

2013-2014 NYCA IRM Requirement Study

Base Case Model Assumptions

Load Parameters

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|---|--|--|---|--------------|----------------------|
| Preliminary Peak Load (for preliminary base case study and sensitivities) | 2011 Gold Book: NYCA: 33,182MW NYC: 11,635 MW Long Island: 5,543 MW | 2012 Gold Book: NYCA: 33,696 MW NYC: 11,680 MW Long Island: 5,643 MW | This peak load forecast is utilized for the parametric results. | N | Low(-) |
| Peak Load | October 1, 2011 forecast NYCA: 33,335 MW NYC: 11,607 MW Long Island: 5,521 MW | October 1, 2012 forecast NYCA: TBD MW NYC: TBD MW Long Island: TBD MW | Forecast based on examination of 2012 weather normalized peaks. Top three external Area peak days aligned with NYCA | N | |
| Load Shape | 2002 Load Shape | 2002 Load Shape | As determined by the NYSRC EC | 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. Method and values accepted by LFTF (See attachment A) | N | Low(+) |

2013-2014 IRM Study Assumption Matrix

Capacity Parameters - Generation

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|-------------------------------------|---|--|---|--------------|----------------------|
| Existing Generating Unit Capacities | 2011 Gold Book values Use min (DMNC vs. CRIS) capacity value | 2012 Gold Book values Use min (DMNC vs. CRIS) capacity value | 2012 Gold Book publication | N | Low(-) |
| Proposed New Non-Wind Units | Total new capacity = 1413 MW. See Tables A-5 and A-6 of the 2012 IRM Report | See Attachment B | Units built since the 2011 Gold Book and those non-renewable units with Interconnection Agreements signed by August 1. | N | Low(+) |
| Retirements | 351 MW of retirements See Appendix E of the 2012 IRM Report | 924 MW of retirements See Attachment B2 | Newly adopted Policy 5 guidelines on retirement disposition in IRM studies | N | Med (-) |
| Forced and Partial Outage Rates | Five-year (2006-2010) GADS data | Five-year (2007-2011) GADS data Those units with less than five years – use representative data. See attachments C and C1 | Most recent five-year period Includes proxy data for new unit(s) and units that are deemed suspect as part of the GADS screening process (no suspect units identified this year) | N | Med(+) |
| EFORd | Transition rates representing the Equivalent Forced Outage Rates (EFOR) were derived using NYISO developed software | T. Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods from APA method using GADS Open Source software | White Paper indicates that using the new software creates transition rates more closely aligned with demand periods. Scenario using last year's data dropped the IRM by 0.9 percentage points | Y | Med (-) |

2013-2014 IRM Study Assumption Matrix

Capacity Parameters – Generation (continued)

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|----------------------------|--|--|---|--------------|----------------------|
| 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 between upstate and downstate | Nominal 50 MWs – divided equally between upstate and downstate | Review of most recent data | N | None |
| 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 | 337 MW of new wind | 215 MW of new wind See Attachment B1 | Renewable units based on RPS agreements and ICS input | N | Med(+) |
| Wind Resources | Wind Capacity – 1648 MWs Derived from hourly wind data resulting in an average Summer Peak Hour availability of ~11% | Wind Capacity – 1584 MWs Derived from hourly wind data resulting in an average Summer Peak Hour availability of ~11% | Based on collected hourly wind data Summer Peak Hour capacity factor based on June 1 – Aug 31, hours HB14 – HB18 | N | Captured above |
| Wind Shape | 2002 Wind Generation Profile | 2002 Wind Generation Profile | Sensitivity will be performed using MARS' probabilistic feature. | N | None |

2013-2014 IRM Study Assumption Matrix

Capacity Parameters – Generation (continued)

| | | | | | |
|--------------------------|--------------------------|---|--|---|---------|
| Solar Resources | Solar Capacity – 38.5 MW | Solar Capacity – 31.5 plus 30.1 MW of new units Unit output checked against actual hourly solar data. See Attachment B-2 | Based on collected hourly solar data Summer Peak Hour capacity factor based on June 1 – Aug 31, hours HB14 – HB18 | N | Low (+) |
| Non-NYPA Hydro Resources | Derate by 45% | Derate by 45% | Review of unit production and hydrological conditions including recognized forecasts (i.e. NOAA) | N | None |

