Generating Availability Data System (GADS) as Used Under NYISO Rules

Mathangi Srinivasan
Senior Market Trainer, NYISO

GADS Training for Generator Owners/Operators

May 8, 2018, Rensselaer, NY
Housekeeping Items

- Wear Photo ID Badge above the waist at all times
  - Be sure to turn badge in and sign out at end of each class day
- Picture taking is *not allowed* on NYISO Premises, in or outside the building
- Safety Procedures:
  - Fire Alarm
  - Lockdown
- Restroom Locations
- Designated Smoking Area
- Meals and Beverages
- Work Station
  - Materials and Table Top Microphones
Course Objectives

Attendees will:

- Learn the origin of the Generating Availability Data System (GADS) from NERC’s perspective
- Understand NYISO’s use of GADS data
- Name the three types of GADS data
- Identify the NYISO-required Design data fields
- Become familiar with the elements and layout of Event Records
- Distinguish between the different Unit States, Cause Codes, and Contribution Codes
Course Objectives

- Understand the process of Generator Outage Scheduling with the NYISO
- Become familiar with the elements and layout of Performance Records
- Recognize common reporting errors
- Understand NYISO’s use of GADS data to calculate derating (EFORd) factors
- Identify potential penalties/sanctions for noncompliance with GADS reporting to the NYISO
Agenda for today

- Introduction
- Design and Event entry
- Outage scheduling
- Performance entry
- Calculation of EFORd
- Scenarios
- GADS Portal Demo
- Panel Discussion
Note: Information provided regarding NERC rules and requirements is provided solely as an overview for background and context of NYISO requirements. The NYISO is not informing or advising attendees on obligations for NERC requirements or procedures.
GADS- Introduction
GADS Origin

Generating Availability Data System

- Objective of GADS: Compilation and maintenance of an accurate, dependable, and comprehensive database capable of monitoring the performance of electric generating units and pieces of equipment

- Established by NERC in 1982 to expand data collection activities begun in the 1970s.

- Uses IEEE Standard 762, “Definitions for Use In Reporting Electric Generating Unit Reliability, Availability and Productivity”
GADS Overview

- General GADS information and the “GADS Data Reporting Instructions” (DRI) may be found at
  
  http://www.nerc.com/pa/RAPA/gads/Pages/Data%20Reporting%20Instructions.aspx

- The GADS Data Reporting Instructions document details the procedures, format, and frequency to follow when reporting data to NERC
GADS Overview

- Mandatory GADS Submittal
  - All conventional units 20 MW or larger submit GADS data to NERC
  - Beginning in 2013

- Non-mandatory GADS Submittal
  - Wind and solar units (not mandatory at this time) please see FAQs at:

- See NERC website for details
GADS Overview

- The three types of data reported:
  - Design
    - Identifies the unit as an unique entity
  - Event
    - Specific data for each unit event
      - Derating, Maintenance, Outage, Reserve Shutdowns
  - Performance
    - Summary of unit operation for a month
## Differences between NERC and NYISO requirements

<table>
<thead>
<tr>
<th></th>
<th>NERC</th>
<th>NYISO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Submission requirement</strong></td>
<td>Mandatory for 20 MW or larger conventional units effective 2013</td>
<td>Required for non-SCR ICAP suppliers</td>
</tr>
<tr>
<td><strong>Data Submission</strong></td>
<td>End of the month following the end of a quarter. Jan-Mar reported by 30 Apr</td>
<td>Each month (YTD) reported by the 20th of the following month – Jan to April data – reported by May 20th</td>
</tr>
<tr>
<td><strong>Data Required</strong></td>
<td>All data defined in “GADS Data Reporting Instructions” sections III &amp; IV (as mandatory)</td>
<td>In the NYISO ICAP Manual (Attachment K)</td>
</tr>
<tr>
<td><strong>Data Formats</strong></td>
<td>One format; decimal only</td>
<td>One format: decimal only (YTD data only)</td>
</tr>
</tbody>
</table>
NYISO & GADS

- NYISO’s use of GADS data
  - NYISO and the New York State Reliability Council’s (NYSRC) Reliability Studies
  - Installed Reserve Margin (IRM) determination for the New York Control Area (NYCA)
  - Calculation of Derating Factors (EFORd) for the Installed Capacity (ICAP) Market
Installed Reserve Margin (IRM)

- Capacity above firm system load, required to provide for equipment (forced and scheduled) outages and transmission capability limitations, expressed as a percentage
  - GADS reporting provides data about equipment outages
- Established annually by the NYS Reliability Council (NYSRC) for the upcoming Capability Year
- Based on the Northeast Power Coordinating Council (NPCC) Standard for Resource Adequacy
- Required for the calculation of the Installed Capacity needs of NY and to operate NYISO’s capacity markets
Equivalent Forced Outage Rate demand (EFORd)

- The Services Tariff defines it as: “The portion of time a unit is in demand, but is unavailable due to forced outages”
  - GADS reporting provides data about unit outages and derates
- NYISO uses EFORd to calculate the UCAP (Unforced Capacity) of a Unit

\[
\text{UCAP} = \text{Available ICAP} \times (1 - \text{EFORd})
\]

