

2015-2016 NYCA IRM Requirement Study

Base Case Model Assumptions

Load Parameters

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Preliminary Peak Load (for preliminary base case study and sensitivities)	2013 Gold Book: NYCA: 33,725 MW NYC: 11,658 MW Long Island: 5,566 MW	2014 Gold Book: NYCA: 34,066 MW NYC: 12,050 MW Long Island: 5,543 MW Zones G-J: 16,557 MW	This peak load forecast is utilized for the parametric results.	N	Med(+)
Peak Load	October 1, 2013 forecast NYCA: 33,655 MW NYC: 11,740 MW Long Island 5,461 MW	October 1, 2014 forecast* NYCA: 33,563 MW NYC: 11,988 MW Long Island 5,537 MW	Forecast based on examination of 2014 weather normalized peaks. Top three external Area peak days aligned with NYCA	N	
Load Shape	Multiple Load Shapes Model using years 2002, 2006, and 2007	Multiple Load Shapes Model using years 2002, 2006, and 2007	NYISO recommendation	N	None
Load Forecast Uncertainty	Zonal model updated to reflect current data	Zonal model updated to reflect current data	Based on collected data and input from LIPA, Con Ed, and NYISO. (See attachment A)	N	Med(+)

- Pending final review and approval at Load Forecasting Task Force

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Capacity Parameters - Generation

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Existing Generating Unit Capacities	2013 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2014 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2014 Gold Book publication	N	Unknown
Proposed New Units (Non-Renewable)	76.9 MW of capacity was repowered or returned to service	546 MW of new non- wind resources (see Attachment B)	Retired units returning to service	N	Med(-)
Retirements and Mothballed units	164 MW retirements reported	75 MW retirements or mothballs reported See Attachment B3	Policy 5 guidelines on retirement or mothball disposition in IRM studies	N	None
Forced and Partial Outage Rates	Five-year (2008-2012) GADS data for each unit represented. Those units with less than five years – use representative data.	Five-year (2009-2013) GADS data for each unit represented. Those units with less than five years – use representative data. See attachments C and C1	Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period (2009-2013)	N	Low(-)
Planned Outages	Based on schedules received by the NYISO and adjusted for history	Based on schedules received by the NYISO and adjusted for history	Updated schedules	N	None
Summer Maintenance	Nominal 50 MWs – divided equally between upstate and downstate	Nominal 50 MWs – divided equally between upstate and downstate	Review of most recent data	N	Unknown

*(-) indicates a reduction in IRM while (+) indicates an increase. Range: Low < 0.5%, Medium 0.5% - 1%, High > 1%

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Capacity Parameters – Generation (continued)

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Combustion Turbine Derates	Derate based on temperature correction curves provided	Derate based on temperature correction curves provided	Operational history indicates the derates are in-line with manufacturer's curves	N	None
Proposed New Wind Units	No new wind	No new qualifying wind for study year identified See Attachment B1	Renewable units based on RPS agreements, interconnection Queue and ICS input	N	Below
Wind Resources	Wind Capacity – 1366.6 MWs	Wind Capacity - 1457.1 MWs. A new 88.5 MW unit came on line.	Total Wind Modeled	N	Low(+)
Wind Shape	Actual hourly plant output of the 2012 calendar year. Summer Peak Hour availability of 17%	Actual hourly plant output of the 2013 calendar year. Summer Peak Hour availability of 14%	Production data from 2013	N	Low(+)
Solar Resources	Solar Capacity of 31.5 MW plus 12.5 MW of new units with a summer capacity factor of 65%.	31.5 MW of solar modeled per 2013 production data summer capacity factor of 47.3%.	Summer Peak capacity factor based on 2013 hourly production data June 1 – Aug 31, hours HB14 – HB18	N	Low(+)
Small Hydro Resources	Derate by 45%	Derate by 45%	Review of historic unit production.	N	None
Large Hydro	Probabilistic Model based on 30 years of operational	Probabilistic Model based on 30 years of	Historical data provided by NYPA	N	None

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2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

	data	operational data			
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Capacity Parameters – Import and Exports

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Capacity Purchases	Grandfathered amounts: PJM – 1080 MW HQ – 1090 MW All contracts model as equivalent contracts	Grandfathered amounts: PJM – 1080 MW HQ – 1090 MW All contracts model as equivalent contracts	Grandfathered Rights, ETCNL, and other FERC identified rights	N	None
Capacity Sales	Long Term firm sales (279 MW)	Long Term firm sales (283.5 MW)	These are long term federally monitored contracts	N	None
New UDRs	No new UDRs	No new UDR projects	Existing UDR elections are made by August 1 st and will be incorporated into the model	N	None

