

# 2016-2017 NYCA IRM Requirement Study

IRM Base Case Model Assumptions

Assumption Matrix V02

June 3, 2015

### Load Parameters

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact <sup>1</sup>
1	Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities )	2014 Gold Book NYCA: 34,066 MW NYC: 12,050 MW LI: 5,543 MW G-J: 13,387 MW	2015 Gold Book NYCA: <del>xx</del> 33,636 MW NYC: <del>xx</del> 12,013 MW LI: <del>xx</del> 5,506 MW G-J: <del>xx</del> 16,441 MW	Gold Book Forecast is used for Preliminary Base Case parametric study and sensitivity cases	N	
2	Peak Load Forecast (Final Base Case)	October 2014 NYCA: 33,587 MW NYC: 11,990 MW LI: 5,522 MW G-J: 16,387 MW	October 2015 NYCA: xx MW NYC: xx MW LI: xx MW G-J: xx MW	Forecast based on examination of 2015 weather normalized peaks. Top three external Area peak days aligned with NYCA	N	
3	Load Shape (Multiple Load Shape)	Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007	Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007	NYISO Recommendation Sensitivity with composite shape	N	<u>None</u>
4	Load Forecast Uncertainty	(Attachment A)	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A)	<u>No change from last year's model</u>	N	<u>None</u>

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

## Generation Parameters

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	Existing Generating Unit Capacities	2014 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2015 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2015 Gold Book publication	N	
2	Proposed New Units (Non-Renewable)	743.0 MW of new or returning non- wind resources (Attachment B)	<del>xx-734.4</del> MW of new or returning non- wind resources (Attachment B1)	2015 Gold Book publication and generator notifications	N	
3	Retirements and Mothballed units	111.7 MW retirements or mothballs reported ( Attachment B)	<del>xx-0</del> MW retirements or mothballs reported ( Attachment B2)	Policy 5 guidelines on retirement or mothball disposition in IRM studies	N	
4	Forced and Partial Outage Rates	Five-year (2009-2013) GADS data for each unit represented. Those units with less than five years – use representative data.	Five-year (2010-2014) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachments C and C1)	Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period (2010-2014)	N	
5	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	<u>None</u>
6	Summer Maintenance	Nominal 50 MWs – divided equally between upstate and downstate	Nominal xx MWs – divided equally between upstate and downstate	Review of most recent data	N	
7	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	<u>None</u>

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
8	Existing and Proposed New Wind Units	1457.1 MW Wind Capacity (Attachment B3)	<del>YY-1455.1</del> MW of qualifying wind for study year (Attachment B3)	Renewable units based on RPS agreements, interconnection Queue and ICS input	N	
9	Wind Shape	Actual hourly plant output of the 2013 calendar year. Summer Peak Hour availability of 14%	Actual hourly plant output of the <del>2013-2014</del> calendar year. Summer Peak Hour availability of <del>xx15.1</del> %	Actual hourly plant output of the 2014 calendar year. <u>Summer Peak capacity factor based on 2014 hourly production data: June 1 – Aug 31, hours HB14 – HB18</u> Summer Peak Hour availability of <del>xx</del> %	N	
10	Solar Resources	31.5 MW of Solar modeled per 2013 production data summer capacity factor of 47.3%.	<del>xx-31.5</del> MW Solar Capacity per 2014 production data summer capacity factor of <del>xx38.8</del> % (Attachment B4)	<u>Actual hourly plant output of the 2014 calendar year.</u> Summer Peak capacity factor based on 2014 hourly production data: June 1 – Aug 31, hours HB14 – HB18	N	
11	Small Hydro Resources	Derate by 45%	Derate by xx%	Review of historic unit production.	N	
12	Large Hydro	Probabilistic Model based on 30 years of operational data	TBD	Historical data submitted via GADS	N	

