Demand Response Auditing

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Disclaimer for Customer Training: ISO New England (ISO) provides training to enhance participant and stakeholder understanding. Not all issues and requirements are addressed by the training. Consult the effective Transmission, Markets and Services Tariff and the relevant Market Manuals, Operating Procedures and Planning Procedures for detailed information. In case of a discrepancy between training provided by ISO and the Tariff or Procedures, the meaning of the Tariff and Procedures shall govern.
## Acronyms

<table>
<thead>
<tr>
<th>ACR</th>
<th>Definition</th>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADCR</td>
<td>active demand capacity resource</td>
<td>NCPC</td>
<td>Net Commitment-Period Compensation</td>
</tr>
<tr>
<td>ATT</td>
<td>Audit and Testing Tool</td>
<td>NERC</td>
<td>North American Electric Reliability Corporation</td>
</tr>
<tr>
<td>CAMS</td>
<td>Customer Asset Management System</td>
<td>PRD</td>
<td>price-responsive demand</td>
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<tr>
<td>CCA</td>
<td>claimed capability audit</td>
<td>RTU</td>
<td>remote terminal unit</td>
</tr>
<tr>
<td>DDE</td>
<td>demand-designated entity</td>
<td>SA</td>
<td>security administrator</td>
</tr>
<tr>
<td>DDP</td>
<td>desired dispatch point</td>
<td>SMD</td>
<td>Standard Market Design</td>
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<td>DRA</td>
<td>demand response asset</td>
<td>TMSR</td>
<td>10-minute synchronized reserves</td>
</tr>
<tr>
<td>DRR</td>
<td>demand response resource</td>
<td>TMNSR</td>
<td>10-minute non-synchronized (nonspinning) reserves</td>
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<tr>
<td>DRMUI</td>
<td>Demand Response Market User Interface</td>
<td>TMOR</td>
<td>30-minute operating reserves</td>
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<td>FRPP</td>
<td>forward reserve procurement period</td>
<td>UCM</td>
<td>unit control mode</td>
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FRPP: forward reserve procurement period

ATT: Audit and Testing Tool

NCPC: Net Commitment-Period Compensation

NERC: North American Electric Reliability Corporation

PRD: price-responsive demand

RTU: remote terminal unit

SA: security administrator

SMD: Standard Market Design

TMSR: 10-minute synchronized reserves

TMNSR: 10-minute non-synchronized (nonspinning) reserves

TMOR: 30-minute operating reserves

UCM: unit control mode
<table>
<thead>
<tr>
<th>Release Date</th>
<th>Training Title</th>
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<tr>
<td>Oct 23, 2017</td>
<td>Demand Resources Working Group: <strong>Fully Integrated Price Responsive Demand Presentation</strong></td>
</tr>
<tr>
<td>Nov 7, 2017</td>
<td><strong>Price-Responsive Demand Overview</strong></td>
</tr>
<tr>
<td>Feb 28, 2018</td>
<td>Energy Market Offers &amp; Asset Management</td>
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<tr>
<td>Mar 8, 2018</td>
<td><strong>Q1 Settlements Forum</strong></td>
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<td>Mar 22, 2018</td>
<td><strong>Demand Response Registration</strong></td>
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<td>Mar 27, 2018</td>
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<tr>
<td>Mar 29, 2018</td>
<td><strong>Passive Demand Resource Registration and Auditing</strong></td>
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References

Operating Procedures
• No. 8 – Operating Reserve and Regulation
• No. 23 – Generator Resource Auditing

Manuals
• M-MVDR – Measurement and Verification of Demand Reduction Value from Demand Resources
• M-RPA – Registration and Performance Auditing

Tariff
• III.1.5.1 – Claimed Capability Audits
• III.1.7.12 – Seasonal DR Audit Value of an Active Demand Capacity Resource*

* Will be in the revised Tariff
Purpose of This Training

Prepare active demand resources for the new or changing audit requirements that will go into effect with price-responsive demand (PRD) on June 1, 2018
Topics

Seasonal DR audits for active demand response resources (DRR)

• Auditing rules and requirements
• DR Auditing and Testing Tool (ATT)
• Live software demo

Claim 10/30 DR audits for active DRR

Reserves
Claimed Capability Auditing (CCA) for Demand Response

Jim Nichols
Information About Audits in the Tariff

Specific Locations

PRD rules go into effect on June 1, 2018

Market Rule 1

- III.1.5.1 – Claimed Capability Audits
  - III.1.5.1.1 – General Audit Requirements
  - III.1.5.1.3.1 – Seasonal DR Audits
  - III.1.5.1.4 – ISO Initiated Claimed Capability Audits

- III.1.7.12 – Seasonal DR Audit Value of an Active Demand Capacity Resource
Claimed Capability Auditing for DR

