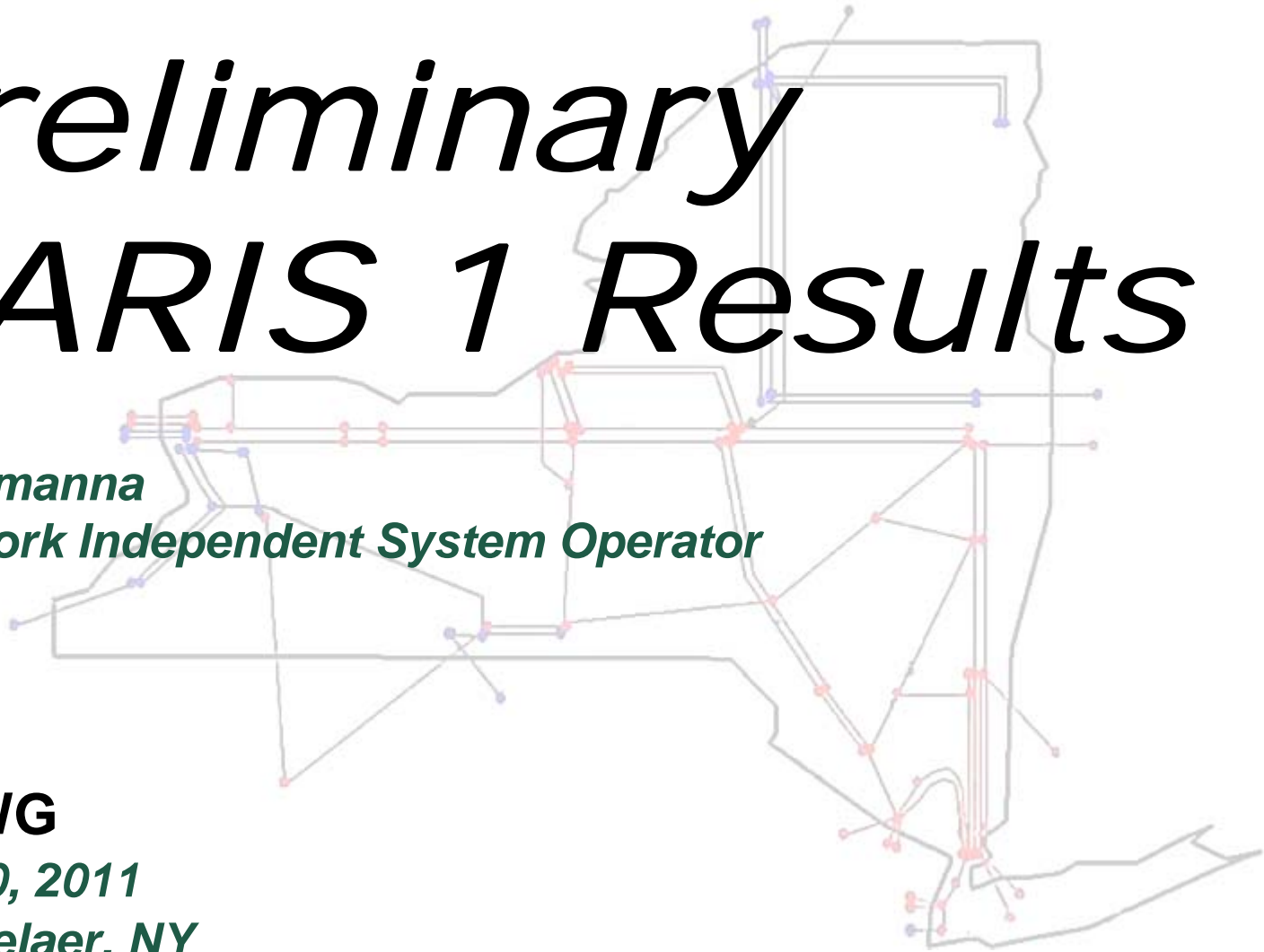


Preliminary CARIS 1 Results

*Bill Lamanna
New York Independent System Operator*

ESPWG
*July 20, 2011
Rensselaer, NY*



Topics:

- 1. Preliminary CARIS 1 Results*
- 2. Preliminary Scenario Suggestions*
- 3. Central East Model*

1. Preliminary CARIS 1 Results

- ◆ **Description of how Central-East and hurdle rates are modeled**

Demand\$ Congestion Payment Definition

- ◆ ***The Demand\$ congestion value (also known as hedged congestion) 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 GSF x Zone Load)***
 - ***Total Demand\$ Congestion = Sum of all constraints' Demand\$ Congestion.***
- ◆ ***Unhedged Congestion - This is the Demand\$ Congestion Payments minus the TCC hedge.***

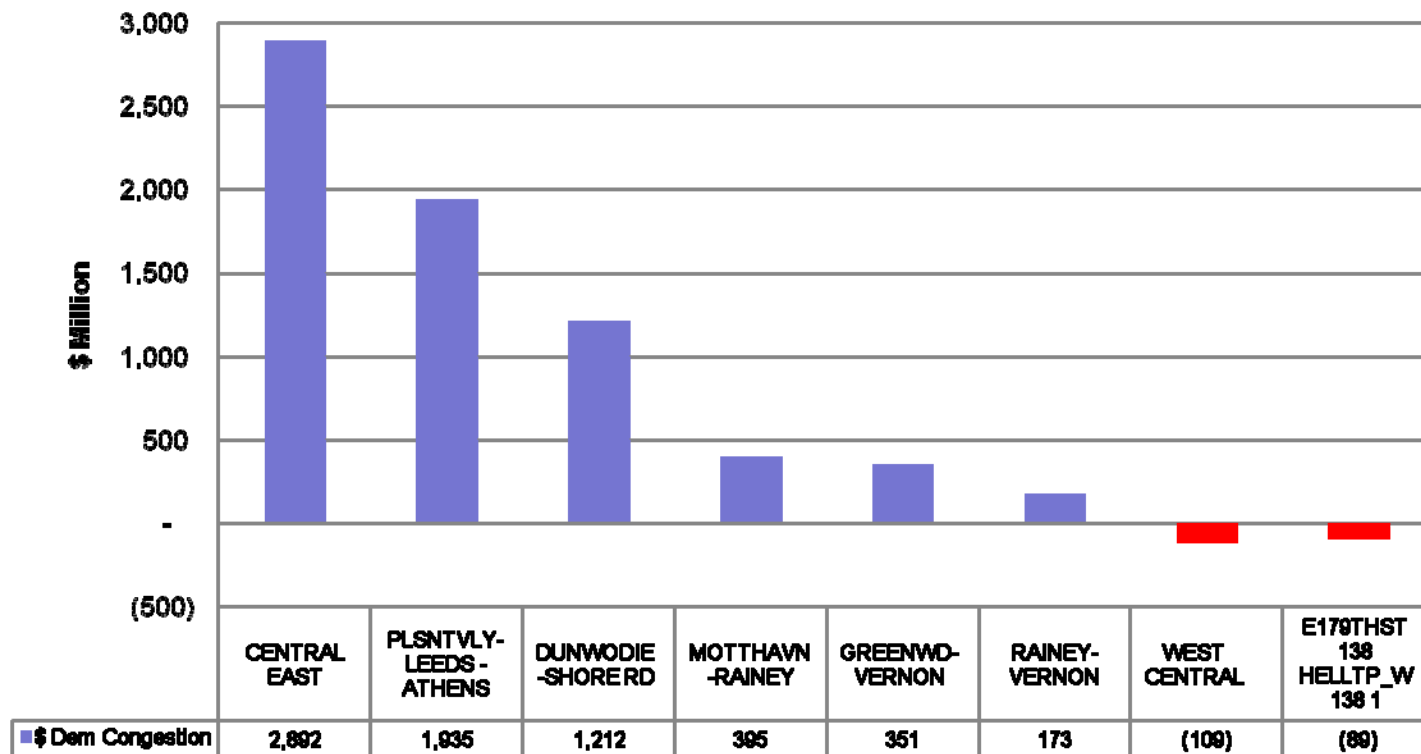
Historic Demand\$ Congestion by Constraint (\$M)

Constraint	2006	2007	2008	2009	2010	Total
CENTRAL EAST	195	572	1,199	435	491	2,892
PLSNTVLY 345 LEEDS 345 1	452	435	667	149	232	1,935
DUNWODIE 345 SHORE_RD 345 1	492	260	187	118	155	1,212
MOTTHAVN 345 RAINEY 345 (1 & 2)	0	43	272	50	30	395
GREENWD 138 VERNON 138 1	69	52	65	68	97	351
RAINEY 138 VERNON 138 1	21	19	81	20	32	173
WEST CENTRAL	(2)	(51)	(55)	(1)	(0)	(109)
E179THST 138 HELLTP_W 138 1	(10)	(12)	(34)	(13)	(20)	(89)

Source: PROBE DAM Annual Report; DAM Data include Virtual bidding & Transmission Outages.

Historic Demand\$ Congestion by Constraint (\$M)

Top Historic Constraints, 2006-2010 (\$M)



Source: PROBE DAM Annual Report; DAM Data include Virtual bidding & Transmission Outages.