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2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Topology Parameters

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Interface Limits	All changes reviewed and commented on by TPAS See Attachment E	All changes reviewed and commented on by TPAS See Attachment E	Based on 2014 Operating Study, 2014 Operations Engineering Voltage Studies, 2014 Comprehensive Planning Process, and additional analysis including interregional planning initiatives	N	Low(+)
New Transmission	None Identified	None currently Identified	Based on TO provided models and NYISO review	N	None
Cable Forced Outage Rates	All existing Cable EFORs updated for NYC and LI to reflect most recent five-year history	All existing Cable EFORs will be updated for NYC and LI to reflect most recent five-year history	Based on TO analysis	N	Low(+)

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2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Emergency Operating Procedure Parameters

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
Special Case Resources	July 2014 – 1195 MW based on registrations and modeled as 758 MW of effective capacity . Monthly variation based on historical experience (no Limit on number of calls)	July 2014 – 1132 MW based on registrations and modeled as 742 MW of effective capacity . Monthly variation based on historical experience (no Limit on number of calls)	Those sold for the program discounted to historic availability. Summer values calculated from July 2014 registrations (see attachment F).	N	Low(-)
EDRP Resources	July 2013 – 93.9 MW registered model as 12.8 MW in July and proportional to monthly peak load in other months. Limit to five calls per month	July 2014 86 MW registered model as 14 MW in July and proportional to monthly peak load in other months. Limit to five calls per month	Those sold for the program discounted to historic availability. Summer values calculated from July 2014 registrations and forecast growth.	N	None
Other EOPs	721 MW of non-SCR/non-EDRP resources See Attachment D	713 MW of non-SCR/non-EDRP resources See Attachment D	Based on TO information, measured data, and NYISO forecasts	N	Low(+)

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2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

External Control Areas Parameters

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
PJM	Load and Capacity data provided by PJM/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E	Load and Capacity data provided by PJM/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 Include PJM Annual & Extended Demand Response Program MW See Attachment E	Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.	N	Unknown
ISONE	Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E	Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E	Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.	N	Unknown
HQ	Load and Capacity data provided by HQ/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E	Load and Capacity data provided by HQ/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E	Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.	N	Unknown
IESO	Load and Capacity data provided by IESO/NPCC CP-8 data may be adjusted per NYSRC Policy 5 See Attachment E	Load and Capacity data provided by IESO/NPCC CP-8 data may be adjusted per NYSRC Policy 5 See Attachment E	Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.	N	Unknown
Reserve Sharing	All NPCC Control Areas and PJM interconnection indicate that they will share reserves	All NPCC Control Areas and PJM interconnection indicate that they will share	Per NPCC CP-8 WG	N	None

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2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

	equally among all members	reserves equally among all members			
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Miscellaneous Parameters

Parameter	2014 Model Assumptions	2015 Model Assumptions Recommended	Basis for Recommendation	Model Change	Possible IRM Impact*
MARS Model Version	Version 3.16.5	Version 3.18 ¹	Per benchmark testing and ICS recommendation	N	None
Environmental Initiatives	No estimated impacts based on review of existing rules and retirement trends	No estimated impacts based on review of existing rules and retirement trends	Impacts mitigated by operational procedure during peak hours	N	None

¹ The assumption incorporates the peak load logic enhancements contained in this version of MARS.

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2015-2016 IRM Study Assumption Matrix

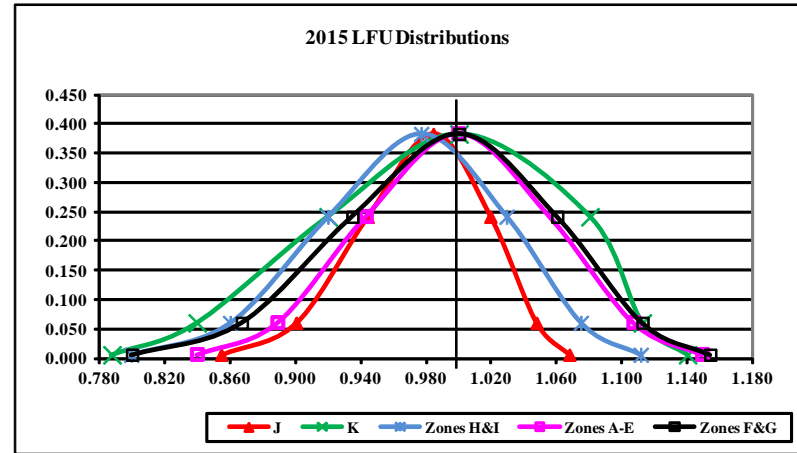
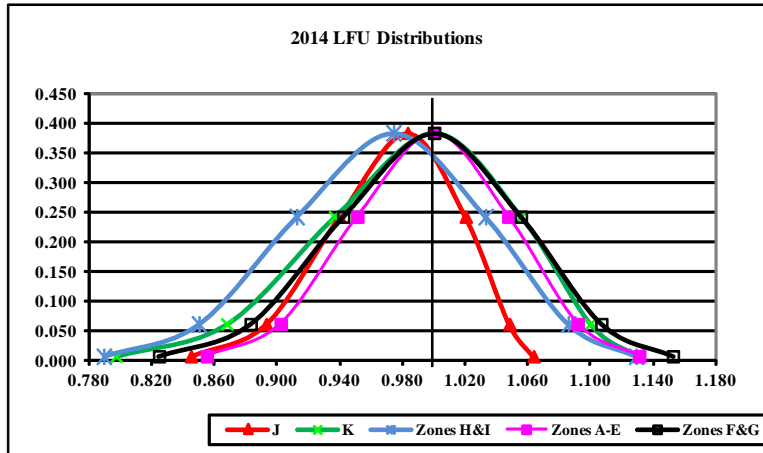
Final Base Assumptions

