Installed Capacity Subcommittee Report to the Executive Committee

LOAD SHAPE AND EFORd MODELS FOR 2013 IRM STUDY BASE CASE

Purpose of Report

This report covers the Installed Capacity Subcommittee's (ICS) review and development of load shape and EFORd models for the 2013 IRM Study. The report includes a brief background and description of each model, ICS member arguments for and against use of the model for the 2013 IRM Study, ICS polling results, and consensus recommendations if any. Separate white papers have been prepared by the NYISO that provide details of the development or each model. ICS has reviewed and accepted these papers. Much of the background below material was taken from these NYISO white papers.

Load Shape Model

1. Background

For a number of years, ICS has selected the year 2002 as the reference year for representation of daily peak loads of the New York Control Area, as well as all external areas. The selection of the 2002 load shape by ICS has been consistent with the load shape selected by the NPCC for its resource adequacy studies. The 2002 load shape has a comparatively larger number of daily peak hours that are close to or nearly equal to the summer peak demand than for other years during the 1999-2012 periods. As a result, there are a higher number of LOLE events using the 2002 load shape than if a load shape of any other year was instead represented. As a result, all else being equal, the resulting IRM will tend to be higher using the 2002 load shape, and therefore represents a conservative IRM load shape representation.

Because of the conservative nature of the 2002 load shape, in December 2011 the Executive Committee requested ICS to review other load shapes to ascertain whether the NYSRC should consider moving to a different load shape for use in the 2013-2014 IRM study. ICS then requested the NYISO to review historical load shapes and to determine which year presented an average or typical load shape. The attached NYISO white paper[1] concludes that the 2007 load shape represents a typical year. ICS agrees with this NYISO finding.

[1] NYISO White Paper, "Review of Load Shape Selection Criteria - Final Report" (June 1, 2012)

2. IRM Impact of Using of a 2007 Load Shape

2012 IRM Study Base Case – 16.1%
2012 IRM Study Base Case replacing 2002 load shape with 2007 load shape – 13.4%
IRM Impact of Using a 2007 Load Shape – **2.7% lower IRM**

3. Pros and Cons of Replacing the 2002 Load Shape with a 2007 Load Shape

Cons – Reasons offered by ICS participants as to why the 2002 load shape should be retained for the 2013 IRM Study:

- Planning for reliability should not rely on using an average shape. Analogy: airline passengers would rather fly on a plane that has been designed to withstand the extremes vs. designed to withstand only average flying conditions.
- The 2002 shape is conservative, but not overly conservative. Other years exceeded the 2002 in conservatism that would have raised the IRM for load extremes that appear to be more anomalous.
- A new MARS program will soon be available that uses multiple historical load shape statistics which will be reviewed by ICS for future application.
- An IRM reduction of 2.7% in one year appears to be too large, particularly if a new EFORd model were to be adopted which would further reduce the IRM.

Pros – Reasons offered by ICS participants as to why a 2007 load shape should be adopted:

- The 2002 load shape is overly conservative.
- There are other methods to build in conservatism into the IRM model without using a conservative load shape to start.
- Recognizes the IRM change the change should more gradual (IRM drops by 2.7% with the 2007 shape), but may be willing to accept the change to reduce the amount of conservatism.

4. ICS Voting on Which Load Shape to Use for 2013 IRM Study

Issue: Use present 2002 load shape vs. 2007 load shape for 2013 IRM Study

ICS Member Voting:
Adopt the 2007 load shape: 4 Members (National Grid, NYSEG/RG&E, Large Consumers, and Central Hudson)
Continue Using the 2002 load shape: 4 Members (LIPA, Con Ed, NYPA, and Wholesale Sellers)

ICS Meeting Participant Voting:
Adopt the 2007 load shape: 5 participants
Continue Using the 2002 load shape: 9 participants

Conclusion: NO ICS MEMBER CONSENSUS ON WHICH LOAD SHAPE MODEL TO USE FOR THE 2013 STUDY.

5. Recommended Sensitivities

- New GE MARS version with multiple load shapes
- 2007 load shape if 2002 load shape is adopted for base case
- 2002 load shape if 2007 load shape is adopted for base case

APA/EFORd Model

1. Background

The FOR or EFOR now used in MARS determines the probability of a generating unit being in a forced outage state. However, ICS recognizes that a better measure for generator performance, especially for peaking units and intermediate cycling units, is that FOR should only be recognized when the unit is needed or demanded. This is the known as FORd and in practice becomes the EFORd. ICS agreed in 2010 that the EFORd would provide an improved or more accurate measure of generator performance as well as provide a metric that was aligned with what is used in the capacity markets.

There is no direct way to determine when a unit is being demanded and how to calculate EFORd. The NYISO (in 2010) and Con Edison (in early 2011) developed different approaches to calculate EFORd's. In order to have an independent review of both approaches and determine which might be superior and should be further developed, if any, in the spring of 2011 the NYISO retained Dr. Chanan Singh, a principal of Associated Power Analysts, Inc. (APA). Dr. Singh concluded that the approaches proposed by NYISO and Con Edison were reasonable, but both had shortcomings. He proposed and developed two alternative methodologies which would provide transition rate matrices that were consistent with EFORd or probabilities conditioned on demand. After review, ICS selected one of these methodologies to implement for NYSRC IRM studies.

