<b>Total-NYCA</b>	<b>(3,036)</b>	<b>(2,221)</b>	<b>(1,388)</b>	<b>(416)</b>	<b>(560)</b>	<b>90</b>	<b>14</b>	<b>(886)</b>	<b>(1,211)</b>	<b>(1,288)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Higher Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(6.9)	(5.9)	(5.5)	(7.6)	(5.7)	(7.8)	(7.7)	(10.6)	(11.2)	(12.2)
Genessee	(2.2)	(2.0)	(2.1)	(3.1)	(2.3)	(3.2)	(3.3)	(3.9)	(4.3)	(4.3)
Central	(1.6)	(1.7)	(1.1)	(1.2)	(0.7)	(1.1)	(1.1)	(2.0)	(2.4)	(2.7)
North	(0.0)	0.1	(0.2)	(0.3)	(0.3)	(0.5)	(0.5)	(0.5)	(0.6)	(0.5)
Mohawk Valley	0.2	0.1	0.3	0.5	0.6	0.7	0.8	0.9	0.7	0.9
Capital	1.9	1.6	2.2	3.0	2.8	3.4	3.8	5.6	5.0	6.6
Hudson Valley	1.8	1.4	2.4	3.2	3.1	3.8	4.2	6.1	5.7	6.6
Milwood	0.6	0.5	0.8	1.0	1.0	1.2	1.3	2.0	1.8	2.2
Dunwoodie	1.2	1.0	1.6	2.1	2.0	2.4	2.7	4.0	3.8	4.4
NY City	11.8	9.6	16.1	20.3	19.3	23.6	26.2	39.2	36.9	42.4
Long Island	7.0	5.1	7.4	10.0	9.6	11.7	13.0	19.2	18.4	21.9
<b>Total-NYCA</b>	<b>13.7</b>	<b>9.7</b>	<b>22.0</b>	<b>28.0</b>	<b>29.3</b>	<b>34.4</b>	<b>39.4</b>	<b>60.0</b>	<b>53.9</b>	<b>65.3</b>

## I.5. Case 5: Lower Natural Gas Prices

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(63)	(33)	(37)	(50)	(52)	(54)	(83)	(113)	(97)	(126)
Genessee	4	5	4	2	2	3	4	3	4	4
Central	3	8	1	(6)	(2)	(7)	(5)	(18)	(15)	(17)
North	11	7	9	6	7	7	8	12	16	16
Mohawk Valley	4	5	4	3	4	4	4	5	5	6
Capital	(43)	(33)	(38)	(43)	(52)	(44)	(55)	(76)	(77)	(94)
Hudson Valley	(1)	1	(1)	(1)	(4)	0	(1)	(0)	0	(1)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(70)	(71)	(76)	(112)	(109)	(127)	(146)	(127)	(143)	(148)
Long Island	(13)	(16)	(16)	(36)	(38)	(41)	(45)	(33)	(42)	(46)
<b>Total NYCA</b>	<b>(167)</b>	<b>(129)</b>	<b>(149)</b>	<b>(237)</b>	<b>(244)</b>	<b>(258)</b>	<b>(321)</b>	<b>(347)</b>	<b>(351)</b>	<b>(406)</b>
Imports	(82)	(112)	(98)	(74)	(72)	(80)	(53)	(71)	(67)	(62)
Exports	32	32	33	24	25	30	22	37	66	52
<b>NYCA + Imports - Exports</b>	<b>(281)</b>	<b>(273)</b>	<b>(279)</b>	<b>(335)</b>	<b>(341)</b>	<b>(369)</b>	<b>(396)</b>	<b>(455)</b>	<b>(485)</b>	<b>(520)</b>
Total IESO	(15)	(21)	(21)	(50)	(55)	(64)	(68)	(80)	(71)	(108)
Total PJM	(412)	(494)	(593)	(786)	(834)	(854)	(894)	(1,168)	(1,256)	(1,341)
Total ISONE	(268)	(284)	(312)	(365)	(402)	(423)	(448)	(462)	(500)	(521)
<b>Total System</b>	<b>(863)</b>	<b>(927)</b>	<b>(1,074)</b>	<b>(1,439)</b>	<b>(1,535)</b>	<b>(1,600)</b>	<b>(1,730)</b>	<b>(2,056)</b>	<b>(2,178)</b>	<b>(2,376)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(12)	(20)	(23)	(44)	(45)	(48)	(50)	(43)	(47)	(55)
Genessee	(16)	(20)	(20)	(35)	(34)	(35)	(34)	(33)	(36)	(41)
Central	(32)	(37)	(38)	(60)	(59)	(63)	(64)	(64)	(71)	(78)
North	(11)	(14)	(14)	(23)	(22)	(24)	(22)	(25)	(26)	(30)
Mohawk Valley	(15)	(17)	(17)	(28)	(28)	(29)	(29)	(30)	(32)	(36)
Capital	(49)	(52)	(53)	(68)	(70)	(77)	(84)	(74)	(82)	(88)
Hudson Valley	(38)	(40)	(41)	(55)	(55)	(60)	(64)	(60)	(65)	(71)
Milwood	(11)	(12)	(12)	(16)	(17)	(18)	(19)	(18)	(20)	(22)
Dunwoodie	(24)	(25)	(25)	(34)	(34)	(37)	(39)	(37)	(41)	(45)
NY City	(213)	(223)	(225)	(303)	(307)	(333)	(351)	(337)	(372)	(406)
Long Island	(101)	(104)	(106)	(139)	(140)	(154)	(166)	(166)	(182)	(203)
<b>Total-NYCA</b>	<b>(520)</b>	<b>(564)</b>	<b>(573)</b>	<b>(805)</b>	<b>(812)</b>	<b>(878)</b>	<b>(922)</b>	<b>(885)</b>	<b>(975)</b>	<b>(1,073)</b>
Export	32	32	33	24	25	30	22	37	66	52
<b>NYCA+Export</b>	<b>(489)</b>	<b>(531)</b>	<b>(540)</b>	<b>(781)</b>	<b>(788)</b>	<b>(848)</b>	<b>(900)</b>	<b>(848)</b>	<b>(909)</b>	<b>(1,021)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(66)	(48)	(53)	(87)	(88)	(94)	(118)	(151)	(136)	(179)
Genessee	(3)	(5)	(6)	(14)	(13)	(15)	(12)	(12)	(14)	(14)
Central	23	(2)	(4)	(30)	(41)	(38)	(30)	(29)	(1)	(5)
North	(3)	(11)	(8)	(24)	(22)	(24)	(21)	(19)	(17)	(23)
Mohawk Valley	(1)	(3)	(3)	(10)	(9)	(9)	(9)	(8)	(10)	(11)
Capital	(42)	(38)	(41)	(59)	(66)	(60)	(76)	(79)	(86)	(107)
Hudson Valley	(2)	(1)	(3)	(4)	(6)	(3)	(4)	(2)	(2)	(4)
Milwood	(67)	(70)	(70)	(93)	(95)	(102)	(107)	(103)	(112)	(119)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(46)	(50)	(51)	(110)	(100)	(119)	(137)	(95)	(117)	(127)
Long Island	(11)	(16)	(14)	(42)	(42)	(45)	(49)	(32)	(43)	(51)
<b>Total-NYCA</b>	<b>(220)</b>	<b>(244)</b>	<b>(254)</b>	<b>(472)</b>	<b>(482)</b>	<b>(507)</b>	<b>(563)</b>	<b>(531)</b>	<b>(538)</b>	<b>(640)</b>
Import	(82)	(112)	(98)	(74)	(72)	(80)	(53)	(71)	(67)	(62)
<b>NYCA+Import</b>	<b>(301)</b>	<b>(355)</b>	<b>(352)</b>	<b>(545)</b>	<b>(554)</b>	<b>(588)</b>	<b>(616)</b>	<b>(602)</b>	<b>(605)</b>	<b>(702)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	5	3	2	2	0	(1)	(5)	2	2	1
Genessee	(2)	(2)	(2)	(2)	(2)	(2)	(3)	(2)	(3)	(2)
Central	(7)	(6)	(7)	(6)	(7)	(8)	(11)	(7)	(11)	(9)
North	(0)	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	(3)	(2)	(2)	(2)	(2)	(3)	(4)	(2)	(3)	(3)
Capital	(27)	(27)	(28)	(24)	(28)	(31)	(41)	(27)	(32)	(30)
Hudson Valley	(19)	(18)	(18)	(16)	(18)	(20)	(26)	(18)	(22)	(21)
Milwood	(6)	(5)	(6)	(5)	(6)	(6)	(8)	(6)	(7)	(7)
Dunwoodie	(12)	(11)	(11)	(10)	(11)	(13)	(16)	(11)	(14)	(13)
NY City	(105)	(98)	(101)	(91)	(101)	(118)	(148)	(104)	(127)	(125)
Long Island	(55)	(50)	(53)	(48)	(51)	(59)	(75)	(63)	(73)	(76)
<b>Total-NYCA</b>	<b>(231)</b>	<b>(215)</b>	<b>(227)</b>	<b>(204)</b>	<b>(227)</b>	<b>(261)</b>	<b>(338)</b>	<b>(239)</b>	<b>(289)</b>	<b>(284)</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(3.3)	(3.0)	(4.5)	(6.9)	(8.7)	(9.6)	(14.6)	(24.9)	(21.8)	(28.9)
Genessee	0.2	0.3	0.4	0.3	0.4	0.5	0.5	0.7	0.8	0.8
Central	0.1	0.9	0.7	0.9	1.4	0.4	0.3	0.2	0.4	0.1
North	0.4	0.4	0.8	0.6	0.9	0.8	0.9	1.8	2.3	2.4
Mohawk Valley	0.2	0.3	0.4	0.4	0.6	0.6	0.6	1.0	0.9	1.2
Capital	0.6	1.4	1.8	2.3	2.1	3.1	2.8	2.9	3.3	2.5
Hudson Valley	0.0	0.2	0.1	0.1	(0.1)	0.3	0.2	0.3	0.7	0.7
Milwood	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	0.7	1.4	1.5	1.5	1.3	1.0	0.1	7.7	7.2	8.9
Long Island	0.7	1.2	1.9	1.0	1.2	1.3	1.3	3.5	3.1	3.4
<b>Total-NYCA</b>	<b>(0.4)</b>	<b>3.2</b>	<b>2.9</b>	<b>0.3</b>	<b>(0.9)</b>	<b>(1.6)</b>	<b>(8.0)</b>	<b>(6.9)</b>	<b>(3.1)</b>	<b>(9.0)</b>



Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-19.1%	-13.3%	-14.2%	-16.5%	-16.2%	-14.8%	-19.0%	-18.4%	-15.7%	-17.1%
Genessee	17.9%	19.2%	18.5%	10.2%	11.3%	14.8%	17.2%	11.6%	12.2%	11.6%
Central	0.7%	2.8%	1.6%	1.6%	2.3%	0.6%	0.5%	0.2%	0.3%	0.1%
North	35.6%	21.1%	35.2%	22.1%	28.5%	30.0%	30.6%	20.8%	27.9%	22.3%
Mohawk Valley	13.7%	14.8%	13.9%	10.1%	12.3%	13.4%	13.4%	11.5%	10.6%	11.8%
Capital	2.0%	2.6%	2.3%	2.3%	1.7%	2.6%	2.1%	1.4%	1.5%	1.1%
Hudson Valley	2.4%	5.5%	1.6%	2.0%	-1.5%	4.1%	2.3%	2.6%	3.8%	3.1%
Milwood	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%	2.3%	2.3%	1.5%	1.7%	1.6%	1.3%	2.0%	1.7%	2.0%
Long Island	4.1%	3.6%	3.7%	1.5%	1.4%	1.4%	1.4%	2.7%	2.2%	2.2%
<b>Total-NYCA</b>	0.0%	1.6%	1.3%	0.4%	0.4%	0.3%	-0.6%	-0.6%	-0.3%	-0.7%

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	(0.0)	(3.2)	(3.4)	(3.8)	(5.8)	(7.9)	(7.0)	(9.1)
Genessee	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)	(2.0)	(1.9)	(2.8)	(3.1)	(3.4)	(3.8)	(4.1)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	(0.0)	(0.0)	(0.0)	(5.2)	(5.3)	(6.7)	(8.9)	(11.2)	(10.8)	(13.1)