Projected Demand\$ Congestion by Constraint (\$M)

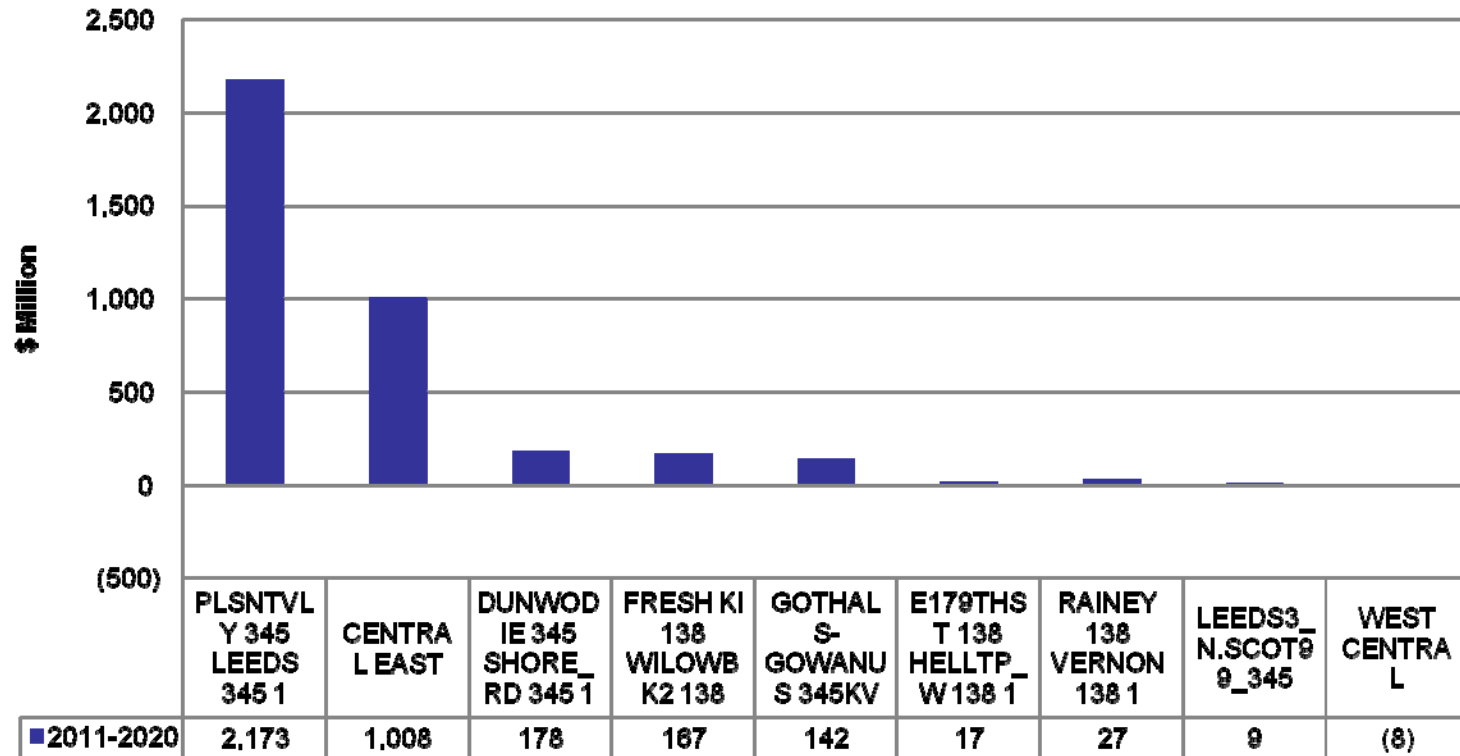
Constraint	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
PLSNTVLY 345 LEEDS 345 1	203	204	143	145	166	198	225	261	298	330	2,173
CENTRAL EAST	223	116	92	69	67	81	89	90	84	96	1,008
DUNWODIE 345 SHORE_RD 345 1	5	9	11	14	16	18	20	24	28	33	178
FRESH KI 138 WILOWBK2 138	13	15	13	15	15	17	17	19	21	23	167
GOTHALS-GOWANUS 345KV	13	14	12	13	13	14	14	15	16	18	142
RAINEY 138 VERNON 138 1	2	2	3	2	3	3	3	3	3	4	27
E179THST 138 HELLTP_W 138 1	1	1	2	2	2	2	2	2	2	2	17
LEEDS3_N.SCOT99_345	4	1	0	1	0	0	1	0	1	1	9
WEST CENTRAL	(2)	(1)	(1)	(0)	(0)	(0)	(1)	(1)	(1)	(1)	(8)

Source: NYISO CARIS Base Case (does not include Virtuals and Transmission Outages).

Note: Without Athens SPS modeled.

Projected Demand\$ Congestion by Constraint (\$M)

Top Projected Constraints, 2011-2020 (\$M)

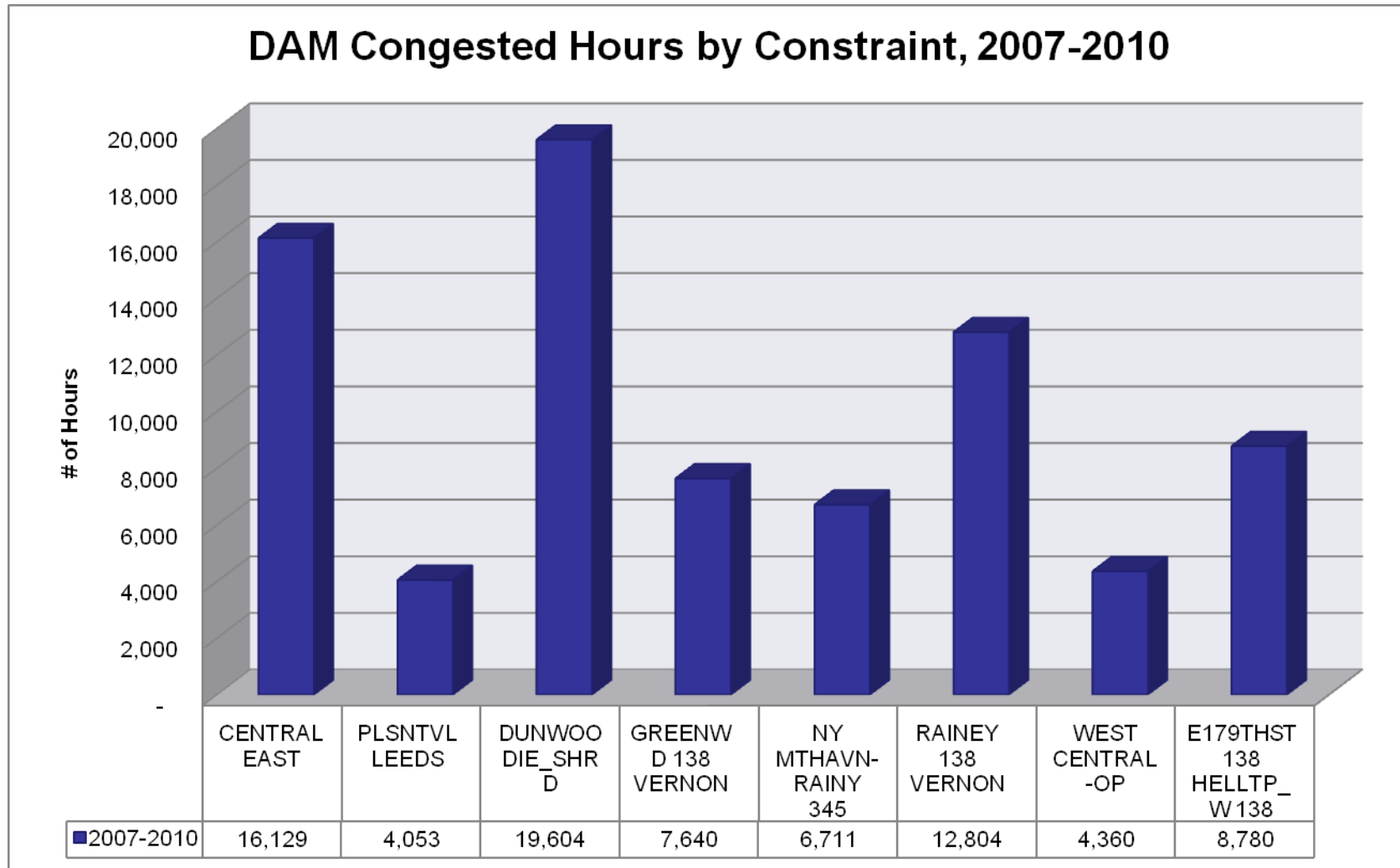


Historic # of Congested Hours by Constraint

# of DAM Congested Hours	Actual				
Constraint	2007	2008	2009	2010	Total
CENTRAL EAST	3,195	5,182	4,788	2,964	16,129
PLSNTVLY LEEDS	1,572	1,083	725	673	4,053
DUNWOODIE_SHORE RD	5,603	4,469	5,240	4,292	19,604
GREENWD 138 VERNON	1,677	1,177	2,230	2,556	7,640
NY MTHAVN-RAINY 345	1,354	2,816	1,646	895	6,711
RAINEY 138 VERNON	3,210	3,567	2,948	3,079	12,804
WEST CENTRAL-OP	1,943	2,120	296	1	4,360
E179THST 138 HELLTP_W 138	1,625	2,503	2,319	2,333	8,780