- Refers to the historical availability of a generating unit and is associated with the unit’s deliverability

*Markets Services Tariff-Definitions 2.5
NYISO & GADS

- NYISO’s Tariff and Regulatory Requirements
  - NYISO Market Service Tariff 5.12.5
  - NYS Reliability Council Rule I-R2 & Requirement 2
  - NERC’s Rules of Procedure Section 1600
Let’s Review

What is the meaning of the acronym DRI?

a) Development of Regional Impact
b) Dynamic Rating Information
c) Data Reporting Instructions
d) Date Required In-place
e) None of the above
Let’s Review

Name the types of data collected by GADS

a) Event & Performance
b) Design, Event & Performance
c) Event
NYISO GADS DESIGN DATA
Identifies the unit as a unique entity
Design Data

- Generators are required to submit this data to the NYISO (typically once), separate and distinct from what a generator may submit to NERC

- Design data required by the NYISO is a shorter list than that required by NERC
Design Data

- Utility (Company) Code (3-character)
- Unit Code (3-character; alpha-numeric)
- Unit Name & Abbreviation (Short Name)
- Maximum Net Capacities
- Commercial In-Service Date
- Service Hour Method
## Unit Code Criteria

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-1ZZ</td>
<td>Fossil (Steam) (Use 600-649 if additional numbers are needed)</td>
</tr>
<tr>
<td>200-2ZZ</td>
<td>Nuclear</td>
</tr>
<tr>
<td>300-3ZZ</td>
<td>Combustion Turbines (use 700-7ZZ if add’l numbers needed)</td>
</tr>
<tr>
<td>400-4ZZ</td>
<td>Diesel Engines</td>
</tr>
<tr>
<td>500-5ZZ</td>
<td>Hydro/Pumped Storage Units (use 900-9ZZ if add’l numbers needed)</td>
</tr>
<tr>
<td>650-6ZZ</td>
<td>Fluidized Bed Combustion Units</td>
</tr>
<tr>
<td>800-8ZZ</td>
<td>Misc (Multi-Boiler/Multi-Turbine, Geothermal, Combined Cycle, etc)</td>
</tr>
</tbody>
</table>
Let's Review

Generator is required to provide Design data as part of the periodic data collection process

a) True
b) False
GADS EVENT DATA
Data about each unit event
NYISO Event Data

- Reported on at least two separate records

  - **Record 01**
    - Utility, Unit, Year, Event Number, Revision Code, Event Type
    - Start of Event (Date/Time), End of Event (Date/Time), Net Available Capacity

  - **Record 02**
    - Utility, Unit, Year, Event Number, Revision Code, Event Type
    - Cause Code & Event Contribution Code
## Event Elements (Key Elements)

<table>
<thead>
<tr>
<th><strong>Record Code</strong></th>
<th>07 for Event Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utility (Co.) Code</strong></td>
<td>3-char. code from NERC GADS Data Reporting – App C</td>
</tr>
<tr>
<td><strong>Unit Code</strong></td>
<td>A unique ID (3-char.) assigned by the owner based on the criteria from NERC GADS Data Reporting – Appendix C</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>4-digit year for the period reported</td>
</tr>
<tr>
<td><strong>Event Number</strong></td>
<td>Unique # assigned to each event, doesn’t have to be sequential, but can’t repeat in same year</td>
</tr>
<tr>
<td><strong>Revision Code</strong></td>
<td>1-digit code, (1-9) signals a correction, addition and (X) indicates deletion to previously reported data</td>
</tr>
<tr>
<td><strong>Event Type</strong></td>
<td>2 character code that best describes the event (inactive, outage, derating, reserve shutdown).</td>
</tr>
<tr>
<td><strong>Record Number</strong></td>
<td>Either 01 for first record or 02 for second; at end</td>
</tr>
</tbody>
</table>
## Event Elements Record 01

### After Key Elements

| Start of Event | Time (month/day/hour/minute) the event began | - 24-hour clock  
- Midnight reported as 0000 of next day  
- Beginning of day is 0000 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Event</td>
<td>Time (month/day/hour/minute) the event ended</td>
<td>Events that span reporting period should have no end time until the event ends*</td>
</tr>
<tr>
<td>Net Available Capacity</td>
<td>Capacity available with derating</td>
<td>Only reported for derating events</td>
</tr>
</tbody>
</table>

* Events spanning years: Event will end on 12/31 of that year and will be reported for Dec, and a new event record will be started for 01/01 of the next year with a new Event Number
Unit States-Event Type

Inactive
- Inactive Reserve
- Mothballed
- Retired

Active
- Available (Zero to Full Load)
  - RS (Not Connected)
  - In Service (Connected)