### Transactions – Imports and Exports

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	Capacity Purchases	Grandfathered amounts: PJM – 1080 MW HQ – 1090 MW All contracts model as equivalent contracts	Existing Rights: PJM – 1080 MW HQ – 1090 MW All contracts model as equivalent contracts	Grandfathered Rights, ETCNL, and other awarded long-term rights	N	
2	Capacity Sales	Long Term firm sales Summer 281.8 MW	Long Term firm sales Summer <del>286.6</del> MW	These are long term federal contracts	N	
3	New UDRs	No new UDR projects	TBD	Existing UDR elections are made by August 1 <sup>st</sup> and will be incorporated into the model	N	

### Topology

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	Interface Limits	All changes reviewed and commented on by TPAS	All changes reviewed and commented on by TPAS (Attachment E)	Based on 2015: Operating Study, Operations Engineering Voltage Studies, Comprehensive Planning Process, and additional analysis including interregional planning initiatives	N	
2	New Transmission	None Identified	TBD	Based on TO provided models and NYISO review	N	
3	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	

## Emergency Operating Procedures

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	Special Case Resources	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)	July 2015 – <del>xx</del> <u>1124</u> MW based on registrations and modeled as xx 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 2015 registrations (Attachment F)	N	
2	EDRP Resources	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	July 2015 <del>xx</del> <u>86</u> MW registered modeled as xx 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 2015 registrations and forecast growth.	N	
3	Other EOPs	713 MW of non-SCR/non-EDRP resources	xx MW of non-SCR/non-EDRP resources (Attachment D)	Based on TO information, measured data, and NYISO forecasts	N	

### External Control Areas

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	PJM	<p>Load and Capacity data provided by PJM/NPCC CP-8</p> <p>Data may be adjusted per NYSRC Policy 5</p> <p>Include PJM Annual &amp; Extended Demand Response Program MW [Extended: 4112 MW: Annual: 1505 MW: Total MW: 5617]</p>	<p>TBD</p> <p>(Attachment E)</p>	<p>Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes. White paper on external EOPs</p>	TBD	
2	ISONE	<p>Load and Capacity data provided by ISONE/NPCC CP-8</p> <p>Data may be adjusted per NYSRC Policy 5</p>	<p>Load and Capacity data provided by ISONE/NPCC CP-8</p> <p>Data may be adjusted per NYSRC Policy 5 (See Attachment E)</p>	<p>Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.</p>	N	
3	HQ	<p>Load and Capacity data provided by HQ/NPCC CP-8</p> <p>Data may be adjusted per NYSRC Policy 5</p>	<p>Load and Capacity data provided by HQ/NPCC CP-8</p> <p>Data may be adjusted per NYSRC Policy 5 (Attachment E)</p>	<p>Initial review performed by the NPCC CP-8 WG prior to Policy 5 changes.</p>	N	



#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
4	IESO	Load and Capacity data provided by IESO/NPCC CP-8 data may be adjusted per NYSRC Policy 5	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	
5	Reserve Sharing	All NPCC Control Areas and PJM interconnection indicate that they will share reserves equally among all members	All NPCC Control Areas and PJM interconnection indicate that they will share reserves equally among all members	Per NPCC CP-8 WG	N	

### Miscellaneous

#	Parameter	2015 Model Assumptions	2016 Model Assumptions	Basis for Recommendation	Model Change	Impact
1	MARS Model Version	Version 3.18	Version 3.20 <sup>2</sup>	Per benchmark testing and ICS recommendation	N	
2	Environmental Initiatives	No estimated impacts based on review of existing rules and retirement trends	TBD	Review of existing regulations and rules.	N	

<sup>2</sup> Assumes this version is completed in the February timeframe.