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-52.4%	-44.9%	-47.0%	-52.0%	-49.7%	-41.9%	-49.8%	-47.5%	-41.6%	-43.1%
Genessee	44.0%	44.0%	43.5%	25.0%	28.6%	38.9%	47.1%	29.6%	33.3%	32.1%
Central	-43.4%	-46.0%	-52.4%	-78.4%	-74.3%	-70.4%	-66.7%	-58.9%	-58.8%	-55.7%
North	25.5%	16.2%	20.7%	13.3%	14.8%	13.6%	14.7%	17.1%	21.6%	19.6%
Mohawk Valley	9.7%	9.6%	7.7%	5.7%	6.0%	6.0%	6.5%	7.3%	6.2%	7.5%
Capital	0.4%	0.5%	0.4%	0.4%	0.3%	0.4%	0.4%	0.3%	0.3%	0.2%
Hudson Valley	0.1%	0.1%	0.1%	-0.3%	-0.1%	0.1%	-0.3%	2.3%	2.7%	2.1%
Milwood	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	5.4%	6.1%	5.5%	3.5%	4.1%	3.8%	2.5%	5.4%	6.8%	5.0%
Long Island	0.5%	0.5%	0.5%	0.2%	0.2%	0.2%	0.2%	0.7%	0.8%	0.8%
<b>Total-NYCA</b>	<b>-43.9%</b>	<b>-39.3%</b>	<b>-42.5%</b>	<b>-49.0%</b>	<b>-46.4%</b>	<b>-43.4%</b>	<b>-47.8%</b>	<b>-45.3%</b>	<b>-41.6%</b>	<b>-42.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	(0.3)
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.3)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-30.9%	-18.9%	-22.9%	-24.1%	-24.1%	-22.0%	-30.6%	-32.5%	-27.5%	-29.9%
Genessee	10.7%	10.6%	10.3%	6.2%	5.9%	7.2%	8.6%	8.3%	9.4%	8.6%
Central	-11.4%	-5.8%	-9.5%	-9.1%	-8.0%	-13.2%	-13.7%	-10.4%	-10.6%	-10.8%
North	20.2%	13.1%	16.0%	10.1%	11.2%	10.1%	11.2%	13.7%	17.3%	15.8%
Mohawk Valley	12.6%	13.4%	11.8%	9.7%	10.8%	11.5%	10.4%	11.6%	11.2%	12.1%
Capital	1.6%	1.9%	1.7%	1.4%	1.1%	1.4%	1.2%	1.3%	1.5%	1.3%
Hudson Valley	2.0%	4.6%	1.4%	1.0%	-0.4%	2.0%	1.1%	3.1%	4.5%	3.7%
Milwood	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	7.4%	7.7%	7.1%	3.8%	5.1%	4.5%	3.9%	5.8%	4.5%	6.1%
Long Island	3.8%	3.3%	3.4%	1.5%	1.6%	1.6%	1.7%	2.7%	2.4%	2.4%
<b>Total-NYCA</b>	<b>-7.2%</b>	<b>-1.8%</b>	<b>-3.2%</b>	<b>-4.4%</b>	<b>-4.1%</b>	<b>-5.1%</b>	<b>-8.0%</b>	<b>-8.4%</b>	<b>-7.0%</b>	<b>-8.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.83)	(1.35)	(1.49)	(2.76)	(2.85)	(3.00)	(3.14)	(2.72)	(2.96)	(3.41)
Genessee	(1.64)	(1.98)	(2.01)	(3.35)	(3.28)	(3.42)	(3.29)	(3.35)	(3.61)	(4.04)
Central	(2.01)	(2.31)	(2.33)	(3.72)	(3.65)	(3.87)	(3.84)	(3.96)	(4.37)	(4.79)
North	(1.73)	(2.01)	(2.01)	(3.33)	(3.26)	(3.44)	(3.27)	(3.62)	(3.82)	(4.35)
Mohawk Valley	(2.07)	(2.36)	(2.35)	(3.74)	(3.68)	(3.90)	(3.81)	(4.05)	(4.35)	(4.85)
Capital	(4.05)	(4.29)	(4.32)	(5.48)	(5.65)	(6.11)	(6.61)	(5.92)	(6.50)	(6.89)
Hudson Valley	(3.71)	(3.86)	(3.89)	(5.17)	(5.25)	(5.64)	(5.93)	(5.68)	(6.20)	(6.67)
Milwood	(3.82)	(3.94)	(3.97)	(5.24)	(5.33)	(5.72)	(6.01)	(5.79)	(6.32)	(6.79)
Dunwoodie	(3.81)	(3.92)	(3.96)	(5.24)	(5.33)	(5.71)	(6.00)	(5.79)	(6.33)	(6.79)
NY City	(3.85)	(3.97)	(4.02)	(5.27)	(5.37)	(5.77)	(6.03)	(5.88)	(6.41)	(6.91)
Long Island	(4.24)	(4.27)	(4.35)	(5.58)	(5.66)	(6.16)	(6.54)	(6.55)	(7.10)	(7.74)
<b>NYCA Avg. LBMP</b>	<b>(2.89)</b>	<b>(3.11)</b>	<b>(3.15)</b>	<b>(4.44)</b>	<b>(4.48)</b>	<b>(4.79)</b>	<b>(4.95)</b>	<b>(4.85)</b>	<b>(5.27)</b>	<b>(5.75)</b>

Projected Changes in Generator GWh (2013-2022) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(1,140)	(469)	(504)	(664)	(699)	(745)	(1,144)	(1,545)	(1,238)	(1,617)
Genessee	148	158	137	78	77	87	99	103	109	106
Central	763	854	742	621	676	602	578	500	538	514
North	333	216	244	157	165	147	163	244	301	296
Mohawk Valley	171	167	133	108	107	112	108	138	126	146
Capital	741	924	808	763	574	778	689	547	580	425
Hudson Valley	25	62	18	18	(15)	34	22	34	73	63
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	932	1,012	1,000	727	797	782	578	1,119	1,024	1,154
Long Island	631	560	592	251	226	229	222	464	387	392
<b>Total-NYCA</b>	<b>2,604</b>	<b>3,483</b>	<b>3,170</b>	<b>2,060</b>	<b>1,909</b>	<b>2,026</b>	<b>1,314</b>	<b>1,604</b>	<b>1,900</b>	<b>1,478</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Lower Natural Gas Prices

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	8.9	8.1	7.0	7.8	7.7	8.5	7.4	12.9	11.7	13.9
Genessee	3.0	2.3	2.2	2.5	2.5	2.9	2.8	5.3	4.8	5.7
Central	1.9	1.3	1.3	0.8	0.8	1.0	1.1	2.1	1.8	2.3
North	0.2	0.4	0.3	0.7	0.6	0.7	0.4	0.7	0.6	0.6
Mohawk Valley	(0.2)	(0.3)	(0.3)	(0.5)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)	(0.7)
Capital	(2.2)	(2.0)	(1.8)	(3.0)	(2.6)	(3.7)	(3.1)	(3.7)	(3.9)	(4.1)
Hudson Valley	(2.6)	(2.4)	(2.4)	(3.5)	(3.3)	(3.7)	(3.2)	(5.0)	(5.0)	(5.3)
Milwood	(0.8)	(0.8)	(0.7)	(1.1)	(1.0)	(1.1)	(1.0)	(1.6)	(1.6)	(1.7)
Dunwoodie	(1.7)	(1.6)	(1.6)	(2.3)	(2.1)	(2.3)	(2.1)	(3.4)	(3.3)	(3.5)
NY City	(17.3)	(15.8)	(15.5)	(22.5)	(21.1)	(22.7)	(19.9)	(33.1)	(32.6)	(34.6)
Long Island	(8.1)	(7.5)	(7.3)	(10.3)	(9.7)	(11.2)	(9.7)	(15.7)	(15.4)	(16.9)
<b>Total-NYCA</b>	<b>(19.0)</b>	<b>(18.1)</b>	<b>(18.8)</b>	<b>(31.4)</b>	<b>(28.7)</b>	<b>(32.3)</b>	<b>(27.7)</b>	<b>(42.0)</b>	<b>(43.5)</b>	<b>(44.3)</b>