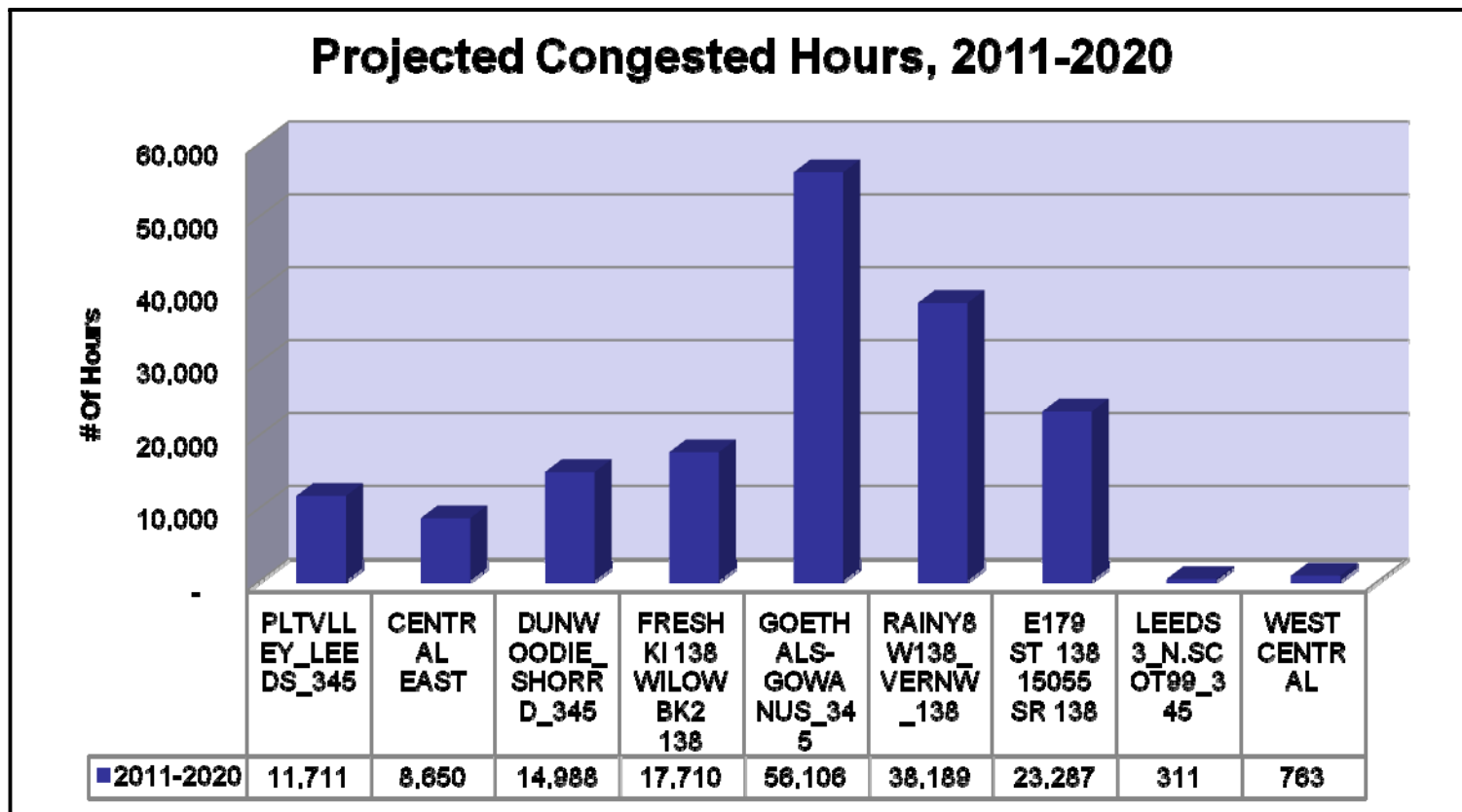
Source: NYISO Website - DAM Limiting Constraints.

Historic Congested Hours



Source: NYISO Website - DAM Limiting Constraints.

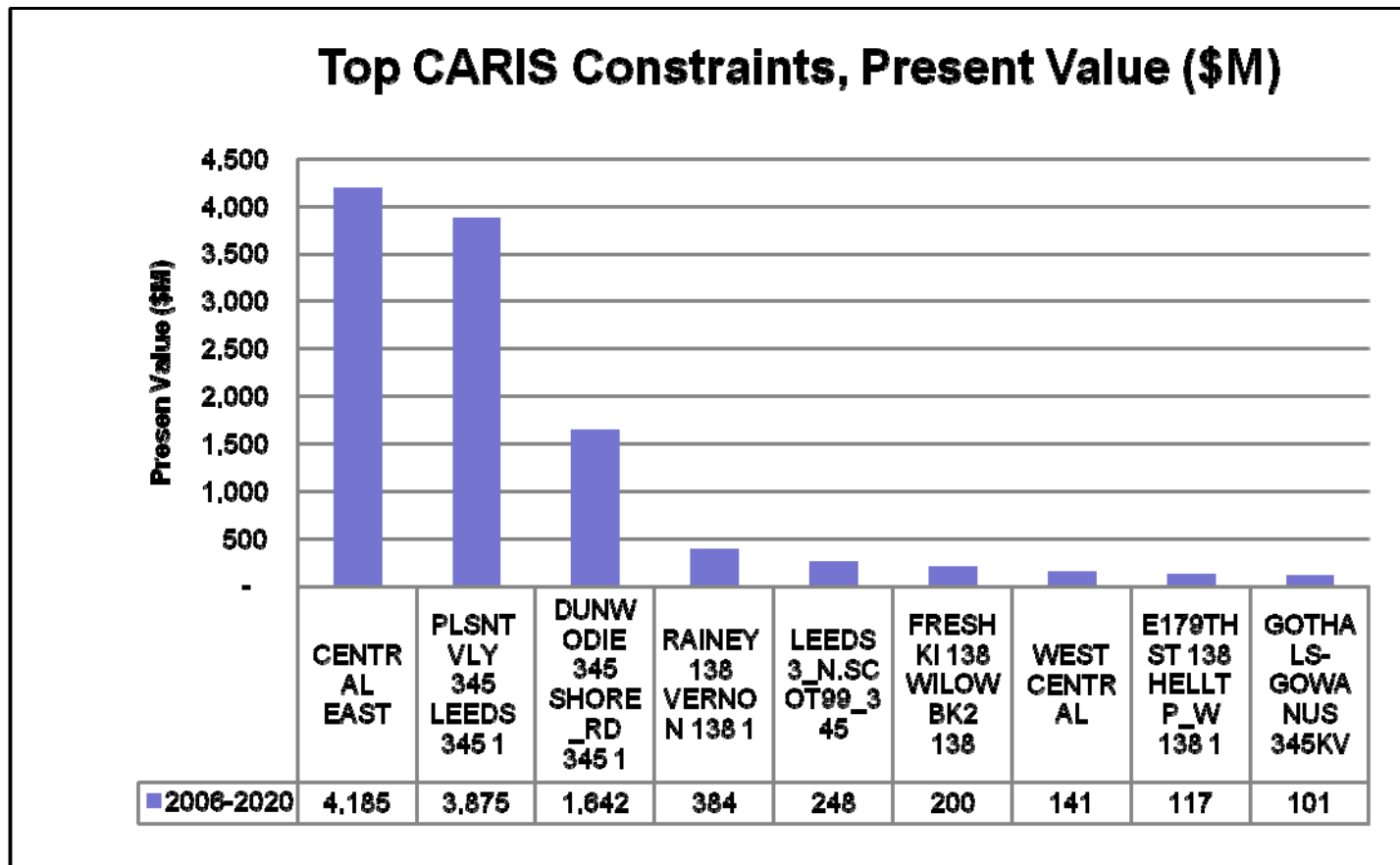
Projected Congested Hours by Constraint



Top Constraints - Present Value, 2006-2020

Constraint	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL (ABS)
CENTRAL EAST	268	733	1432	484	509	215	104	77	53	49	55	56	53	46	49	4,185
PLSNTVLY 345 LEEDS 345 1	622	558	797	166	240	196	183	120	113	120	134	142	153	163	168	3,875
DUNWODIE 345 SHORE_RD 345 1	677	333	223	131	161	5	8	9	11	12	12	13	14	15	17	1,642
RAINEY 138 VERNON 138 1	29	24	97	22	33	5	9	11	14	16	18	20	24	28	33	384
LEEDS3_N.SCOT99_345	36	14	107	49	34	4	1	0	1	0	0	0	0	0	0	248
FRESH KI 138 WILLOWBK2 138	23	12	25	8	16	13	13	11	11	11	11	11	11	11	12	200
E179THST 138 HELLTP_W 138 1	14	15	41	14	21	1	1	1	1	1	1	1	1	1	1	117
GOTHALS-GOWANUS 345KV	0	0	(1)	0	0	13	13	10	10	10	10	9	9	9	9	102
WEST CENTRAL	(3)	(65)	(66)	(1)	(0)	(2)	(0)	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(141)

Top CARIS Constraints Present Value (\$M), 2006-2020



Historic Demand\$ Congestion by Zone (\$M)