*Main Topics*

**Auditing rules and requirements**

**Auditing and Testing Tool (ATT)**

- Including live demo
Claimed Capability Audits Are Performed by DRRs

DRRs participate in the Energy and Reserve Markets

DRAs provide actual load reduction

Active Demand Capacity Resource

Capacity Market Participation

Demand Response Resource #1
6 MW

Demand Response Resource #2
6 MW

Demand Response Resource #3
12 MW

Energy/Reserve Market Participation

Demand Response Resource Asset #1
6 MW

Demand Response Resource Asset #2
4 MW

Demand Response Resource Asset #3
2 MW

Demand Response Resource Asset #4
12 MW

No Direct Market Participation

Claimed Capability Audits Are Performed by DRRs
Claimed Capability Audits Are Performed by DRRs

- **ADCR**
- **DRR #1**: 6 MW
- **DRR #2**: 6 MW
- **DRR #3**: 12 MW
- **DRA #1**: 6 MW
- **DRA #2**: 4 MW
- **DRA #3**: 2 MW
- **DRA #4**: 12 MW

**Capacity Market Participation**
- DRRs participate in the Energy and Reserve Markets

**Energy/Reserve Market Participation**
- DRAs provide actual load reduction
Types of CCAs

Seasonal DR audit
• Customer initiated
  – Request to be dispatched for an audit
  – Use a past dispatch

ISO-initiated audit
• A seasonal DR audit that is initiated by the ISO
Seasonal DR Audits
Audit Seasons

Seasonal DR audits determine the ability of a DRR to perform during specified months for a specified duration.

Summer seasonal DR audit must be conducted:
- At least once every capability demonstration year
- During the months of April through November

Winter seasonal DR audit must be conducted:
- At least once every capability demonstration year
- During the months of December through March

You can submit multiple audits for a DRR

[Diagram showing the months of the year with a pie chart highlighting the months for audits]
### Capability Demonstration Year

*September 1 through August 31*

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<tr>
<td>Sep-2017</td>
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<td>Dec-2017</td>
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<td>Feb-2018</td>
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<td>Apr-2018</td>
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<td>Apr-2020</td>
</tr>
<tr>
<td>May-2018</td>
<td>May-2019</td>
<td>May-2020</td>
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</tbody>
</table>

- **Audit in Aug**: Need to audit again sometime in a 2018/2019 summer month.
Audit Time Requirement

Performed for 12 contiguous 5-minute intervals

12 contiguous 5-min intervals
Submitting an Audit: 2 Options

- Request Audit Dispatch
- Use Past Dispatch
Option: Request Audit Dispatch

• You enter your request via ATT
• ISO will dispatch between 0800 and 2200
  – Non-NERC holiday weekday
  – Within 5 business days following the request
  – Specific date and time unannounced

• Dispatch instruction will contain an audit flag and will order DRR to its offered max reduction
  – Audit start will be the first 5-minute interval after sufficient time has been allowed for your resource to ramp
    • Based on its demand reduction offer parameters in eMarket
  – You don’t qualify for Net Commitment-Period Compensation (NCPC) if you request a dispatch for an audit
Cancelling an Audit – 2 Steps

Lead market participant may cancel an audit request prior to issuance of the audit dispatch instruction.

Perform both of these actions to ensure DRR is not dispatched:

1. Demand-designated entity (DDE) call ISO control room
2. Cancel audit request in ATT (person with lead market participant access)
Audit Period for ISO Dispatch - Fixed

- Baseline Adjustment Period
- Notification Time
- Start up Time
- Ramp Time

Audit
1 Hour (12 intervals)

Demand Reduction

Baseline MW
Adjusted Baseline MW
Load MW

Energy Settlement

Audit Dispatch Notification
Audit Start
Audit End

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Option: Use a Past Dispatch

• Can choose 12 contiguous 5-minute intervals during a past dispatch
  – Starting with any 5-minute interval after the completion of notification time
  – Performance information can be accessed via demand response market user interface (DRMUI)

• Lead market participant must notify the ISO
  – Via ATT
  – By 5:00 p.m. on the fifth business day following the dispatch
  – Enter the date and start time

• Request cannot be cancelled
  – If submission has less than 12 valid 5-min intervals → cancelled
Audit Period for a Past Dispatch – You Choose

Use Past Dispatch

Choose any 1 hour (12 contiguous intervals) that fall within a dispatch
Seasonal Audit Value of a DRR

Sum of the average demand reductions demonstrated during the audit by each of the DRAs associated with it

- A DRA must be operational to contribute to the audit
- Any DRA on a forced or scheduled curtailment is assessed a zero contribution

Results effective one day following processing of the audit results by the ISO
Effect of DRA *Not* Performing an Audit

As Part of a DRR During a Demonstration Year

Its audit contribution for the missed season will be set to zero at end of demonstration year
Effect of Adding or Removing DRAs from a DRR

DRR’s seasonal DR audit value is updated to match new configuration
ISO-Initiated CCA
ISO-Initiated CCA