## I.6. Case 6: Full MainTier RPS and Full EEPS Goals Achievement

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(14)	(24)	(54)	(62)	(65)	(71)	(98)	(107)	(82)	(92)
Genessee	(0)	(1)	(4)	(6)	(6)	(6)	(6)	(8)	(8)	(7)
Central	(4)	(25)	(70)	(97)	(115)	(112)	(112)	(113)	(118)	(110)
North	(2)	(6)	(8)	(8)	(7)	(6)	(7)	(15)	(15)	(19)
Mohawk Valley	(1)	(3)	(8)	(12)	(11)	(12)	(12)	(12)	(14)	(13)
Capital	(14)	(29)	(53)	(63)	(51)	(56)	(62)	(65)	(62)	(60)
Hudson Valley	(1)	(0)	(2)	(5)	(4)	(3)	(1)	(6)	(9)	(12)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(27)	(57)	(91)	(129)	(120)	(140)	(152)	(159)	(175)	(188)
Long Island	(8)	(18)	(27)	(30)	(30)	(34)	(36)	(40)	(46)	(48)
<b>Total NYCA</b>	<b>(73)</b>	<b>(163)</b>	<b>(317)</b>	<b>(411)</b>	<b>(406)</b>	<b>(440)</b>	<b>(487)</b>	<b>(525)</b>	<b>(529)</b>	<b>(550)</b>
Imports	(40)	(89)	(149)	(187)	(200)	(233)	(212)	(210)	(192)	(221)
Exports	13	39	96	139	166	150	166	245	300	323
<b>NYCA + Imports - Exports</b>	<b>(125)</b>	<b>(291)</b>	<b>(562)</b>	<b>(737)</b>	<b>(772)</b>	<b>(823)</b>	<b>(866)</b>	<b>(980)</b>	<b>(1,021)</b>	<b>(1,094)</b>
Total IESO	(9)	(12)	(20)	(44)	(33)	(53)	(48)	(88)	(84)	(97)
Total PJM	(46)	(82)	(166)	(219)	(238)	(265)	(255)	(246)	(290)	(307)
Total ISONE	(13)	(35)	(54)	(68)	(73)	(73)	(69)	(97)	(101)	(117)
<b>Total System</b>	<b>(141)</b>	<b>(292)</b>	<b>(556)</b>	<b>(743)</b>	<b>(750)</b>	<b>(832)</b>	<b>(860)</b>	<b>(956)</b>	<b>(1,005)</b>	<b>(1,071)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(11)	(32)	(74)	(94)	(106)	(102)	(107)	(102)	(117)	(121)
Genessee	(8)	(19)	(43)	(59)	(66)	(63)	(66)	(65)	(73)	(73)
Central	(13)	(33)	(78)	(100)	(111)	(108)	(117)	(113)	(126)	(128)
North	(5)	(16)	(36)	(42)	(49)	(46)	(49)	(46)	(50)	(51)
Mohawk Valley	(6)	(15)	(38)	(48)	(54)	(53)	(56)	(55)	(61)	(62)
Capital	(10)	(18)	(27)	(33)	(29)	(35)	(33)	(48)	(56)	(60)
Hudson Valley	(9)	(21)	(34)	(39)	(39)	(42)	(44)	(52)	(58)	(61)
Milwood	(3)	(6)	(10)	(11)	(11)	(12)	(13)	(15)	(17)	(18)
Dunwoodie	(6)	(13)	(21)	(24)	(24)	(26)	(27)	(32)	(36)	(38)
NY City	(52)	(120)	(194)	(222)	(224)	(239)	(254)	(299)	(336)	(360)
Long Island	(25)	(62)	(95)	(95)	(96)	(107)	(119)	(147)	(163)	(181)
<b>Total-NYCA</b>	<b>(148)</b>	<b>(356)</b>	<b>(649)</b>	<b>(768)</b>	<b>(809)</b>	<b>(830)</b>	<b>(885)</b>	<b>(975)</b>	<b>(1,093)</b>	<b>(1,154)</b>
Export	13	39	96	139	166	150	166	245	300	323
<b>NYCA+Export</b>	<b>(135)</b>	<b>(317)</b>	<b>(553)</b>	<b>(629)</b>	<b>(643)</b>	<b>(680)</b>	<b>(718)</b>	<b>(730)</b>	<b>(793)</b>	<b>(831)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(15)	(21)	(57)	(63)	(73)	(71)	(93)	(94)	(80)	(85)
Genessee	1	(3)	(16)	(20)	(24)	(22)	(22)	(20)	(25)	(22)
Central	(1)	(24)	(42)	(43)	(88)	(25)	(8)	(12)	(36)	(34)
North	(3)	(13)	(34)	(36)	(44)	(36)	(40)	(39)	(44)	(46)
Mohawk Valley	(2)	3	47	85	83	96	98	127	124	139
Capital	(15)	(32)	(58)	(72)	(50)	(58)	(61)	(83)	(90)	(88)
Hudson Valley	0	4	2	0	2	3	5	1	(4)	(6)
Milwood	(3)	(10)	(18)	(19)	(18)	(18)	(19)	(24)	(30)	(31)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(28)	(74)	(121)	(168)	(152)	(176)	(191)	(217)	(247)	(268)
Long Island	(11)	(26)	(39)	(43)	(40)	(49)	(54)	(69)	(81)	(88)
<b>Total-NYCA</b>	<b>(77)</b>	<b>(196)</b>	<b>(334)</b>	<b>(381)</b>	<b>(404)</b>	<b>(356)</b>	<b>(384)</b>	<b>(430)</b>	<b>(512)</b>	<b>(529)</b>
Import	(40)	(89)	(149)	(187)	(200)	(233)	(212)	(210)	(192)	(221)
<b>NYCA+Import</b>	<b>(117)</b>	<b>(285)</b>	<b>(483)</b>	<b>(568)</b>	<b>(604)</b>	<b>(588)</b>	<b>(597)</b>	<b>(640)</b>	<b>(704)</b>	<b>(750)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	(0)	(1)	0	2	(0)	0	0	(3)	(7)
Genessee	(0)	0	2	3	4	3	4	2	3	3
Central	(1)	(0)	(0)	(1)	4	0	(1)	(2)	(2)	(2)
North	0	(0)	0	(0)	0	(0)	(0)	0	0	(0)
Mohawk Valley	(0)	0	1	2	3	2	2	1	1	1
Capital	(0)	6	31	41	57	47	53	34	37	34
Hudson Valley	(1)	2	17	24	34	27	29	19	21	18
Milwood	(0)	0	5	7	10	8	9	6	6	6
Dunwoodie	(1)	1	10	14	20	17	18	11	13	11
NY City	(6)	3	82	123	176	136	145	89	101	79
Long Island	(8)	(3)	32	55	77	57	56	24	31	17
<b>Total-NYCA</b>	<b>(17)</b>	<b>8</b>	<b>179</b>	<b>268</b>	<b>387</b>	<b>297</b>	<b>314</b>	<b>185</b>	<b>207</b>	<b>160</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.7)	(2.1)	(5.9)	(7.8)	(9.9)	(11.4)	(15.3)	(21.5)	(16.6)	(19.2)
Genessee	(0.0)	(0.1)	(0.3)	(0.5)	(0.6)	(0.6)	(0.6)	(0.9)	(1.0)	(0.9)
Central	(0.1)	(1.4)	(5.1)	(7.9)	(11.0)	(10.6)	(10.5)	(13.1)	(13.6)	(12.7)
North	(0.1)	(0.3)	(0.5)	(0.7)	(0.6)	(0.6)	(0.6)	(1.7)	(1.7)	(2.2)
Mohawk Valley	(0.0)	(0.2)	(0.5)	(0.9)	(1.0)	(1.1)	(1.1)	(1.3)	(1.5)	(1.5)
Capital	(0.3)	(1.1)	(3.1)	(4.3)	(4.1)	(4.3)	(4.8)	(6.2)	(6.0)	(5.7)
Hudson Valley	(0.0)	(0.1)	(0.3)	(0.5)	(0.6)	(0.5)	(0.3)	(0.9)	(1.3)	(1.5)
Milwood	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)	(1.5)	(3.7)	(6.4)	(6.7)	(7.8)	(8.5)	(13.9)	(15.4)	(16.5)
Long Island	(0.2)	(0.7)	(1.5)	(2.1)	(2.5)	(2.7)	(2.8)	(3.7)	(4.3)	(4.5)
<b>Total-NYCA</b>	<b>(1.8)</b>	<b>(7.5)</b>	<b>(21.0)</b>	<b>(31.2)</b>	<b>(36.8)</b>	<b>(39.6)</b>	<b>(44.5)</b>	<b>(63.2)</b>	<b>(61.4)</b>	<b>(64.7)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-3.9%	-9.2%	-18.4%	-18.8%	-18.5%	-17.7%	-19.2%	-15.9%	-12.0%	-11.3%
Genessee	-2.7%	-6.2%	-15.4%	-16.8%	-17.3%	-17.9%	-17.2%	-14.9%	-15.3%	-12.6%
Central	-0.8%	-4.5%	-12.1%	-15.0%	-17.7%	-16.0%	-15.3%	-11.9%	-11.7%	-10.0%
North	-5.9%	-12.8%	-24.2%	-22.6%	-20.8%	-21.5%	-22.1%	-19.7%	-20.6%	-19.8%
Mohawk Valley	-2.6%	-6.8%	-19.0%	-20.8%	-21.8%	-23.3%	-23.2%	-15.4%	-17.3%	-14.8%
Capital	-0.9%	-2.0%	-4.1%	-4.3%	-3.4%	-3.6%	-3.7%	-3.1%	-2.8%	-2.4%
Hudson Valley	-1.4%	-4.6%	-6.9%	-10.3%	-8.1%	-7.4%	-4.8%	-7.1%	-6.6%	-7.4%
Milwood	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	-1.0%	-2.1%	-3.5%	-4.0%	-3.6%	-3.7%	-3.8%	-3.6%	-3.8%	-3.7%
Long Island	-1.0%	-2.1%	-3.0%	-3.1%	-2.9%	-3.2%	-3.1%	-2.9%	-3.1%	-3.0%
<b>Total-NYCA</b>	<b>-1.4%</b>	<b>-3.2%</b>	<b>-6.3%</b>	<b>-6.8%</b>	<b>-6.6%</b>	<b>-6.6%</b>	<b>-7.0%</b>	<b>-6.2%</b>	<b>-5.7%</b>	<b>-5.4%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	(0.0)	(2.6)	(2.8)	(3.5)	(4.9)	(5.7)	(4.3)	(5.0)
Genessee	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)	(1.9)	(1.9)	(2.2)	(2.1)	(2.4)	(2.3)	(1.9)
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	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(4.5)</b>	<b>(4.7)</b>	<b>(5.7)</b>	<b>(7.0)</b>	<b>(8.1)</b>	<b>(6.6)</b>	<b>(7.0)</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-9.1%	-22.0%	-42.9%	-42.6%	-41.0%	-38.2%	-40.8%	-34.2%	-25.3%	-23.9%
Genessee	-8.0%	-16.0%	-34.8%	-37.5%	-38.1%	-38.9%	-38.9%	-33.3%	-37.0%	-28.6%
Central	-2.0%	-13.0%	-34.0%	-74.1%	-72.9%	-54.3%	-47.5%	-42.3%	-35.4%	-26.7%
North	-4.2%	-9.6%	-14.1%	-13.6%	-11.0%	-10.0%	-10.3%	-16.3%	-16.3%	-17.6%
Mohawk Valley	-1.4%	-3.9%	-8.9%	-11.0%	-10.1%	-10.5%	-10.2%	-9.3%	-10.4%	-9.2%
Capital	-0.2%	-0.3%	-0.7%	-0.7%	-0.5%	-0.5%	-0.6%	-0.6%	-0.5%	-0.4%
Hudson Valley	1.6%	14.4%	14.3%	14.1%	14.5%	14.7%	14.3%	14.0%	12.5%	7.5%
Milwood	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	-2.8%	-4.7%	-7.6%	-8.8%	-7.9%	-8.0%	-8.5%	-8.7%	-9.4%	-11.2%
Long Island	0.0%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%	-0.8%	-0.9%	-2.0%
<b>Total-NYCA</b>	<b>-5.3%</b>	<b>-15.2%</b>	<b>-33.2%</b>	<b>-42.3%</b>	<b>-40.7%</b>	<b>-36.8%</b>	<b>-37.2%</b>	<b>-32.5%</b>	<b>-25.1%</b>	<b>-22.4%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.1)	(0.2)
Genessee	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)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(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	0.0	0.0	0.0	(0.0)	0.0	0.0	0.0	(0.0)	0.0	(0.0)
Milwood	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)	(0.1)	(0.0)
Long Island	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.4)</b>	<b>(0.3)</b>	<b>(0.3)</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-5.4%	-11.8%	-26.5%	-22.4%	-23.0%	-23.3%	-27.2%	-24.6%	-17.5%	-17.7%
Genessee	14.1%	25.8%	22.1%	20.6%	22.1%	24.5%	24.2%	20.1%	20.0%	21.2%
Central	1.2%	-3.8%	-13.1%	-17.2%	-17.9%	-16.5%	-14.6%	-14.9%	-13.5%	-11.5%
North	-3.4%	-7.6%	-11.0%	-10.7%	-8.8%	-7.8%	-8.3%	-13.2%	-13.2%	-14.4%
Mohawk Valley	-3.1%	-6.5%	-18.0%	-20.2%	-18.5%	-20.0%	-20.2%	-15.1%	-17.2%	-15.1%
Capital	-0.7%	-1.4%	-2.5%	-2.5%	-2.0%	-2.1%	-2.1%	-2.4%	-2.3%	-2.1%
Hudson Valley	4.9%	58.3%	56.2%	57.2%	59.0%	61.2%	60.1%	49.3%	46.4%	44.7%
Milwood	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	-3.4%	-5.6%	-9.0%	-8.7%	-8.6%	-7.9%	-7.6%	-11.1%	-11.0%	-11.1%
Long Island	-0.8%	-1.6%	-2.5%	-2.8%	-2.7%	-2.9%	-3.0%	-2.8%	-3.2%	-3.1%
<b>Total-NYCA</b>	<b>-1.7%</b>	<b>-2.8%</b>	<b>-8.4%</b>	<b>-8.1%</b>	<b>-8.1%</b>	<b>-8.5%</b>	<b>-9.7%</b>	<b>-10.6%</b>	<b>-8.4%</b>	<b>-8.5%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.10)	(0.85)	(2.85)	(3.65)	(4.43)	(3.94)	(4.25)	(3.34)	(4.14)	(4.15)
Genessee	(0.21)	(0.81)	(2.73)	(3.60)	(4.36)	(3.79)	(4.12)	(3.39)	(3.93)	(3.75)
Central	(0.21)	(0.88)	(3.04)	(3.98)	(4.65)	(4.25)	(4.70)	(3.93)	(4.55)	(4.39)
North	(0.17)	(0.84)	(3.11)	(4.01)	(4.97)	(4.35)	(4.75)	(3.86)	(4.40)	(4.22)
Mohawk Valley	(0.20)	(0.93)	(3.29)	(4.33)	(5.05)	(4.65)	(5.07)	(4.50)	(5.06)	(5.04)
Capital	(0.12)	(0.29)	(0.07)	(0.13)	0.33	0.11	0.30	(0.57)	(0.98)	(1.01)
Hudson Valley	(0.18)	(0.55)	(1.00)	(1.16)	(1.05)	(1.03)	(1.08)	(1.42)	(1.76)	(1.82)
Milwood	(0.19)	(0.56)	(0.99)	(1.11)	(0.99)	(0.99)	(1.04)	(1.38)	(1.70)	(1.79)
Dunwoodie	(0.18)	(0.57)	(1.00)	(1.13)	(1.01)	(1.00)	(1.06)	(1.39)	(1.70)	(1.79)
NY City	(0.20)	(0.59)	(1.05)	(1.16)	(1.07)	(1.10)	(1.18)	(1.52)	(1.85)	(1.97)
Long Island	(0.29)	(0.70)	(1.07)	(1.05)	(0.96)	(1.11)	(1.33)	(1.85)	(2.14)	(2.35)
<b>NYCA Avg. LBMP</b>	<b>(0.19)</b>	<b>(0.69)</b>	<b>(1.84)</b>	<b>(2.30)</b>	<b>(2.56)</b>	<b>(2.37)</b>	<b>(2.57)</b>	<b>(2.47)</b>	<b>(2.93)</b>	<b>(2.93)</b>

Projected Changes in Generator GWh (2013-2022) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(324)	(165)	(155)	86	80	(26)	(329)	(416)	(29)	(114)
Genessee	47	41	(18)	(34)	(25)	(16)	(9)	(36)	(42)	(22)
Central	(41)	(238)	(326)	98	(115)	53	115	246	223	457
North	(55)	(126)	(86)	84	123	140	135	16	19	(20)
Mohawk Valley	(32)	253	2,094	2,888	2,919	2,929	2,936	2,950	2,900	2,920
Capital	(338)	(632)	(1,319)	(1,428)	(1,089)	(1,093)	(1,193)	(1,233)	(1,173)	(1,033)
Hudson Valley	(3)	116	96	70	90	99	118	69	33	14
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	(575)	(1,158)	(1,814)	(2,415)	(2,104)	(2,331)	(2,432)	(2,300)	(2,400)	(2,440)
Long Island	(175)	(352)	(498)	(511)	(481)	(514)	(507)	(501)	(554)	(540)
<b>Total-NYCA</b>	<b>(1,497)</b>	<b>(2,262)</b>	<b>(2,025)</b>	<b>(1,161)</b>	<b>(603)</b>	<b>(758)</b>	<b>(1,166)</b>	<b>(1,207)</b>	<b>(1,021)</b>	<b>(778)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – RPS and EEPS

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.5	0.3	2.0	2.0	2.6	3.0	3.3	3.1	2.6	3.0
Genessee	(0.2)	(0.3)	0.4	0.1	0.5	0.5	0.7	0.8	0.3	0.4
Central	(0.5)	(1.3)	(1.7)	(2.9)	(2.9)	(3.1)	(3.2)	(3.9)	(4.2)	(4.8)
North	0.1	0.1	0.0	(0.1)	(0.1)	(0.2)	(0.2)	(0.1)	(0.1)	(0.2)
Mohawk Valley	(0.3)	(1.2)	(3.7)	(5.3)	(5.3)	(5.9)	(6.2)	(7.5)	(7.6)	(8.6)
Capital	(0.4)	(0.8)	(1.0)	(1.1)	(1.8)	(1.9)	(1.6)	(1.0)	(1.5)	(1.1)
Hudson Valley	(0.6)	(1.3)	(1.7)	(1.5)	(1.9)	(1.6)	(1.7)	(1.6)	(1.8)	(1.2)
Milwood	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.5)	(0.5)	(0.5)	(0.5)	(0.4)
Dunwoodie	(0.4)	(0.8)	(1.1)	(0.9)	(1.1)	(0.9)	(1.0)	(0.9)	(1.0)	(0.6)
NY City	(3.9)	(7.8)	(10.8)	(8.7)	(11.4)	(9.0)	(9.4)	(9.1)	(10.3)	(6.1)
Long Island	(1.5)	(4.5)	(6.4)	(5.6)	(6.9)	(6.3)	(6.6)	(6.3)	(7.1)	(5.7)
<b>Total-NYCA</b>	<b>(7.4)</b>	<b>(18.0)</b>	<b>(24.5)</b>	<b>(24.6)</b>	<b>(29.0)</b>	<b>(25.9)</b>	<b>(26.5)</b>	<b>(27.1)</b>	<b>(31.2)</b>	<b>(25.3)</b>