Attachment A NYCA Load Forecast Uncertainty

2014 and 2015 LFU Models

2014 Load Forecast Uncertainty Models					
Multiplier	Zones A-E	Zones F&G	Zones H&I	Con Ed (J)	LIPA (K)
0.0062	0.8550	0.8245	0.7893	0.8449	0.7971
0.0606	0.9021	0.8830	0.8500	0.8929	0.8677
0.2417	0.9510	0.9420	0.9123	0.9397	0.9364
0.3830	1.0000	1.0000	0.9741	0.9831	1.0000
0.2417	1.0474	1.0554	1.0329	1.0202	1.0554
0.0606	1.0916	1.1067	1.0856	1.0481	1.0996
0.0062	1.1309	1.1524	1.1289	1.0635	1.1295

2015 Load Forecast Uncertainty Models					
Multiplier	Zones A-E	Zones F&G	Zones H&I	Con Ed (J)	LIPA (K)
0.0062	0.8399	0.7997	0.7992	0.8543	0.7874
0.0606	0.8892	0.8670	0.8598	0.9002	0.8396
0.2417	0.9434	0.9347	0.9197	0.9440	0.9198
0.3830	1.0000	1.0000	0.9768	0.9842	1.0000
0.2417	1.0559	1.0602	1.0291	1.0192	1.0802
0.0606	1.1073	1.1124	1.0746	1.0475	1.1123
0.0062	1.1494	1.1539	1.1113	1.0676	1.1400



2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment B
List² of Proposed Units
(To be in-service by summer of 2015)

<u>Project Name</u>	<u>IS Date</u>	<u>Zone</u>	<u>MW</u>
Ravenswood GT 3-4	2014	J	CRIS 35.8 DMNC 42.9
Danskammer Units 1-4	2014	G	CRIS 503.1 DMNC 493.6
Total			529.4

² The list on this page does not show wind units which are presented on Attachment B-2. These additions are since the publication of the Gold Book.

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment B1 Wind Projects for Inclusion in the 2015-2016 IRM Study

Facility Name	Zone	Connecting Transmission Owner	NYISO Interconnection Study Queue Project Number	Projected/ Actual In-Service Date	New Wind Capacity	Toal Wind Capacity	Total Wind Capacity for 2015 IRM (MW)	
Existing Units								
Altona Wind Power	D	NYPA	174	2008 Sept		97.5	97.5	
Bliss Wind Power	A	Village of Arcade	173	2008 May		100.5	100.5	
Canandaigua Wind Power	C	NYSEG	135&199	2008 Jun		125.0	125.0	
Chateaugay Wind Power	D	NYPA	214	2008 Sept		106.5	106.5	
Clinton Wind Power	D	NYPA	172 & 211	2008 May		100.5	100.5	
Ellenburg Windpark	D	NYPA	175	2008 May		81.0	81.0	
Erie Wind*	A	National Grid	N/A	2012 Feb		15.0	0.0	
Fenner Wind Farm*	C	NYSEG	N/A	2001 Dec		30.0	0.0	
Hardscrabble Wind	E	National Grid	156	2011 Sept		74.0	74.0	
High Sheldon Wind Farm	C	NYSEG	144	2009 Feb		112.5	112.5	
Howard Wind	C	NYSEG	182	2011 Dec		57.4	57.4	
Madison Wind Power	E	NYSEG	N/A	2000 Sept		11.5	11.5	
Maple Ridge 1	E	National Grid	171	2006 Feb		231.0	231.0	
Maple Ridge 2	E	National Grid	171	2006 Feb		90.7	90.7	
Marble River Wind Farm 1 and 2*	D	NYPA	161 & 171	2012 Oct		215.0	0.0	
Munnsville	E	NYSEG	127A	2007 Aug		34.5	34.5	
Steel Wind	A	National Grid	N/A	2007 Jan		20.0	20.0	
Stony Creek (Orangeville)	C	NYSEG	263	2013 Dec	88.5	88.5	88.5	
Western NY Wind Power*	B	RG&E	N/A	2000 Oct		6.6	0.0	
Wethersfield Wind Power	C	NYSEG	177	2008 Dec		126.0	126.0	
Proposed Units								
Marsh Hill Wind Farm	C	NYSEG	378	2014- Oct	16.2	16.2	0.0	
TOTAL CAPACITY - ALL CATEGORIES						104.7	1,739.9	1,457.1
* Lessor of DMNC or CRIS rights								