Capacity Parameters – Import and Exports

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|--------------------|---|---|--|--------------|----------------------|
| Capacity Purchases | Grandfathered amounts: ISONE – 50 MW PJM – 1080 MW HQ – 1090 MW All contracts model as equivalent contracts | Grandfathered amounts: ISONE – 50 MW (through 12/2013) 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 MW) | These are long term federally monitored contracts | N | None |
| New UDRs | Amounts are confidential | UDRs on HTP Line | Contracted amounts of capacity are confidential and are included as capacity internal to the NYISO | N | Low (-) |
| Capacity Wheels | None modeled | None modeled. Sensitivity Case to be run | The ISO Tariff is silent about capacity wheels though NYCA | N | None |

2013-2014 IRM Study Assumption Matrix

Topology Parameters

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|---------------------------|--|--|---|--------------|----------------------|
| Interface Limits | All changes reviewed and commented on by TPAS | All changes reviewed and commented on by TPAS See Attachment E | Based on 2012 Operating Study, 2012 Operations Engineering Voltage Studies, 2012 Comprehensive Planning Process, and additional analysis including interregional planning initiatives | N | Low(+) |
| New Transmission | None | HTP – Hudson Transmission Project – scheduled for 2013 operation | Based on TO provided models and NYISO review | Y | See above-UDRs |
| Cable Forced Outage Rates | All existing Cable EFORS updated for NYC and LI to reflect five-year history | All existing Cable EFORS updated for NYC and LI to reflect most recent five-year history | Based on TO analysis | N | None |

2013-2014 IRM Study Assumption Matrix

Emergency Operating Procedure Parameters

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|------------------------|---|---|---|--------------|----------------------|
| Special Case Resources | July 2012 – 2192 MW based on registrations and NYISO growth rate forecast and modeled as 1862 MW. Monthly variation based on historical experience | July 2013 – 1767 MW based on registrations and NYISO growth rate forecast and modeled as 1437 MW . 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 2012 registrations (see attachment F). Potential sensitivity for alternate performance calculation | N | Med (+) |
| SCR change | MW levels tied to load levels (LFU) | Decouple MW levels from load levels | LFU multipliers were overstating the MWs from SCRs | N | Med(+) |
| EDRP Resources | July 2012 – 148 MW registered model as 95 MW in July and August. Proportional to monthly peak load in other months Limit to five calls per month | July 2013 – 143.9 MW registered model as 14.4 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 2012 registrations and forecast growth. | N | Low (+) |
| Other EOPs | 735 MW of non-SCR/non-EDRP resources | 765 MW of non-SCR/non-EDRP resources See Attachment D | Based on TO information, measured data, and NYISO forecasts | N | Low(-) |

2013-2014 IRM Study Assumption Matrix

External Control Areas Parameters

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible IRM Impact* |
|-----------|------------------------------|---|--|--------------|----------------------|
| PJM | Four Area representation | Load and Capacity data provided by PJM/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E | Additional level of review (prior to Policy 5 changes) performed by the NPCC CP-8 WG | N | Low(-) |
| ISONE | Thirteen Area representation | Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E | Additional level of review (prior to Policy 5 changes) performed by the NPCC CP-8 WG | N | Low(-) |
| HQ | Single Area representation | Load and Capacity data provided by HQ/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E | Additional level of review (prior to Policy 5 changes) performed by the NPCC CP-8 WG | N | Low(-) |
| IESO | Single Area representation | Load and Capacity data provided by IESO/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 See Attachment E | Additional level of review (prior to Policy 5 changes) performed by the NPCC CP-8 WG | N | Low(-) |

2013-2014 IRM Study Assumption Matrix

External Control Areas Parameters (Continued)

| | | | | | |
|-----------------|---|---|------------------|---|------|
| Reserve Sharing | All NPCC Control Areas indicate that they will share reserves equally among all members | All NPCC Control Areas indicate that they will share reserves equally among all members | Per NPCC CP-8 WG | N | None |
|-----------------|---|---|------------------|---|------|

Miscellaneous Parameters

| Parameter | 2012 Model Assumptions | 2013 Model Assumptions Recommended | Basis for Recommendation | Model Change | Possible Impact* |
|---------------------------|------------------------|--|--|--------------|------------------|
| MARS Model Version | Version 3.12 | Version 3.14 | Per benchmark testing and ICS recommendation | N | None |
| Environmental Initiatives | None for Base Case | No estimated impacts based on review of existing rules and retirement trends | An analysis of air and water pollution rules, Retirement trends, and Economic conditions | N | None |

