

2017-2018 NYCA IRM Requirement Study

IRM Base Case Model Assumptions

Assumption Matrix

~~March 29~~May 4, 2016

Draft ~~V02~~V03

Load Parameters

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities)	2015 Gold Book NYCA: 33,636 MW NYC: 12,013 MW LI: 5,506 MW G-J: 16,441 MW	2016 Gold Book NYCA: xxxxx 33363 MW NYC: yyyyy 11795 MW LI: zzzz 5422 MW G-J: uuuuu 16313 MW	Gold Book Forecast is used for Preliminary Base Case parametric study and sensitivity cases	N
2	Peak Load Forecast (Final Base Case)	October 2015 NYCA: 33377.6 MW NYC: 11777 MW LI: 5457 MW G-J: 16375 MW	NYCA: xxxxxx MW NYC: yyyyy MW LI: zzzz MW G-J: uuuuu MW	Forecast based on examination of 2016 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	ICS Recommendation. Potential Sensitivity replacing 2002 shape	N
4	Load Forecast Uncertainty	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A)	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A)	Due to cool summer weather in 2014 and 2015, the LFU models do not need to be updated because there is no new information to model extreme weather conditions.	N

Generation Parameters

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	Existing Generating Unit Capacities	2015 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2016 Gold Book values. Use min (DMNC vs. CRIS) capacity value	2016 Gold Book publication	N
2	Proposed New Units (Non-Renewable) <u>and re-ratings</u>	374.4 MW of new or returning non- wind resources (Attachment B1)	0 <u>67.5</u> MW of <u>project related re-ratings.</u> (Attachment B1)	2016 Gold Book publication and generator notifications	N
3	Retirements and Mothballed units	0 MW retirements or mothballs reported (Attachment B2)	6666 <u>1619.7</u> MW retirements or mothballs reported <u>or</u> ### Units in IIFO and IR ¹ (Attachment B2)	Updated Policy 5 guidelines on retirement or mothball disposition in IRM studies.	N
4	Forced and Partial Outage Rates	Five-year (2010-2014) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachments C and C1)	Five-year (2011-2015) 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 (2011-2015)	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

¹ ICAP Ineligible Forced Outage (IIFO) and inactive Reserve (IR)

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
6	Summer Maintenance	Nominal 50 MWs – divided equally between upstate and downstate	Nominal YY 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
8	Existing and Proposed New Wind Units	1455.1 MW of qualifying wind for study year (Attachment B3)	hhhhh <u>MW 220.9221.1 MW of Wind Capacity additions totaling 16762.2 MW of qualifying wind</u> (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 over the period 2011-2015. New units will use zonal hourly averages or nearby units.	Paper on new functionality of the GE MARS program to randomly select a wind shape from multiple years of production data	Y

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#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
10	Solar Resources	31.5 MW Solar Capacity per 2014 production data summer availability factor of 38.8 % (Attachment B4)	31.5 MW Solar Capacity. Model chooses from 4 years of production data covering the period 2012-2015. xxx MW Solar Capacity per 2015 production data summer availability factor of aa.a % (Attachment B4) May consider production data output over the period 2012-2015.	Concepts in paper referenced in wind paper applies to solar modeling. GE MARS program will randomly select a daily solar shape from multiple years of production data. Concepts in paper referenced in wind paper above may also apply to solar modeling. GE MARS program can randomly select a daily solar shape from multiple years of production data.	Y
11	Small Hydro Resources	Derate by 46%	Derate by yy%	Review of five years of unit production data over the years 2011 to 2015	N
12	Large Hydro	Probabilistic Model based on 5 years of GADS data	Probabilistic Model based on 5 years of GADS data	Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period (2011-2015)	N

Transactions – Imports and Exports

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	Capacity Purchases	Existing Rights: PJM – 1080 MW HQ – 1090 MW +20 MW if awarded through Class Year 2015. Total HQ 1110 MW All contracts model as equivalent contracts	Grandfathered amounts: PJM – 1080 MW HQ – 1090 MW HQ TO 1110 MW if assuming awarded CRIS rights All contracts model as equivalent contracts	Grandfathered Rights, ETCNL, and other awarded long-term rights including 20 MW CRIS potentially awarded to HQUS	N
2	Capacity Sales	Long Term firm sales Summer 286.6 MW	Long Term firm sales Summer yyy MW	These are long term federal contracts	N
3	FCM Sales	No Sales within study period	Xxxx MW	Sensitivity based on Examination of Neighbor’s FCM auction results	N
4	New UDRs	No new UDR projects	No new UDR projects	Existing UDR elections are made by August 1 st and will be incorporated into the model	N