## I.7. Case 7: Lower CO2 Emission Costs

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	9	48	55	71	58	11	17	(1)
Genessee	0	0	0	0	0	0	1	(5)	(6)	(5)
Central	0	0	1	4	6	6	9	(34)	(44)	(27)
North	0	0	0	1	2	(1)	1	(8)	(11)	(12)
Mohawk Valley	0	0	0	0	0	(0)	(1)	(6)	(7)	(6)
Capital	0	0	1	1	4	1	(5)	(108)	(114)	(136)
Hudson Valley	0	0	1	1	(0)	1	1	(9)	(9)	(13)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	(8)	(15)	(29)	(25)	(40)	(219)	(257)	(302)
Long Island	0	0	0	1	1	(1)	(2)	(52)	(61)	(74)
<b>Total NYCA</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>41</b>	<b>39</b>	<b>52</b>	<b>22</b>	<b>(430)</b>	<b>(491)</b>	<b>(575)</b>
Imports	0	0	(20)	(95)	(158)	(194)	(178)	9	7	23
Exports	0	0	3	13	4	(4)	3	(105)	(140)	(152)
<b>NYCA + Imports - Exports</b>	<b>0</b>	<b>0</b>	<b>(18)</b>	<b>(67)</b>	<b>(123)</b>	<b>(139)</b>	<b>(160)</b>	<b>(316)</b>	<b>(345)</b>	<b>(400)</b>
Total IESO	0	0	(3)	(16)	(23)	(35)	(30)	(162)	(160)	(194)
Total PJM	0	0	(42)	(156)	(252)	(309)	(314)	(4,235)	(4,696)	(5,312)
Total ISONE	0	0	(20)	(71)	(126)	(136)	(150)	(386)	(431)	(460)
<b>Total System</b>	<b>0</b>	<b>0</b>	<b>(60)</b>	<b>(202)</b>	<b>(362)</b>	<b>(429)</b>	<b>(472)</b>	<b>(5,213)</b>	<b>(5,779)</b>	<b>(6,541)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	(3)	(16)	(25)	(26)	(26)	(95)	(106)	(117)
Genessee	0	0	(2)	(12)	(17)	(17)	(17)	(54)	(59)	(65)
Central	0	0	(3)	(20)	(25)	(25)	(27)	(86)	(95)	(104)
North	0	0	(1)	(7)	(10)	(9)	(10)	(34)	(38)	(42)
Mohawk Valley	0	0	(1)	(8)	(11)	(11)	(11)	(38)	(42)	(46)
Capital	0	0	(3)	(11)	(16)	(20)	(21)	(53)	(60)	(63)
Hudson Valley	0	0	(2)	(9)	(13)	(14)	(16)	(49)	(54)	(59)
Milwood	0	0	(0)	(2)	(4)	(4)	(5)	(14)	(16)	(17)
Dunwoodie	0	0	(1)	(5)	(8)	(8)	(10)	(30)	(33)	(36)
NY City	0	0	(8)	(47)	(69)	(75)	(86)	(270)	(294)	(322)
Long Island	0	0	(4)	(21)	(32)	(38)	(42)	(120)	(133)	(147)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>(27)</b>	<b>(159)</b>	<b>(228)</b>	<b>(248)</b>	<b>(270)</b>	<b>(843)</b>	<b>(929)</b>	<b>(1,018)</b>
Export	0	0	3	13	4	(4)	3	(105)	(140)	(152)
<b>NYCA+Export</b>	<b>0</b>	<b>0</b>	<b>(24)</b>	<b>(146)</b>	<b>(224)</b>	<b>(251)</b>	<b>(267)</b>	<b>(948)</b>	<b>(1,069)</b>	<b>(1,171)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	7	28	31	50	48	(49)	(49)	(67)
Genessee	0	0	(1)	(5)	(7)	(8)	(7)	(30)	(36)	(36)
Central	0	0	(3)	(10)	(29)	(23)	(8)	(154)	(178)	(157)
North	0	0	(1)	(8)	(11)	(13)	(12)	(53)	(61)	(67)
Mohawk Valley	0	0	(0)	(4)	(6)	(6)	(6)	(26)	(28)	(30)
Capital	0	0	2	2	11	5	(0)	(131)	(146)	(168)
Hudson Valley	0	0	1	0	0	0	1	(10)	(11)	(15)
Milwood	0	0	(2)	(15)	(21)	(23)	(26)	(83)	(91)	(100)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	(4)	(8)	(8)	(1)	(19)	(244)	(286)	(333)
Long Island	0	0	2	4	8	6	4	(62)	(73)	(86)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(16)</b>	<b>(32)</b>	<b>(12)</b>	<b>(26)</b>	<b>(843)</b>	<b>(957)</b>	<b>(1,058)</b>
Import	0	0	(20)	(95)	(158)	(194)	(178)	9	7	23
<b>NYCA+Import</b>	<b>0</b>	<b>0</b>	<b>(20)</b>	<b>(111)</b>	<b>(190)</b>	<b>(206)</b>	<b>(204)</b>	<b>(834)</b>	<b>(951)</b>	<b>(1,035)</b>



Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	(1)	0	(0)	(2)	(1)	(7)	(8)	(8)
Genessee	0	0	(0)	(0)	(0)	(0)	(0)	1	1	2
Central	0	0	(0)	(2)	1	(0)	(1)	(0)	(0)	2
North	0	0	0	(0)	0	0	(0)	0	0	0
Mohawk Valley	0	0	(0)	(0)	0	0	(0)	0	0	1
Capital	0	0	(0)	3	3	(1)	(2)	8	8	12
Hudson Valley	0	0	0	2	3	1	(0)	5	6	8
Milwood	0	0	0	1	1	0	(0)	1	2	2
Dunwoodie	0	0	0	1	2	1	(0)	3	4	5
NY City	0	0	2	14	18	9	(1)	28	40	48
Long Island	0	0	1	6	6	1	(3)	9	13	16
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>25</b>	<b>33</b>	<b>9</b>	<b>(10)</b>	<b>48</b>	<b>67</b>	<b>89</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	(0.9)	(1.9)	(6.2)	(7.7)	(12.7)	(36.9)	(38.7)	(51.2)
Genessee	0.0	0.0	(0.1)	(0.5)	(0.8)	(0.8)	(0.8)	(2.0)	(2.2)	(2.5)
Central	0.0	0.0	(2.4)	(8.1)	(13.4)	(14.9)	(15.8)	(34.0)	(37.3)	(40.8)
North	0.0	0.0	(0.1)	(0.4)	(0.6)	(0.7)	(0.6)	(3.0)	(3.1)	(4.0)
Mohawk Valley	0.0	0.0	(0.2)	(0.7)	(1.0)	(1.1)	(1.2)	(2.8)	(3.0)	(3.4)
Capital	0.0	0.0	(4.7)	(16.7)	(27.9)	(29.0)	(32.3)	(66.0)	(72.9)	(81.8)
Hudson Valley	0.0	0.0	(0.2)	(0.8)	(1.6)	(1.5)	(1.7)	(4.2)	(6.3)	(7.3)
Milwood	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	(7.4)	(29.2)	(50.4)	(59.2)	(62.0)	(130.9)	(141.1)	(159.7)
Long Island	0.0	0.0	(3.1)	(11.5)	(19.5)	(20.8)	(22.3)	(41.5)	(46.4)	(52.4)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>(19.0)</b>	<b>(69.9)</b>	<b>(121.4)</b>	<b>(135.7)</b>	<b>(149.4)</b>	<b>(321.4)</b>	<b>(351.2)</b>	<b>(403.0)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	4.4%	20.1%	24.4%	26.5%	20.6%	11.8%	13.4%	10.7%
Genessee	0.0%	0.0%	0.6%	2.0%	2.9%	3.0%	4.1%	-5.4%	-6.6%	-4.9%
Central	0.0%	0.0%	1.0%	3.6%	5.2%	5.5%	6.1%	2.4%	1.8%	5.1%
North	0.0%	0.0%	2.0%	4.5%	9.4%	-0.1%	6.4%	-7.6%	-12.7%	-9.3%
Mohawk Valley	0.0%	0.0%	0.9%	1.7%	3.2%	1.5%	1.0%	-4.7%	-5.3%	-2.7%
Capital	0.0%	0.0%	0.4%	1.3%	2.4%	2.2%	1.9%	-2.1%	-2.0%	-2.4%
Hudson Valley	0.0%	0.0%	1.3%	2.1%	2.1%	2.9%	3.9%	-4.1%	-1.6%	-3.4%
Milwood	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%	0.4%	0.6%	0.8%	0.5%	-2.3%	-2.9%	-3.3%
Long Island	0.0%	0.0%	0.4%	1.2%	2.2%	2.1%	2.0%	-0.9%	-1.2%	-1.7%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.7%</b>	<b>2.8%</b>	<b>3.9%</b>	<b>4.4%</b>	<b>4.0%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>-0.1%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	3.3	4.4	6.0	6.0	5.1	5.8	5.7
Genessee	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	1.4	1.9	2.5	2.9	3.0	3.3	5.6
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>4.7</b>	<b>6.3</b>	<b>8.5</b>	<b>8.9</b>	<b>8.1</b>	<b>9.1</b>	<b>11.2</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	11.8%	53.8%	64.8%	66.3%	49.6%	30.4%	34.6%	27.0%
Genessee	0.0%	0.0%	0.0%	4.2%	4.8%	5.6%	11.1%	-14.8%	-14.8%	-10.7%
Central	0.0%	0.0%	9.8%	54.1%	73.9%	61.8%	65.3%	52.7%	51.1%	76.3%
North	0.0%	0.0%	1.3%	2.9%	4.8%	0.0%	3.2%	-6.3%	-9.8%	-8.3%
Mohawk Valley	0.0%	0.0%	0.4%	1.1%	1.5%	0.8%	0.8%	-2.8%	-2.8%	-1.7%
Capital	0.0%	0.0%	0.1%	0.2%	0.4%	0.4%	0.3%	-0.4%	-0.4%	-0.5%
Hudson Valley	0.0%	0.0%	0.1%	0.0%	0.2%	0.2%	0.0%	-0.2%	-1.0%	-1.8%
Milwood	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%	0.2%	1.2%	1.7%	2.3%	1.2%	-5.7%	-6.6%	-8.7%
Long Island	0.0%	0.0%	0.2%	0.2%	0.3%	0.3%	0.2%	-0.1%	-0.3%	-0.7%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.0%</b>	<b>9.4%</b>	<b>44.2%</b>	<b>55.4%</b>	<b>55.7%</b>	<b>47.2%</b>	<b>32.4%</b>	<b>35.2%</b>	<b>36.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.2	0.2
Genessee	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	0.1	0.1	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>	<b>0.2</b>	<b>0.3</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	7.4%	32.7%	42.1%	42.7%	34.8%	19.0%	21.9%	15.6%
Genessee	0.0%	0.0%	0.1%	1.0%	1.0%	1.2%	1.5%	-3.5%	-4.3%	-3.3%
Central	0.0%	0.0%	3.0%	11.0%	14.3%	15.3%	16.7%	12.3%	11.8%	20.8%
North	0.0%	0.0%	0.9%	2.2%	3.7%	0.0%	2.3%	-4.9%	-7.8%	-6.7%
Mohawk Valley	0.0%	0.0%	0.7%	1.8%	2.9%	1.1%	0.3%	-4.9%	-6.2%	-3.2%
Capital	0.0%	0.0%	0.2%	0.7%	1.3%	1.1%	1.1%	-1.5%	-1.5%	-1.9%
Hudson Valley	0.0%	0.0%	1.1%	1.3%	1.8%	2.0%	2.6%	-3.8%	-2.3%	-3.7%
Milwood	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%	0.6%	1.0%	1.4%	0.7%	0.3%	-8.7%	-8.1%	-9.7%
Long Island	0.0%	0.0%	0.2%	0.7%	1.4%	1.0%	1.1%	-0.9%	-1.0%	-1.6%
<b>Total-NYCA</b>	0.0%	0.0%	2.2%	8.6%	11.3%	12.5%	11.6%	4.9%	5.6%	5.2%

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.00	0.00	(0.21)	(1.02)	(1.52)	(1.59)	(1.59)	(5.98)	(6.64)	(7.33)
Genessee	0.00	0.00	(0.16)	(1.11)	(1.58)	(1.58)	(1.64)	(5.29)	(5.80)	(6.44)
Central	0.00	0.00	(0.18)	(1.17)	(1.52)	(1.53)	(1.63)	(5.31)	(5.86)	(6.48)
North	0.00	0.00	(0.15)	(1.04)	(1.47)	(1.39)	(1.44)	(5.00)	(5.52)	(6.15)
Mohawk Valley	0.00	0.00	(0.16)	(1.10)	(1.49)	(1.46)	(1.54)	(5.12)	(5.65)	(6.27)
Capital	0.00	0.00	(0.22)	(0.92)	(1.39)	(1.62)	(1.74)	(4.32)	(4.86)	(5.20)
Hudson Valley	0.00	0.00	(0.15)	(0.86)	(1.23)	(1.35)	(1.51)	(4.74)	(5.18)	(5.70)
Milwood	0.00	0.00	(0.14)	(0.84)	(1.21)	(1.32)	(1.50)	(4.72)	(5.14)	(5.66)
Dunwoodie	0.00	0.00	(0.14)	(0.84)	(1.20)	(1.30)	(1.49)	(4.73)	(5.13)	(5.66)
NY City	0.00	0.00	(0.14)	(0.83)	(1.21)	(1.31)	(1.48)	(4.70)	(5.12)	(5.64)
Long Island	0.00	0.00	(0.15)	(0.84)	(1.27)	(1.44)	(1.61)	(4.77)	(5.27)	(5.78)
<b>NYCA Avg. LBMP</b>	<b>0.00</b>	<b>0.00</b>	<b>(0.16)</b>	<b>(0.96)</b>	<b>(1.37)</b>	<b>(1.44)</b>	<b>(1.56)</b>	<b>(4.97)</b>	<b>(5.47)</b>	<b>(6.03)</b>

Projected Changes in Generator GWh (2013-2022) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	225	1,024	1,266	1,594	1,522	1,030	1,150	1,060
Genessee	0	0	6	16	20	19	24	(45)	(57)	(42)
Central	0	0	90	296	461	471	522	25	(74)	264
North	0	0	14	33	56	0	34	(88)	(137)	(123)
Mohawk Valley	0	0	8	20	29	13	10	(55)	(61)	(34)
Capital	0	0	156	432	779	689	613	(762)	(777)	(916)
Hudson Valley	0	0	16	22	24	28	39	(58)	(35)	(69)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	18	338	485	739	473	(1,502)	(1,864)	(2,179)
Long Island	0	0	70	218	371	353	332	(173)	(233)	(328)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>603</b>	<b>2,399</b>	<b>3,491</b>	<b>3,907</b>	<b>3,569</b>	<b>(1,628)</b>	<b>(2,086)</b>	<b>(2,368)</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Lower CO2 Emission Costs

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.1	0.4	0.5	(0.6)	(0.5)	(8.4)	(8.7)	(9.6)
Genessee	0.0	0.0	(0.1)	(0.5)	(0.8)	(1.4)	(1.5)	(3.1)	(3.1)	(3.3)
Central	0.0	0.0	(0.1)	(0.6)	(0.6)	(1.2)	(1.2)	(3.9)	(4.0)	(5.2)
North	0.0	0.0	0.1	0.2	0.2	0.4	0.3	0.4	0.5	0.5
Mohawk Valley	0.0	0.0	(0.0)	(0.2)	(0.1)	(0.2)	(0.2)	(0.7)	(0.7)	(1.0)
Capital	0.0	0.0	(0.2)	(0.7)	(0.8)	(0.8)	(0.6)	0.7	0.4	0.7
Hudson Valley	0.0	0.0	(0.1)	(0.0)	0.4	0.4	0.5	(1.7)	(2.1)	(2.3)
Milwood	0.0	0.0	(0.0)	(0.0)	0.1	0.1	0.1	(0.5)	(0.6)	(0.7)
Dunwoodie	0.0	0.0	(0.0)	0.0	0.3	0.3	0.4	(1.0)	(1.2)	(1.3)
NY City	0.0	0.0	(0.2)	0.5	2.3	3.4	4.5	(9.3)	(12.0)	(13.2)
Long Island	0.0	0.0	(0.3)	(0.9)	(0.4)	(0.7)	(0.2)	(3.9)	(5.0)	(5.4)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.9)</b>	<b>(1.8)</b>	<b>1.1</b>	<b>(0.3)</b>	<b>1.6</b>	<b>(31.3)</b>	<b>(36.5)</b>	<b>(40.7)</b>