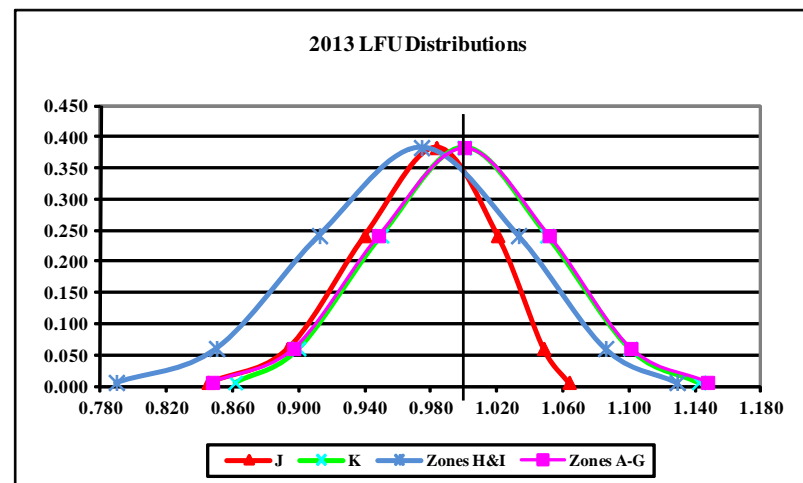
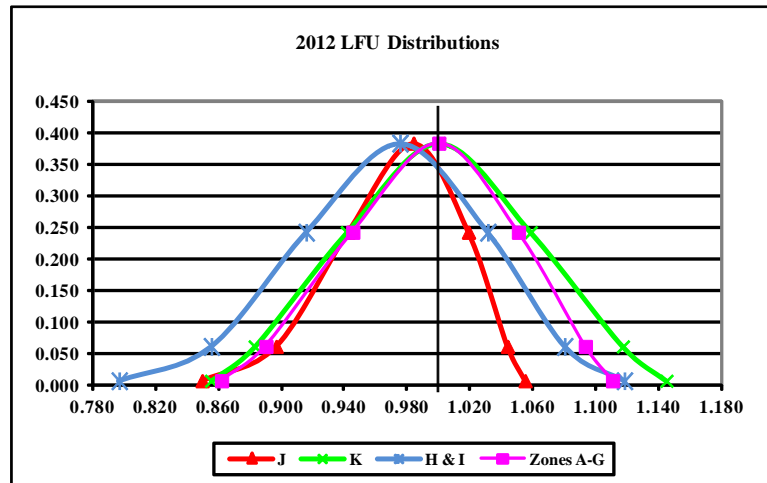
2013-2014 IRM Study Assumption Matrix

Attachment A NYCA Load Forecast Uncertainty

2012 and 2013 LFU Models

| Multiplier | Zones H&I | Con Ed (J) | LIPA (K) | Zones A-G |
|------------|-----------|------------|----------|-----------|
| 0.0062 | 1.1181 | 1.0549 | 1.1448 | 1.1105 |
| 0.0606 | 1.0801 | 1.0437 | 1.1171 | 1.0932 |
| 0.2417 | 1.0312 | 1.0189 | 1.0585 | 1.0506 |
| 0.3830 | 0.9753 | 0.9839 | 1.0000 | 1.0000 |
| 0.2417 | 0.9157 | 0.9422 | 0.9415 | 0.9453 |
| 0.0606 | 0.8554 | 0.8966 | 0.8829 | 0.8901 |
| 0.0062 | 0.7968 | 0.8495 | 0.8552 | 0.8619 |

| Multiplier | Zones H&I | Con Ed (J) | LIPA (K) | Zones A-G |
|------------|-----------|------------|----------|-----------|
| 0.0062 | 1.1289 | 1.0635 | 1.1420 | 1.1473 |
| 0.0606 | 1.0856 | 1.0481 | 1.1004 | 1.1009 |
| 0.2417 | 1.0329 | 1.0202 | 1.0502 | 1.0514 |
| 0.3830 | 0.9741 | 0.9831 | 1.0000 | 1.0000 |
| 0.2417 | 0.9123 | 0.9397 | 0.9498 | 0.9480 |
| 0.0606 | 0.8500 | 0.8929 | 0.8996 | 0.8967 |
| 0.0062 | 0.7893 | 0.8449 | 0.8613 | 0.8475 |



2013-2014 IRM Study Assumption Matrix

Attachment B
List¹ of Proposed Units
(To be in-service by summer of 2013)

| <u>Project Name</u> | <u>IS Date</u> | <u>Zone</u> | <u>MW</u> |
|--|----------------|-------------|------------------------|
| | | | |
| Hudson Transmission Project [UDR] | 6/01/13 | J | 660² |
| EnXco Solar | 12/12 | K | 13.1 |
| FIT(Feed-in-tariff) | 6/13 | K | 17 |
| | | | |

¹ The list on this page does not show wind units which are presented on Attachment B-1.