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment B-2
List of Solar Proposed Units
To be in-service by summer of 2015

<u>Project Name</u>	<u>IS Date</u>	<u>Zone</u>	<u>MW</u>
None to report			

Attachment B-3
Proposed Generating Unit Retirements
(for Inclusion in the 2015-2016 Installed Reserve Margin Study)

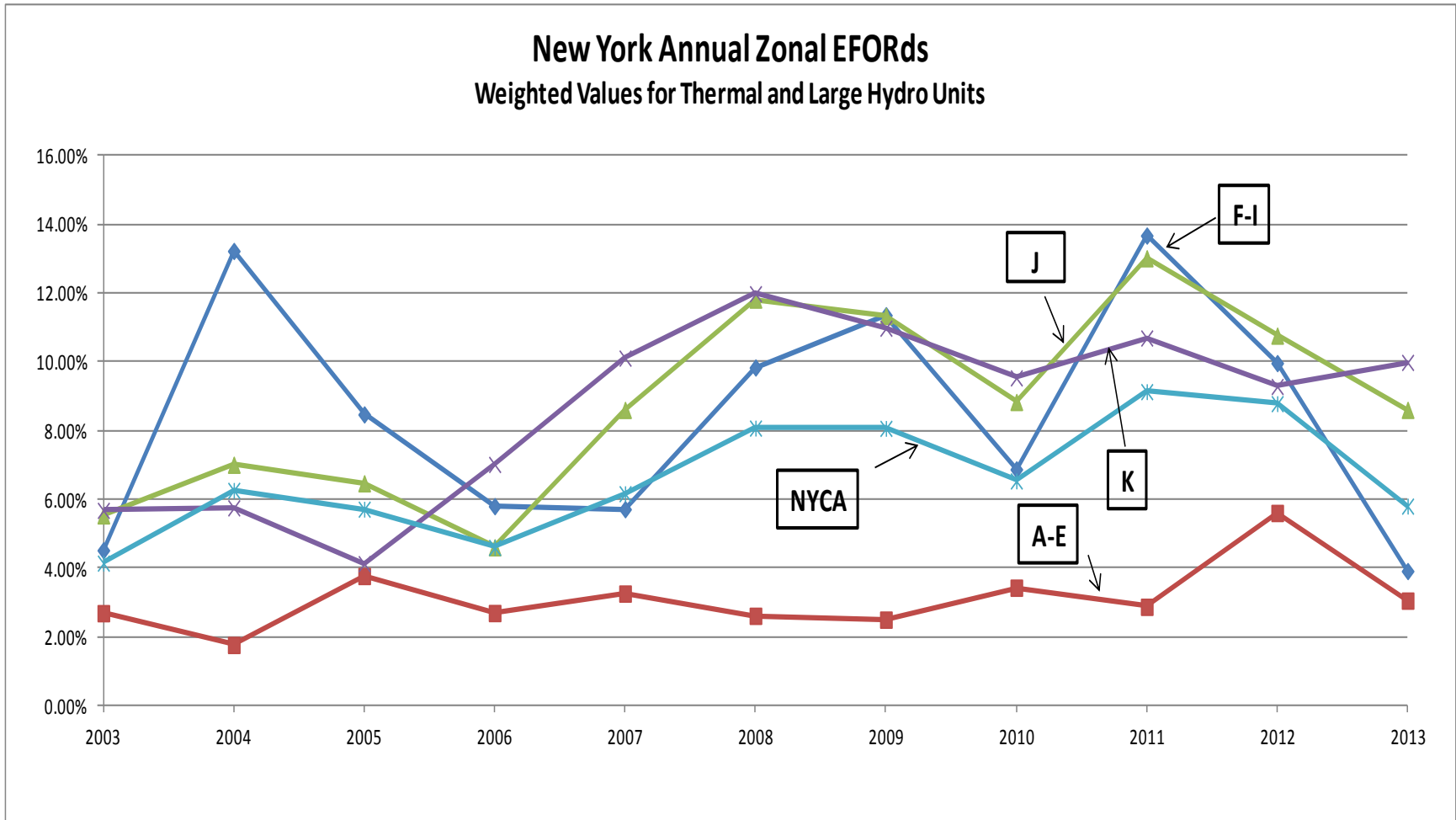
<u>Unit</u>	<u>Zone</u>	<u>MW*</u>
Dunkirk 2	A	75
	Total:	75