• ISO may call on a DRR to perform at any time

• Audit is unannounced

• Results replace either summer or winter seasonal DR audit value

• Fulfills the seasonal DR audit obligation of a DRR
How an ISO-Initiated Audit Works

• Dispatch instruction will order DRR to its offered max reduction

• Audit is 1 hour and will start with the first five-minute interval after sufficient time has been allowed for the resource to ramp (based on its demand reduction offer parameters)

• These audits are evaluated for NCPC compensation
  – In accordance with Market Rule 1, Appendix F - Net Commitment-Period Compensation (NCPC) Accounting
Active Demand Capacity Resource (ADCR)
Seasonal DR Audit Value of an ADCR

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Seasonal DR audit values are maintained for all ADCRs

ADCR seasonal DR audit value is sum of its DRRs’ seasonal DR audits

ADCR 12 MW

DRR #1 6 MW

DRR #2 6 MW

DRA #1 6 MW

DRA #2 4 MW

DRA #3 2 MW

12 MW

30
Impacts of Audits on FCM

As of June 1, 2018: audit results will not be used for FCM settlement

• Pay-for-performance will be in effect

Other impacts of audit values remain and will not be covered as part of this presentation
Data Conversion

Record Seeding in ATT
Names and IDs – What Changes? What Stays the Same?

Existing capacity resources become ADCRs: same name same ID

New!! System-generated name & ID

Existing DR assets converted: same name new ID

ADCR

DRR #1

DRA #1

DRR #2

DRA #2

DRR #3

DRA #3

DRA #4

DRA #4
ATT Will be Seeded

Audit records for audits previously performed by demand capacity resources
- Showing the asset results that were associated with it

Summer conversion audit record to introduce the DRR
- Reflecting most recent audit results as of end of summer 2017
- Summer 2017 audits will expire August 31, 2018
  - Need to audit between June 1st and August 31st 2018

Winter conversion audit record to introduce the DRR
- Reflecting most recent winter audit results as of end of January 2018
- Winter 2017/2018 audits will expire August 31, 2019
  - Need to audit between December 1st 2018 and end of March 31st 2019
Seeded Audit Record

Actual Audit

<table>
<thead>
<tr>
<th>Request ID</th>
<th>Requestor Name (ID)</th>
<th>Audit Type</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>688</td>
<td>ATT Test Customer 1, Test User 1 (999999691)</td>
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<table>
<thead>
<tr>
<th>Audit Status</th>
<th>Audit Source</th>
<th>Post Dispatch Audit</th>
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</thead>
<tbody>
<tr>
<td>COMPLETE</td>
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<table>
<thead>
<tr>
<th>Resource</th>
<th>Demand Response Resource Name (ID)</th>
<th>CSO MW</th>
<th>Net CSO MW</th>
<th>Audit Results</th>
<th>Load Zone Name (ID)</th>
<th>Aggregation Zone Name (ID)</th>
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<tr>
<td>Capacity Resource Type</td>
<td>Demand Capacity Resource 2 (60930)</td>
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<td>4226</td>
<td>SEMA (4006)</td>
<td>DR MA_SEMA (7613)</td>
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<table>
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<th>Dates</th>
<th>Submitted</th>
<th>Audit Window Start</th>
<th>Audit Window End</th>
<th>Actual Audit Start</th>
<th>Actual Audit End</th>
<th>Earliest Audit Expiration</th>
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<tr>
<td></td>
<td>06/30/2017 15:06</td>
<td>07/05/2017</td>
<td>08/02/2017</td>
<td>07/19/2017 16:30</td>
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<th>07/19/2017</th>
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<th>Audit Results</th>
<th>Status History</th>
<th>Dispatch Info</th>
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<table>
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<th>Asset ID</th>
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<td>60413</td>
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<td>50444</td>
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Seeded Audit Record

*Summer Conversion Audit Record to Introduce DRR*

### Audit Request Details

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<td>88984</td>
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<td>Initial data population, not an actual audit</td>
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<th>Audit Status</th>
<th>Audit Source</th>
<th>Post Dispatch Audit</th>
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<td>COMPLETE</td>
<td>CUSTOMER</td>
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### Resource

<table>
<thead>
<tr>
<th>Capacity Resource Type</th>
<th>CSO MW</th>
<th>Net CSO MW</th>
<th>Demand Response Resource Name (ID)</th>
<th>Audit Results</th>
<th>Load Zone Name (ID)</th>
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<td>DR MA_SEMA (7513)</td>
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### Dates

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<tr>
<th>Submitted</th>
<th>Audit Window Start</th>
<th>Audit Window End</th>
<th>Actual Audit Start</th>
<th>Actual Audit End</th>
<th>Earliest Audit Expiration</th>
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### Audit Results

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<td>60562</td>
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**New Asset IDs**