² The amount contracted is confidential. This entry indicates that up to 660 MW of contracts could be obtained.

2013-2014 IRM Study Assumption Matrix

Attachment B1 Renewable Generating Wind Projects for Inclusion in the 2013-2013 Installed Reserve Margin Study

| Facility Name | Zone | Connecting Transmission Owner | NYISO Interconnection Study Queue Project Number | Projected/ Actual In-Service Date | New Wind Capacity for 2013 IRM (MW) | Total Wind Capacity for 2013 IRM (MW) |
|--|------|-------------------------------|--|-----------------------------------|-------------------------------------|---------------------------------------|
| Existing Units | | | | | | |
| Steel Wind | A | National Grid | | 2007 Jan | | 20.0 |
| Bliss Wind Power | A | Village of Arcade | 173 | 2008 May | | 100.5 |
| Canandaigua Wind Power | C | NYSEG | 135&199 | 2008 Jun | | 125.0 |
| Hardscrabble Wind | E | National Grid | 156 | 2011 Sept | | 74.0 |
| Howard Wind | C | NYSEG | 182 | 2011 Dec | | 57.4 |
| Wethersfield Wind Power | C | NYSEG | 177 | 2008 Dec | | 126.0 |
| High Sheldon Wind Farm | C | NYSEG | 144 | 2009 Feb | | 112.5 |
| Altona Wind Power | D | NYPA | 174 | 2008 Sept | | 97.5 |
| Chateaugay Wind Power | D | NYPA | 214 | 2008 Sept | | 106.5 |
| Clinton Wind Power | D | NYPA | 172 & 211 | 2008 May | | 100.5 |
| Ellenburg Windpark | D | NYPA | 175 | 2008 May | | 81.0 |
| Munnsville | E | NYSEG | 127A | 2007 Aug | | 34.5 |
| Maple Ridge 1 | E | National Grid | 171 | 2006 Feb | | 231.0 |
| Maple Ridge 2 | E | National Grid | 171 | 2006 Feb | | 90.7 |
| Madison Wind Power | E | NYSEG | N/A | 2000 Sept | | 11.5 |
| Proposed Units | | | | | | |
| Marble River Wind Farm 1 and 2 | D | NYPA | 161 & 171 | 2012 Oct | 215.0 | 215.0 |
| TOTAL CAPACITY - ALL CATEGORIES | | | | | 215.0 | 1,583.6 |

2013-2014 IRM Study Assumption Matrix

Attachment B2

Proposed Generating Unit Retirements

(for Inclusion in the 2013-2013 Installed Reserve Margin Study)³

| <u>Unit</u> | <u>Zone</u> | <u>MW</u> |
|--------------------|--------------------|------------------|
| Far Rockaway ST04 | K | 107 |
| Glenwood ST 04 | K | 115 |
| Glenwood ST 05 | K | 109 |
| Montauk Diesel | K | 6 |
| Astoria GT 10 | J | 18 |
| Astoria GT 11 | J | 16 |
| Astoria 2 | J | 177 |
| Astoria 4 | J | 376 |
| Ravenswood GT 3-4* | J | N/A |
| | Total: | 924 |