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Topology

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	Interface Limits	All changes reviewed and commented on by TPAS (Attachment E)	All changes reviewed and commented on by TPAS See (Attachment E)	Based on 201x: Operating Study, Operations Engineering Voltage Studies, Comprehensive Planning Process, and additional analysis including interregional planning initiatives	N
2	New Transmission	Transmission Owner Transmission Solutions (TOTS)	xxxx Identified	Based on TO provided models and NYISO review	N
3	Cable Forced Outage Rates	All existing Cable EFORs will be updated for NYC and LI to reflect most recent five-year history	All existing Cable EFORs updated for NYC and LI to reflect most recent five-year history	Based on TO analysis	N

Emergency Operating Procedures

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	Special Case Resources	July 2015 –1254 MW based on registrations and modeled as 961 MW of effective capacity. Monthly variation based on historical experience (no limit on number of calls)*	July 2016 – ssss MW based on registrations and modeled as aaa MW of effective capacity. Monthly variation based on historical experience (Calls Limited to 5/month.)*	Those sold for the program discounted to historic availability. Summer values calculated from July 2016 registrations (Attachment F)	N
2	EDRP Resources	July 2015 75 MW registered modeled as 12 MW in July and proportional to monthly peak load in other months. Limit to five calls per month	July 2016 bb MW registered model as cc 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 2016 registrations and forecast growth.	N
3	Other EOPs	671 MW of non-SCR/non-EDRP resources (Attachment D)	cccc MW of non-SCR/non-EDRP resources	Based on TO information, measured data, and NYISO forecasts	N

* The number of SCR calls is limited to 5/month when calculating LOLE based on all 8760 hours.

External Control Areas

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	PJM	Load and Capacity data provided by PJM/NPCC CP-8. Data may be adjusted per NYSRC Policy 5 Acceptable DR of 1890 available but not needed per Policy 5. 4 zone model. See (Attachment E)	Load and Capacity data provided by PJM/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. White paper on external EOPs	TBD
2	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
3	HQ	Load and Capacity data provided by HQ/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (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

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
4	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
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 <u>initially</u> share reserves equally among all members and then among non-members	Per NPCC CP-8 WG	N

Miscellaneous

#	Parameter	2016 Model Assumptions	2017 Model Assumptions	Basis for Recommendation	Model Change
1	MARS Model Version	Version 3.18	Version 3.20 Allows for H5 formatting.	Per benchmark testing and ICS recommendation	N
2	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	Review of existing regulations and rules.	N

Attachment A

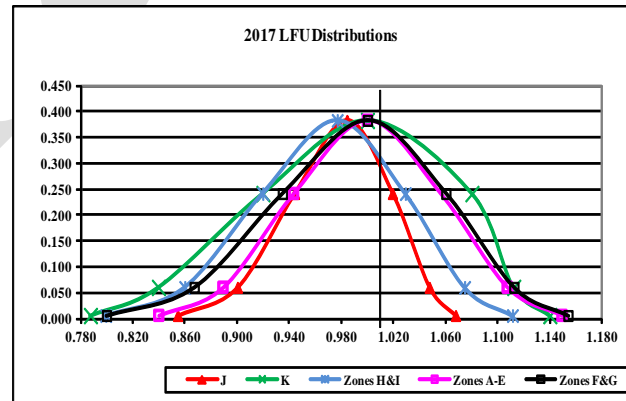
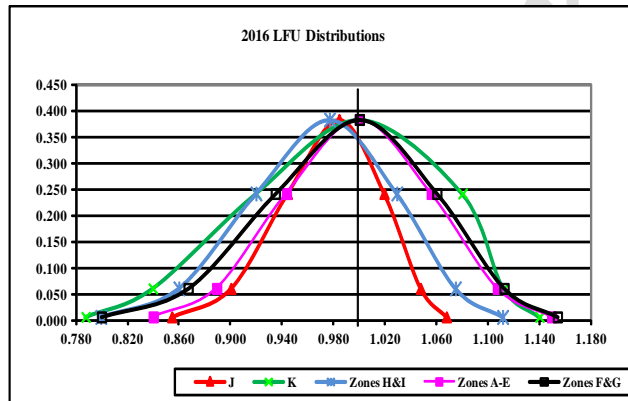
NYCA Load Forecast Uncertainty Model