- Unavailable (No Load)
  - Unplanned Outages
  - Planned Outages

- Unplanned Deratings
  - Forced Deratings
  - Planned Deratings

- Planned Deratings
  - D1
  - D2
  - D3

- Scheduled Deratings
  - D4
  - DM
  - PD
  - DP

* NYISO only collects GADS data from Active Units
Unit State - Event Type

- Inactive States

- Active States
  - Unavailable (outages)
  - Available (deratings)
Units in any one of these states are not eligible to participate in the ICAP market, therefore NYISO does not require GADS data on units from this category.
## Inactive State

<table>
<thead>
<tr>
<th>Inactive Reserve</th>
<th>IR</th>
<th>Unavailable but can be brought back quickly with repairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothballed</td>
<td>MB</td>
<td>Unavailable but can be brought back in weeks or months with repairs</td>
</tr>
<tr>
<td>Retired</td>
<td>RU</td>
<td>Unit is unavailable and not expected to return to service in the future</td>
</tr>
</tbody>
</table>

See DRI Section III, page 5, for associated rules.

Unit State – Active, Unavailable
## Scheduled outages

<table>
<thead>
<tr>
<th>Type</th>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Outage</td>
<td>PO</td>
<td>Scheduled well in advance, defined duration (weeks), once or twice/year</td>
</tr>
<tr>
<td>Maintenance Outage</td>
<td>MO</td>
<td>An outage that received NYISO’s approval (with minimum two days notice) and there are no reliability issues if the unit is removed from service</td>
</tr>
<tr>
<td>Planned Outage Extension</td>
<td>PE</td>
<td>Extension of a PO for work that is in the original scope. Start date/time must match the original PO end date/time</td>
</tr>
<tr>
<td>Maintenance Outage Extension</td>
<td>ME</td>
<td>Extension of a MO for work that is in the original scope. Start date/time must match the original MO end date/time</td>
</tr>
</tbody>
</table>

*See Services Tariff, OATT, and Outage Scheduling Manual for other outage reporting requirements. The requirements for GADS reporting may be different. NYISO Rules supersede GADS rules*
# Forced outages

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup Failure</td>
<td>SF</td>
<td>Unit is unable to synchronize within a specified time following an outage or reserve shutdown</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage – Immediate</td>
<td>U1</td>
<td>An outage that requires immediate removal of a unit from service, another outage state or reserve shutdown</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage – Delayed</td>
<td>U2</td>
<td>An outage that does not require immediate removal of a unit from the in-service state but requires removal within six hours</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage – Postponed</td>
<td>U3</td>
<td>An outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend</td>
</tr>
</tbody>
</table>
ICAP Ineligible Forced Outage – IIFO

- A Generator on a Forced Outage (U1, U2, U3, SF) without a credible repair plan will be placed in an ICAP Ineligible Forced Outage (IIFO) on the first of the month following 180 days of being in a Forced Outage.

- A Generator may voluntarily reclassify itself from a Forced Outage to an IIFO if the Generator has been in a Forced Outage for at least sixty (60) days.

- A unit in an IIFO shall report its status as a Forced Outage in its GADS data provided to the NYISO.
## Miscellaneous States

<table>
<thead>
<tr>
<th>State</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve Shutdown</td>
<td>RS</td>
<td>Unit is available but not synchronized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance work can be conducted while in this state as long as the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maintenance does not prevent the unit from synchronizing within normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>start-up time and reaching available capacity on demand</td>
</tr>
<tr>
<td>Non-curtailing Event *</td>
<td>NC</td>
<td>Unit component removed from service but does not require a unit outage or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>derating</td>
</tr>
</tbody>
</table>

* NYISO does not use or require these events
# Unit State – Active, Available

<table>
<thead>
<tr>
<th>Active</th>
<th>Available (Zero to Full Load)</th>
<th>unavailable (No Load)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS (Not Connected)</td>
<td>In Service (Connected)</td>
<td></td>
</tr>
</tbody>
</table>

**Unplanned Deratings**
- D1
- D2
- D3

**Planned Deratings**
- D4
- DM
- PD
- DP

**Forced Deratings**
- Scheduled Deratings
Scheduled Deratings

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Derating</td>
<td>PD</td>
<td>Schedule well in advance for a predetermined duration</td>
</tr>
<tr>
<td>Maintenance Derating</td>
<td>D4</td>
<td>Approved by NYISO, and there are no reliability issues when the unit’s output is reduced. Flexible start time and does not require a predetermined duration</td>
</tr>
<tr>
<td>Maintenance Derating Extension</td>
<td>DM</td>
<td>Extension of a D4 for work within original scope and start date/time must match the original D4 end date/time</td>
</tr>
<tr>
<td>Planned Derating Extension</td>
<td>DP</td>
<td>Extension of a PD for work within original scope and Start date/time must match the original PD end date/time</td>
</tr>
</tbody>
</table>

*Planned/maintenance deratings must be coordinated by NYISO Operations with at least 2 days notice from unit’s owner/operator
## Forced Deratings