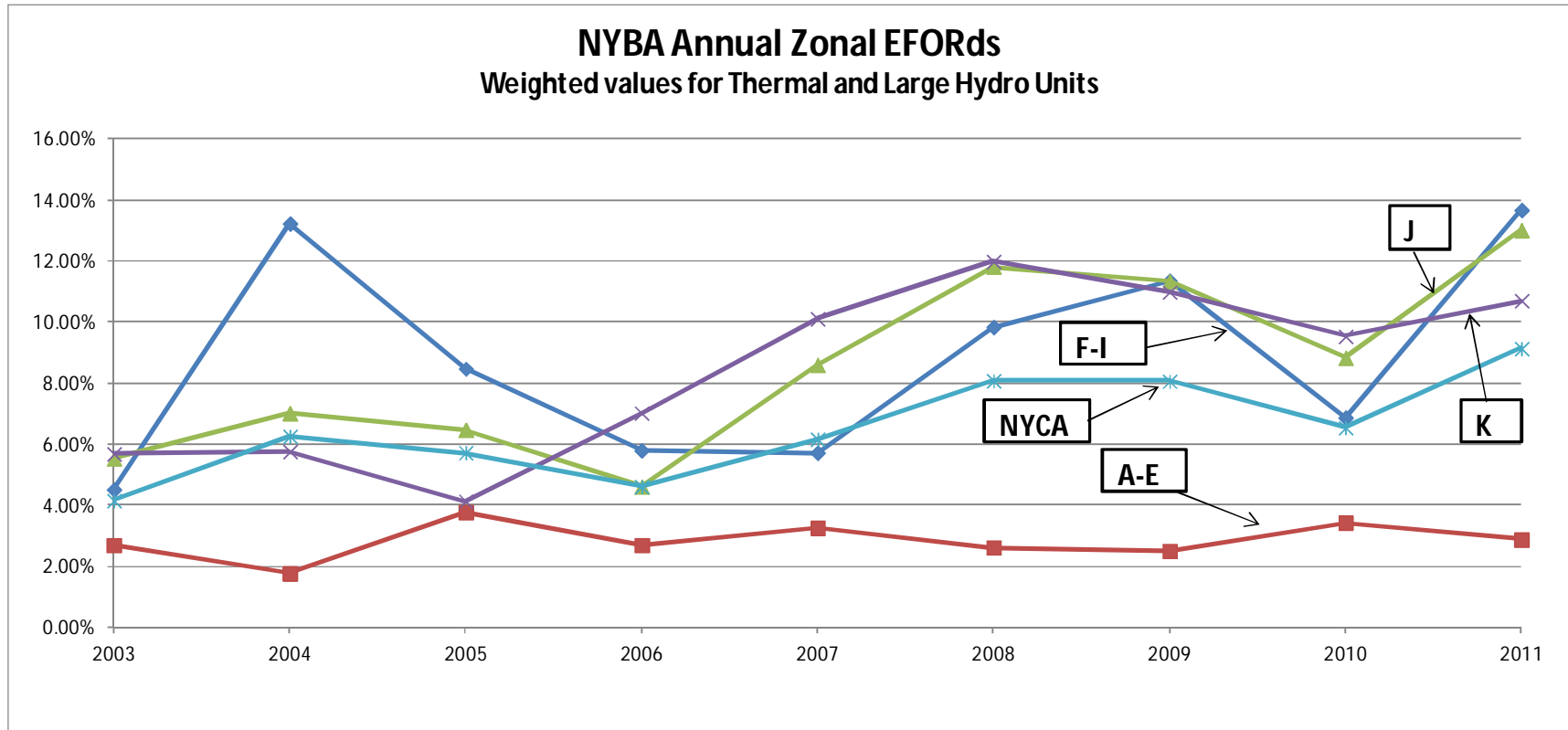
* Ravenswood GT 3-4 (32 MW) retired on 9/01/2011 and has already shown 0 MW of summer capability in the 2012 Gold Book. Several other units fall into this category and are listed in the 2012 Gold Book on table IV-3a (page 61).

³ The ICS qualifies retirements for inclusion based on NYSRC Policy 5-6.