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

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

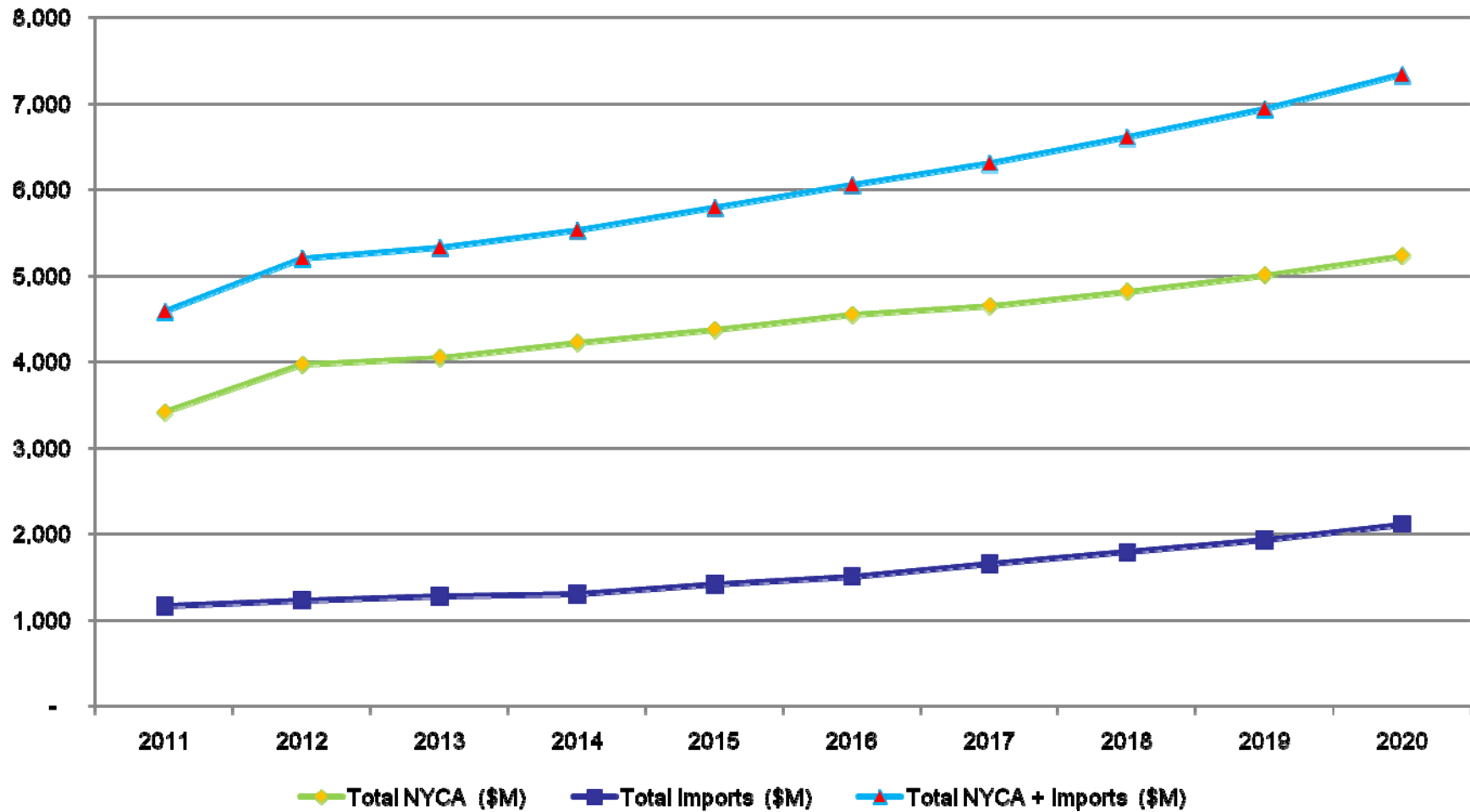
Projected Demand\$ Congestion by Zone (\$M)

Demand Congestion (\$M)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	2	1	2	1	1	1	2	2	3	3
GENESSEE	4	0	1	0	0	0	0	1	1	1
CENTRAL	10	2	1	1	1	1	1	1	1	1
NORTH	1	1	1	1	0	0	1	1	2	3
MOHAWKVA	6	2	1	1	1	1	2	2	2	2
CAPITAL	43	21	17	13	13	15	16	16	15	16
HUDSONVA	51	36	27	24	26	31	34	38	41	46
MILLWOOD	18	13	10	9	9	11	13	14	15	17
DUNWOODI	35	25	19	17	19	22	25	28	31	34
NYCITY	315	238	186	172	188	218	246	277	307	346
LONGISLA	134	107	87	84	94	110	124	144	159	178
Total NYCA	618	447	350	322	351	410	463	523	577	647

Source: NYISO CARIS Base Case (does not include Virtuals and Transmission Outages). Absolute values are reported.

Projected Production Costs

Production Costs (\$M)



Historic Zonal Generator Payments (\$M)

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

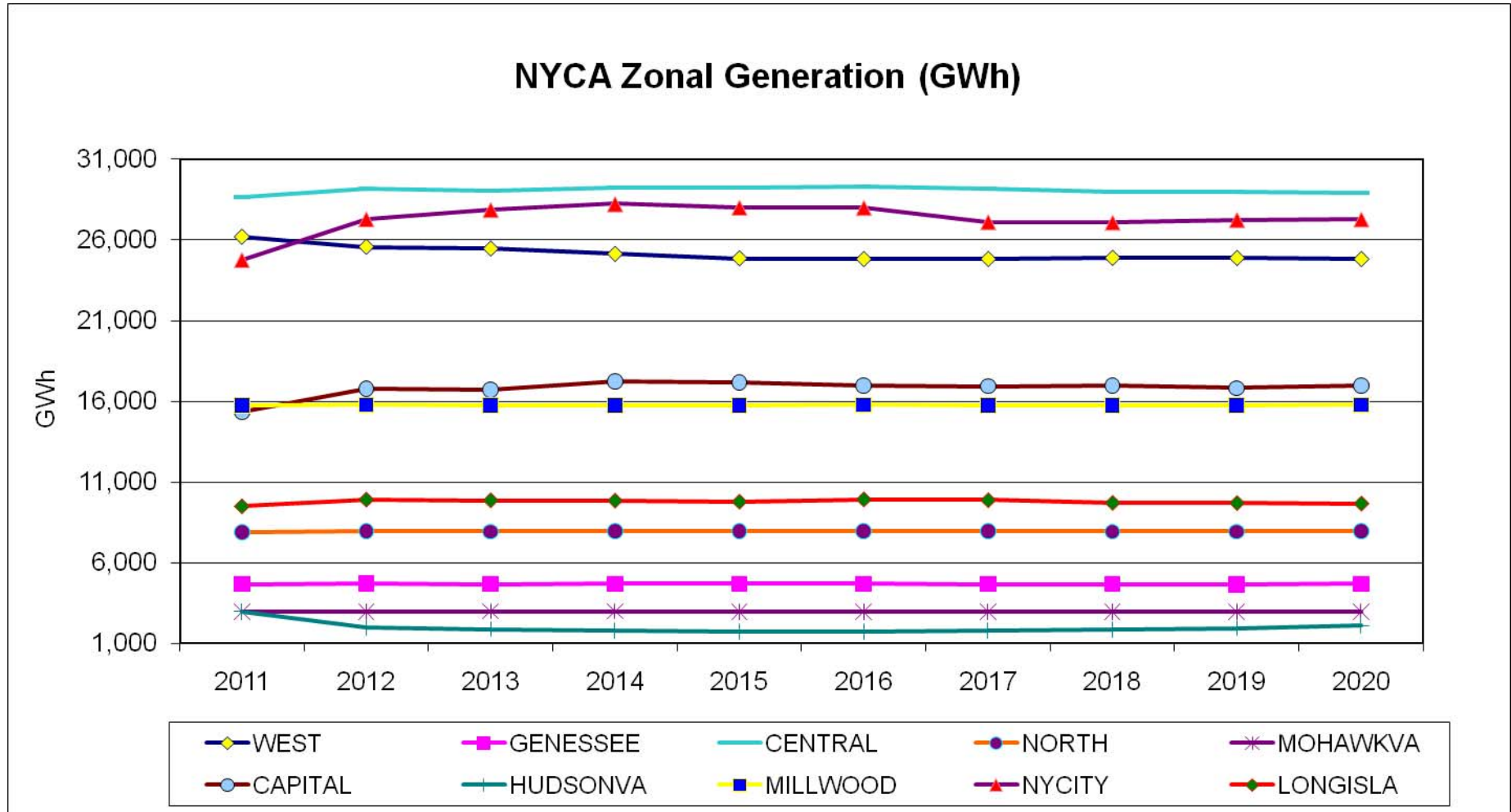
Historic Generator Payment Source: PROBE DAM quarterly reports; DAM data do not include BPCG and Ancillary services; DAM data include Virtual bidding & Transmission outages.

Historic Load, Generation and Interchange (GWh)