2016 and 2017 LFU Models

<u>2016 Load Forecast Uncertainty Models</u>					
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

<u>2017 Load Forecast Uncertainty Models</u>					
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

2017 LFU remains unchanged from the 2016 LFU forecast



Attachment B

New and Retiring Generating Units

B1 - Proposed Non-wind Units and Unit Re-ratings						
Project or Generator Name	Zone	In Service Date	Forecast CRIS (MW)	Projected Summer Capability (MW)	MARS Model (MW)	New or Incremental (MW)
New Units						
New Non-wind Units						0.00
Re-ratings						
Bowline 2 rerate	G	Summer 2017	567.4	569.0	567.4	10.0
East River 1	J	Summer 2017	160.5	150.9	150.9	6.3
East River 2	J	Summer 2017	164.2	152.4	152.4	7.6
Sithe Independence	C	Summer 2017	954.4	954.4	954.4	43.6
Total New Units + Re-rates						67.5

Attachment B-continued

New and Retiring Generating Units

Attachment B2 -Announced Unit Retirements and ICAP Ineligible Forced Outage (IIFO)					
Project or Generator Name	Zone	Retirement Date	Existing CRIS (MW)	Summer Capability (MW)	MARS Model (MW)
Niagara Bio-Gen	A	1/1/2006	50.5	39.7	39.7
Astoria GT 05	J	1/1/2006	16	12.3	12.3
Astoria GT 07	J	1/1/2006	15.5	11.5	11.5
Astoria GT 12	J	1/1/2006	22.7	17.7	17.7
Astoria GT 13	J	1/1/2006	24	16.9	16.9
Fitzpatrick 1	C	1/1/2017	858.9	852.9	852.9
Ginna	B	1/4/2017	582	581.4	581.4
Astoria GT 08	J	7/1/2016	15.3	11.4	11.4
Astoria GT 10	J	7/1/2016	24.9	18.4	18.4
Astoria GT 11	J	7/1/2016	23.6	16.5	16.5
Ravenswood 04	J	1/5/2016	15.2	12.9	12.9
Ravenswood 05	J	1/5/2016	15.7	15.5	15.5
Ravenswood 06	J	1/5/2016	16.7	12.6	12.6
Total Retirements & IIFO				1619.7	