<table>
<thead>
<tr>
<th>Unplanned (Forced) Derating – Immediate</th>
<th>D1</th>
<th>Event that requires an immediate reduction in capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unplanned (Forced) Derating – Delayed</td>
<td>D2</td>
<td>Event that does not require immediate action, but requires a reduction in capacity within six hours</td>
</tr>
<tr>
<td>Unplanned (Forced) Derating – Postponed</td>
<td>D3</td>
<td>Event that can be postponed beyond six hrs, but requires a reduction in capacity before the end of the next weekend</td>
</tr>
</tbody>
</table>
Derating States

- Derate Events can overlap all other event types (RS, PO, FO, MO, etc.)
- A Derate Event does not indicate a generator’s availability, but rather its output capability (Available Capacity)
- A Derate Event can last an entire year, e.g., a DEC Environmental Restriction (NOₓ, SO₂)
- GADS assumes generator is In-Service when other events do not exist during the derate time period
Derating States

- A Derate Event is not reported when reduction is less than 3% of Net Maximum Capacity (NMC), and less than 15 minutes in duration.
- Derates due to Ambient Conditions are not reported to GADS.
Testing following outages

- Periods of testing of equipment after outages need to be reported to GADS.
- On-line testing (synchronized)
  - If unit is online and in service at a reduced load, following a planned, maintenance or forced outage, the testing is reported as a planned derating (PD), maintenance derating (D4), or unplanned forced derating (D1) respectively

- Off-line testing (not synchronized)
  - If unit is not synchronized during testing, the testing period will be part of the outage event. Outage ends when the testing is complete, and the unit is placed in service or enters another state
# Outage/Derating States and EFORd

<table>
<thead>
<tr>
<th>Outages and Startup Failure</th>
<th>Impact on EFORd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Outage PO</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Outage MO</td>
<td>No</td>
</tr>
<tr>
<td>Planned Outage Extension PE</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Outage Extension ME</td>
<td>No</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Immediate U1</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Delayed U2</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Postponed U3</td>
<td>Yes</td>
</tr>
<tr>
<td>Startup Failure SF</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Derates</th>
<th>Impact on EFORd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Derate PD</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Derate D4</td>
<td>No</td>
</tr>
<tr>
<td>Planned Derate Extension DP</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Derate Extension DM</td>
<td>No</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Immediate D1</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Delayed D2</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Postponed D3</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Let’s Review

NYISO requires GADS reports for units in an inactive state

a) True

b) False
Let’s Review

There are situations where unavailable generators can have a derate code in effect.

a) True

b) False
## Allowable State Transitions

<table>
<thead>
<tr>
<th>TO FROM</th>
<th>U1</th>
<th>U2</th>
<th>U3</th>
<th>SF</th>
<th>MO</th>
<th>PO</th>
<th>ME</th>
<th>PE</th>
<th>RS</th>
<th>DM</th>
<th>DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
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</tr>
<tr>
<td>U2</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>U3</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
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<tr>
<td>MO</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>PO</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>ME</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>PE</td>
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<td>No</td>
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<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IEEE Standard 762 does not recognize transition to /of deratings from /to other event types except as shown.
Events Spanning Periods

- Event Number (required)
  - Unique number assigned to a single event
  - One event number per outage/derating
  - Need not be sequential
  - An event that continues through multiple months keeps the originally assigned number
One Event for One Outage

Month 1

Event 1

Month 2

Event 2

Month 3

Event 3
Events Spanning Periods

- Some data providers report a new event record for the same event if it goes from one month to the next

- What are the advantages of such actions to the GADS statistics?
Events Spanning Periods

- None!
  - This action may distort the frequency calculation of outages
  - Increase the work load of the reporter by having them repeat reports
  - Increases the chances of errors in performance and event records
    - Hours of outage
    - Cause codes and Event types
Events Spanning Periods

How should events that span periods be reported?

- There are two different ways
  - Report an end date/time of the last day of reporting period and revise in later period when event actually ends
  - Report event without an end date/time. Report the end date/time after the event is finished. This is the preferred method of reporting to NYISO
NYISO Event Data-Record 02

- Record 02
  - Utility, Unit, Year, Event Number, Revision Code, Event Type
  - Cause Code & Event Contribution Code

- Additional records
  - Same format as Record 02 with incremental record number
  - Report of additional system/component cause codes
  - NYISO removes these records prior to input to its database
## Event Elements (Key Elements)

<table>
<thead>
<tr>
<th>Record Code</th>
<th>07 for Event Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility (Co.) Code</td>
<td>3-char. code from NERC GADS Data Reporting – App C</td>
</tr>
<tr>
<td>Unit Code</td>
<td>A unique ID (3-char.) assigned by the owner based on the criteria from NERC GADS Data Reporting – Appendix C and next slide</td>
</tr>
<tr>
<td>Year</td>
<td>4-digit year for the period reported</td>
</tr>
<tr>
<td>Event Number</td>
<td>Unique # assigned to each event, doesn’t have to be sequential, but can’t repeat in same year</td>
</tr>
<tr>
<td>Revision Code</td>
<td>1-digit code, (1-9) signals a correction, addition and (X) indicates deletion to previously reported data</td>
</tr>
<tr>
<td>Event Type</td>
<td>2 character code that best describes the event (inactive, outage, derating, reserve shutdown)</td>
</tr>
<tr>
<td>Record Number</td>
<td>Either 01 for first record or 02 for second; at end</td>
</tr>
</tbody>
</table>
## Event Elements - Record 02