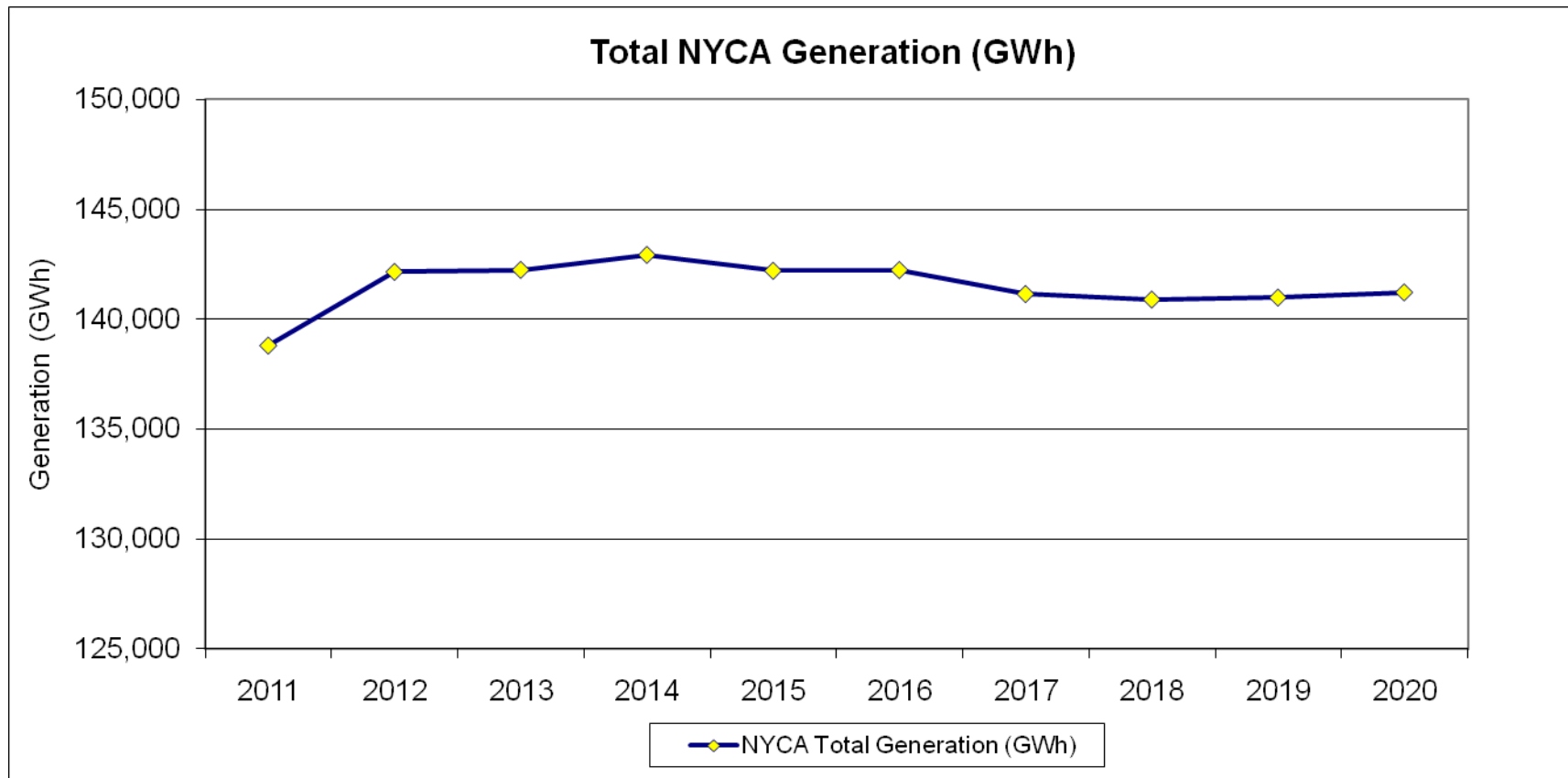
YEAR	NYCA Actual GWh		
	Load	Generation	Net Imports
2004	160,211	147,171	13,040
2005	167,208	153,265	13,943
2006	162,237	148,359	13,878
2007	167,341	150,407	16,934
2008	165,613	144,619	20,994
2009	158,780	136,501	22,279
2010	163,505	139,357	24,148

Source: NYISO Gold Books, 2005-2011.

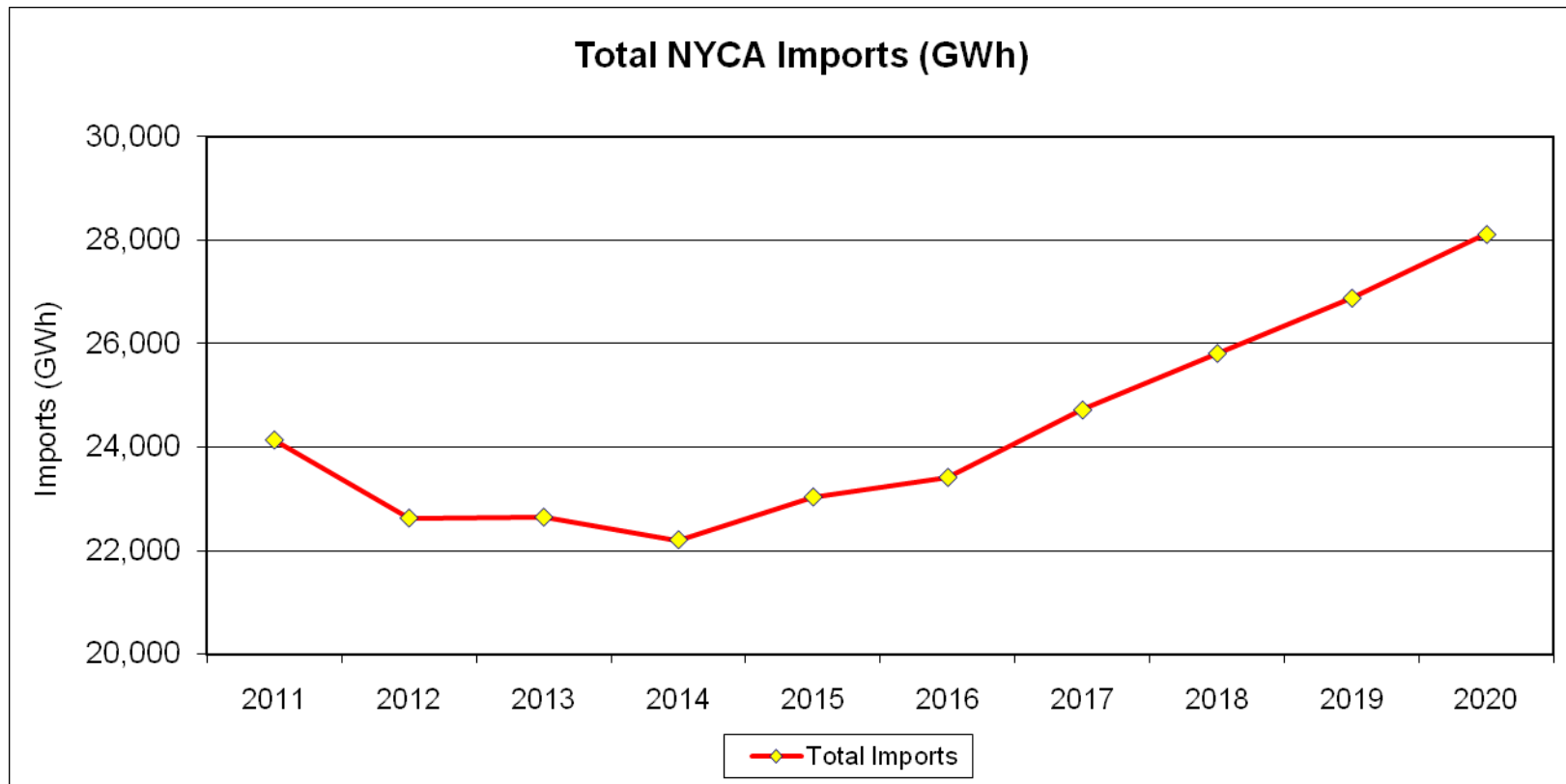
Projected Zonal Generation



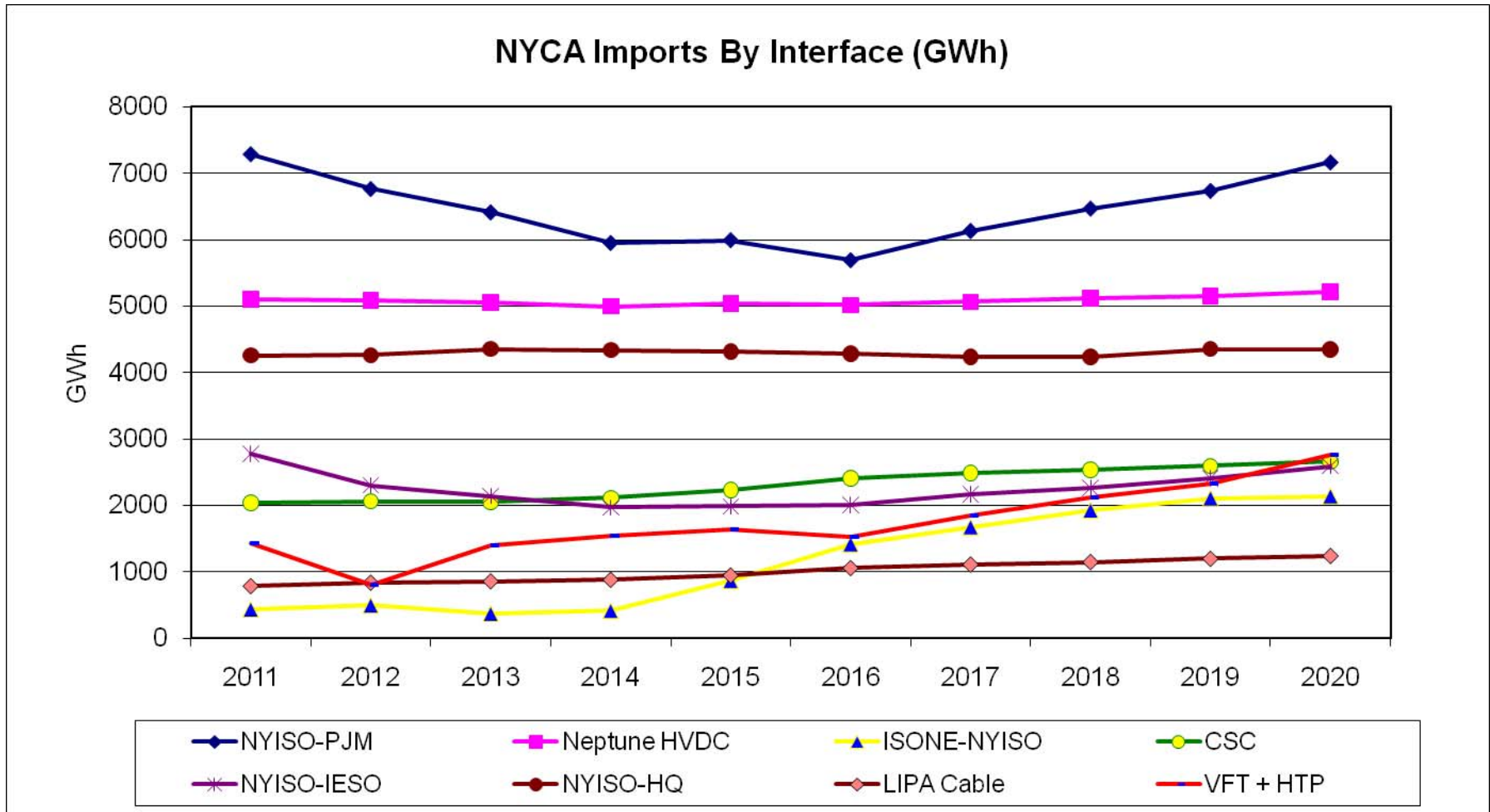
Projected NYCA Generation



Projected Imports (GWh)