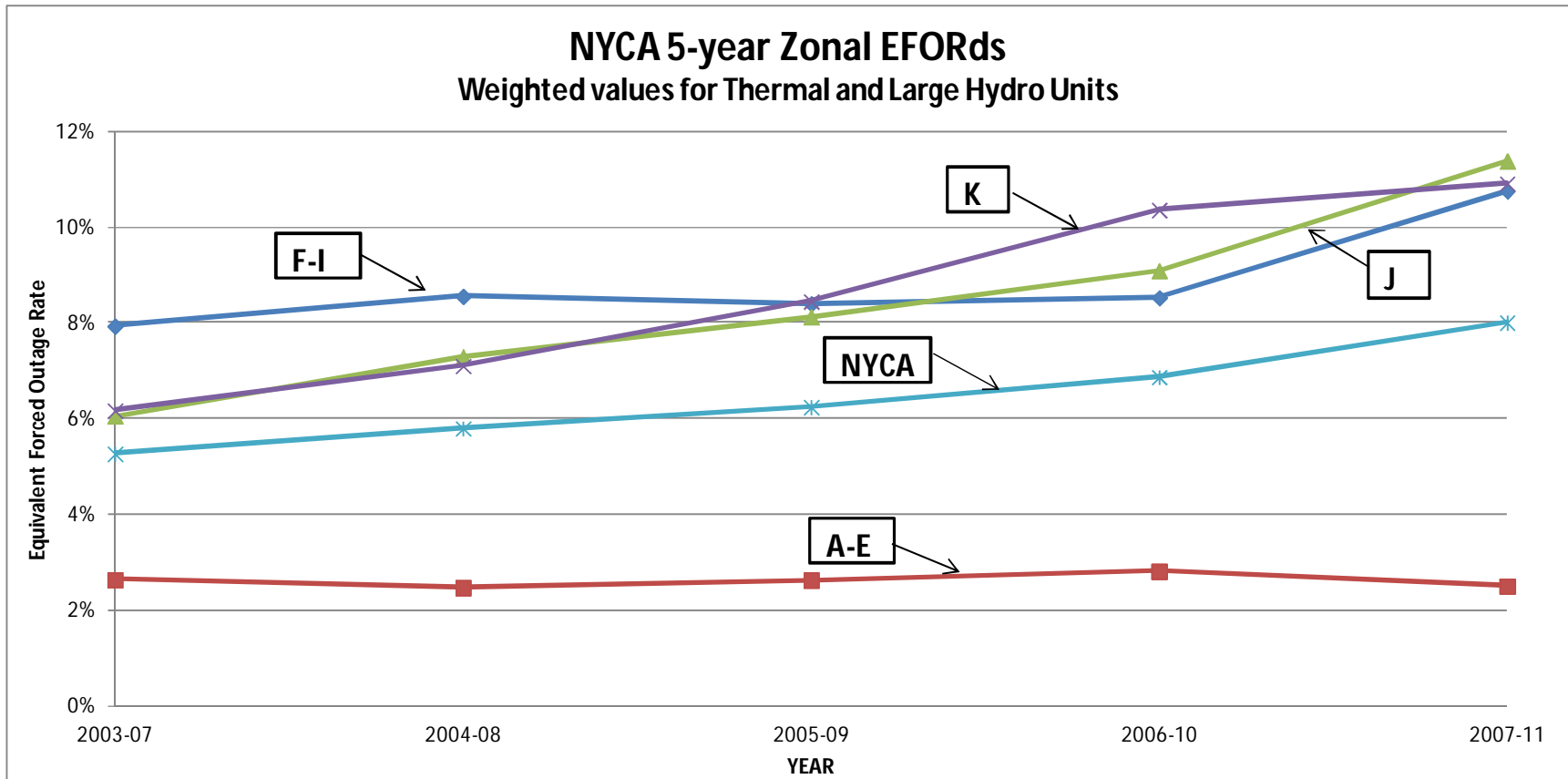
2013-2014 IRM Study Assumption Matrix

2013-2014 IRM Study Assumption Matrix

Attachment C



Attachment C1



Note that the 2007-2011 values for zones J and K would drop by 0.21% and 0.16% respectively, if the proposed retirements (see attachment B2) were removed from the calculations.

2013-2014 IRM Study Assumption Matrix

Attachment D Emergency Operating Procedures

| Step | Procedure | Effect | 2012 MW Value | 2013 MW Value |
|-------------|------------------------------------|--|---|---|
| 1 | Special Case Resources | Load relief | 2192 MW (representing the amount sold) | 1767 MW (representing the amount sold) |
| 2 | Emergency Demand Response Program* | Load relief | 148/95 MW | 144/14 MW |
| 3 | 5% manual voltage Reduction | Load relief | 62 MW | 66 MW |
| 4 | Thirty-minute reserve to zero | Allow operating reserve to decrease to largest unit capacity (10-minute reserve) | 600 MW | 655 MW |
| 5 | 5% remote voltage reduction | Load relief | 442 MW | 486 MW |
| 6 | Voluntary industrial curtailment | Load relief | 143 MW | 125 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 | 1200 MW | 1310 MW |
| 10 | Customer disconnections | Load relief | As needed | As needed |

* These values represent the registered amounts coupled with the effective amounts