## I.8. Case 8: Athens SPS Out of Service

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(3)	(9)	(2)	(3)	(2)	(1)	(2)	(3)	(3)	(3)
Genessee	(0)	(0)	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Central	(1)	(1)	(4)	(2)	(1)	(5)	(2)	(4)	(3)	(1)
North	(0)	(1)	(1)	(1)	(1)	(0)	(1)	(2)	(2)	(1)
Mohawk Valley	(0)	(0)	(0)	(0)	0	(0)	(0)	(0)	(0)	(0)
Capital	(5)	(6)	(7)	(4)	(6)	(3)	(4)	(4)	(5)	(3)
Hudson Valley	3	2	1	2	2	2	2	1	1	3
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	14	10	12	9	9	7	14	16	17	12
Long Island	1	1	3	1	(0)	1	1	1	(0)	(0)
<b>Total NYCA</b>	<b>8</b>	<b>(4)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>(0)</b>	<b>9</b>	<b>5</b>	<b>5</b>	<b>6</b>
Imports	(2)	3	6	7	8	4	2	3	2	2
Exports	(0)	(3)	3	5	5	2	6	4	3	4
<b>NYCA + Imports - Exports</b>	<b>6</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>4</b>
Total IESO	(7)	(4)	(3)	(2)	(2)	(1)	(4)	(7)	(7)	(5)
Total PJM	5	11	(3)	1	4	2	3	11	5	3
Total ISONE	1	1	2	1	(1)	(0)	(3)	(1)	(1)	1
<b>Total System</b>	<b>7</b>	<b>5</b>	<b>(2)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>7</b>	<b>2</b>	<b>5</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(1)	(2)	(2)	(3)	(4)	(3)	(3)	(4)	(5)	(2)
Genessee	(1)	(2)	(2)	(2)	(3)	(2)	(2)	(2)	(4)	(2)
Central	(1)	(2)	(3)	(3)	(4)	(1)	(3)	(2)	(5)	(3)
North	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mohawk Valley	(1)	(1)	(1)	(1)	(2)	(1)	(1)	(1)	(2)	(1)
Capital	(3)	(3)	(4)	(4)	(4)	(5)	(6)	(6)	(9)	(7)
Hudson Valley	1	1	1	(0)	0	1	2	3	1	1
Milwood	1	1	1	0	0	1	1	2	1	1
Dunwoodie	1	1	2	1	1	2	2	3	3	2
NY City	12	10	14	4	8	16	18	29	20	19
Long Island	2	2	3	(1)	1	3	3	6	2	3
<b>Total-NYCA</b>	<b>10</b>	<b>3</b>	<b>7</b>	<b>(11)</b>	<b>(7)</b>	<b>11</b>	<b>10</b>	<b>26</b>	<b>1</b>	<b>12</b>
Export	(0)	(3)	3	4	5	2	6	4	3	4
<b>NYCA+Export</b>	<b>9</b>	<b>(0)</b>	<b>10</b>	<b>(6)</b>	<b>(2)</b>	<b>12</b>	<b>17</b>	<b>30</b>	<b>4</b>	<b>16</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(6)	(12)	(6)	(7)	(7)	(5)	(6)	(7)	(9)	(6)
Genessee	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(1)
Central	(23)	(22)	(23)	(18)	(16)	(40)	(19)	(28)	(27)	(12)
North	(1)	(3)	(2)	(3)	(3)	(2)	(3)	(3)	(4)	(2)
Mohawk Valley	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Capital	(12)	(13)	(16)	(13)	(15)	(14)	(16)	(18)	(24)	(18)
Hudson Valley	3	2	1	2	1	2	2	2	1	3
Milwood	3	2	3	1	1	3	3	6	4	3
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	22	17	20	11	14	19	28	37	32	27
Long Island	3	3	5	(0)	1	3	4	5	1	2
<b>Total-NYCA</b>	<b>(13)</b>	<b>(27)</b>	<b>(21)</b>	<b>(30)</b>	<b>(26)</b>	<b>(35)</b>	<b>(7)</b>	<b>(9)</b>	<b>(28)</b>	<b>(4)</b>
Import	(2)	3	6	7	8	4	2	3	2	2
<b>NYCA+Import</b>	<b>(15)</b>	<b>(24)</b>	<b>(15)</b>	<b>(23)</b>	<b>(18)</b>	<b>(31)</b>	<b>(5)</b>	<b>(7)</b>	<b>(25)</b>	<b>(2)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	1	1	1	0	(0)	(1)	(1)	(1)	(1)	(0)
Genessee	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
Central	1	1	0	1	0	2	0	1	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)	(0)	(1)	(2)	(2)	(3)	(4)	(3)	(5)	(5)
Hudson Valley	3	3	4	3	3	4	4	5	6	4
Milwood	1	1	1	1	1	2	2	2	2	2
Dunwoodie	3	3	3	2	3	3	4	5	5	4
NY City	22	23	29	21	25	30	33	43	44	32
Long Island	7	7	9	6	8	9	10	12	13	9
<b>Total-NYCA</b>	<b>37</b>	<b>40</b>	<b>46</b>	<b>33</b>	<b>39</b>	<b>47</b>	<b>48</b>	<b>65</b>	<b>65</b>	<b>44</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.2)	(0.8)	(0.2)	(0.5)	(0.3)	(0.1)	(0.2)	(0.5)	(0.4)	(0.4)
Genessee	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)	(0.3)	(0.1)	(0.1)	(0.5)	(0.2)	(0.5)	(0.3)	(0.1)
North	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.0)	(0.1)	(0.2)	(0.2)	(0.1)
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)	(0.2)	(0.4)	(0.3)	(0.4)	(0.3)	(0.3)	(0.3)	(0.5)	(0.3)
Hudson Valley	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.3
Milwood	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	0.3	0.5	0.6	0.6	0.4	0.9	1.5	1.6	1.1
Long Island	0.0	0.1	0.2	0.0	(0.0)	0.1	0.1	0.1	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>(0.6)</b>	<b>(0.2)</b>	<b>(0.2)</b>	<b>(0.3)</b>	<b>(0.3)</b>	<b>0.3</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.0%	-3.4%	-0.7%	-1.1%	-0.6%	-0.2%	-0.3%	-0.4%	-0.3%	-0.3%
Genessee	-0.2%	-0.8%	-0.7%	-0.1%	0.2%	-0.6%	-0.1%	-0.4%	-0.5%	-0.6%
Central	-0.1%	-0.1%	-0.7%	-0.3%	-0.2%	-0.7%	-0.3%	-0.5%	-0.3%	-0.1%
North	-0.9%	-1.4%	-2.8%	-2.9%	-2.5%	-1.2%	-3.0%	-1.9%	-2.2%	-1.2%
Mohawk Valley	-0.3%	-0.5%	-0.9%	-0.4%	0.0%	-0.7%	-0.2%	-0.2%	-0.3%	-0.3%
Capital	-0.4%	-0.4%	-0.5%	-0.3%	-0.4%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%
Hudson Valley	5.1%	3.2%	1.4%	3.1%	2.1%	2.4%	1.9%	0.4%	0.6%	1.3%
Milwood	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	0.7%	0.5%	0.5%	0.3%	0.3%	0.2%	0.4%	0.4%	0.4%	0.3%
Long Island	0.2%	0.2%	0.4%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
<b>Total-NYCA</b>	<b>0.1%</b>	<b>-0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	(0.2)	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)
Genessee	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	0.1	(0.0)	(0.0)	(0.0)	(0.2)	(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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.1)</b>	<b>(0.1)</b>	<b>(0.0)</b>	<b>(0.1)</b>	<b>(0.3)</b>	<b>(0.1)</b>	<b>(0.1)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-2.1%	-8.6%	-1.3%	-2.8%	-1.2%	-0.3%	-0.5%	-0.6%	-0.5%	-0.4%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Central	1.2%	1.3%	-1.8%	1.8%	-1.6%	-0.6%	-0.7%	-2.5%	-0.3%	-0.6%
North	-0.6%	-0.9%	-1.6%	-1.6%	-1.4%	-0.7%	-1.4%	-1.6%	-1.7%	-1.0%
Mohawk Valley	-0.3%	-0.4%	-0.7%	-0.4%	0.0%	-0.4%	0.0%	-0.3%	-0.3%	-0.3%
Capital	-0.1%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Hudson Valley	0.4%	0.3%	0.1%	0.0%	0.2%	0.3%	0.6%	1.0%	0.4%	0.6%
Milwood	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	1.7%	1.3%	1.4%	0.8%	0.8%	0.6%	1.3%	1.4%	1.8%	1.2%
Long Island	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.3%
<b>Total-NYCA</b>	<b>-0.5%</b>	<b>-3.4%</b>	<b>-1.3%</b>	<b>-1.2%</b>	<b>-1.1%</b>	<b>-0.3%</b>	<b>-0.5%</b>	<b>-1.0%</b>	<b>-0.3%</b>	<b>-0.4%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.0)	(0.0)	0.0	(0.0)	0.0	0.0	0.0	(0.0)	(0.0)	0.0
Genessee	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>(0.0)</b>	<b>(0.0)</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>	<b>(0.0)</b>	<b>0.0</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	-1.1%	-4.5%	0.0%	-1.3%	-0.9%	-0.4%	-0.4%	-0.5%	-0.5%	-0.3%
Genessee	0.0%	-0.2%	-0.4%	0.0%	0.1%	-0.2%	0.0%	-0.3%	-0.4%	-0.5%
Central	-0.2%	-0.1%	-1.8%	-0.7%	-1.0%	-1.8%	-0.9%	-1.4%	-0.6%	-0.6%
North	-0.5%	-0.9%	-1.3%	-1.3%	-1.0%	-0.4%	-1.0%	-1.2%	-1.4%	-0.8%
Mohawk Valley	-0.4%	-0.5%	-0.6%	-0.2%	0.0%	-0.4%	-0.2%	-0.2%	-0.3%	-0.3%
Capital	-0.3%	-0.3%	-0.5%	-0.3%	-0.3%	-0.4%	-0.2%	-0.3%	-0.3%	-0.2%
Hudson Valley	4.0%	3.0%	1.4%	1.9%	1.6%	1.3%	1.2%	0.6%	0.5%	1.9%
Milwood	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%	2.3%	2.6%	1.5%	1.6%	1.4%	2.2%	2.1%	2.4%	1.4%
Long Island	0.3%	0.3%	0.4%	0.1%	0.0%	0.2%	0.2%	0.2%	0.0%	0.0%
<b>Total-NYCA</b>	<b>0.2%</b>	<b>-0.4%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2%</b>	<b>0.1%</b>	<b>0.2%</b>	<b>0.1%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(0.05)	(0.11)	(0.11)	(0.15)	(0.22)	(0.18)	(0.18)	(0.19)	(0.29)	(0.12)
Genessee	(0.13)	(0.22)	(0.19)	(0.18)	(0.23)	(0.15)	(0.18)	(0.17)	(0.27)	(0.15)
Central	(0.06)	(0.13)	(0.13)	(0.14)	(0.21)	(0.05)	(0.15)	(0.12)	(0.23)	(0.13)
North	(0.10)	(0.19)	(0.14)	(0.15)	(0.20)	(0.12)	(0.14)	(0.12)	(0.21)	(0.09)
Mohawk Valley	(0.08)	(0.16)	(0.13)	(0.15)	(0.20)	(0.09)	(0.14)	(0.12)	(0.22)	(0.12)
Capital	(0.19)	(0.22)	(0.27)	(0.28)	(0.31)	(0.31)	(0.38)	(0.35)	(0.52)	(0.39)
Hudson Valley	0.07	0.02	0.09	(0.01)	(0.01)	0.08	0.07	0.17	0.08	0.07
Milwood	0.15	0.10	0.18	0.08	0.08	0.18	0.18	0.32	0.24	0.20
Dunwoodie	0.16	0.10	0.19	0.08	0.08	0.20	0.19	0.33	0.25	0.21
NY City	0.15	0.09	0.18	0.08	0.07	0.17	0.17	0.32	0.22	0.20
Long Island	0.04	(0.01)	0.07	(0.02)	0.00	0.09	0.06	0.13	0.06	0.06
<b>NYCA Avg. LBMP</b>	<b>(0.00)</b>	<b>(0.07)</b>	<b>(0.02)</b>	<b>(0.08)</b>	<b>(0.10)</b>	<b>(0.02)</b>	<b>(0.05)</b>	<b>0.02</b>	<b>(0.08)</b>	<b>(0.02)</b>

Projected Changes in Generator GWh (2013-2022) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(88)	(180)	(48)	(60)	(45)	(20)	(25)	(39)	(38)	(35)
Genessee	(1)	(6)	(4)	(1)	1	(4)	(0)	(3)	(4)	(5)
Central	(22)	(22)	(76)	(38)	(19)	(70)	(32)	(49)	(39)	(12)
North	(9)	(13)	(19)	(20)	(14)	(6)	(15)	(23)	(24)	(16)
Mohawk Valley	(4)	(5)	(8)	(4)	(0)	(6)	(1)	(4)	(4)	(4)
Capital	(144)	(132)	(157)	(79)	(110)	(64)	(63)	(62)	(82)	(33)
Hudson Valley	54	40	17	32	20	21	20	7	10	25
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	288	197	223	140	132	106	189	206	216	125
Long Island	24	27	53	8	(5)	10	13	6	0	(0)
<b>Total-NYCA</b>	<b>97</b>	<b>(94)</b>	<b>(20)</b>	<b>(23)</b>	<b>(41)</b>	<b>(32)</b>	<b>86</b>	<b>39</b>	<b>35</b>	<b>45</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Athens SPS Out of Service