*Amount of MW removed from the Base Case

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

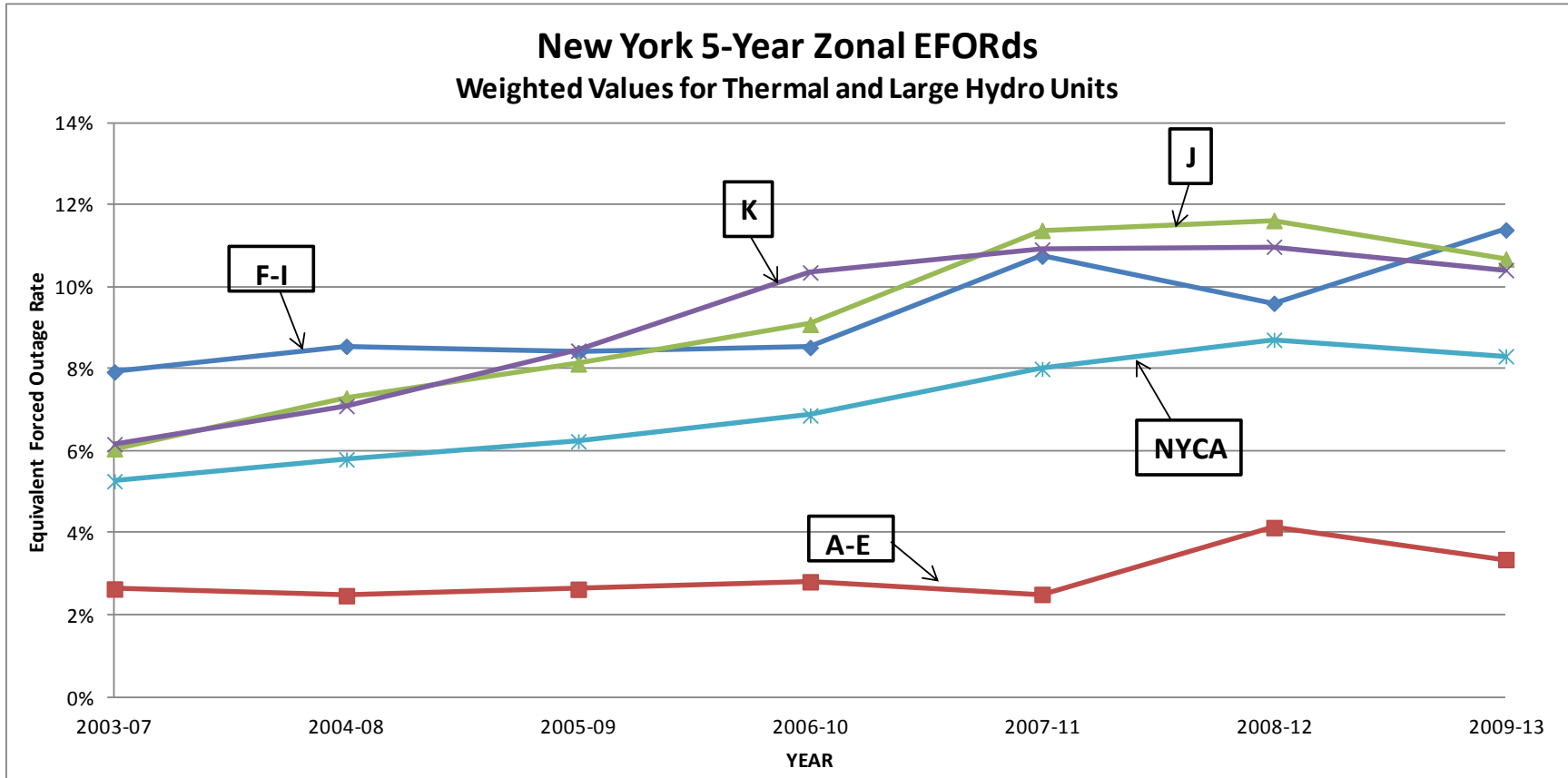
Attachment C



2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment C1



2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment D Emergency Operating Procedures