<table>
<thead>
<tr>
<th>System/Component Cause Code</th>
<th>Code that identifies the system, major component or piece of equipment involved in the event.</th>
<th>4-digit code listed in NERC GADS DRI App B*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Contribution Code</td>
<td>Code that describes how the component identified in Sys/Comp Cause Code contributed to the event.</td>
<td>1-digit code list on a following slide. NYISO only receives contribution code 1</td>
</tr>
</tbody>
</table>

* See also Section VI in the DRI for 2017 GADS Cause Code Changes

* Events spanning years should have the event end on the 12/31@24XX reported for Dec and create a new record reported for Jan starting the 01/01@00XX of the next year with a new Event Number
Cause Codes Guidelines

- When reporting an event, select the Cause Code from the proper unit type section
- The following criteria are to be used in selecting a Cause Code
  - Assign event cause to major component or system
    - Not to auxiliary component or operation that triggered the failure of the major component or system
  - See Appendix B of the NERC DRI
    - Cause Code Sections
Cause Codes Guidelines – Power Supply Issues

- Single vs. Multiple Components
  - Use Cause Code for component when power supply serves a single component
    - e.g., Motor control centers, breakers, etc.
  - Use Cause Code for power supply system when it serves multiple components
  - See example on next slide
Cause Codes Guidelines – Power Supply Issues

- For example:
  - If a breaker failure results in the loss of a Forced Draft fan, the Cause Code for the FD fan would be used (single)
  - If a problem in the AC power distribution caused not only the loss of the FD fan but also several other major components, then use the Cause Code for AC power distribution (multiple)
Cause Codes Guidelines

- Report instruments or controls which are part of a particular fan, pump, or valve, using the Cause Code for that component
  - Such as pressure switches, pressure regulators, position indicators, etc.
Control Systems

• Cause codes have been assigned to some control systems, such as feed water control
  • Report all instruments, transmitters, logic modules, etc., associated with these systems using the Cause Code for that control system
Cause Codes Guidelines

- Non-specific overhaul work
  - OK to use the Cause Codes for major overhaul
- Major repairs during a major overhaul
  - To be reported separately using the appropriate specific Cause Code(s)
Cause Codes Guidelines

- Use “External”, “Safety, Regulatory, and Environmental” Cause Codes
  - Only when no other system/component Cause Code applies

- For example:
  - If stack emission limits are exceeded because of a fault in the flue gas scrubber, use a scrubber Cause Code
  - If a new limit on emissions is imposed and is exceeded even though the scrubber is functioning properly, then use an environmental code
Cause Code Guidelines – Cause Code 9300

- Cause Code 9300 is the only cause code, from among those that are otherwise listed as “Outside Management Control,” that does not expose the unit to EFORd degradation, for NYISO.

- It is used when the unit is forced into an outage by an equipment failure that involves equipment located on the electrical network including and beyond the generator step-up transformer.

- In the GADS data submittal to the NYISO, the outage/derate event (U1, U2, U3, D1, D2, or D3) must be coded with the 9300 cause code (transmission system problems other than catastrophes).

  - See NYISO Installed Capacity Manual section 4.6.2
Plant Boundaries

At what location on the electric network does the NYISO consider an electric equipment failure to be Outside of Management Control?
Plant Boundaries

- NYISO Definition – Generator Owner responsibility ends at the low side bushings of the generator step-up (GSU) transformer

- NERC statement of entities with reporting responsibilities (DRI Pg I-2)
  - Generating Companies-GENCO
  - Transmission Companies-TRANSO
  - Distribution Companies-DISCO
NYISO defines events associated with equipment in the shaded area to be an Outside Management Control “9300” event.

(Image credited to IEEE 762, Annex D)
## Event Elements – Record 02

<table>
<thead>
<tr>
<th>Event Contribution Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Primary cause of event</td>
</tr>
<tr>
<td>2</td>
<td>Contributed to primary cause of event</td>
</tr>
<tr>
<td>3</td>
<td>Work done during the event – Identify components worked on during an event that did not contribute to the event</td>
</tr>
<tr>
<td>5</td>
<td>After startup, delayed unit from reaching load point</td>
</tr>
</tbody>
</table>
Let’s Review

Where can Event Cause Codes be found?

a) NYISO Market Data website
b) NYISO ICAP Manual
c) NPCC Generator Reporting Guidelines
d) NERC GADS DRI Appendix B
If a cooling water feed pump fails, any Cause Code that deals with cooling water feed pumps can be used for the event report

a) True
b) False
Let’s Review

If an event spans more than one reporting period, what is the NYISO preferred method to report the end date?

a) Initially report without an end date/time and report the end date/time after the event is finished

b) Include an end date/time with initial report and modify the end date/time with each subsequent report

c) Don’t report anything until the event has ended
At what location on the electric network does the NYISO consider an electric equipment failure to be Outside of Management Control?

a) At the first piece of equipment owned by the distribution or transmission company
b) First breaker on the high side of the GSU transformer
c) High side bushings of the GSU transformer
d) Low side bushings of the GSU transformer
Generator Outage Scheduling with the NYISO
Coordinating Events with NYISO

- NYISO must receive at least two (2) calendar days notice of a Maintenance Outage (MO) or Maintenance Derating (D4).