2013-2014 IRM Study Assumption Matrix

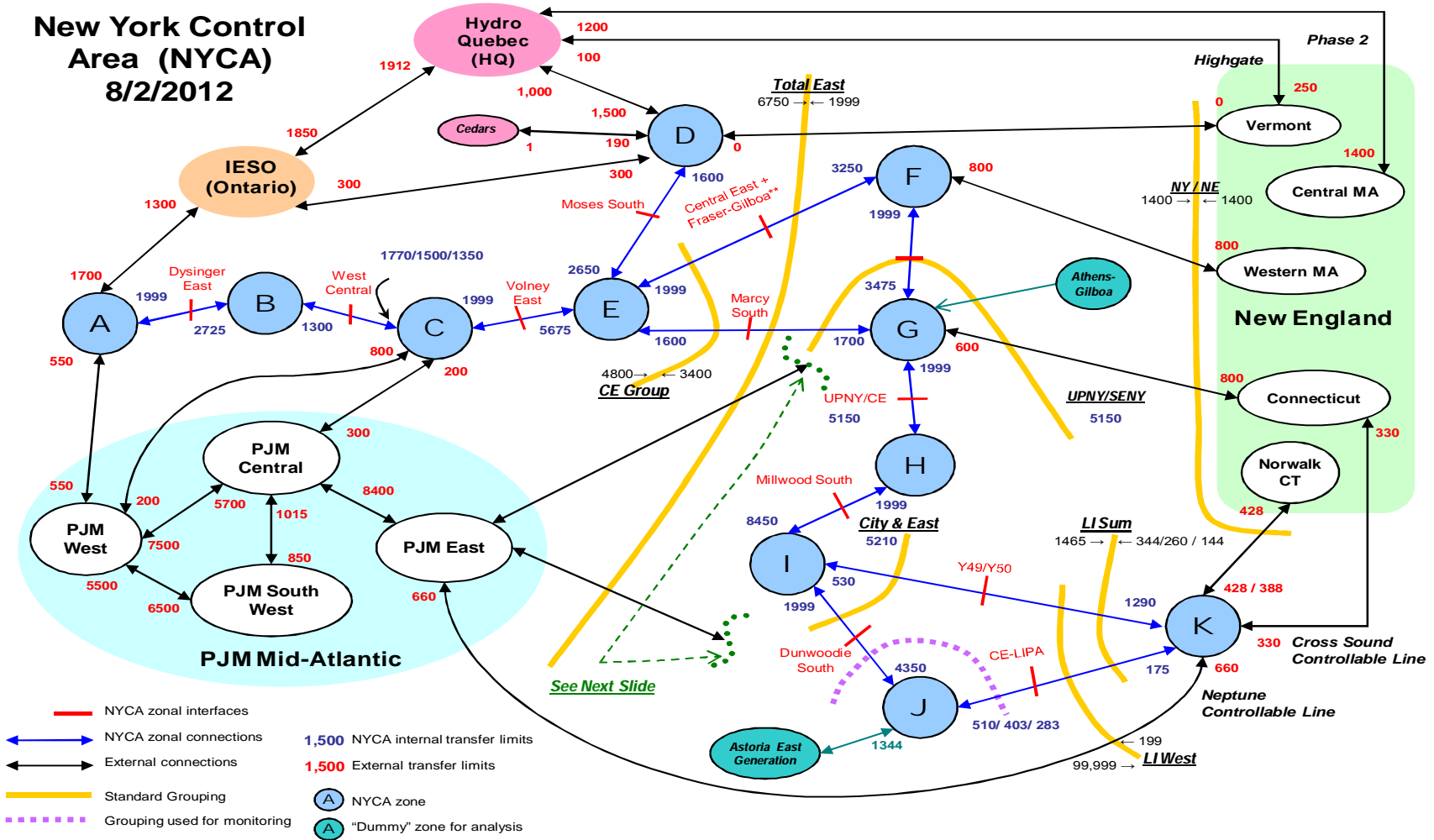
* *The reserves have increased from 1800 MW to 1965 MW as a result of the power uprate on Nine Mile 2.

Attachment E

2013-2014 IRM Study Assumption Matrix

Transmission System Representation changes for 2013 IRM Study/2012 RNA - Summer Emergency Ratings (MW)