Step	Procedure	Effect	2014 MW Value	2015 MW Value
1	Special Case Resources	Load relief	1195 MW Enrolled/758 MW modeled	1132 MW Enrolled/742 MW modeled
/ 2	Emergency Demand Response Program	Load relief	94 MW Enrolled/13 MW Modeled	86 MW Enrolled/14 MW Modeled
3	5% manual voltage Reduction	Load relief	73 MW	62 MW
4	Thirty-minute reserve to zero	Allow operating reserve to decrease to largest unit capacity (10-minute reserve)	655 MW	655 MW
5	5% remote voltage reduction	Load relief	444 MW	441 MW
6	Voluntary industrial curtailment	Load relief	116 MW	122 MW
7	General public appeals	Load relief	88 MW	88 MW
8	Emergency Purchases	Increase capacity	Varies	Varies
9	Ten-minute reserve to zero	Allow 10-minute reserve to decrease to zero	1310 MW	1310 MW
10	Customer disconnections	Load relief	As needed	As needed

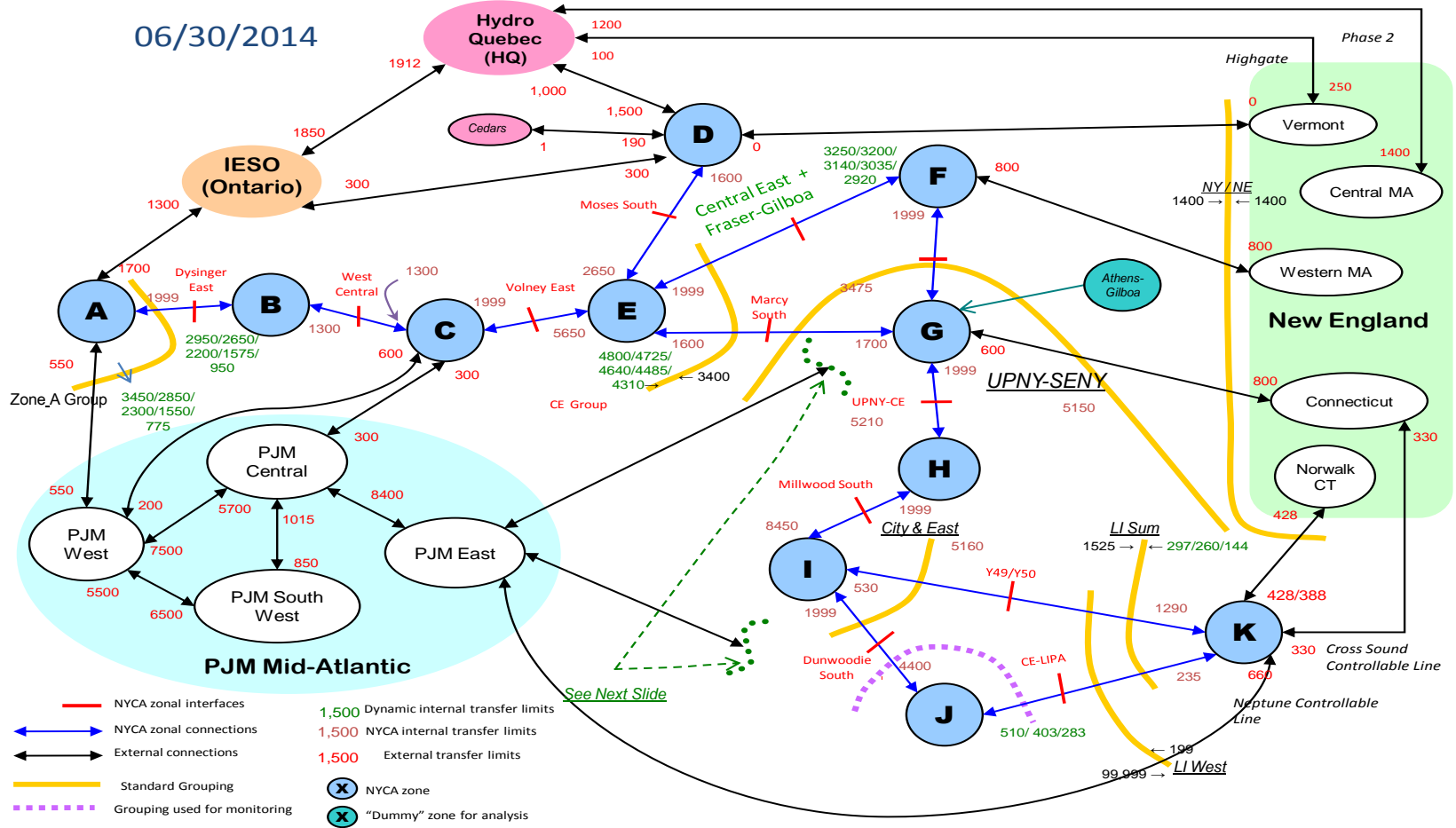
2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment E