- All outages and derates for which NYISO receives fewer than two calendar days notice will automatically be characterized as FORCED.
Generator Outage Scheduling

- **Generator Outage Scheduling Defined**
  - All Generators located in the NYCA or supplying ICAP to the NYCA must submit a confidential notification of their proposed outage schedule to the NYISO

- **Generator Outage Basis for Coordination**
  - Limit “Severity of Impact,” Maintain NYS Reliability, compliance with reliability rules
  - Outages reduce ability to contribute to reliable operation of interconnected system
Outage Scheduling Process

- **Annual Maintenance Submittals**
  - Generator Owners Submit Confidential Requirements, which include:
    - Current Year plus Two-Year Schedule of Annual Scheduled Outages
    - Submitted to NYISO by September 1st

- **Submittal Process: Two Year Projection**
  - Manual Submittal (E-Mail)
  - CSV Upload
  - Updates to these projections such as cancellation of scheduled outage must include justification
Outage Scheduling Process

- Scheduled Outage Submittals
- 3 Types of Outages: Out-of-Service, Derate, In-Service
- Submittal Processes:
  - Manual Submittal Methods
    - E-Mail
    - Telephone
    - Manual Entry into iTOA
  - CSV Upload into iTOA
- Submit Request to NYISO Generation Scheduling Desk and Local TO
- A derate to 0 MW should be scheduled as OOS
Outage Scheduling Application

- Outage Scheduling via iTOA
  - Outage Scheduler Application (iTOA)
  
Outage Scheduler Login Page

Each company’s NYISO MIS Administrator must assign Outage Scheduler privileges to access this application.
iTOA Main Menu

- Screen to enter New Outage Request
- List of Generator’s Outage Requests (all statuses)
- List of Generator’s pending Outage Requests
- Gen Outage Requests Batch entry via CSV file upload
New Outage Request

Save and Return provides Action Menu Options
New Outage Request - Edit Menu Options
New Outage Request – Action Menu Options

- Edit
- Action
- Copy
- Print

- Submit
- Delete
- Cancel
- Approve
- Complete
Notifications

Generator Owners Notified via Email as to Status of Request(s)

- Submitted
- Evaluating
- Approved
- Denied/Re-Scheduled
- Completed
- Modifications to Existing Requests
- Cancelled
Outage Scheduling References

- NYISO Outage Scheduling Manual
  - Sections 3 & 4
- Outage Scheduler User Guide
- NYISO Installed Capacity Manual
  - Section 4
- NPCC Document C-13
  - Operational Planning Coordination
- Market Services Tariff
  - Section 5
- NYISO Generation Scheduling Desk
  - Telephone: 518-356-6050
  - Email: genplan@nyiso.com
- iTOA Generator Operator Outage Scheduling
  [Website Link](http://www.nyiso.com/public/webdocs/markets_operations/services/market_training/workshops_courses/Training_Course_Materials/Miscellaneous/GO_iTOA_September%202016.pdf)
A unit owner notifies NYISO that a unit requires an outage. What conditions must be met for the event to be possibly considered a Maintenance outage?

a) Advance notice was given
b) The outage could be deferred until after the next weekend
c) Notice was given with at least 2 calendar days notice
d) Both b & c must be true
GADS Performance Data
Summarizes unit operations monthly
NYISO Performance Data

Reported on two separate records

- **Record 01**
  - Record Code, Utility, Unit, Year, Month, Revision Code
  - Net Max Capacity, Net Dependable Capacity, Net Actual Generation, Attempted & Actual Starts

- **Record 02**
  - Record Code, Utility, Unit, Year, Month, Revision Code
  - Unit Time Information-Number of Hours of:
    - Service, Reserve Shutdown, Pumping (mode), Synchronous Condenser (mode), Available, Planned Outage, Forced Outage, Maintenance Outage, Extensions of Scheduled Outages, Unavailable, Period
### Performance Elements- Key Data

<table>
<thead>
<tr>
<th><strong>Record Code</strong></th>
<th>05 for Performance data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utility (Company) Code</strong></td>
<td>3-char. code from NERC GADS Data Reporting – Appendix C</td>
</tr>
<tr>
<td><strong>Unit Code</strong></td>
<td>Same 3-char. code used in the Event reporting for the same unit</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>4-digit year for the period reported</td>
</tr>
<tr>
<td><strong>Month</strong></td>
<td>2-digit, <em>e.g.</em>, 02 for Feb, 11 for Nov</td>
</tr>
<tr>
<td><strong>Revision Code</strong></td>
<td>1-digit, (1-9) signals a correction, addition to previously reported data</td>
</tr>
<tr>
<td><strong>Record Number</strong></td>
<td>Either 01 for first record or 02 for second; at end</td>
</tr>
<tr>
<td>Performance Elements-Record 01</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Net Max Capacity</strong></td>
<td>Gross Max Capacity (MW) less station service</td>
</tr>
<tr>
<td><strong>Net Dependable Capacity</strong></td>
<td>Max sustainable net output (MW) if there are no constraints. Seasonal verification required</td>
</tr>
<tr>
<td><strong>Net Actual Generation</strong></td>
<td>Actual net generation (MWHr) during the reporting month</td>
</tr>
</tbody>
</table>
## Performance Elements-Record 01