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DR Audit and Testing Tool

Seasonal DR Audits
Purpose of ATT

• Submit active seasonal DRR audits and view results

• Submit claim 10/30 audit requests for active DR
  – Only for submissions - not results
  – Claim 10/claim 30 is covered later in this presentation

• Submit passive (on-peak and seasonal peak) DR audits and view results
  – Covered in March 29, 2018 webinar
Single Sign-On (SSO) Requires a Digital Certificate

• Digital certificate is issued to your company’s security administrator (SA) by ISO

• Your company’s SA assigns your access

• Standard Market Design (SMD) Applications Home Page
  – [https://smd.iso-ne.com](https://smd.iso-ne.com)

Don’t know who your company’s SA is? Call ISO Customer Support and we’ll help you find out.
User Roles

Sandbox/Production

- A&TT / Lead Participant Maintainer
- A&TT / Lead Participant Read Only
- A&TT / Demand Designated Entity Read Only

Request these roles from your company’s SA

Sandbox available on April 2, 2018
ATT DRR Audit Types

Seasonal
• Request dispatch, or
• Use past dispatch

Claim 10/Claim 30
• Request dispatch

Both Seasonal + Claim 10/30
• Request dispatch
**Process Flow: Scheduled Seasonal Audit**

- **Submit**

  - **≤ 5 Business Days**
    - **1.5 Business Days**

  - May cancel prior to dispatch

- **When data resubmission deadline closes**
  - Once each DR asset is either approved or deferred
  - Once each DR asset is either approved or failed

- **DRR**: Cannot request audits with overlapping windows unless prior audit(s) already dispatched

- If ISO ends the dispatch with less than 12 intervals completed, audit status goes to
  - **Seasonal**: cancelled
  - **Seasonal + claim 10/30**: partially completed
Process Flow: Using a Past Dispatch as a Seasonal Audit

1.5 Business Days

When submitted audit will progress to “Waiting for Dispatch Data” and then to “Initial Review In Progress”

Once each DR asset is either approved or deferred

When data resubmission deadline closes

Once each DR asset is either approved or failed

SUBMIT within 5 Business Days
Process Flow: Claim10/Claim30 Audit

May cancel prior to dispatch

≤ 5 Business Days

SUBMIT

PENDING → SCHEDULED → DISPATCH RECEIVED → COMPLETE
Auditing and Testing Tool Demonstration
Operating Reserves

Kory Haag
Reserve Definitions – 10 Minutes

**Ten Minute Spinning Reserve (TMSR)** – can be provided from DRR that is dispatched and has no controllable generation

**Ten Minute Non-Spinning Reserve (TMNSR)** – can be provided by DRR that is currently not dispatched but can be dispatched in 10 minutes or less
Converting Reserves to Energy – Time Requirements (TMSR and TMNSR)

Resources providing TMSR and TMNSR are dispatched up by the ISO in real time in response to a loss of supply

- Under NERC standard BAL-002-1 (R4.1), the ISO must ensure that the lost supply is replaced within 15 minutes of the occurrence of the contingency
- ISO uses Ten Minute Reserve (TMR) in order to provide operators time to react to the supply loss and meet the NERC Standard
Reserve Definitions – Thirty Minutes

**Thirty Minute Operating Reserve (TMOR)** – can be provided by dispatched or not dispatched DRR that can be dispatched within 30 minutes.
Resources providing TMOR are dispatched up by the ISO in real-time when the available TMSR and TMNSR is below or is expected to be below the total system TMR requirement

- Under NERC standard BAL-002-1 (R4.1), the ISO must restore its total system TMR requirement either:
  1. Within 115 minutes if the deficiency was caused by a NERC-reportable supply loss or
  2. Within 90 minutes from the time when there was insufficient resources providing the TMR product to meet the total system TMR requirement (if the deficiency was not caused by a NERC-reportable supply loss)
Measuring DRR Performance

Determining Reserves
DRR Performance Audits

3-Types

1. ISO-initiated
2. Participant requested
3. Normal dispatch
Audit Periodicity Requirement

Once every forward reserve procurement period (FRPP)

- Summer FRPP: June, July, August, September
- Winter FRPP: October, November, December, January, February, March, April, May
Performance is Measured at the DRR Level

• Only uses real-time telemetry
  – No corrections are used

• DRA performance is aggregated to the DRR performance

• If a DRA is added to or removed from a DRR the claim 10/30 value is not affected

• Participant’s responsibility to maintain claim 10/30 offer to reflect actual capability

• Performance factor will be affected if offers are not accurate
  – More on performance factor later in this presentation
Claim 30 Capability
Calculated weekly, effective for the next Monday-Sunday

ISO calculates the **TMOR** capability of a DRR that has not been dispatched as the lower of the **claim 30** value or the **offered claim 30**.