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.3	0.4	0.2	0.1	0.2	(0.0)	0.2	0.2	0.3	0.1
Genessee	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.1
Central	(0.1)	0.1	(0.0)	(0.1)	0.0	(0.0)	0.0	0.1	0.0	(0.0)
North	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
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)	0.0	(0.1)	(0.1)	0.1	(0.1)	0.0	(0.1)	(0.1)	(0.2)
Hudson Valley	(0.4)	(0.2)	(0.4)	(0.4)	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)
Milwood	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Dunwoodie	(0.3)	(0.2)	(0.3)	(0.3)	(0.1)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)
NY City	(2.7)	(1.8)	(2.6)	(2.5)	(1.6)	(2.0)	(2.2)	(2.6)	(3.0)	(2.8)
Long Island	(1.2)	(0.8)	(1.2)	(1.1)	(0.6)	(0.9)	(0.9)	(1.0)	(1.2)	(1.2)
<b>Total-NYCA</b>	<b>(4.5)</b>	<b>(2.3)</b>	<b>(4.4)</b>	<b>(4.3)</b>	<b>(2.2)</b>	<b>(3.6)</b>	<b>(3.2)</b>	<b>(4.0)</b>	<b>(4.7)</b>	<b>(4.5)</b>

## I.9. Case 9: Higher Natural Gas cost differential

Projected Changes in Production Costs (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	14	22	18	23	22	27	15	37	32	23
Genessee	1	2	2	3	2	2	3	3	3	3
Central	2	12	11	7	10	9	7	3	5	6
North	8	7	6	8	6	6	6	11	11	10
Mohawk Valley	1	1	1	0	1	2	2	2	3	3
Capital	(135)	(117)	(136)	(183)	(181)	(196)	(223)	(216)	(232)	(245)
Hudson Valley	(10)	(9)	(9)	(9)	(11)	(8)	(9)	(8)	(15)	(15)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	142	137	157	222	227	266	305	285	316	309
Long Island	42	44	48	52	57	58	54	57	54	58
<b>Total NYCA</b>	<b>66</b>	<b>99</b>	<b>99</b>	<b>123</b>	<b>135</b>	<b>167</b>	<b>159</b>	<b>174</b>	<b>176</b>	<b>153</b>
Imports	61	70	82	104	105	97	103	70	50	81
Exports	106	155	173	219	244	278	267	200	174	187
<b>NYCA + Imports - Exports</b>	<b>20</b>	<b>14</b>	<b>8</b>	<b>8</b>	<b>(5)</b>	<b>(13)</b>	<b>(5)</b>	<b>45</b>	<b>52</b>	<b>47</b>
Total IESO	(6)	(7)	(8)	(15)	(18)	(21)	(22)	(12)	(19)	12
Total PJM	127	148	169	185	210	191	200	254	252	262
Total ISONE	100	80	94	85	104	103	142	115	154	177
<b>Total System</b>	<b>287</b>	<b>321</b>	<b>353</b>	<b>379</b>	<b>431</b>	<b>440</b>	<b>479</b>	<b>531</b>	<b>562</b>	<b>604</b>



Projected Changes in Load LBMP Payments (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	2	0	(0)	2	(6)	(2)	(1)	3	3	2
Genessee	1	(0)	(1)	1	(4)	(1)	(1)	2	3	3
Central	2	(0)	(1)	1	(6)	(1)	0	6	7	6
North	(1)	(2)	(3)	(1)	(4)	(2)	(2)	1	2	1
Mohawk Valley	2	1	0	2	(1)	1	1	4	4	4
Capital	49	45	51	52	56	50	52	58	57	62
Hudson Valley	22	21	24	25	27	24	25	27	27	28
Milwood	6	6	7	7	8	7	7	8	8	8
Dunwoodie	12	12	14	14	15	14	14	16	16	16
NY City	107	100	120	124	131	120	117	128	128	133
Long Island	41	41	48	53	59	59	58	60	61	65
<b>Total-NYCA</b>	<b>243</b>	<b>222</b>	<b>260</b>	<b>280</b>	<b>274</b>	<b>269</b>	<b>270</b>	<b>312</b>	<b>315</b>	<b>330</b>
Export	106	155	173	219	244	278	267	200	174	187
<b>NYCA+Export</b>	<b>349</b>	<b>378</b>	<b>433</b>	<b>499</b>	<b>518</b>	<b>547</b>	<b>537</b>	<b>512</b>	<b>489</b>	<b>517</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	16	19	15	21	12	21	11	35	39	31
Genessee	2	2	2	3	0	2	2	4	6	5
Central	41	51	54	59	65	46	39	40	63	68
North	5	3	1	5	(2)	2	1	11	11	10
Mohawk Valley	(1)	(1)	(2)	(1)	(3)	(0)	(1)	1	2	2
Capital	(135)	(121)	(135)	(191)	(185)	(207)	(237)	(237)	(262)	(277)
Hudson Valley	(9)	(8)	(7)	(8)	(9)	(7)	(9)	(8)	(16)	(16)
Milwood	37	35	40	41	41	37	38	44	43	46
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	183	176	206	282	290	332	367	355	390	387
Long Island	56	58	66	72	78	80	75	80	77	82
<b>Total-NYCA</b>	<b>195</b>	<b>212</b>	<b>240</b>	<b>283</b>	<b>286</b>	<b>304</b>	<b>288</b>	<b>325</b>	<b>353</b>	<b>339</b>
Import	61	70	82	104	105	97	103	70	50	81
<b>NYCA+Import</b>	<b>256</b>	<b>282</b>	<b>322</b>	<b>387</b>	<b>391</b>	<b>401</b>	<b>391</b>	<b>395</b>	<b>403</b>	<b>421</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	7	6	7	7	8	6	7	7	5	6
Genessee	4	3	4	3	4	4	4	4	4	4
Central	5	4	5	4	5	5	6	6	5	4
North	0	0	0	(0)	0	(0)	(0)	(0)	(0)	(0)
Mohawk Valley	2	2	3	2	3	3	3	3	2	2
Capital	47	45	52	49	59	49	51	50	48	52
Hudson Valley	24	24	29	27	34	29	29	27	26	28
Milwood	7	7	8	8	10	8	8	8	8	8
Dunwoodie	14	14	17	16	20	17	17	16	15	16
NY City	125	121	149	144	179	154	152	140	137	142
Long Island	47	49	59	59	77	70	70	61	60	64
<b>Total-NYCA</b>	<b>284</b>	<b>274</b>	<b>334</b>	<b>320</b>	<b>398</b>	<b>343</b>	<b>345</b>	<b>321</b>	<b>310</b>	<b>327</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.7	1.8	1.9	3.0	3.6	4.4	2.1	7.2	6.8	5.0
Genessee	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4
Central	0.2	0.8	1.1	1.2	1.5	1.2	1.2	1.3	1.3	1.5
North	0.2	0.4	0.4	0.6	0.6	0.6	0.5	1.3	1.2	1.1
Mohawk Valley	0.0	0.1	0.1	0.0	0.1	0.2	0.2	0.2	0.3	0.3
Capital	(3.9)	(6.3)	(9.7)	(14.5)	(17.1)	(17.5)	(19.6)	(24.8)	(27.4)	(29.1)
Hudson Valley	(0.3)	(0.5)	(0.6)	(0.8)	(1.0)	(0.8)	(0.9)	(1.1)	(2.0)	(2.0)
Milwood	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	1.9	3.4	5.3	9.9	11.1	11.7	15.2	23.2	26.3	25.7
Long Island	0.8	1.6	2.5	3.1	4.1	4.1	3.6	4.8	4.4	4.7
<b>Total-NYCA</b>	<b>(0.1)</b>	<b>1.5</b>	<b>1.1</b>	<b>2.8</b>	<b>3.1</b>	<b>4.1</b>	<b>2.5</b>	<b>12.5</b>	<b>11.3</b>	<b>7.6</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	4.3%	8.1%	6.1%	7.2%	6.7%	6.8%	2.7%	5.3%	4.9%	2.9%
Genessee	4.2%	5.3%	7.1%	6.5%	6.4%	5.9%	7.2%	6.2%	6.3%	5.2%
Central	1.3%	2.7%	2.6%	2.2%	2.4%	1.9%	1.7%	1.2%	1.1%	1.1%
North	21.6%	17.4%	18.1%	20.8%	19.3%	21.2%	18.2%	14.8%	14.6%	10.4%
Mohawk Valley	1.8%	2.4%	2.7%	1.0%	2.4%	4.0%	3.4%	2.4%	3.3%	3.3%
Capital	-12.8%	-11.6%	-12.8%	-14.6%	-14.1%	-14.5%	-15.2%	-12.2%	-12.5%	-12.3%
Hudson Valley	-18.8%	-15.1%	-14.3%	-14.8%	-15.1%	-12.0%	-12.5%	-8.6%	-10.4%	-9.6%
Milwood	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	5.4%	5.1%	5.7%	6.5%	6.4%	6.4%	7.4%	5.8%	6.3%	5.6%
Long Island	4.6%	4.8%	5.0%	4.5%	4.8%	4.7%	4.0%	3.7%	3.2%	3.1%
<b>Total-NYCA</b>	<b>0.4%</b>	<b>1.2%</b>	<b>1.1%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.6%</b>	<b>1.3%</b>	<b>1.3%</b>	<b>1.1%</b>	<b>0.7%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	1.0	1.1	1.5	0.6	1.9	1.8	1.3
Genessee	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	0.8	0.8	0.5	0.8	0.8	0.7	0.6
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.9</b>	<b>1.9</b>	<b>1.9</b>	<b>1.4</b>	<b>2.7</b>	<b>2.5</b>	<b>1.9</b>

Projected Changes in SO<sub>2</sub> Emissions (%) (2013-2022) by Zone – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	9.5%	19.5%	14.0%	17.1%	16.3%	16.0%	5.0%	11.5%	10.6%	6.1%
Genessee	8.0%	12.0%	17.4%	16.7%	14.3%	11.1%	16.7%	18.5%	18.5%	14.3%
Central	9.3%	14.9%	13.1%	31.6%	28.8%	11.6%	18.3%	14.0%	10.3%	8.7%
North	15.1%	12.8%	10.5%	12.3%	10.0%	9.6%	8.5%	12.0%	11.2%	9.3%
Mohawk Valley	0.7%	1.1%	1.1%	0.0%	0.7%	1.5%	1.1%	1.4%	1.7%	1.7%
Capital	-2.2%	-1.8%	-2.0%	-2.1%	-1.9%	-1.8%	-2.1%	-2.1%	-2.3%	-2.3%
Hudson Valley	-0.3%	-0.4%	-0.2%	-0.4%	-0.2%	0.0%	-0.3%	-0.6%	-0.1%	-0.4%
Milwood	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	9.3%	9.5%	10.8%	13.2%	13.3%	12.8%	15.3%	12.0%	13.4%	11.4%
Long Island	0.5%	0.7%	0.6%	0.6%	0.6%	0.6%	0.4%	0.5%	0.4%	0.3%
<b>Total-NYCA</b>	<b>8.6%</b>	<b>15.0%</b>	<b>11.7%</b>	<b>17.6%</b>	<b>16.3%</b>	<b>12.6%</b>	<b>7.6%</b>	<b>11.0%</b>	<b>9.5%</b>	<b>6.2%</b>

Projected Changes in NO<sub>x</sub> Emissions Cost (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0
Genessee	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	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	(0.0)	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total-NYCA</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>

Projected Changes in NO<sub>x</sub> Emissions (%) (2013-2022) by Zone – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	7.8%	13.5%	10.4%	10.3%	10.8%	11.3%	4.3%	8.9%	7.8%	4.1%
Genessee	2.5%	3.1%	3.7%	4.2%	3.0%	2.4%	3.3%	4.8%	5.5%	4.3%
Central	5.5%	7.7%	7.3%	8.7%	8.1%	4.3%	5.2%	5.1%	3.8%	4.2%
North	12.0%	10.1%	8.0%	9.2%	7.3%	6.9%	6.3%	9.8%	9.0%	7.2%
Mohawk Valley	2.5%	2.7%	3.6%	2.2%	3.3%	4.4%	4.0%	3.5%	4.8%	5.0%
Capital	-7.7%	-7.0%	-7.3%	-7.8%	-7.4%	-7.4%	-7.8%	-7.5%	-7.9%	-7.9%
Hudson Valley	-13.0%	-9.6%	-9.6%	-9.0%	-9.4%	-7.1%	-8.2%	-7.4%	-10.3%	-8.4%
Milwood	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	5.6%	7.2%	9.0%	10.0%	10.2%	4.7%	9.4%	10.0%	8.2%	8.5%
Long Island	2.9%	3.0%	3.0%	2.6%	2.6%	2.8%	2.1%	2.0%	1.8%	1.8%
<b>Total-NYCA</b>	<b>4.0%</b>	<b>5.6%</b>	<b>5.2%</b>	<b>5.4%</b>	<b>5.4%</b>	<b>4.3%</b>	<b>3.4%</b>	<b>5.1%</b>	<b>4.1%</b>	<b>3.2%</b>

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.14	0.01	(0.01)	0.15	(0.35)	(0.13)	(0.08)	0.22	0.22	0.19
Genessee	0.11	0.01	(0.02)	0.14	(0.32)	(0.03)	(0.02)	0.33	0.46	0.45
Central	0.15	0.01	(0.06)	0.13	(0.38)	(0.01)	0.03	0.47	0.50	0.48
North	(0.15)	(0.25)	(0.35)	(0.10)	(0.64)	(0.26)	(0.26)	0.17	0.28	0.26
Mohawk Valley	0.23	0.09	0.04	0.27	(0.21)	0.11	0.13	0.58	0.65	0.65
Capital	3.99	3.58	3.99	3.97	4.22	3.77	3.95	4.56	4.42	4.83
Hudson Valley	2.22	2.02	2.32	2.37	2.45	2.22	2.26	2.59	2.57	2.71
Milwood	2.16	1.98	2.28	2.35	2.45	2.20	2.23	2.54	2.52	2.66
Dunwoodie	2.11	1.93	2.23	2.29	2.37	2.14	2.16	2.46	2.44	2.58
NY City	2.03	1.85	2.13	2.18	2.25	2.01	1.98	2.28	2.25	2.34
Long Island	1.84	1.78	2.02	2.23	2.44	2.41	2.38	2.58	2.54	2.68
<b>NYCA Avg. LBMP</b>	<b>1.35</b>	<b>1.18</b>	<b>1.32</b>	<b>1.45</b>	<b>1.30</b>	<b>1.31</b>	<b>1.34</b>	<b>1.71</b>	<b>1.71</b>	<b>1.80</b>