Projected Imports by Interface (GWh)

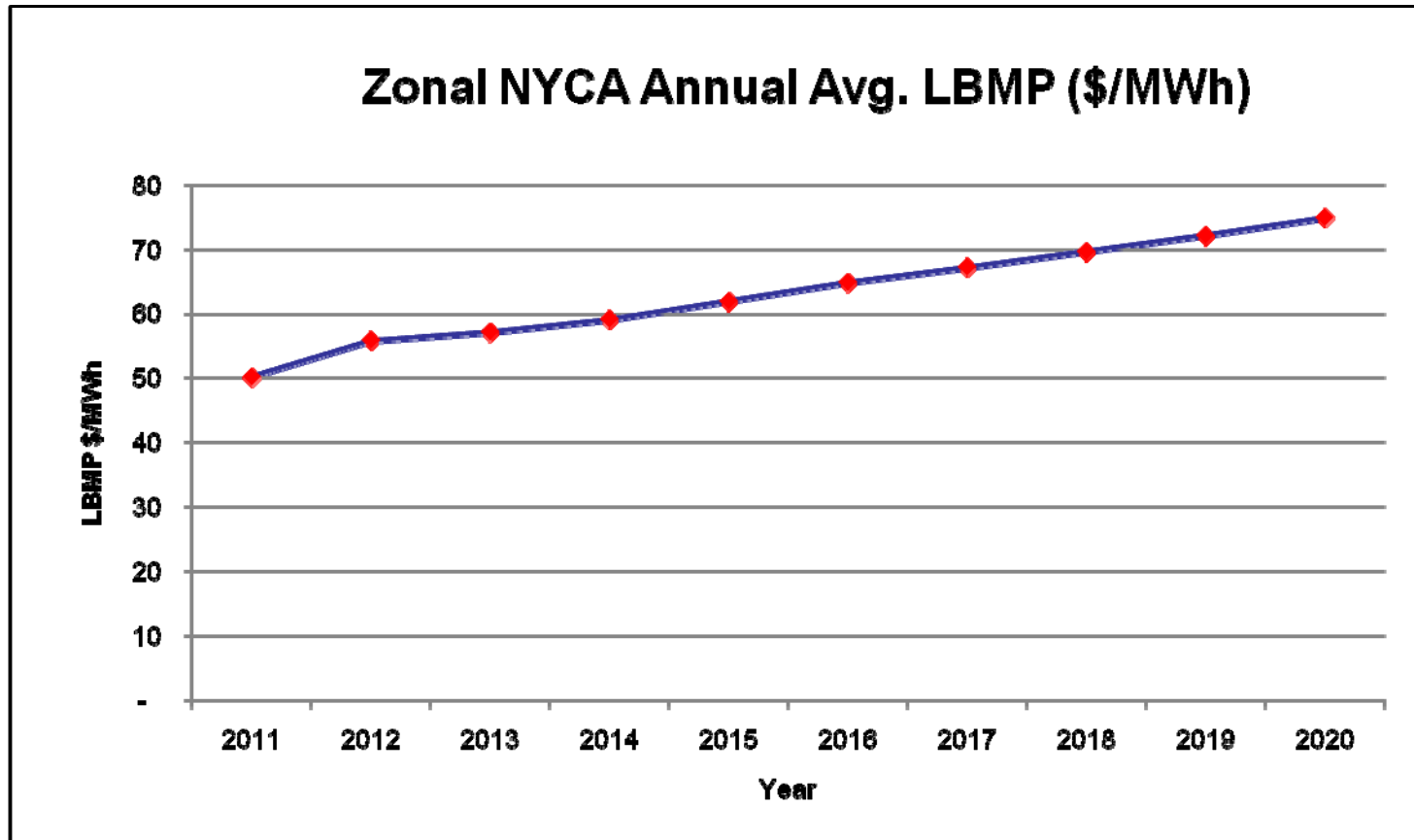


Historic Zonal Load Payments (\$M)

Zone	2006	2007	2008	2009	2010
West	868	983	1,061	511	629
Genesee	649	668	754	435	520
Central	779	928	1,060	569	726
North	351	413	474	193	183
Mohawk Valley	400	443	469	256	313
Capital	720	818	1,008	508	578
Hudson Valley	761	864	1,114	496	630
Millwood	252	263	385	132	168
Dunwoodie	442	494	706	315	375
NYCity	4,394	4,696	5,919	2,753	3,305
Long Island	2,353	2,261	2,535	1,231	1,577
NYCA Total	11,969	12,831	15,485	7,397	9,005

Historic Load Payment Source: PROBE DAM quarterly reports.
 DAM data includes Virtual bidding & Transmission outages.

Projected NYCA Zonal LBMP



Projected SO_x Emissions (Tons)

SO _x (tons)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	20,742	18,503	18,262	17,123	16,238	16,075	16,181	16,352	16,365	15,935
GENESSEE	0	0	0	0	0	0	0	0	0	0
CENTRAL	1,222	254	233	182	161	172	182	194	217	247
NORTH	403	554	589	621	653	670	636	571	569	520
MOHAWKVA	44	3	3	8	8	3	3	3	3	13
CAPITAL	62	66	66	68	67	66	66	66	65	65
HUDSONVA	10,777	5,875	5,480	5,096	4,850	4,976	5,287	5,495	5,839	6,432
MILLWOOD	12	12	12	12	12	12	12	12	12	12
DUNWOODI	-	-	-	-	-	-	-	-	-	-
NYCITY	260	359	428	423	420	419	402	405	408	407
LONGISLA	6,773	7,586	7,498	7,395	7,366	7,514	7,438	7,209	7,145	7,093
Total NYCA (tons)	40,296	33,213	32,573	30,928	29,776	29,910	30,208	30,309	30,623	30,724
IESO	199,135	160,666	156,862	142,548	132,431	132,760	131,792	128,490	122,555	111,992
PJM	2,506,978	2,305,600	2,286,518	2,229,362	2,175,838	2,114,530	2,083,769	2,050,555	2,011,126	1,962,210
NE	106,975	80,754	79,628	74,235	68,314	66,933	64,942	62,913	60,693	59,087
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals (tons)	2,813,089	2,547,021	2,523,007	2,446,145	2,376,582	2,314,223	2,280,502	2,241,957	2,194,374	2,133,289
Total System (tons)	2,853,385	2,580,234	2,555,580	2,477,073	2,406,358	2,344,132	2,310,710	2,272,267	2,224,996	2,164,013

Projected SO_x Emission Costs

SO _x Costs (\$M)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	2	6	6	5	5	5	5	6	6	6
GENESSEE	0	0	0	0	0	0	0	0	0	0
CENTRAL	0	0	0	0	0	0	0	0	0	0
NORTH	0	0	0	0	0	0	0	0	0	0
MOHAWKVA	0	0	0	0	0	0	0	0	0	0
CAPITAL	0	0	0	0	0	0	0	0	0	0
HUDSONVA	1	2	2	2	2	2	2	2	2	2
MILLWOOD	0	0	0	0	0	0	0	0	0	0
DUNWOODI	0	0	0	0	0	0	0	0	0	0
NYCITY	0	0	0	0	0	0	0	0	0	0
LONGISLA	1	2	2	2	2	2	3	3	3	3
Total NYCA (\$M)	4	10	10	10	10	10	10	11	11	11
IESO	20	48	48	45	43	44	45	45	44	41
PJM	251	692	703	703	703	700	707	713	717	717
NE	11	24	24	23	22	22	22	22	22	22
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals (\$M)	281	764	776	771	768	766	774	780	783	780
Total System (\$M)	285	774	786	781	777	776	784	791	793	791

Projected NO_x Emissions (Tons)

NO _x (tons)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	10,150	9,645	9,584	9,338	9,138	9,091	9,113	9,154	9,153	9,077
GENESSEE	7	8	7	9	8	7	6	6	6	7
CENTRAL	2,314	1,641	1,600	1,535	1,476	1,503	1,514	1,524	1,569	1,607
NORTH	385	393	395	396	398	399	397	394	394	392
MOHAWKVA	228	228	226	231	227	223	221	219	219	221
CAPITAL	1,723	1,865	1,854	1,911	1,907	1,890	1,887	1,881	1,862	1,875
HUDSONVA	3,441	2,105	1,986	1,852	1,759	1,794	1,887	1,948	2,076	2,284
MILLWOOD	1,046	1,049	1,046	1,046	1,046	1,049	1,046	1,046	1,046	1,050
DUNWOODI	-	-	-	-	-	-	-	-	-	-
NYCITY	2,226	2,407	2,404	2,425	2,385	2,394	2,290	2,255	2,272	2,266
LONGISLA	6,467	6,657	6,620	6,587	6,552	6,633	6,592	6,463	6,445	6,426
Total NYCA (tons)	27,988	25,999	25,722	25,329	24,898	24,984	24,955	24,890	25,043	25,205
IESO	68,263	62,974	62,631	61,062	59,649	59,626	59,863	59,440	58,715	57,716
PJM	635,373	594,014	591,472	581,931	574,468	570,769	567,825	563,840	559,096	552,928
NE	38,429	33,863	33,556	32,467	31,644	31,596	31,358	30,986	30,486	30,117
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals (tons)	742,065	690,851	687,658	675,459	665,760	661,991	659,046	654,266	648,297	640,762
Total System (tons)	770,053	716,850	713,380	700,789	690,658	686,975	684,001	679,156	673,340	665,967