**Claim 30 Capability**
Used for:
- Settlements
- Real time reserve calculations
- **Performance factor calculation**

**Offered Claim 30**
- Provides a Market Participant the ability to offer (or redeclare) a **TMOR** capability that is different than the claim 30 of the DRR that has not been dispatched

- Maximum amount of **TMOR** that can be allocated to a DRR that has not been dispatched
Claim 30 Value

Claim 30 Capability
Used for:
• Settlements
• Real time reserve calculations
• Performance factor calculation

Claim 30 = Maximum Reduction Level × Performance Factor

Offered Claim 30
Claim 30 Value Upon Full Integration of PRD

On June 1, 2018, and October 1, 2018:

• Maximum reduction level for DRR will equal 30 minute performance for DRAs that were active in Summer 2017 and Winter 2017-2018
  – Value will be removed ~ 4 weeks after the start of each FRPP in 2018
• Performance factor will equal 1.0 until first startup dispatch
Maximum Reduction Level

- Highest reduction a resource has reached at **30 minutes** in the current or previous like FRPP
Maximum Reduction Level Carryover

- Becomes effective from the week of the increase and going forward for the current FRPP
- Carries forward to the next like FRPP
Measuring DRR Reduction

- Use real-time telemetry values
  - 5 minute data for TMOR
- Measure at 30 minutes from dispatch time
  - Interpolate between data points

(t = 30)  \( \rightarrow \)  \( t = 60 \)

End of the measurement period
30 minutes and 60 minutes

Desired Dispatch Point (DDP)
Increasing a Resource’s Maximum Reduction Level

<table>
<thead>
<tr>
<th>Economic Dispatch</th>
<th>Formal Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Normal economic dispatch</td>
<td>1. Market participant requests an audit</td>
</tr>
<tr>
<td>2. Reduction at 30 minutes greater than current maximum reduction level</td>
<td>2. Requested DDP is sent on unannounced dispatch</td>
</tr>
<tr>
<td>3. The maximum reduction level is raised prospectively (limited by DDP)</td>
<td>3. Reduction at 30 minutes is greater than current maximum reduction level</td>
</tr>
<tr>
<td></td>
<td>4. The maximum reduction level is raised prospectively</td>
</tr>
</tbody>
</table>
A **performance factor** allows ISO to model a resource’s historical ability to achieve **target value** from a not dispatched state.

- Calculated for each resource based on the performance in its previous **ten** startups (limited by 3 years).
- Uses weighted average calculation.
Performance Factor and Target Value

Each time a fast-start DRR is dispatched from a not dispatched state its performance is evaluated based upon its reduction at 30 minutes, in relation to its target value.
Target Value

• Minimum expected reduction the resource should meet at 30 minutes based upon offered parameters
• Compared to actual resource reduction at 30 minutes to determine whether the resource met expectations
• Directly affected by participant supply offer parameters:
  – DDP (dependent upon startup time, notification time, response rate)
  – Claim 30 capability
  – Maximum reduction / minimum reduction
Determining the Target Value

Target Value is the \textbf{minimum} of these values

Find the \textbf{minimum} of these two numbers

Find the \textbf{maximum} of these two numbers

\begin{tabular}{|c|c|c|c|}
\hline
Claim 30 & Offered Claim 30 & Desired Dispatch Point (DDP) & Min Reduction \\
\hline
48 & 50 & 60 & 30 \\
\hline
\end{tabular}

The \textbf{minimum} value is 48 MW

The \textbf{Target Value} is 48 MW

The \textbf{maximum} value is 60 MW
## Target Value Scenarios

The **Target Value** is compared to actual resource reduction to calculate the performance factor.

The **Target Value** is the **minimum** of these values.

<table>
<thead>
<tr>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Desired Dispatch Point (DDP)</th>
<th>Minimum Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>50</td>
<td>50</td>
<td>30</td>
</tr>
</tbody>
</table>

Find the **minimum** of these two numbers.

Find the **maximum** of these two numbers.

**Target Value** = 20 MW
Calculating Performance Factor

Finding the Dispatch Performance

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Value</td>
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<td></td>
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<td></td>
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<tr>
<td>Actual Output</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispatch Performance (Actual Output / Target Output)</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Weighted Dispatch Performance (Dispatch Performance x Weighting Factor)</td>
<td></td>
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</tr>
</tbody>
</table>

**Dispatch Performance** is limited to 1.0

\[
\text{Performance Factor} = \frac{\sum_{n=1}^{10} \left( \frac{\text{Actual Reduction at 30 minutes}}{\text{Target Value}} \right) \ast n}{\sum_{n=1}^{10} n}
\]
Calculating Performance Factor

| Weighting Factor / Start Number | 10 | 9 | Add these numbers together | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|--------------------------------|----|---|-----------------------------|---|---|---|---|---|---|---|---|---|
| Target Value                  |    |   |                             |   |   |   |   |   |   |   |   |   |
| Actual Output                 |    |   |                             |   |   |   |   |   |   |   |   |   |
| Dispatch Performance          |    |   |                             |   |   |   |   |   |   |   |   |   |
| (Actual Output / Target Value)|    |   |                             |   |   |   |   |   |   |   |   |   |
| Weighted Dispatch Performance |    |   |                             |   |   |   |   |   |   |   |   |   |
| (Dispatch Performance x Weighting Factor) | Add these numbers together | Sum of weighted dispatch performance. | Performance Factor | = \[
\sum_{n=1}^{10} \left( \frac{\text{Actual Output at 10 minutes}}{\text{Target Value}} \times n \right)
\]
| Sum of weighting factor       |    |   |                             |   |   |   |   |   |   |   |   |   |
DRR Sustainability Caveat