Transmission System Representation for Year 2015 - Summer Emergency Ratings (MW)

06/30/2014

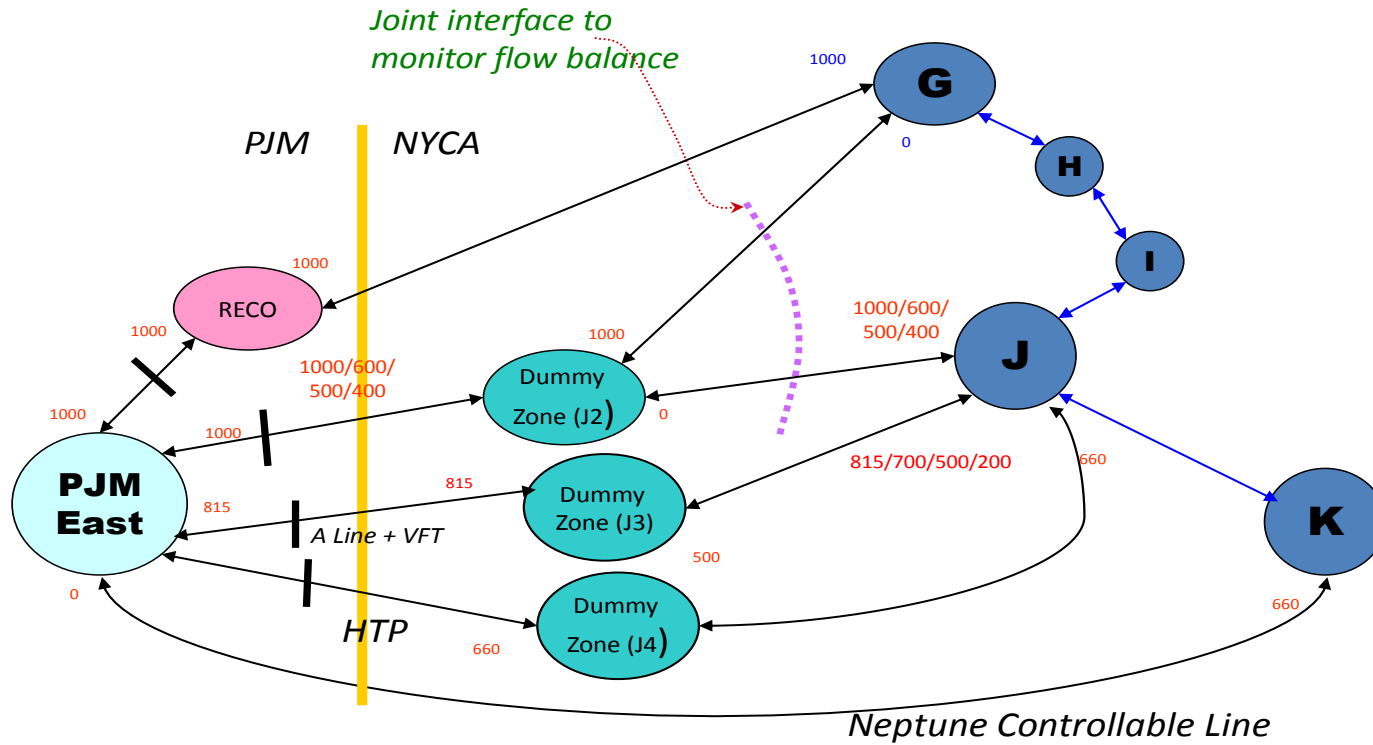


2015-2016 IRM Study Assumption Matrix

Attachment E1

Transmission System Representation for Year 2015 - Summer Emergency Ratings (MW)