Projected Changes in Generator GWh (2013-2022) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	397	490	365	426	379	444	261	560	535	392
Genessee	32	44	52	52	47	36	43	56	60	50
Central	100	282	316	213	260	283	215	119	124	129
North	196	169	123	147	111	102	92	174	158	139
Mohawk Valley	21	26	27	13	24	35	31	33	44	46
Capital	(4,546)	(3,858)	(4,122)	(4,539)	(4,224)	(4,169)	(4,550)	(4,482)	(4,743)	(4,738)
Hudson Valley	(193)	(178)	(159)	(147)	(157)	(115)	(128)	(125)	(226)	(215)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	2,790	2,644	2,985	3,795	3,653	4,131	4,496	3,907	4,299	3,896
Long Island	736	769	812	784	830	800	706	665	588	593
<b>Total-NYCA</b>	<b>(465)</b>	<b>386</b>	<b>400</b>	<b>744</b>	<b>924</b>	<b>1,549</b>	<b>1,167</b>	<b>908</b>	<b>840</b>	<b>292</b>

Projected Changes in Loss Payments (2013-2022) by Zone (\$M) – Higher Natural Gas cost differential

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	(3.9)	(3.1)	(2.8)	(4.7)	(4.2)	(4.8)	(4.7)	(7.6)	(7.4)	(8.8)
Genessee	(1.5)	(1.3)	(1.1)	(1.8)	(1.7)	(1.8)	(1.8)	(2.9)	(2.7)	(3.1)
Central	(1.5)	(1.3)	(1.2)	(1.7)	(1.7)	(1.7)	(1.8)	(2.5)	(2.6)	(2.9)
North	(0.4)	(0.3)	(0.2)	(0.4)	(0.2)	(0.3)	(0.3)	(0.7)	(0.6)	(0.8)
Mohawk Valley	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.5)	(0.5)	(0.6)
Capital	3.5	3.1	2.8	4.0	3.7	4.1	4.8	6.7	6.5	7.5
Hudson Valley	(1.0)	(0.8)	(1.2)	(1.5)	(1.3)	(1.7)	(1.8)	(1.7)	(1.7)	(1.8)
Milwood	(0.3)	(0.3)	(0.4)	(0.5)	(0.4)	(0.6)	(0.6)	(0.6)	(0.6)	(0.7)
Dunwoodie	(0.8)	(0.7)	(0.9)	(1.3)	(1.1)	(1.5)	(1.6)	(1.5)	(1.6)	(1.7)
NY City	(11.1)	(9.2)	(11.8)	(16.6)	(14.9)	(19.2)	(20.9)	(20.5)	(21.1)	(23.3)
Long Island	(3.4)	(2.7)	(3.8)	(4.7)	(4.2)	(5.4)	(5.7)	(4.9)	(5.1)	(5.7)
<b>Total-NYCA</b>	<b>(20.7)</b>	<b>(16.9)</b>	<b>(20.9)</b>	<b>(29.5)</b>	<b>(26.3)</b>	<b>(33.2)</b>	<b>(34.6)</b>	<b>(36.7)</b>	<b>(37.5)</b>	<b>(41.9)</b>

## I.10. Case 10: National CO2 Sensitivity

Projected Changes in Production Costs (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	0	0	0	0	0	(112)	(103)	(109)
Genessee	0	0	0	0	0	0	0	(8)	(9)	(9)
Central	0	0	0	0	0	0	0	(90)	(91)	(90)
North	0	0	0	0	0	0	0	(19)	(17)	(24)
Mohawk Valley	0	0	0	0	0	0	0	(10)	(11)	(12)
Capital	0	0	0	0	0	0	0	(167)	(180)	(180)
Hudson Valley	0	0	0	0	0	0	0	(10)	(15)	(17)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	0	0	0	0	0	(249)	(262)	(297)
Long Island	0	0	0	0	0	0	0	(66)	(78)	(82)
<b>Total NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(731)</b>	<b>(766)</b>	<b>(820)</b>
Imports	0	0	0	0	0	0	0	345	322	354
Exports	0	0	0	0	0	0	0	(212)	(279)	(273)
<b>NYCA + Imports - Exports</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(174)</b>	<b>(165)</b>	<b>(193)</b>
Total IESO	0	0	0	0	0	0	0	(156)	(148)	(169)
Total PJM	0	0	0	0	0	0	0	(5,991)	(6,475)	(7,031)
Total ISONE	0	0	0	0	0	0	0	(210)	(215)	(228)
<b>Total System</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(7,088)</b>	<b>(7,604)</b>	<b>(8,247)</b>

Projected Changes in Load LBMP Payments (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	0	0	0	0	0	(78)	(87)	(91)
Genessee	0	0	0	0	0	0	0	(40)	(43)	(48)
Central	0	0	0	0	0	0	0	(63)	(69)	(76)
North	0	0	0	0	0	0	0	(28)	(30)	(33)
Mohawk Valley	0	0	0	0	0	0	0	(29)	(32)	(35)
Capital	0	0	0	0	0	0	0	(22)	(26)	(24)
Hudson Valley	0	0	0	0	0	0	0	(33)	(35)	(37)
Milwood	0	0	0	0	0	0	0	(10)	(10)	(11)
Dunwoodie	0	0	0	0	0	0	0	(21)	(22)	(24)
NY City	0	0	0	0	0	0	0	(186)	(194)	(206)
Long Island	0	0	0	0	0	0	0	(68)	(73)	(80)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(578)</b>	<b>(622)</b>	<b>(663)</b>
Export	0	0	0	0	0	0	0	(212)	(279)	(273)
<b>NYCA+Export</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(790)</b>	<b>(901)</b>	<b>(936)</b>

Projected Changes in Generator LBMP Payments (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity										
Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	0	0	0	0	0	(180)	(171)	(197)
Genessee	0	0	0	0	0	0	0	(28)	(32)	(32)
Central	0	0	0	0	0	0	0	(239)	(241)	(266)
North	0	0	0	0	0	0	0	(56)	(57)	(69)
Mohawk Valley	0	0	0	0	0	0	0	(26)	(29)	(31)
Capital	0	0	0	0	0	0	0	(209)	(230)	(230)
Hudson Valley	0	0	0	0	0	0	0	(12)	(18)	(20)
Milwood	0	0	0	0	0	0	0	(60)	(65)	(67)
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	0	0	0	0	0	(333)	(350)	(392)
Long Island	0	0	0	0	0	0	0	(92)	(105)	(113)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(1,238)</b>	<b>(1,297)</b>	<b>(1,418)</b>
Import	0	0	0	0	0	0	0	345	322	354
<b>NYCA+Import</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(893)</b>	<b>(975)</b>	<b>(1,064)</b>

Projected Changes in Demand \$ Congestion (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	0	0	0	0	0	(2)	(5)	(0)
Genessee	0	0	0	0	0	0	0	2	3	3
Central	0	0	0	0	0	0	0	5	4	6
North	0	0	0	0	0	0	0	(0)	0	0
Mohawk Valley	0	0	0	0	0	0	0	2	2	2
Capital	0	0	0	0	0	0	0	25	24	32
Hudson Valley	0	0	0	0	0	0	0	13	14	18
Milwood	0	0	0	0	0	0	0	4	4	5
Dunwoodie	0	0	0	0	0	0	0	8	8	10
NY City	0	0	0	0	0	0	0	72	79	103
Long Island	0	0	0	0	0	0	0	39	42	51
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>168</b>	<b>175</b>	<b>231</b>

Projected Changes in CO2 Emissions Cost (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(22.8)	(20.9)	(23.3)
Genessee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.8)	(0.9)	(0.9)
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(10.5)	(10.9)	(10.9)
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.1)	(2.0)	(2.8)
Mohawk Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.1)	(1.2)	(1.3)
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(16.0)	(17.5)	(17.5)
Hudson Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.1)	(1.6)	(1.8)
Milwood	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	(46.8)	(51.6)	(57.7)
Long Island	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(6.7)	(8.0)	(8.6)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(107.9)</b>	<b>(114.5)</b>	<b>(124.7)</b>

Projected Changes in CO2 Emissions (%) (2013-2022) by Zone – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-16.9%	-15.1%	-13.7%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-13.4%	-14.6%	-13.5%
Central	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-9.5%	-9.3%	-8.6%
North	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-25.0%	-23.7%	-25.5%
Mohawk Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-12.8%	-13.9%	-13.0%
Capital	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-7.8%	-8.0%	-7.4%
Hudson Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-8.7%	-8.2%	-8.6%
Milwood	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%	-4.9%	-4.9%	-5.1%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.2%	-5.7%	-5.6%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>-7.9%</b>	<b>-7.7%</b>	<b>-7.6%</b>

Projected Changes in SO2 Emissions Cost (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(6.1)	(5.5)	(6.1)
Genessee	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	(1.8)	(1.8)	(2.0)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)
Milwood	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(7.9)</b>	<b>(7.3)</b>	<b>(8.1)</b>

Projected Changes in SO2 Emissions (%) (2013-2022) by Zone – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-36.4%	-32.4%	-28.9%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-29.6%	-33.3%	-32.1%
Central	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-31.8%	-28.2%	-27.0%
North	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.7%	-18.5%	-22.5%
Mohawk Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-7.3%	-8.0%	-7.8%
Capital	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.4%	-1.5%	-1.4%
Hudson Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.4%	-0.1%	-2.1%
Milwood	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%	-11.7%	-10.8%	-11.4%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.5%	-0.8%	-1.1%
<b>Total-NYCA</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>-31.8%</b>	<b>-28.2%</b>	<b>-26.0%</b>

Projected Changes in NOx Emissions Cost (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.2)	(0.2)	(0.2)
Genessee	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)	(0.1)
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	0.0	(0.0)
Milwood	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)	(0.1)	(0.0)
Long Island	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	(0.0)	(0.0)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(0.4)</b>	<b>(0.4)</b>	<b>(0.4)</b>

Projected Changes in NOx Emissions (%) (2013-2022) by Zone – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-28.9%	-26.3%	-23.5%
Genessee	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-8.2%	-8.8%	-8.9%
Central	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-15.3%	-14.2%	-14.2%
North	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-16.3%	-14.7%	-18.2%
Mohawk Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-13.9%	-15.1%	-14.1%
Capital	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-5.2%	-5.4%	-5.1%
Hudson Valley	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-8.4%	-8.5%	-8.3%
Milwood	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%	-12.5%	-10.3%	-10.7%
Long Island	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-3.7%	-4.5%	-4.1%
<b>Total-NYCA</b>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-14.2%	-13.0%	-12.6%

Projected Changes in LBMP \$/MWh (2013-2022) by Zone – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(5.00)	(5.52)	(5.74)
Genessee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(4.14)	(4.40)	(4.84)
Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(4.05)	(4.42)	(4.76)
North	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(4.14)	(4.43)	(4.83)
Mohawk Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(4.00)	(4.32)	(4.69)
Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(1.99)	(2.31)	(2.21)
Hudson Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(3.36)	(3.56)	(3.77)
Milwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(3.38)	(3.57)	(3.78)
Dunwoodie	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(3.41)	(3.61)	(3.81)
NY City	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(3.39)	(3.57)	(3.78)
Long Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(2.99)	(3.25)	(3.44)
<b>NYCA Avg. LBMP</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>(3.62)</b>	<b>(3.91)</b>	<b>(4.15)</b>

Projected Changes in Generator GWh (2013-2022) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0	0	0	0	0	0	0	(1,757)	(1,549)	(1,649)
Genessee	0	0	0	0	0	0	0	(113)	(126)	(118)
Central	0	0	0	0	0	0	0	(1,453)	(1,464)	(1,327)
North	0	0	0	0	0	0	0	(293)	(257)	(339)
Mohawk Valley	0	0	0	0	0	0	0	(151)	(162)	(161)
Capital	0	0	0	0	0	0	0	(2,967)	(3,113)	(2,933)
Hudson Valley	0	0	0	0	0	0	0	(128)	(179)	(192)
Milwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	0	0	0	0	0	0	0	(3,772)	(3,793)	(4,084)
Long Island	0	0	0	0	0	0	0	(973)	(1,078)	(1,079)
<b>Total-NYCA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>(11,606)</b>	<b>(11,720)</b>	<b>(11,882)</b>



Projected Changes in Loss Payments (2013-2022) by Zone (nominal \$M) – National CO2 Sensitivity

Zone	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(12.7)	(13.2)	(14.3)
Genessee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.1)	(2.3)	(2.6)
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(3.5)	(3.6)	(4.2)
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.1)	0.1
Mohawk Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.8)	(0.7)	(0.9)
Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.4	2.5
Hudson Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(4.4)	(4.4)	(5.3)
Milwood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.3)	(1.3)	(1.5)
Dunwoodie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)	(2.8)	(3.4)
NY City	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(28.7)	(29.1)	(35.0)
Long Island	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(6.5)	(6.8)	(8.8)
<b>Total-NYCA</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>(60.1)</b>	<b>(61.9)</b>	<b>(73.4)</b>

## **Appendix J – Comparability Analysis – Additional Details**

The following figures present the NYISO's analysis of generation block sizes that was discussed with the ESPWG and was the basis for selecting the block sizes of 1,320 MW for the Central East-New Scotland-Pleasant Valley (CE-NS-PV) and New Scotland-Pleasant Valley (NS-PV) studies and 660 MW for the Central East study.