• DRR must remain in service for **60 minutes** following the initial dispatch
  – Unit control mode (UCM) of 2 or higher

• Does not require the DRR to be dispatched for 60 minutes.
  – May have a minimum reduction time of less than 60 minutes
DRR Sustainability

1. DRR meets target at 30 minutes
2. DRR goes out of service at 55 minutes after the dispatch

Result: DRR will receive an reduction of zero (0) MW at 30 minutes in performance factor calculation.
Questions?

Next:

• Examples of calculating performance factor
• Specific scenarios which affect claim 30
### Performance Factor Example 1

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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<tbody>
<tr>
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<td>48</td>
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<tr>
<td>Actual Reduction</td>
<td>48</td>
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<td>48</td>
<td>48</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(Actual Reduction / Target Reduction)</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Weighted Dispatch Performance</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>(Dispatch Performance x Weighting Factor)</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- **DRR has a starting performance factor = 1.0**
  - 10 starts in last 3 years
  - DRR reached target value during each start
- **DRR receives a startup DDP**
Example 1

**Step 1. Find the Target Value**

The **minimum** value is 48 MW.

<table>
<thead>
<tr>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Desired Dispatch Point (DDP)</th>
<th>Economic Minimum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>50</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

The **maximum** value is 60 MW.

The **Target Value** is 48 MW.

---

**Results from the most recent start:**

<table>
<thead>
<tr>
<th>DDP</th>
<th>Target Value</th>
<th>Actual Reduction</th>
<th>Dispatch Performance (Actual Reduction ÷ Target Reduction)</th>
<th>Weighted Dispatch Performance (Dispatch Performance × Weighting Factor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>48</td>
<td>40</td>
<td>40/48</td>
<td>8.3</td>
</tr>
</tbody>
</table>
# Example 1

**Step 2. Calculate Performance Factor**

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Value</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Actual Reduction</td>
<td>40</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
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<tr>
<td>Dispatch Performance</td>
<td>40/48</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
</tr>
<tr>
<td>Weighted Dispatch Performance</td>
<td>8.3</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Results from the most recent start:

<table>
<thead>
<tr>
<th>DDP</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Value</td>
<td>48</td>
</tr>
<tr>
<td>Actual Reduction</td>
<td>40</td>
</tr>
<tr>
<td>Dispatch Performance (Actual Reduction ÷ Target Reduction)</td>
<td>40/48</td>
</tr>
<tr>
<td>Weighted Dispatch Performance (Dispatch Performance × Weighting Factor)</td>
<td>8.3</td>
</tr>
</tbody>
</table>

This becomes the most recent start.
Example 1

Step 2. Calculate Performance Factor

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
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<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Value</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Actual Output</td>
<td>40</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Dispatch Performance</td>
<td>40/48</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>(Actual Output / Target Output)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Dispatch Performance</td>
<td>8.3</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Performance Factor = \[
\frac{8.3 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1}{10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1} = \frac{53.3}{55} = 0.969
\]
Performance Factor Example 2

- Using the same target value as the previous example
- Assume that same DRR has had only 3 previous starts in last 3 years and each one the resource has reached target value
  - Starting Performance Factor is 1.0
- DRR receives startup DDP

**Results from the most recent start:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DDP</td>
<td>60</td>
</tr>
<tr>
<td>Target Value</td>
<td>48</td>
</tr>
<tr>
<td>Actual Reduction</td>
<td>40</td>
</tr>
<tr>
<td>Dispatch Performance</td>
<td>40/48</td>
</tr>
<tr>
<td>Weighted Dispatch Performance</td>
<td>8.3</td>
</tr>
</tbody>
</table>
### Example 2

*Calculate Performance Factor*

Results from the most recent start:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DDP</strong></td>
<td>60</td>
</tr>
<tr>
<td><strong>Target Value</strong></td>
<td>48</td>
</tr>
<tr>
<td><strong>Actual Reduction</strong></td>
<td>40</td>
</tr>
<tr>
<td><strong>Dispatch Performance</strong></td>
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</tr>
<tr>
<td><strong>Weighted Dispatch Performance</strong></td>
<td>8.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target Value</strong></td>
<td>48</td>
<td>48</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actual Reduction</strong></td>
<td>40</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dispatch Performance</strong></td>
<td>40/48</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>Weighted Dispatch Performance</strong></td>
<td>8.3</td>
<td>9</td>
<td>8</td>
<td>7</td>
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</tr>
</tbody>
</table>
## Example 2