Projected NOx Emission Costs

NOx Costs (\$M)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	6.1	7.7	10.5	14.9	14.6	14.5	14.6	14.6	14.8	15.0
GENESSEE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CENTRAL	1.4	1.3	1.8	2.5	2.4	2.4	2.4	2.4	2.5	2.7
NORTH	0.2	0.3	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6
MOHAWKVA	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CAPITAL	1.0	1.5	2.0	3.1	3.1	3.0	3.0	3.0	3.0	3.1
HUDSONVA	2.1	1.7	2.2	3.0	2.8	2.9	3.0	3.1	3.4	3.8
MILLWOOD	0.6	0.8	1.2	1.7	1.7	1.7	1.7	1.7	1.7	1.7
DUNWOODI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYCITY	1.3	1.9	2.6	3.9	3.8	3.8	3.7	3.6	3.7	3.8
LONGISLA	3.9	5.3	7.3	10.5	10.5	10.6	10.5	10.3	10.4	10.6
Total NYCA (\$M)	16.8	20.8	28.3	40.5	39.8	40.0	39.9	39.8	40.5	41.7
IESO	41	50	69	98	95	95	96	95	95	96
PJM	381	475	651	931	919	913	909	902	903	915
NE	23	27	37	52	51	51	50	50	49	50
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals (\$M)	445	553	756	1,081	1,065	1,059	1,054	1,047	1,047	1,061
Total System (\$M)	462	573	785	1,121	1,105	1,099	1,094	1,087	1,088	1,103

Projected CO₂ Emissions (Tons)

CO ₂ (1000 tons)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	10,493	9,782	9,703	9,353	9,072	9,008	9,044	9,101	9,102	8,985
GENESSEE	9	10	9	13	11	6	4	3	2	4
CENTRAL	3,701	3,550	3,499	3,542	3,512	3,541	3,526	3,450	3,473	3,444
NORTH	44	62	65	71	74	75	71	64	64	61
MOHAWKVA	39	30	28	34	30	24	23	20	20	24
CAPITAL	5,916	6,552	6,519	6,780	6,747	6,627	6,614	6,626	6,560	6,643
HUDSONVA	2,441	1,416	1,331	1,245	1,180	1,203	1,271	1,318	1,401	1,547
MILLWOOD	-	-	-	-	-	-	-	-	-	-
DUNWOODI	-	-	-	-	-	-	-	-	-	-
NYCITY	12,145	12,833	12,715	12,899	12,753	12,744	12,295	12,288	12,387	12,450
LONGISLA	4,469	4,731	4,710	4,690	4,638	4,715	4,689	4,616	4,609	4,590
Total NYCA (1000 tons)	39,257	38,965	38,578	38,627	38,017	37,943	37,536	37,485	37,619	37,747
IESO	44,199	38,917	38,484	36,771	35,356	35,243	35,292	34,897	34,242	33,245
PJM	437,900	410,780	409,088	402,532	397,103	391,059	388,908	386,203	383,023	378,991
NE	40,394	37,738	37,686	37,247	37,037	37,275	37,421	37,395	37,318	37,140
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals	522,493	487,435	485,258	476,549	469,496	463,577	461,621	458,495	454,583	449,376
Total System (1000 tons)	561,750	526,400	523,836	515,176	507,513	501,519	499,157	495,981	492,202	487,123

Projected CO₂ Emission Costs

CO2 costs (\$M)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WEST	22	98	119	136	152	171	185	200	215	228
GENESSEE	0	0	0	0	0	0	0	0	0	0
CENTRAL	8	36	43	51	59	67	72	76	82	87
NORTH	0	1	1	1	1	1	1	1	2	2
MOHAWKVA	0	0	0	0	1	0	0	0	0	1
CAPITAL	13	66	80	98	113	126	135	146	155	169
HUDSONVA	5	14	16	18	20	23	26	29	33	39
MILLWOOD	0	0	0	0	0	0	0	0	0	0
DUNWOODI	0	0	0	0	0	0	0	0	0	0
NYCITY	26	128	156	187	214	242	251	270	292	316
LONGISLA	10	47	58	68	78	90	96	101	109	116
Total NYCA (\$M)	84	390	473	560	637	721	767	823	888	958
IESO	95	389	471	533	592	670	721	766	808	843
PJM	750	3,142	3,818	4,408	4,986	7,430	7,945	8,481	9,039	9,615
NE	86	377	462	540	620	708	765	821	881	942
HQ	-	-	-	-	-	-	-	-	-	-
Total Externals (\$M)	931	3,908	4,751	5,481	6,199	8,808	9,431	10,069	10,728	11,401
Total System (\$M)	1,015	4,298	5,223	6,041	6,835	9,529	10,198	10,892	11,616	12,358

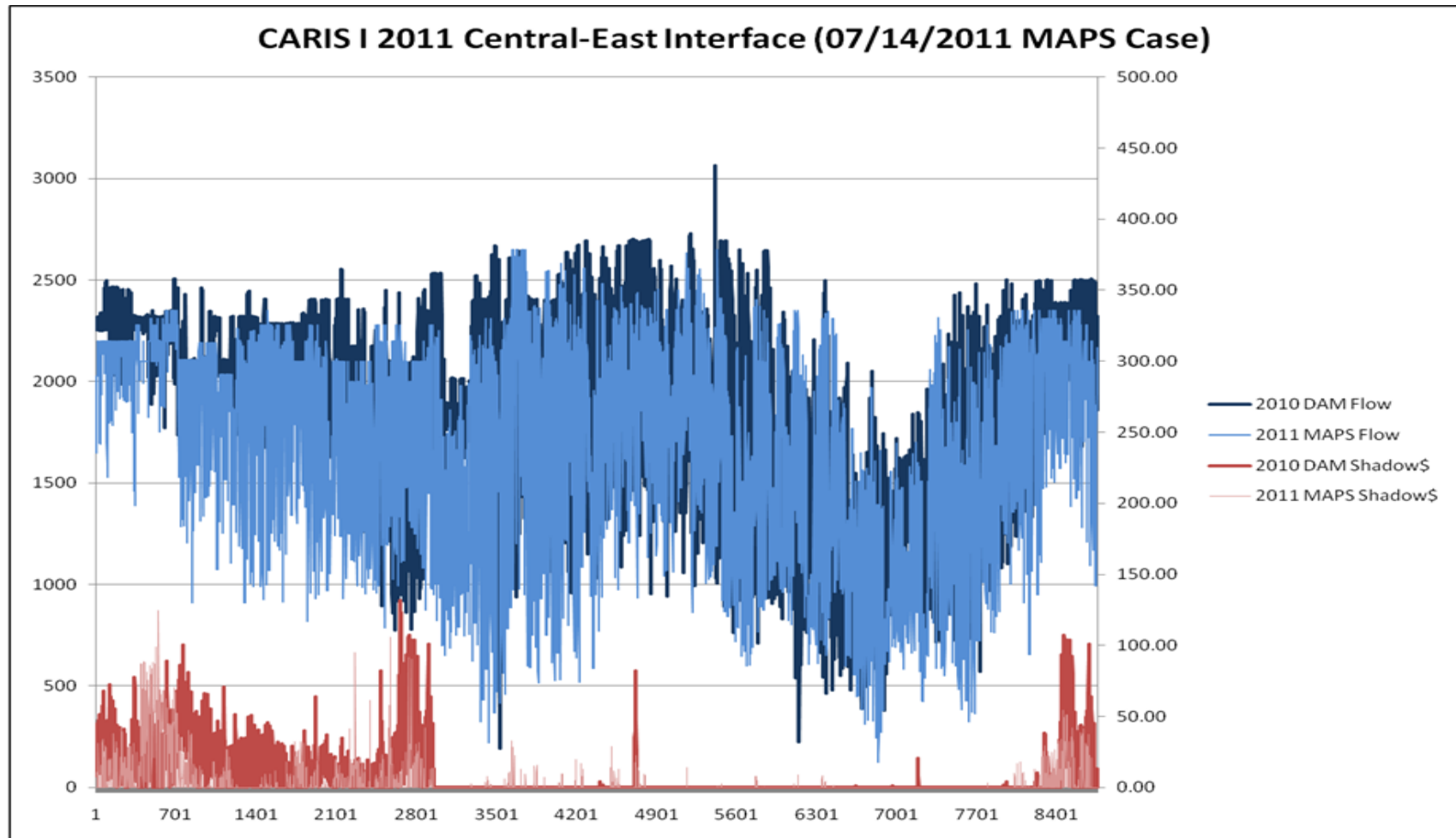
ESPWG Scenario Requests

- 1. *Indian Point Plant Retirement***
- 2. *Combined Generic Transmission Solutions – B/C Analysis***
- 3. *Load Forecast***
- 4. *Fuel Cost Forecast***
- 5. *Emissions Cost Forecast***
- 6. *Athens SPS Continued in-service***