# Attachment A

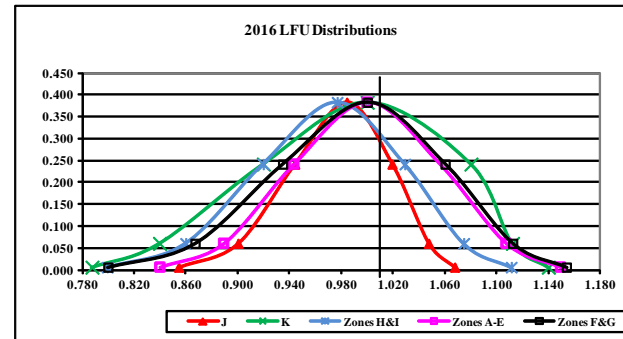
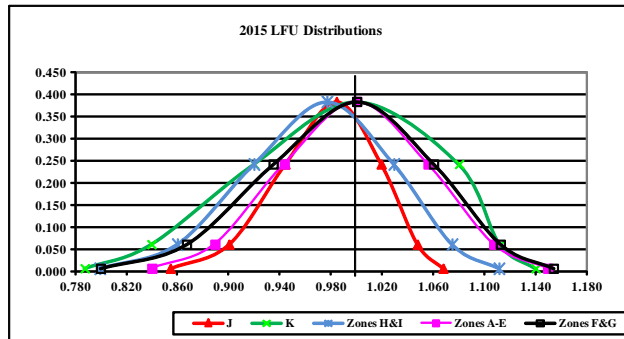
## NYCA Load Forecast Uncertainty Model

### 2015 and 2016 LFU Models

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

2016 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

2016 LFU remains unchanged from the 2015 LFU forecast



## Attachment B

B1 - Proposed Thermal Units					
Project or Generator Name	Zone	In Service Date	CRIS (MW)	Summer Capability (MW)	MARS Model (MW)
Bowline 2 rerate	G	Summer 2015	557.40	374.40	374.40
Dunkirk 3 repowering	A	Summer 2016	201.40	180.00	180.00
Dunkirk 4 repowering	A	Summer 2016	199.10	180.00	180.00
<b>Total New Units</b>			957.90	734.40	<b>734.40</b>

B2 - Retired or Mothballed Units					
Generator Name	Zone	Retire Date	CRIS (MW)	Summer Capability (MW)	MARS Model (MW)
None					
<b>Total Retirements</b>			0.00	0.00	<b>0.00</b>

**B3 - Wind Resources**

Wind Resource	Zone	In Service Date	CRIS (MW)	Summer Capability (MW)	MARS Model (MW)
<b>ICAP Participating Wind Units</b>					
Altona Wind Power	D	09/23/2008	97.50	97.50	97.50
Bliss Wind Power	A	03/20/2008	100.50	100.50	100.50
Canandaigua Wind Power	C	12/05/2008	125.00	125.00	125.00
Chateaugay Wind Power	D	10/07/2008	106.50	106.50	106.50
Clinton Wind Power	D	04/09/2008	100.50	100.50	100.50
Ellensburg Wind Power	D	03/31/2008	81.00	81.00	81.00
Hardscrabble Wind	E	02/01/2011	74.00	74.00	74.00
High Sheldon Wind Farm	C	02/01/2009	112.50	112.50	112.50
Howard Wind	C	12/01/2011	57.40	55.40	55.40
Madison Wind Power	E	09/01/2000	11.50	11.60	11.50
Maple Ridge Wind 1	E	01/01/2006	231.00	231.00	231.00
Maple Ridge Wind 2	E	12/01/2007	90.70	90.80	90.70
Munnsville Wind Power	E	08/20/2007	34.50	34.50	34.50
Orangeville Wind Farm	C	12/01/2013	88.50	93.90	88.50
Steel Wind	A	01/23/2007	20.00	20.00	20.00
Wethersfield Wind Power	C	12/11/2008	126.00	126.00	126.00
		<b>Totals</b>	<b>1457.10</b>	<b>1460.70</b>	<b>1455.10</b>
<b>Non - ICAP Participating Wind Units (Nameplate Capacity)</b>					
Erie Wind		02/01/2012	0.00	15.00	0.00
Fenner Wind Farm		12/01/2001	0.00	30.00	0.00
Marble River		07/01/2012	0.00	215.50	0.00
Marsh Hill Energy Wind Farm		12/01/2014	0.00	16.20	0.00
Western NY Wind Power		10/01/2000	0.00	6.60	0.00
		<b>Totals</b>	<b>0.00</b>	<b>283.30</b>	<b>0.00</b>
<b>Proposed IRM Study Wind Units</b>					
		<b>Totals</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Wind Resources</b>		<b>Totals</b>	<b>1457.10</b>	<b>1744.00</b>	<b>1455.10</b>