Calculate Performance Factor

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Value</td>
<td>48</td>
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<tr>
<td>Actual Output</td>
<td>40</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispatch Performance (Actual Output / Target Output)</td>
<td>40/48</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Dispatch Performance (Dispatch Performance x Weighting Factor)</td>
<td>8.3</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$$\text{Performance Factor} = \frac{8.3 + 9 + 8 + 7}{10 + 9 + 8 + 7} = 0.95$$
Specific Scenarios Which Affect Claim 30

• How a resource can increase their maximum reduction level and claim 30
• How a resource can control the amount of reserves it offers to ensure that it can achieve its target value
• How a resource that underperforms gets a reduced claim 30
• How a resource that meets its target value increases its claim 30
Increasing Claim 30

WEEK 1:
- Min Reduction / DDP = 60 MW
- Claim 30 Capability = 50 MW
- Actual Reduction = 56 MW
**Increasing Claim 30**

Increasing the maximum reduction level will increase the Claim 30 of a resource.

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
<th>DDP</th>
<th>Target Value</th>
<th>Actual Reduct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>1.0</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>1.0</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>56</td>
<td>0.909</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
</tbody>
</table>

ISO honors minimum reduction constraint and sends a DDP of **60 MW**

Resource produces **56 MW** at 30 minutes.
Increasing Claim 30

Assuming no additional dispatches in Week 1, the maximum reduction level in Week 2 will increase to 56 MW since it demonstrated the ability to reach 56 MW.

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Output Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
<th>DDP</th>
<th>Target Value</th>
<th>Actual Reduct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>1.0</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>56</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The resource performed up to its target value, so the **performance factor** remains at **1.0**.
1. How Maximum Reduction Affects Claim 30

\[
\text{Claim 30} = \text{Maximum Reduction Level} \times \text{Performance Factor}
\]

For the given example:

- **Week 1**:
  - Maximum Reduction Level: 50
  - Performance Factor: 1.0
  - Claim 30 Value: 50
  - Offered Claim 30: 50
  - Minimum Reduction: 60
  - DDP: 60
  - Target Value: 50
  - Actual Reduction: 56

- **Week 2**:
  - Maximum Reduction Level: 56
  - Performance Factor: 1.0
  - Claim 30 Value: 50
  - Offered Claim 30: 50
  - Minimum Reduction: 60
  - DDP: 60
  - Target Value: 50
  - Actual Reduction: 56
2. Achieve Target Value by Controlling Reserves

**WEEK 2:**
- Min Reduction / DDP = 60 MW
- Claim 30 Capability = 20 MW
- Actual Reduction = 22 MW

**Graph:**
- **Reduction (MW):**
  - **60 MW**
  - **20 MW**

**Time (minutes):**
- **t = 0**
- **t = 30**

- Same resource as example 1
- For the operating day in question in week 2, the ISO uses 20 MW as the **claim 30 capability.**
2. Achieve Target Value by Controlling Reserves

If the minimum reduction of the resource continues to be 60 MW, ISO will send a DDP of 60MW.

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
<th>DDP</th>
<th>Target Value</th>
<th>Actual Reduct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>1.0</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>56</td>
<td>1.0</td>
<td>56</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Achieve Target Value by Controlling Reserves

The resource reached the Target Value in 30 minutes, so Week 3 performance factor remains at 1.0 and the claim 30 remains at 56 MW.

ISO dispatches a resource from a not dispatched state with these assumptions:

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
<th>DDP</th>
<th>Target Value</th>
<th>Actual Reduct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
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<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>56</td>
<td>1.0</td>
<td>56</td>
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</table>
3. Effect on Claim 30 When a Resource Does Not Reach Target Value

WEEK 3:
Min Reduction / DDP = 60 MW
Claim 30 Capability = 20 MW
Actual Reduction = 10 MW

- Same resource as Example 2
- Reduction at 30 minutes is lower than target value
3. Effect on Claim 30 When a Resource Does Not Reach Target Value

A Market Participant offers a claim 30 of 20 MW for the resource from Example 2, but the resource does not meet its target value.

ISO dispatches a resource from a not dispatched state with these assumptions:

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
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<th>Actual Reduct.</th>
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WEEK 3:
Min Reduction / DDP = 60 MW
Claim 30 Capability = 20 MW
Actual Reduction = 10 MW
### 3. Effect on Claim 30 When Resource Does Not Reach Target Value

<table>
<thead>
<tr>
<th>Weighting Factor / Start Number</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
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<td>Actual Reduction</td>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td>Weighted Dispatch Performance</td>
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**Performance Factor**

\[
\text{Performance Factor} = \frac{5 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1}{10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1} = 0.909
\]
3. Effect on Claim 30 When a Resource Does Not Reach Target Value

When performance factor decreases in Week 3, it causes the Claim 30 to decrease in Week 4.