Attachment B-continued

New and Retiring Generating Units

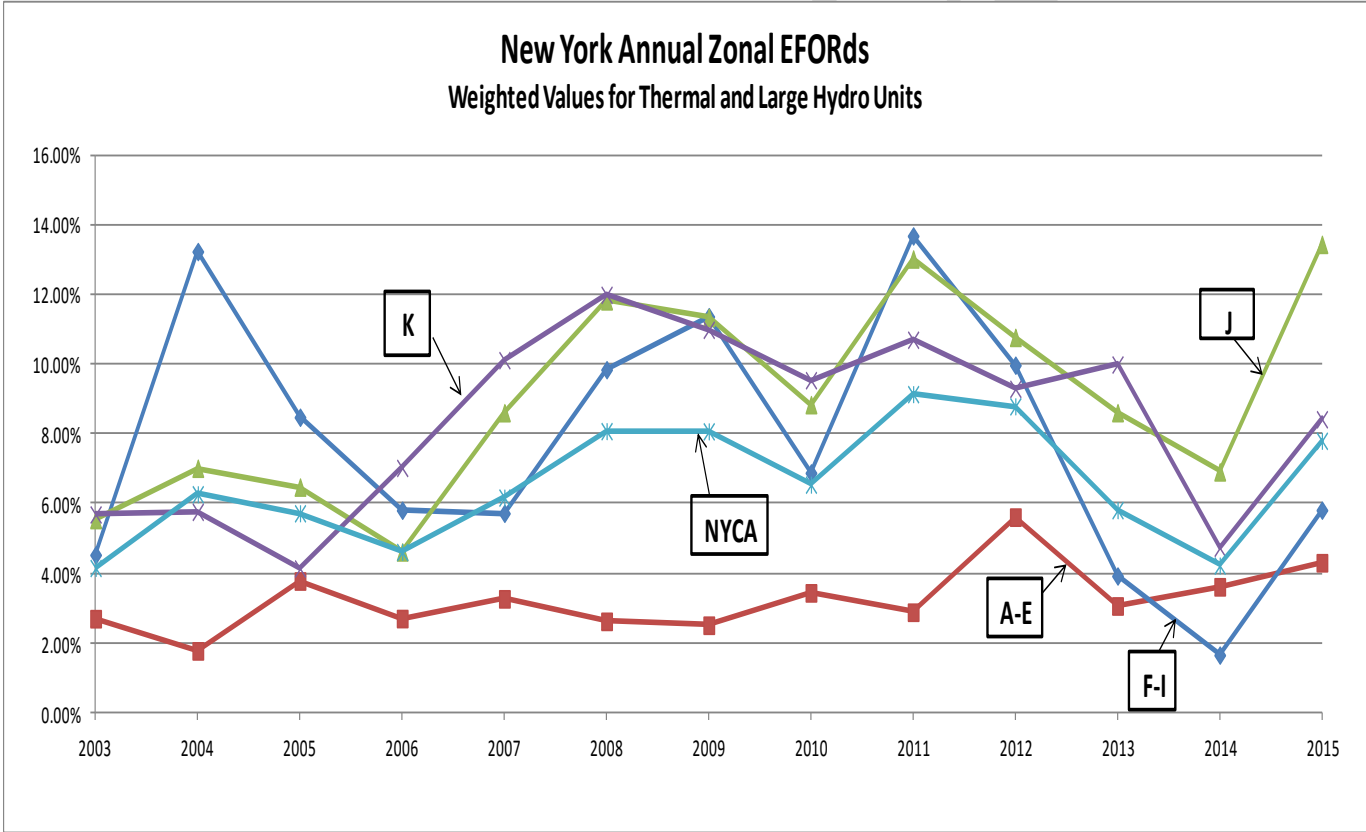
B3 - Wind Resources					
Wind Resource	Zone	In Service Date	CRIS (MW)	Summer Capability (MW)	MARS Model
ICAP Participating Wind Units					
Altona Wind Power	D	09/23/2008	97.5	97.5	97.5
Bliss Wind Power	A	03/20/2008	100.5	100.5	100.5
Canandaigua Wind Power	C	12/05/2008	125.0	125.0	125.0
Chateaugay Wind Power	D	10/07/2008	106.5	106.5	106.5
Clinton Wind Power	D	04/09/2008	100.5	100.5	100.5
Ellenburg Wind Power	D	03/31/2008	81.0	81.0	81.0
Hardscrabble Wind	E	02/01/2011	74.0	74.0	74.0
High Sheldon Wind Farm	C	02/01/2009	112.5	112.5	112.5
Howard Wind	C	12/01/2011	57.4	55.4	55.4
Madison Wind Power	E	09/01/2000	11.5	11.6	11.5
Maple Ridge Wind 1	E	01/01/2006	231.0	231.0	231.0
Maple Ridge Wind 2	E	12/01/2007	90.7	90.8	90.7
Munnsville Wind Power	E	08/20/2007	34.5	34.5	34.5
Orangeville Wind Farm	C	12/01/2013	88.5	93.9	88.5
Steel Wind	A	01/23/2007	20.0	20.0	20.0
Wethersfield Wind Power	C	12/11/2008	126.0	126.0	126.0
		Totals	1457.1	1460.7	1455.1
Non - ICAP Participating Wind Units					
Erie Wind		02/01/2012	0.0	15.0	0.0
Fenner Wind Farm		12/01/2001	0.0	30.0	0.0
Western NY Wind Power		10/01/2000	0.0	6.6	0.0
		Totals	0.0	51.6	0.0
Proposed IRM Study Wind Units					
Marble River	D	7/1/2012*	215.2	215.2	215.2
Orangeville re-rate	C	6/1/2017*	94.4	94.4	5.9
		Totals	215.2	215.2	221.1
Total Wind Resources		Totals	1672.3	1727.5	1676.2
* Study assumes 2015 Class Year will be complete in 2016, awarding Marble River Wind 215 MW and Orangeville Wind 5.9 MW of additional CRIS rights					