New York Control Area (NYCA) 8/2/2012



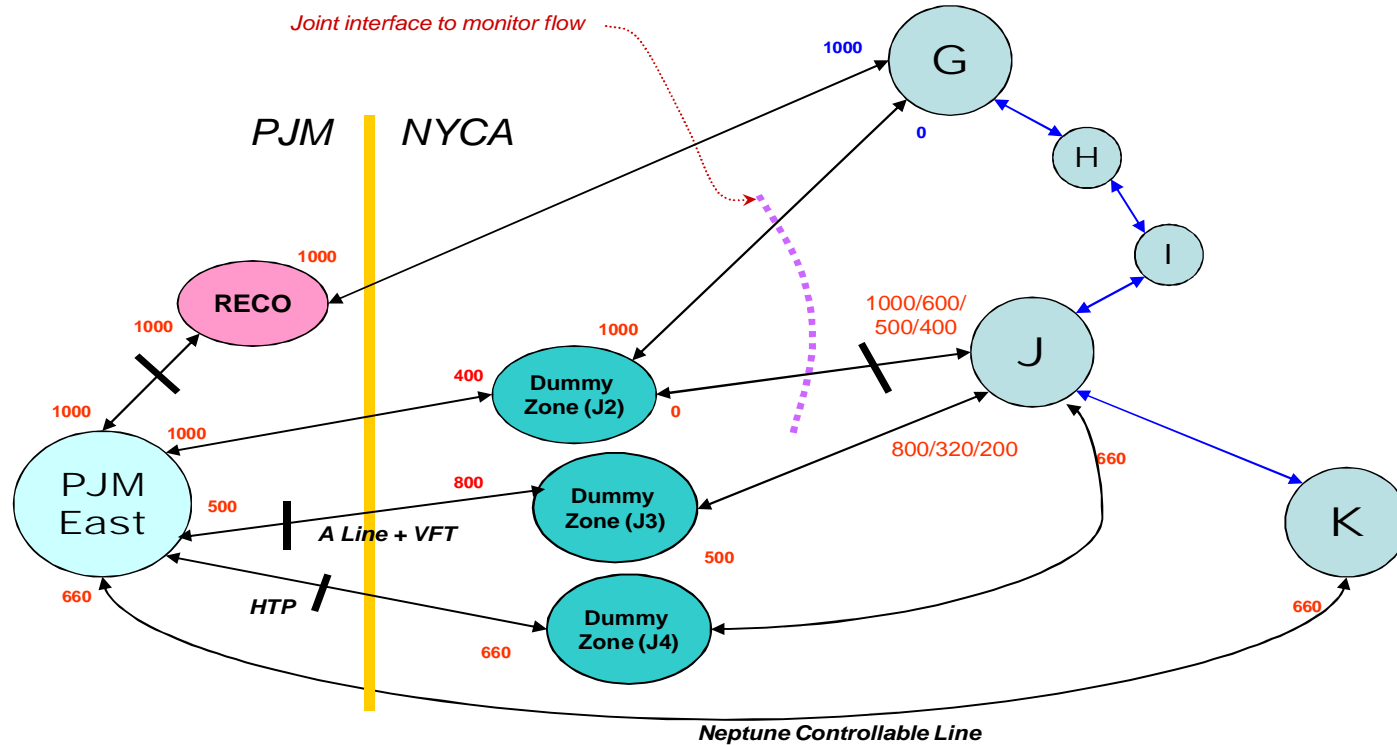
Attachment E1

2013-2014 IRM Study Assumption Matrix

Transmission System Representation changes for 2013 IRM Study/2012 RNA - Summer Emergency Ratings (MW)

2012 PJM-SENY MARS Model

Draft for discussion only – 5/24/2012



$(PJM\ East\ to\ RECO) + (J2\ to\ J) + (PJM\ East\ to\ J3) + (PJM\ East\ to\ J4) = 2000\ MW$

With the retirement of Hudson 1 and other changes in 2011 PJM RTEP, it was determined that this total interface can be supported to a flow of 2000 MW. This interface grouping contains those interfaces with the Bold hash mark. MARS will distribute this flow accordingly. This will change when additional transmission and generation comes into service in 2014 and 2015 up to 2340.

2013-2014 IRM Study Assumption Matrix

Attachment F SCR Determinations

SCR Performance

| | A | B | C | D | E | F |
|--------------|------------------------------------|--------------------------------------|---|----------------------|--------------------------------------|---------------------------|
| | | =A*(1.75%) | | =B*C | | =D*E |
| <u>Zones</u> | July 2012 Registrations | 2013 Forecast¹ | Performance Factor² | 2012 UCAP | Derate Factor³ | In Model Value |
| A-E | 1034.4 | 1052.5 | 0.976 | 1027 | 0.857 | 881 |
| F-I | 184.2 | 187.4 | 0.912 | 171 | 0.857 | 147 |
| J | 418.2 | 425.5 | 0.920 | 392 | 0.857 | 336 |
| K | 99.3 | 101.0 | 0.858 | 87 | 0.857 | 74 |
| Total | 1736.2 | 1766.5 | | 1677 | | 1437 |

1. These values represent a growth rate of 1.75% from July 2012 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 (=0.95), 2) the Effective Capacity Value (ECU)(=0.95), and 3) the fatigue factor (=0.95).