B4 - Solar Resources					
Wind Resource	Zone	In Service Date	CRIS (MW)	Summer Capability (MW)	MARS Model (MW)
<b>ICAP Participating Solar Units</b>					
Long Island Solar	K	11/01/2011	31.50	31.50	31.50
		<b>Totals</b>	31.50	31.50	31.50
<b>Proposed IRM Study Solar Units</b>					
		<b>Totals</b>	0.00	0.00	0.00
<b>Total Solar Resources</b>		<b>Totals</b>	31.50	31.50	<b>31.50</b>

# Attachment C



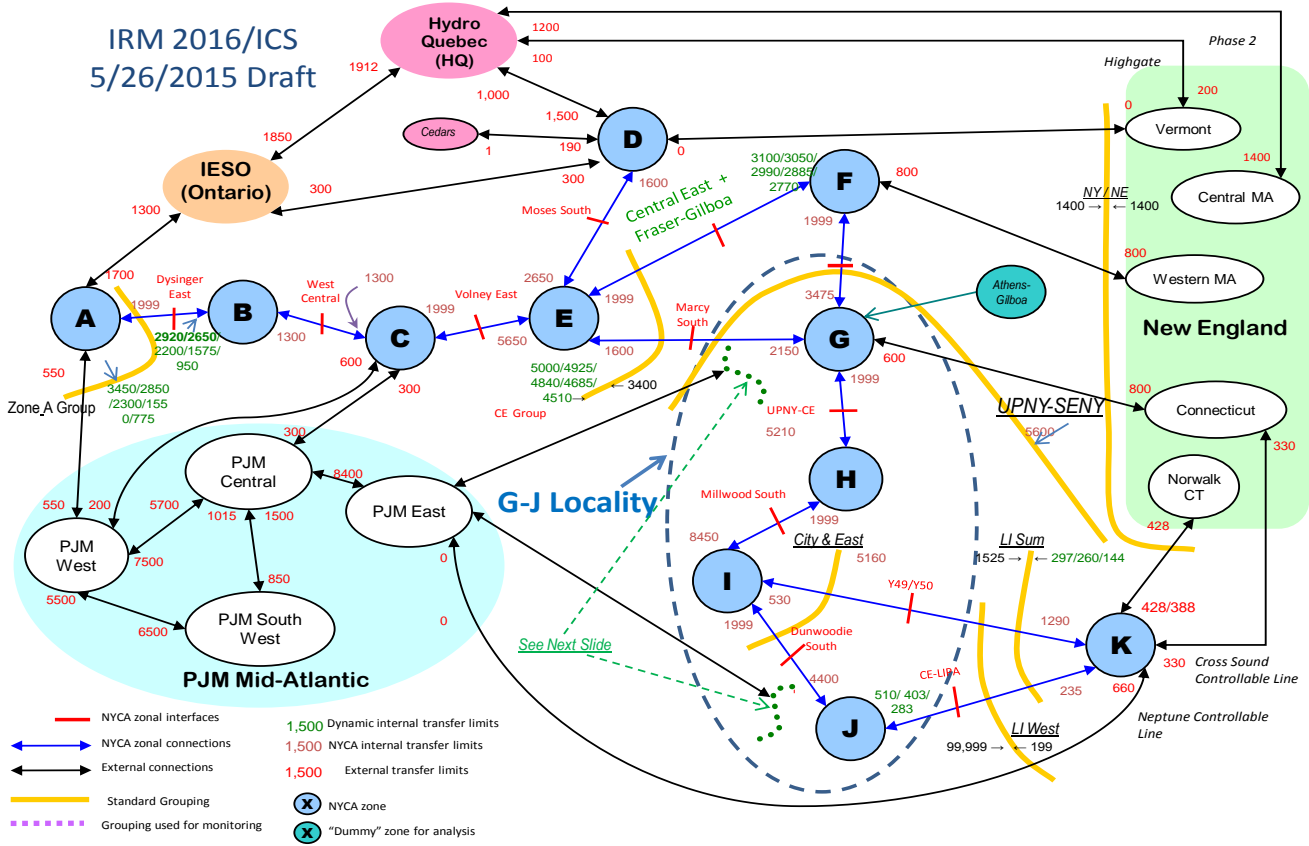
## Attachment D

Step	Procedure	2015 MW	2015 Model	2016 MW	2016 Model
1	Special Case Resources	1132	742	1124	
2	Emergency Demand Response Program	86	14	86	
3	5% Manual Voltage Reduction`	62	62		
4	Allow Thirty-minute Reserves to Zero	655	655		
5	5% Voltage Reduction	441	441		
6	Voluntary Industrial Curtailment	122	122		
7	General Public Appeals	88	88		
8	Emergency Purchases	Varies	Varies	Varies	Varies
9	Allow Ten-minute Reserves to Zero	1310	1310		