The APA/EFORd methodology was implemented and successfully validated. A separate NYISO white paper[2] describes in detail the process of developing the model. The NYISO recommends that this methodology be implemented for the 2013 IRM Study base case.

1. IRM Impact of Implementing the APA/EFORd Model

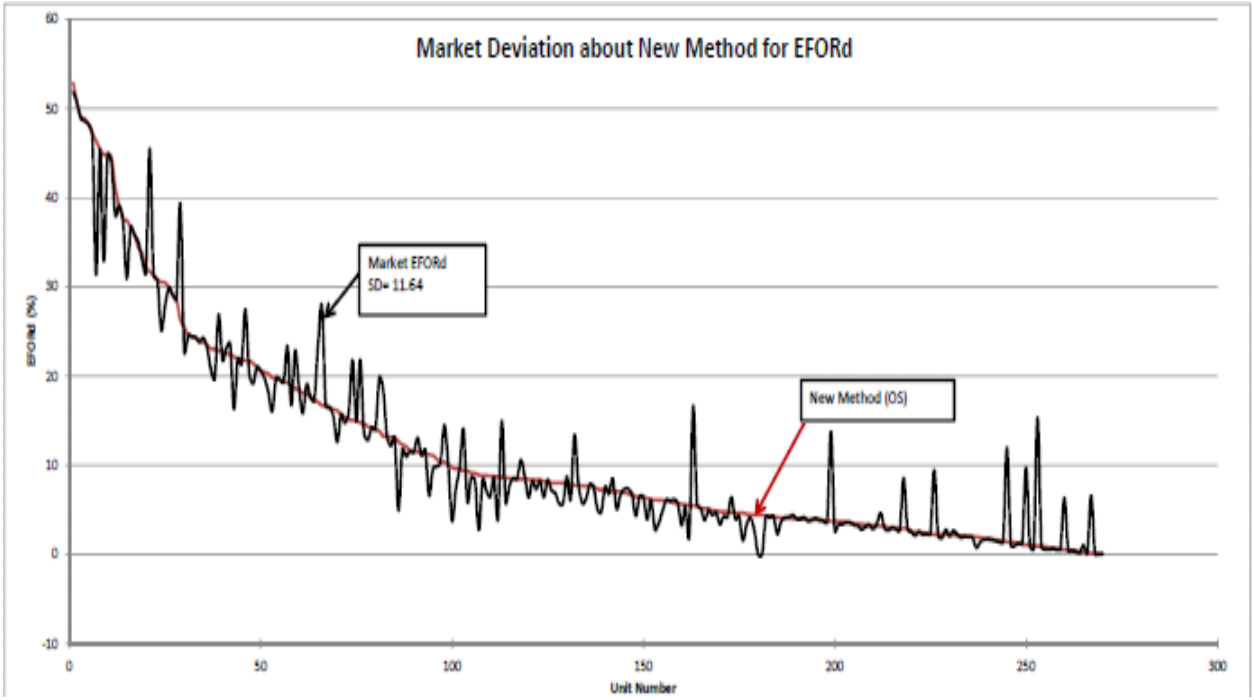
2012 IRM Study Base Case – 16.1%
2012 IRM Study Base Case with APA/EFORd Model Implemented – 15.2%
IRM Impact of Using APA EFORd Model – **0.9% lower IRM**

2. Pros and Cons of Adopting New APA/EFORd Model

Cons:

- The software was not fully tested and that requests to Ron Fluegge, who converted the APA method in to open source computer code, for additional analysis went unanswered. Additional data from the NYISO for internal analysis was requested. NYISO responded at the meeting that they did not have enough time between the request and the meeting to determine if the data could be supplied.
- A concern that more analysis was needed and the deviations shown in the graph below needs further review.

[2] NYISO White Paper, "Development of Generator Transition Rate Matrices for MARS That Are Consistent with the EFORd Reliability Index Validation and Implementation of Method 2 - Final Report " (June 1, 2012)



Pros:

- While the OS software did not produce values closer to market values, not using the new methodology would overstate the amount of forced outages witnessed in the NYCA.
- The methodology should be used with a commitment by the NYISO to explain the deviations.
- Some deviations will always remain due to the way the market data is used vs. the APA method. NYISO acknowledges that market results did not purely reflect NERC EFORd methods, which is approximated by the APA and software.
- The APA method has been selected as the best method to translate outage rates and that further fixes do not negate what has been developed so far.

3. <u>ICS Voting on Adopting the APA/EFORd Model for 2013 IRM Study</u>

Issue: Should the NYSRC adopt the APA/EFORd model for the 2013 IRM Study base case?

ICS Members:
<u>Adopt the Model</u> :
6 Members: National Grid, NYSEG/RG&E, Large Consumers, Central Hudson, LIPA, NYPA

<u>Do not adopt the APA/EFORd Model:</u>
2 Members: Con Ed, Wholesale Sellers

Meeting Participants:
<u>Adopt the Model</u>: 8 Participants

Do not adopt the APA/EFORd Model for the 2013 Base Case: 5 Participants

ICS Consensus: Adopt the APA/EFORd Model

4. Recommended Sensitivities

- Apply APA/EFORd model if not adopted for the base case.
- If APA/EFORd model is adopted for the base case, run w/o the model.