<table>
<thead>
<tr>
<th>Attempted Unit Starts</th>
<th>Number of attempted starts in reported month.</th>
<th>3-digit - Repeated initiations of startup without accomplishing corrective repairs are counted as a single attempt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Unit Starts</td>
<td>Number of times the unit successfully started in the month</td>
<td>3-digit- must be less than or equal to attempted starts</td>
</tr>
</tbody>
</table>
NYISO Performance Data – Record 02

- Record 02
  - Record Code, Utility, Unit, Year, Month, Revision Code
  - Unit Time Information-Number of Hours of:

* Not reported by Wind/Solar Units
# Performance Elements-Record 02

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Hours</strong></td>
<td># hrs unit was synchronized to the system</td>
<td>5-digit=3+2 decimals</td>
</tr>
<tr>
<td><strong>Reserve Shutdown Hours</strong>*</td>
<td># hrs unit was available but not synchronized for economic reasons</td>
<td>5-digit– must equal total of RS hours reported for this month</td>
</tr>
<tr>
<td><strong>Pumping Hours</strong>*</td>
<td># hrs unit operated as a pump/motor</td>
<td>5-digit</td>
</tr>
<tr>
<td><strong>Synch Condensing Hours</strong>*</td>
<td># hrs operated in synchronous condensing mode</td>
<td>5-digit – Do not report in unit service hours</td>
</tr>
</tbody>
</table>

* Not reported by Solar/Wind Units

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Performance Elements-Record 02

<table>
<thead>
<tr>
<th>Available Hours</th>
<th>Sum of Unit Service, Reserve Shutdown, Pumping and Synch Condenser Hours</th>
<th>5-digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Outage Hours</td>
<td>Sum of hrs unit was off-line due to NYISO Approved Planned Outage (PO) events</td>
<td>5-digit – must equal total of PO hours reported for this month</td>
</tr>
<tr>
<td>Forced Outage Hours</td>
<td>Sum of hrs unit was off-line for immediate, delayed or postponed outages (U1, U2, U3 and SF) events</td>
<td>5-digit – must equal total of U1, U2, U3 and SF hours reported for this month</td>
</tr>
</tbody>
</table>

* Not reported by Solar/Wind Units
## Performance Elements-Record 02

<table>
<thead>
<tr>
<th><strong>Maintenance Outage Hours</strong></th>
<th>Sum of hrs unit was off-line due to Maintenance Outage (MO) events</th>
<th>5-digit – must equal total of MO hours reported for this month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Extension of Scheduled Outage Hours</strong></td>
<td>Sum of hrs unit was off-line due to Scheduled Outage Extension (PE/ME) events</td>
<td>5-digit – must equal total of PE/ME hours reported for this month</td>
</tr>
<tr>
<td><strong>Unavailable Hours</strong></td>
<td>Sum of Planned (PO), Forced (U1, U2, U3, SF), Maintenance (MO) and Ext to Scheduled Outages (PE/ME) hours</td>
<td>5-digit – must equal total of PO, U1, U2, U3, SF, MO &amp; PE/ME hours reported for this month</td>
</tr>
<tr>
<td><strong>Period Hours</strong></td>
<td># hrs in the month</td>
<td>5-digit - Available Hrs + Unavailable Hrs must equal Period Hours</td>
</tr>
</tbody>
</table>
Period Hours

- The GADS editing program is designed to use:
  - 744 hours for 31-day months (Jan, Mar, etc.)
  - 720 hours for 30-day months (Jun, Sep, etc.) and
  - 672 hours for February (696 hours in leap year)
Period Hours

- It also adjusts for Daylight Savings Time and leap-years:
  - March 743 hours
  - November 721 hours
  - Leap-Years 8784 hours
Period Hours

- There are two exceptions where fewer hours can be correctly reported
  
  - When a unit goes commercial
  - When the unit is retired or taken out of service for several years (aka Mothballed or MB)
Period Hours

- **Exception #1- When a unit goes commercial**
  - The program checks the Design Data for the date of commercial operation and will accept data after that point.