ISO dispatches a resource from a not dispatched state with these assumptions:

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<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
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</table>
Actual Reduction ≥ Target Value

WEEK 4:

- Min Reduction / DDP = 60 MW
- Claim 30 Capability = 50.9 MW
- Actual Reduction = 48 MW

- Maximum reduction level of 56 MW
- Market Participant offers claim 30 capability of 48 MW
- Target value is 48 MW

Reduction (MW)

Time (minutes)

Output

60 MW

\[ t = 0 \]

\[ t = 30 \]
4. **Actual Reduction ≥ Target value**

**WEEK 4:**
- Min Reduction / DDP = 60 MW
- Claim 30 Capability = 50.9 MW
- Actual Reduction = 48 MW

<table>
<thead>
<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
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</table>
4. Actual Reduction ≥ Target Value

- Performance factor will increase because, for this dispatch, a value of 1 will be utilized in calculating the performance factor.
- Claim 30 will increase because the performance factor increased.

<table>
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<tr>
<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
<th>Minimum Reduction</th>
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### Example 4: Actual Reduction ≥ Target Value

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<tr>
<td>Weighted Dispatch Performance (Dispatch Performance x Weighting Factor)</td>
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</table>

\[
\text{Performance Factor} = \frac{10 + 4.5 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1}{10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1} = 0.918
\]
Example 4: Actual Reduction ≥ Target value (cont.)

Claim 30 = Maximum Reduction Level × Performance Factor

56 MW × .918 = 51.4 MW

<table>
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<th>Week</th>
<th>Maximum Reduction Level</th>
<th>Performance Factor</th>
<th>Claim 30</th>
<th>Offered Claim 30</th>
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Questions?

Next:

- *Performance factor cure*
- *Reports*
Performance Factor Cure

• May be requested if unit has:
  – Chronic problem that meets criteria in Market Rule
  – Major overhaul
• Submit plan to ISO
• Perform maintenance
• Perform audit
• Following audit:
  – All prior history is removed
  – Performance factor set to 1
# Claim10/30 Notification of Starts

## Claim 10/30 Notification of Starts

**OI_CLAIM1030STARTNOTIFICATION_LP_0220201813561200.xls**

**LeadParticipant**

**Market Day: 02/16/2018 and Version: 02/20/2018 13:56:12 GMT**

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<th>Asset ID</th>
<th>Date of Start</th>
<th>10-Minute Target</th>
<th>10-Minute Output</th>
<th>30-Minute Target</th>
<th>30-Minute Output</th>
<th>60 Min In-Service Flag</th>
<th>10-Minute Requested Audit Flag</th>
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# Weekly Claim 10/30 Report

**Market Day:** 02/19/2018 and **Version:** 02/15/2018 13:53:51 GMT

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<th>Claim 30 Maximum Reduction</th>
<th>10-Minute Maximum Reduction</th>
<th>30-Minute Maximum Reduction</th>
<th>Upcoming Forward Reserve Procurement Period Claim 10 Seasonal Baseline</th>
<th>Upcoming Forward Reserve Procurement Period Claim 30 Seasonal Baseline</th>
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<th>30-Minute Performance Factor</th>
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</tbody>
</table>

Note: The 10-Minute and 30-Minute Maximum Output values will be used for Claim 10 and Claim 30 calculations in the next like Forward Reserve Procurement Period, unless the unit reaches a higher output prior to the end of this Forward Reserve Procurement Period through either an audit or economic dispatch.
Do what you offer.

Offer what you do.
Questions?
Customer Support Information

**Ask ISO** (preferred)

- Self-service interface for submitting inquiries
- Accessible through the SMD Applications Homepage
- Requires a valid digital certificate with the role of Ask ISO/External User (Contact your security administrator for assistance)

<table>
<thead>
<tr>
<th>Method</th>
<th>Contact Information</th>
<th>Availability</th>
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<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:custserv@iso-ne.com">custserv@iso-ne.com</a></td>
<td>Anytime</td>
</tr>
<tr>
<td>Phone*</td>
<td>(413) 540-4220</td>
<td>Monday through Friday 8:00 a.m. to 5:00 p.m. (EST)</td>
</tr>
<tr>
<td>Pager</td>
<td>(877) 226-4814</td>
<td>Outside of regular business hours</td>
</tr>
</tbody>
</table>

* Recorded/monitored conversations
Appendix
DRA Operational Status Requirements

• It is in the Monthly Communications Model (*registration process*)
  – ‘Approved’ by ISO in CAMS
  – Telemetry is installed & operational
  – Mapped to an operational DRR

• It has a baseline built for the day-type (*only done once*)

• Meter issue flag is set to ‘No’ in CAMS

• Has no scheduled curtailments in CAMS for the operating day

If any of these criteria are not met the DRA’s status is automatically non-operational and it will not contribute to DRR reduction values