2015 RRS Preliminary Assessment Results

PC Meeting
September 10, 2015
General observations about IRM/FPR and RPM

• For a given DY, RPM develops the reliability requirement
  – based on \( \text{DY 50/50 peak} \times \text{FPR} \)
  – not based on \( \text{DY 50/50 peak} \times \text{IRM} \)

• An increase in the IRM that is purely a result of an increase in the average forced outage rate of the PJM fleet does not meaningfully increase the FPR
  – If IRM equals 16.5, and average XEFORd = 0.066, then
    » \( \text{FPR} = (1+16.5) \times (1-0.066) = 1.0881 \text{ or } 8.81\% \)
  – If average XEFORd increases to 0.076, the IRM = 17.9. Then
    » \( \text{FPR} = (1+17.9) \times (1-0.076) = 1.0894 \text{ or } 8.94\% \)
  – Impact of 1 pp increase in XEFORd: While the IRM when up by 1.4 percentage points, the FPR when up by 0.13 percentage points
### Executive Summary Section: Table of Results

#### 2015 RRS Study results:

<table>
<thead>
<tr>
<th>RRS Year</th>
<th>Delivery Year Period</th>
<th>Calculated IRM</th>
<th>Recommended IRM</th>
<th>Average EFORd</th>
<th>Average XEFORd</th>
<th>World Peak*</th>
<th>Recommended FPR</th>
<th>Recommended DR Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2016 / 2017</td>
<td>16.45%</td>
<td>16.4%</td>
<td>6.57%</td>
<td>5.91%</td>
<td>99.6%</td>
<td>1.0952</td>
<td>0.951</td>
</tr>
<tr>
<td>2015</td>
<td>2017 / 2018</td>
<td>16.45%</td>
<td>16.5%</td>
<td>6.59%</td>
<td>5.93%</td>
<td>99.6%</td>
<td>1.0959</td>
<td>0.950</td>
</tr>
<tr>
<td>2015</td>
<td>2018 / 2019</td>
<td>16.45%</td>
<td>16.5%</td>
<td>6.58%</td>
<td>6.58%</td>
<td>99.6%</td>
<td>1.0883</td>
<td>N/A</td>
</tr>
<tr>
<td>2015</td>
<td>2019 / 2020</td>
<td>16.46%</td>
<td>16.5%</td>
<td>6.60%</td>
<td>6.60%</td>
<td>99.6%</td>
<td>1.0881</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* World peak: World's share of its annual peak, coincident with PJM's annual peak

#### 2014 RRS Study results:

<table>
<thead>
<tr>
<th>RRS Year</th>
<th>Delivery Year Period</th>
<th>Calculated IRM</th>
<th>Recommended IRM</th>
<th>Average EFORd</th>
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<th>World Peak*</th>
<th>Recommended FPR</th>
<th>Recommended DR Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2015 / 2016</td>
<td>15.58%</td>
<td>15.6%</td>
<td>6.19%</td>
<td>5.60%</td>
<td>96.8%</td>
<td>1.0913</td>
<td>0.951</td>
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<tr>
<td>2014</td>
<td>2016 / 2017</td>
<td>15.51%</td>
<td>15.5%</td>
<td>6.30%</td>
<td>5.66%</td>
<td>96.8%</td>
<td>1.0896</td>
<td>0.952</td>
</tr>
<tr>
<td>2014</td>
<td>2017 / 2018</td>
<td>15.66%</td>
<td>15.7%</td>
<td>6.34%</td>
<td>5.70%</td>
<td>96.8%</td>
<td>1.0911</td>
<td>0.951</td>
</tr>
<tr>
<td>2014</td>
<td>2018 / 2019</td>
<td>15.67%</td>
<td>15.7%</td>
<td>6.35%</td>
<td>6.25%</td>
<td>96.8%</td>
<td>1.0847</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* World peak: World's share of its annual peak, coincident with PJM's annual peak
CBOT: Capacity Benefit of Ties
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Impact of 2015 Capacity Model negative due to rounding. Take-away: Impact is significantly smaller than impact of other two factors.
Historical Weighted-Average Forced Outage Rates

PJM 5 Year Average EFORd for Corresponding Target Delivery Year

- 5 Year Average EFORd
PJM Load Model – Weekly Means and Standard Deviations

- Per-Unit Mean
- Per-Unit Standard Deviation

**Summer Weeks**
- June
- July
- August

**Graph Details**
- **2014 Means**
- **2015 Means**
- **2014 StDevs**
- **2015 StDevs**
### Per Unit Mean + 2.1 StDevs

<table>
<thead>
<tr>
<th>Month</th>
<th>Week</th>
<th>2014 LM</th>
<th>2015 LM</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>8</td>
<td>0.9119</td>
<td>0.9074</td>
</tr>
<tr>
<td>July</td>
<td>9</td>
<td>0.9915</td>
<td>0.9468</td>
</tr>
<tr>
<td>July</td>
<td>10</td>
<td>1.0596</td>
<td>1.0678</td>
</tr>
<tr>
<td>July</td>
<td>11</td>
<td>1.0207</td>
<td>0.9889</td>
</tr>
</tbody>
</table>
World Expected Weekly Maximum Profiles

PJM peak week

- 2014 WORLD
- 2015 WORLD

Per-Unit Load

- 0.93
- 0.83

Summer Weeks

- June
- July
- August
Summary - Why is the FPR increasing in the 2015 RRS?

• FPR increasing from 1.0847 to 1.0881 (or from 8.47% to 8.81%)
• Not because the average forced outage rate is higher in the 2015 RRS
• Because the load model selected this year is a better representation of the CP1 distribution in the 2015 Load Forecast
  – Had the load model selected this year (2003-2012) been a candidate last year, it would have been selected for the 2014 RRS
    • It was not a candidate because World hourly loads for Delivery year 2012/2013 were not available
• Also because the World’s peak is becoming more coincident with the PJM peak, thus reducing the CBOT
Next Steps

• Oct. 8, PC: vote on IRM and above parameters
• Nov-Dec, MRC and MC: review and vote on IRM and above parameters
• Dec-Jan, PJM Board: final approval
Questions / Discussion