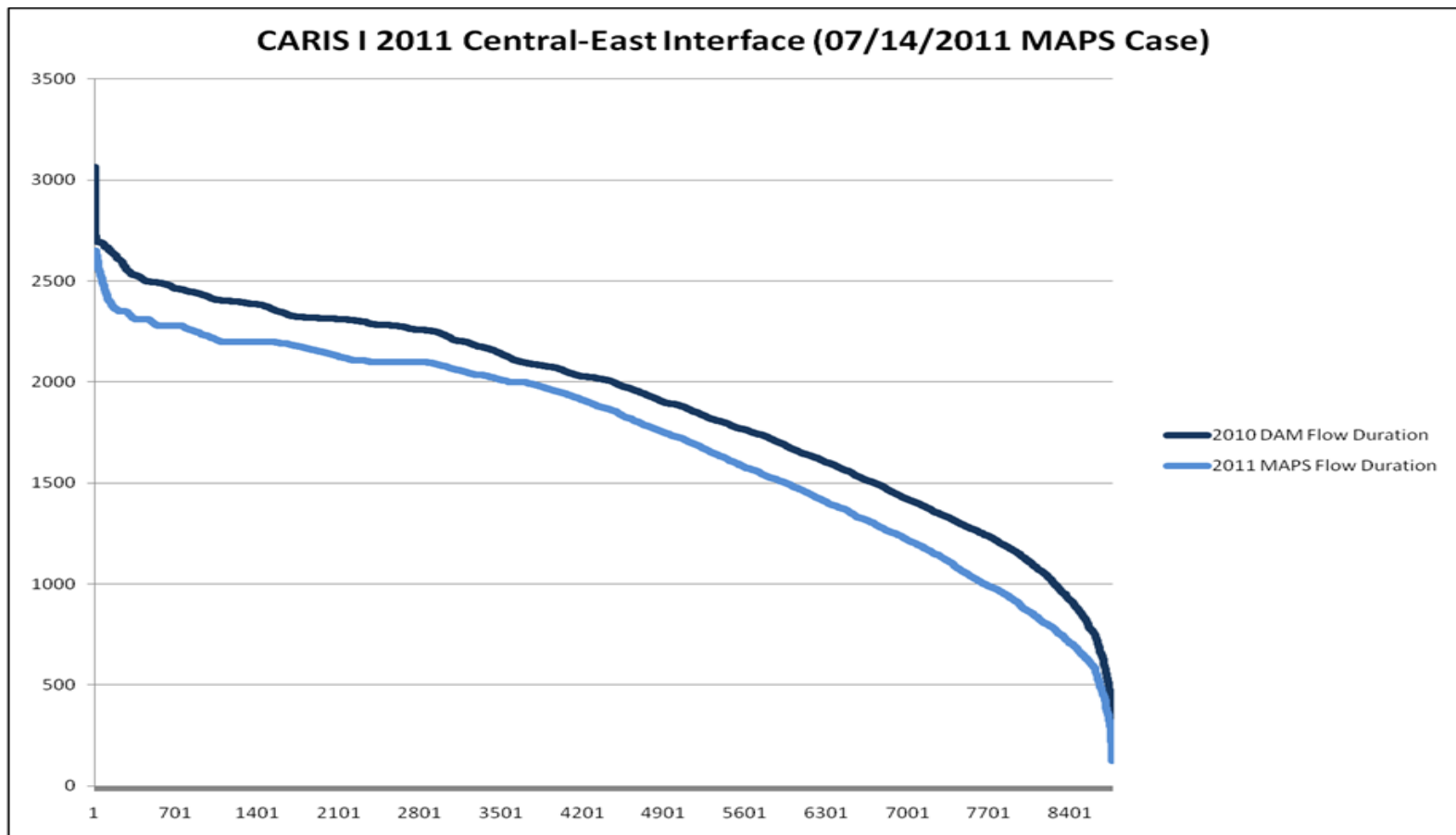
Central East- Comparison of 2011 MAPS (w/o Ast Energy2) to 2010 DAM

Central-East VC Flow Statistics	DAM	MAPS
Average	1,894	1,714
Median	2,013	1,873
Standard Deviation	495	510
Average when Limiting	2,192	2,172
Hours Constraining	2,964	1,694

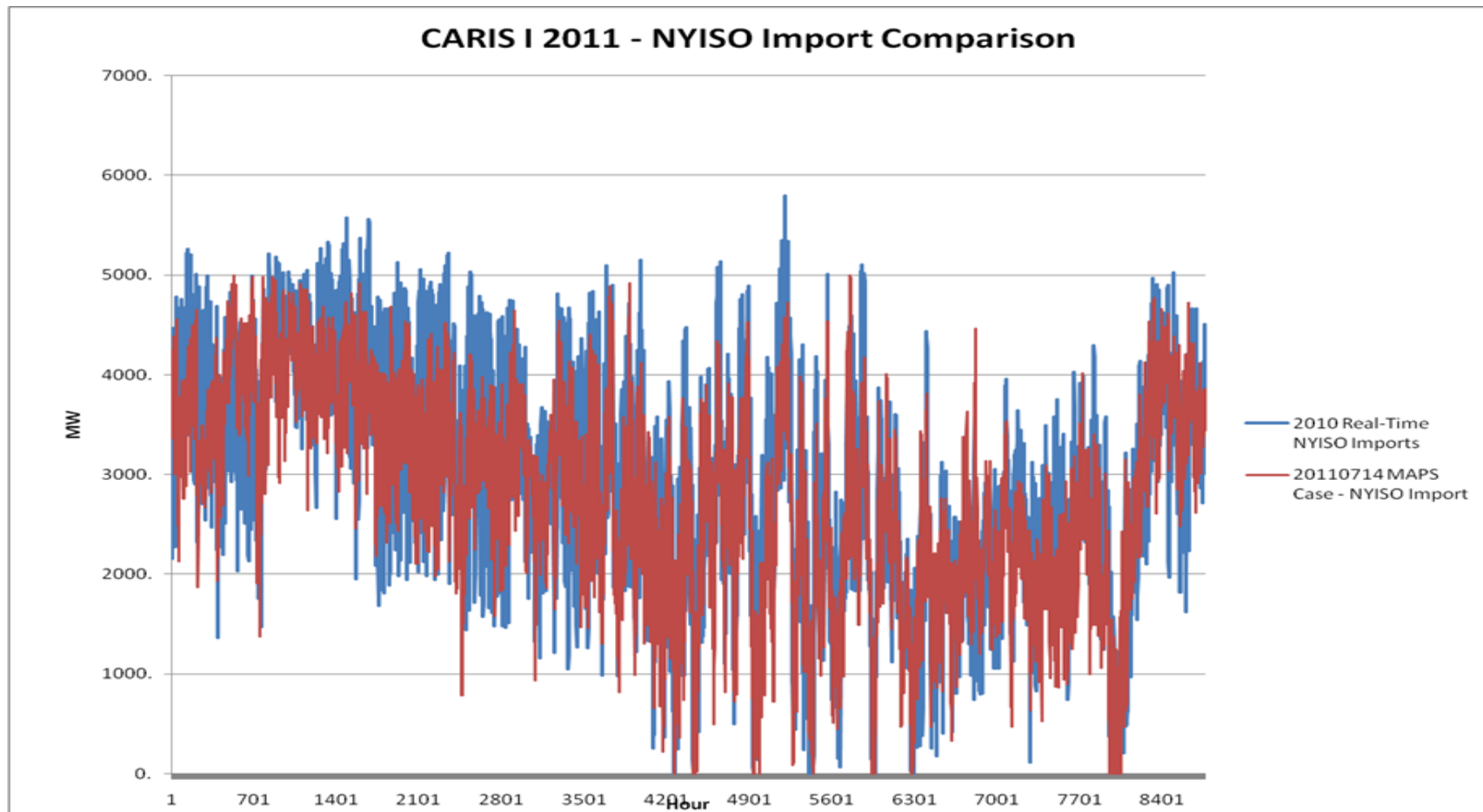
Central East Flow and Shadow Price (2010 DAM and 2011 MAPS w/o Astoria Energy 2)



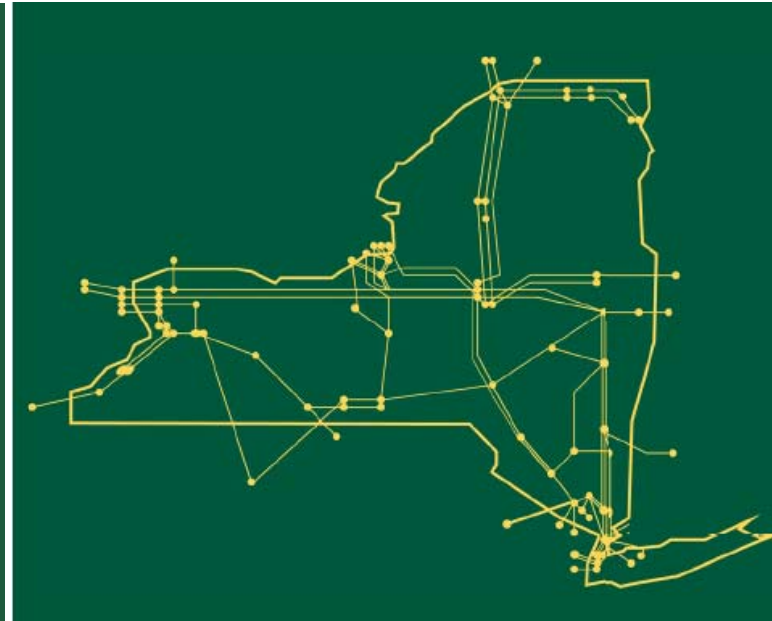
Central East Flow – Load Duration (2010 DAM and 2011 MAPS w/o AST Energy2)



NYCA Imports Comparison (w/o Astoria Energy 2)



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