PJM-SENY MARS Model
06/30/2014



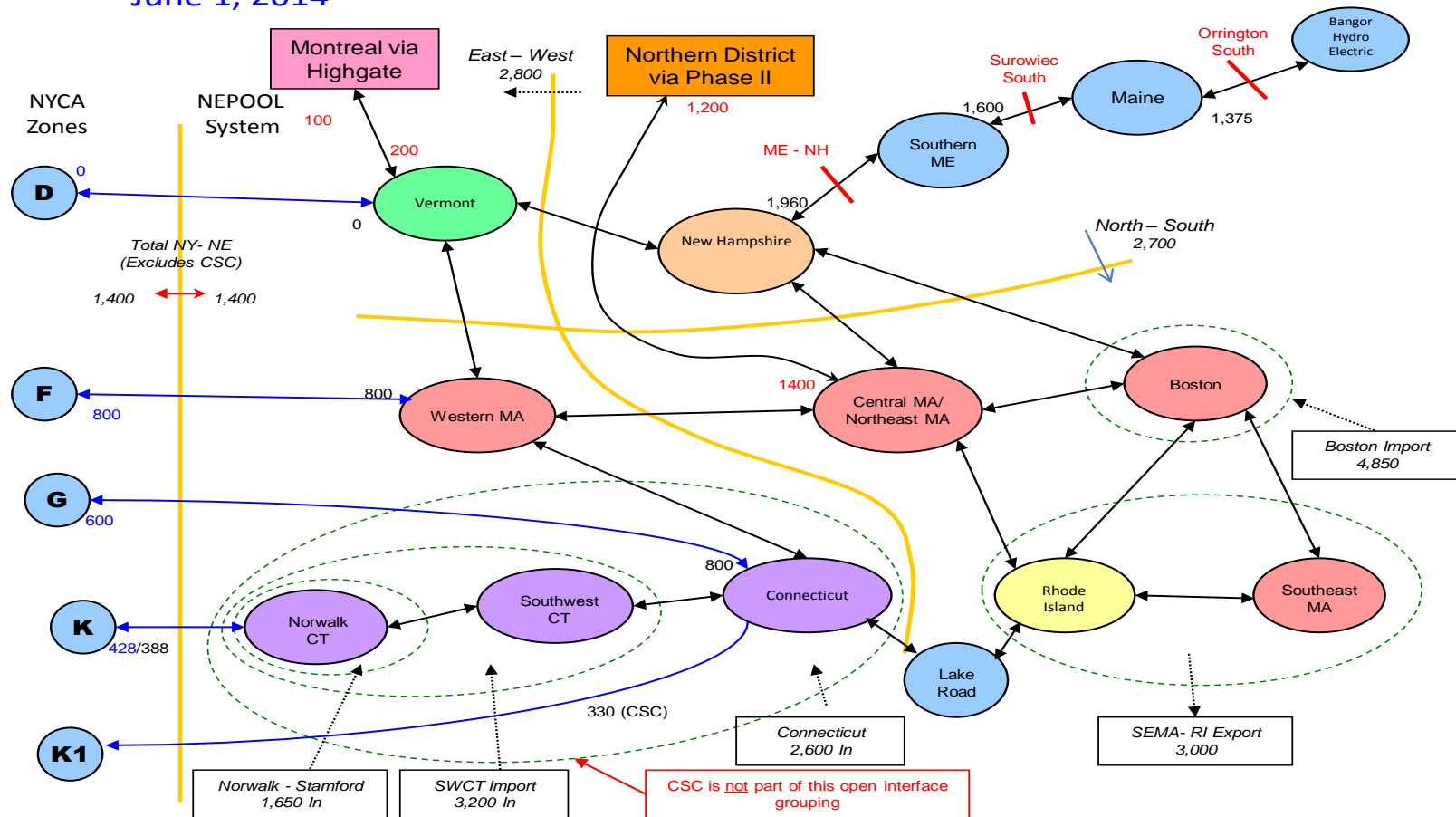
$$(PJM\ East\ to\ RECO) + (PJM\ East\ to\ J2) + (PJM\ East\ to\ J3) + (PJM\ East\ to\ J4) = 3075\ MW$$

2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment E2 New England Representation

Transmission System Representation 2015 IRM Study - Summer Emergency Ratings (MW) – June 1, 2014



2015-2016 IRM Study Assumption Matrix

Final Base Assumptions

Attachment F SCR Determinations

SCR Performance for 2015 IRM Studies

	A	B	C	D	E	F
		=A (no growth)		=B*C		=D*E
<u>Zones</u>	<u>July 2014 Registrations</u>	<u>2015 Forecast¹</u>	<u>Performance Factor²</u>	<u>2015 UCAP</u>	<u>SCR Derate Factor³</u>	<u>In Model Value</u>
A-E	528.2	528.2	0.847	447.2	0.855	382.3
F-I	160.1	160.1	0.817	130.8	0.855	111.9
J	374.0	374.0	0.649	242.8	0.855	207.6
K	70.1	70.1	0.672	47.1	0.855	40.3
Total	1132.4	1132.4		867.9		742.1

1. These values represent no growth from July 2014 ICAP based registrations.
2. Based on ACL
3. This SCR Derate factor captures three different performance derates. These are; 1) the translation factor between ACL and CBL values (=0.90), 2) the Effective Capacity Value (ECU)(=0.95), and 3) the fatigue factor (=1.00).