Figures J-1, J-2 and J-3 illustrate that the quantity of generation MWs necessary to achieve a level of congestion relief comparable to the transmission solution is not reasonable. For example, in the case of the CE-NS-PV study, comparability in congestion relief is not achieved even with nearly 4,000 MWs of generation.

Figures J-4 and J-5 similarly illustrate the concerns with using production cost savings as a measure of comparability. While in the case of the studies terminating at Pleasant Valley, comparability on this basis could be achieved with generation solutions of 330 MW and 1,320 MW; it would require nearly 2,000 MWs at New Scotland to achieve comparability in production cost savings at New Scotland.

Figure J-6 summarizes the results with the Comparable MW panel identifying the selected generation solution sizes (1,320 MWs for CE-NS-PV and NS-PV; and 660 MWs for Central East.) The middle and right panels show how, for these solution sizes, the relative production cost savings and demand congestion relief vary.

After consultation with ESPWG, the block sizes for the Demand Response and Energy Efficiency were set equal to the MW transfer limit increase associated with the transmission solutions.

Figure J-1: CE-NS-PV Solution Comparability Based on Demand Congestion \$

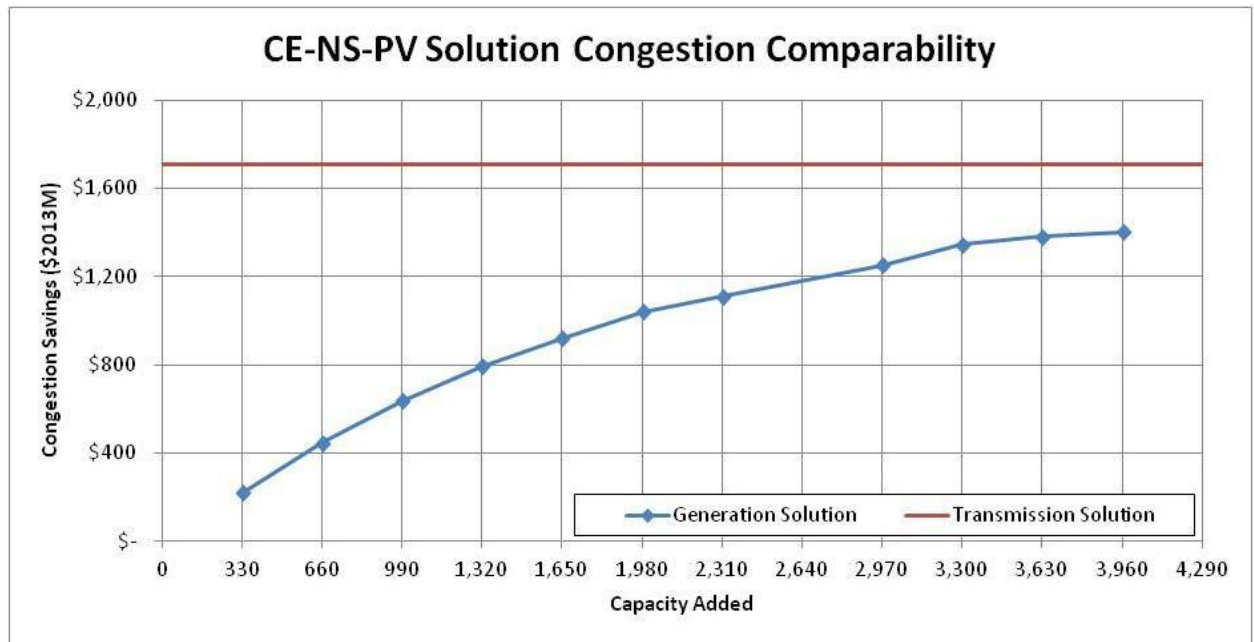


Figure J-2: CE Solution Comparability Based on Demand Congestion\$

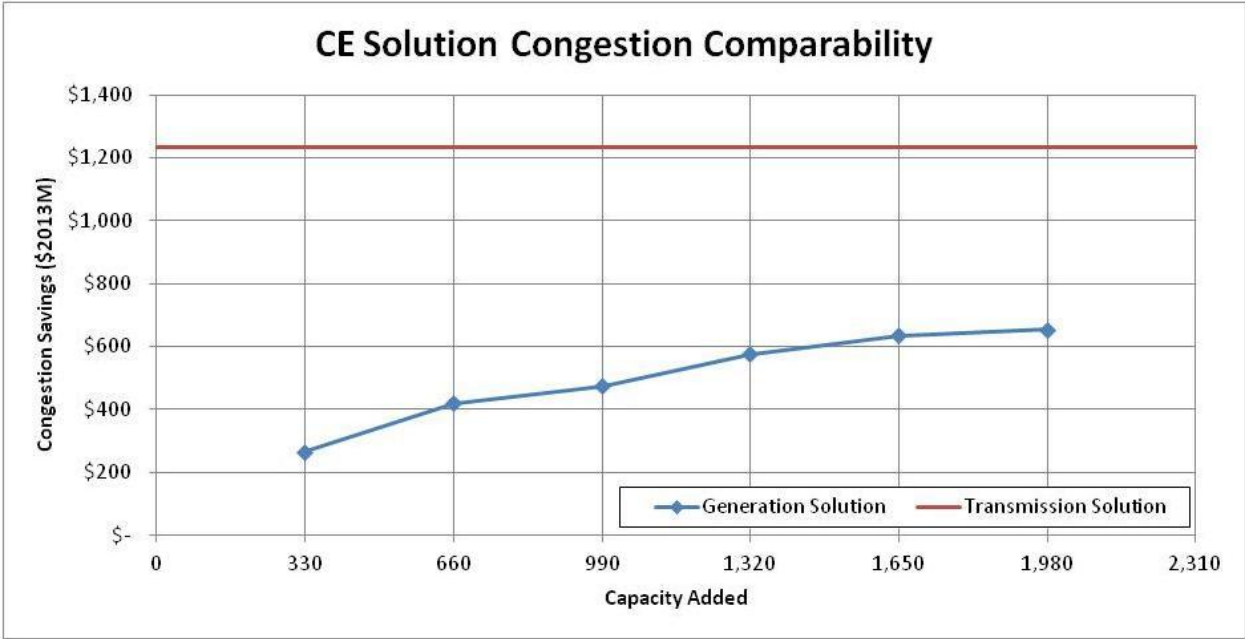


Figure J-3: NS-PV Solution Comparability Based on Demand Congestion \$

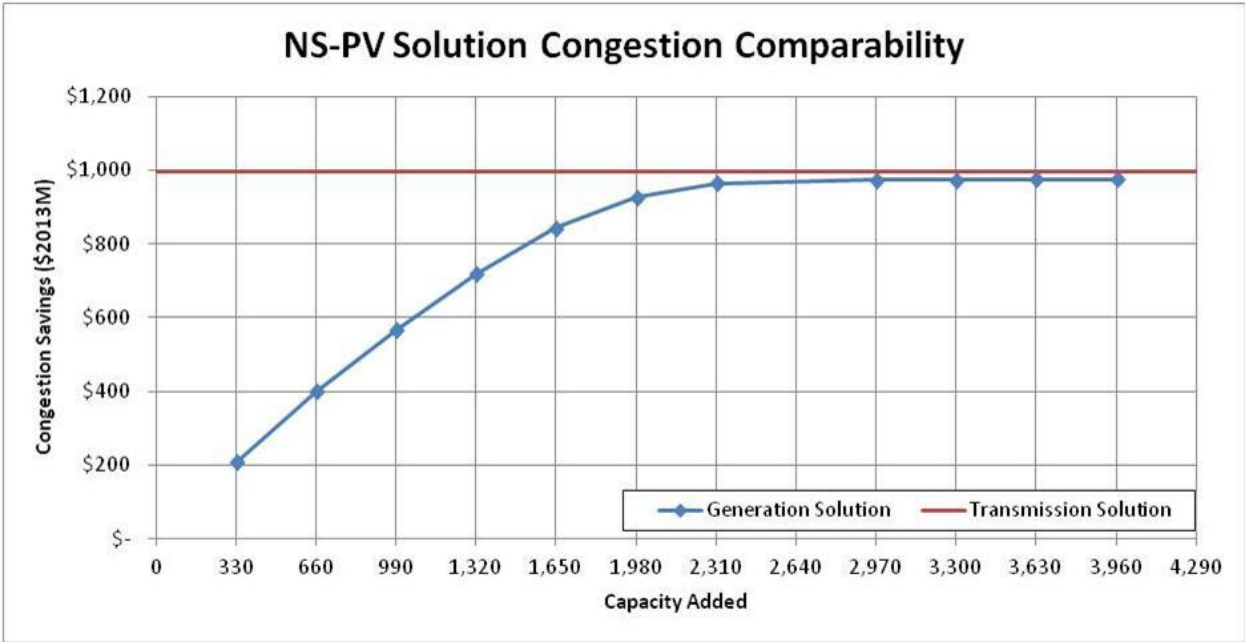


Figure J-4: CE Solution Comparability Based on Production Cost Savings

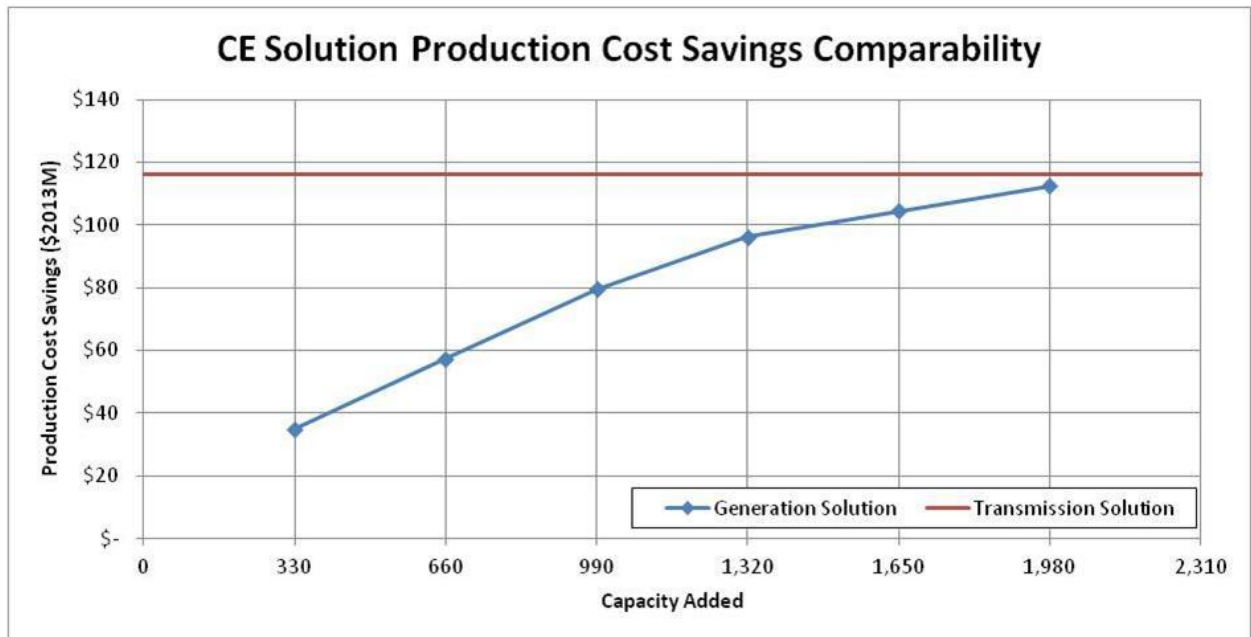


Figure J-5: CE-NS-PV and NS-PV Solutions Comparability Based on Production Cost Savings

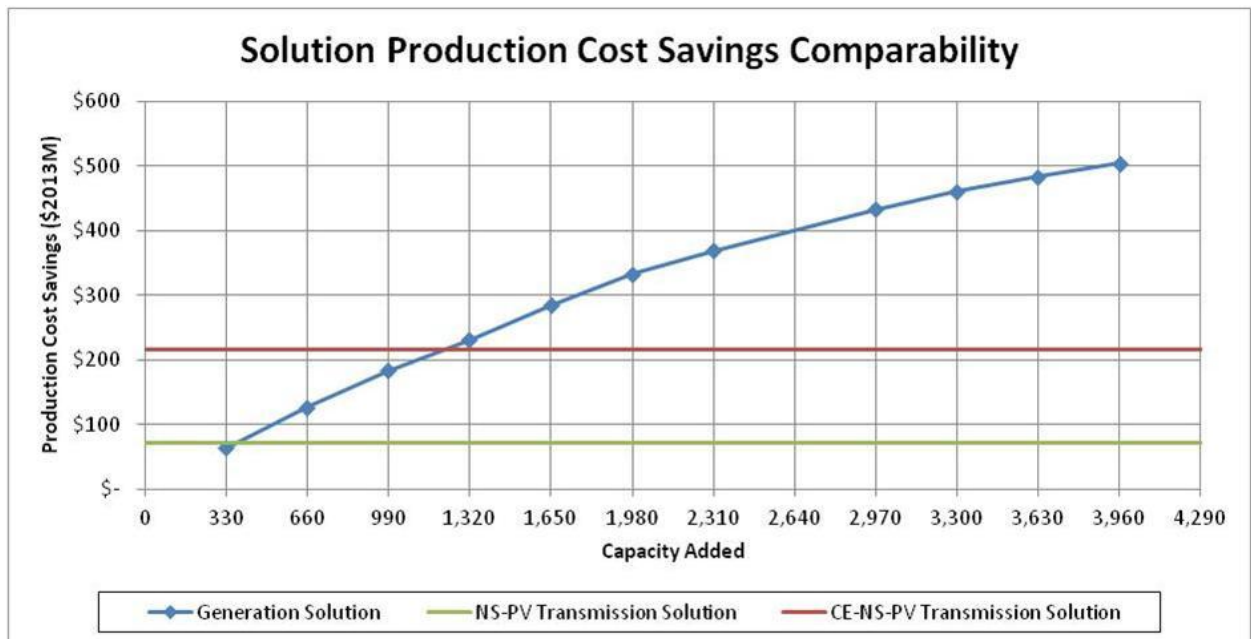


Figure J-6: Summary of Comparability Analysis