10	Customer Disconnections	As Needed	As Needed	As Needed	As Needed
	<b>Total Relief</b>	3896	3434	1210	0

# Attachment E

## Transmission System Representation for Year 2016 - Summer Emergency Ratings (MW)

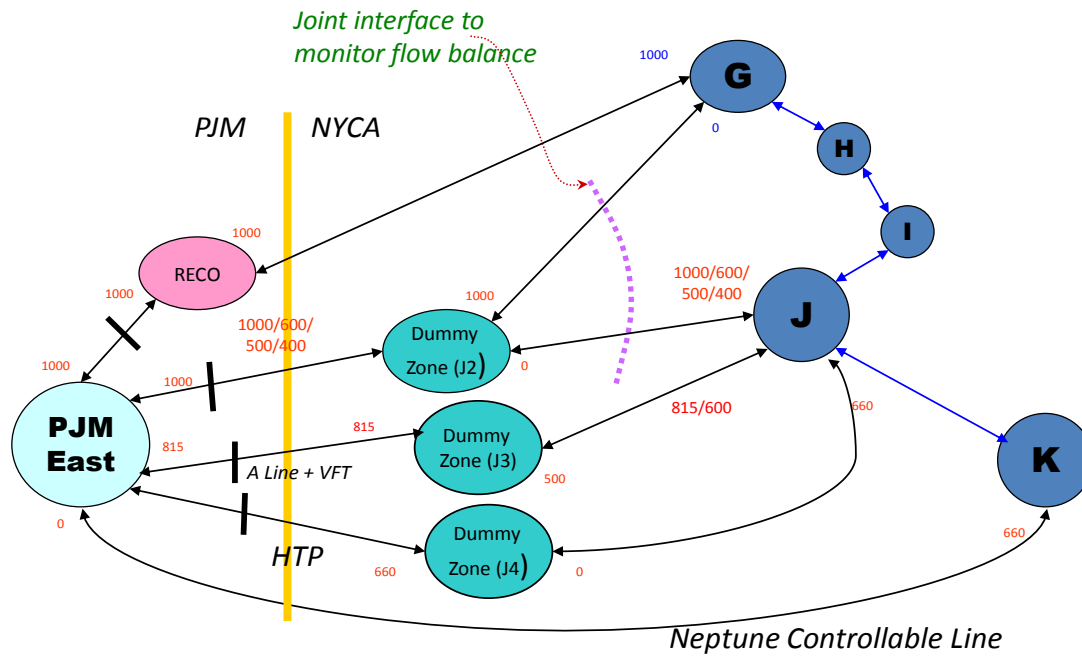
IRM 2016/ICS  
5/26/2015 Draft



# Attachment E1

Transmission System Representation for Year 2016 - Summer Emergency Ratings (MW)

PJM-SENY MARS Model  
5/26/2015



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



## Assumption Matrix History

Date	Version	Preliminary Base Case	Final Base Case
February 4, 2015	V0	Initial Assumptions	
February 13, 2015	V1	Changes from ICS 2/4 mtg.	
<u>June 3, 2015</u>	<u>V2</u>	<u>Added attachment A; filled</u> <u>Added attachment B1 – B4; structure</u> <u>Added attachment D; structure</u> <u>Update Tables B1 – B4</u> <u>(+) Added attachment E and E1; draft</u>	

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