Attachment B-continued

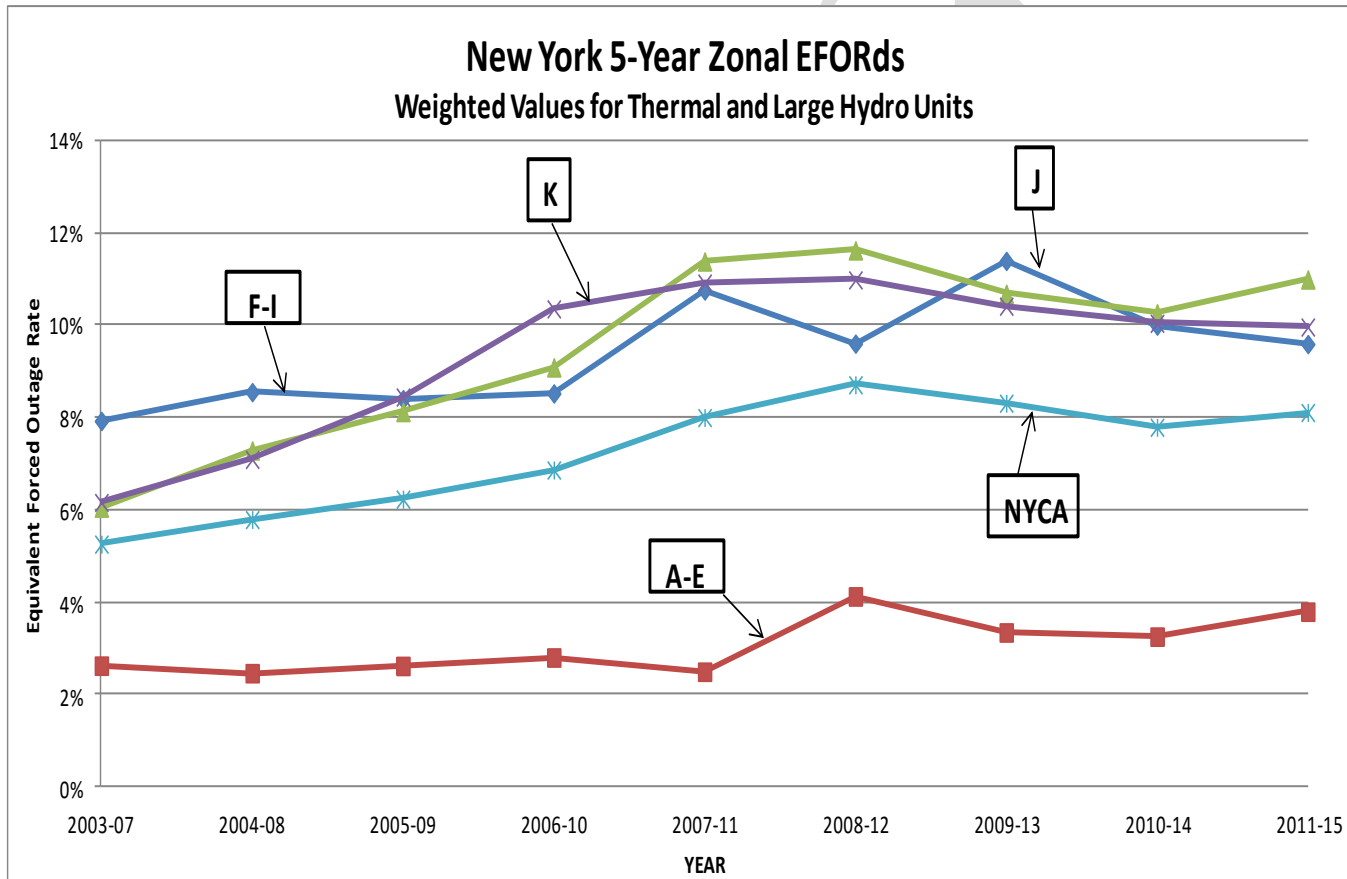
New and Retiring Generating Units

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

Attachment C



Attachment C1



Attachment D

Emergency Operating Procedures

Attachment E

Attachment E1

Attachment F
SCR Determinations

Assumption Matrix History

Date	Ver	Preliminary Base Case	Ver	Final Base Case
2/3/16	V0.1	Preliminary assumptions without attachments.		
2/5/16	V01	Added "Draft" watermark. Editorial Changes as discussed at the 2/3 ICS meeting.		
2/22/16	V02	Load Shape, LFU and LFU graph added. Solar 5 year assumption added		
<u>4/22/16</u>	<u>V03</u>	<u>Added attachments B1-B4, B2, C, -and C1; clarified solar modeling based on production years 2012-2015. 2016 Gold Book forecast added.</u>		

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