- **Exception #2- When the unit is retired or taken out of service for several years (aka Mothballed or MB)**
  - The Period Hours will be 0 for each month in the Inactive State (MB). Inactive Hours will be equal to the normal monthly Period Hours.
Let’s Review

Under what circumstances would Period Hours be less than the total number of hours in a month?

a) Unit started commercial operation mid-month
b) Unit did not operate for the entire month
c) Unit was on reserve shutdown for the entire month
d) Unit was retired during the month
e) Both a & d
Unit Time Information uses a 5 digit (3 + 2 decimals) format to represent hours

a) True

b) False
SUMMARY SHEETS OF REQUIRED FIELDS
# NYISO GADS Data

## Required Event fields for NYISO GADS Data

<table>
<thead>
<tr>
<th></th>
<th>Event Record 01</th>
<th>Event Record 02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Utility (Company) Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unit Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Year</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Revision Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Record Number</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>(Event Only)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event Number</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Event Type</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Start Date/Time</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>End Date/Time</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Available Capacity</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>System/ Comp. Cause Code</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Event Contribution Code</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
### NYISO GADS Data

#### Required Performance fields for NYISO GADS Data

<table>
<thead>
<tr>
<th>Field</th>
<th>Performance Record 01</th>
<th>Performance Record 02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Utility (Company) Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unit Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Year</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Revision Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Record Number</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>(Performance Only)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Month</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Max. Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Dependable Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Actual Generation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unit Loading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attempted Unit Starts</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Actual Unit Starts</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reserve Shutdown Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pumping Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Synch. Condensing Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Service Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Available Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Planned Outage hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Forced Outage Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Maintenance Outage</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Ext of Scheduled Outages</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Unavailable Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Period Hours</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
# Minimum Equivalent Data

<table>
<thead>
<tr>
<th></th>
<th>Performance Record 01</th>
<th>Performance Record 02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Utility (Company) Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unit Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Year</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Revision Code</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Record Number</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>(Performance Only)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Month</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Max. Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Dependable Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Net Actual Generation</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Unit Loading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attempted Unit Starts</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Actual Unit Starts</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Service Hours</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Available Hours</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Planned Outage hours</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Forced Outage Hours</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maintenance Outage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ext of Scheduled Outages</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Unavailable Hours</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Period Hours</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

This Equivalent data set is reported by Solar/Wind units only, **without event data**
COMMON DATA ERRORS
Event and Performance
Common Errors – Data Problems

- Missing Data
  - Essential Event Data
    - Start & End Date/Times (Beginning & End of Year)
    - Event Type Codes (Outages, Derates, Reserve Shutdowns)
    - Net Available Capacity on Derating events only (must be >0)
  - Essential Performance Data
    - Hours Totaled Incorrectly (avail + unavail = period)
    - Generation Limits Error (Output Factor > 100% Max Net Capacity)
Common Errors – Time Issues

- **Start & End Date/Time reversals**
  - Start date/time must be prior to end date/time
  - Events ending at midnight should be reported as 0000 of the next day
    - End date/time of 01/31 @ 2400 report as 02/01 @ 0000
  - Events that span a year-end
    - End on last day of first yr 12/31 @ 24XX
    - Restart on first day of new yr 01/01 @ 00XX
Common Errors - Event Cause Code Issues

- Cause Codes that are not assigned to the appropriate generator type
  - Gas turbine reporting jet engine Cause Code
  - Internal combustion unit reporting gas turbine Cause Code
Common Errors - Incorrect Event Characterization

- **Run-of-River Hydro – Lack of water**
  - Lack of water is equivalent to lack of fuel and should not be reported as a Reserve Shutdown (RS)
  - It should be reported as a Forced Derate (D1, D2, D3) or Forced Outage (U1, U2, U3)

- **Gas Turbine – Lack of fuel**
  - A gas-only GT shutdown for lack of gas is not a Reserve Shutdown (RS)
  - It should be reported as a Forced Outage (U1, U2, U3)
Common Errors - Incorrect Event Characterization

- Hydro – Debris in water
  - Debris in the water is a normal condition that should be handled through normal maintenance. It should be reported as Maintenance Outage (MO) or Forced Outage (U1)
  - It is not Out of Management Control (OMC)
Common Errors - Outside Management Control (OMC) Reporting

9300 is the only OMC Cause Code that NYISO currently excuses from the calculation of the unit’s Derating Factor
Common Errors - Derate Issues

- Derate capacity reported must be the net available capacity not the amount of MW reduced
  - A 100 MW generator that is limited to 80 MW should report 80 MW as the net available capacity not 20 MW
Common Errors - Combined Cycle (CC) Generators – GADS BLOCK Data

- NYISO prefers to receive GADS data for the entire CC as BLOCK data, not the individual components.
- The failure of the CC BLOCK to start is a Startup Failure (SF).
- In a 2x1 CC, the failure of the second GT to start should be reported as a derate.
- In a 2x1 CC, the derate of one GT must include 50% of the ST output.
Common Errors - Performance Reporting Issues

- Hours and MW must properly total
  - A unit can be in one of two performance states – Available or Unavailable
    - \( \text{Available hrs + Unavailable hrs = Period hrs} \)
  - Individual Available hour categories must equal the total Available hours value
    - \( \text{Service hrs + Reserve Shutdown hrs + Synchronous Condensing hrs + Pumping hrs = Available hrs} \)
Common Errors - Performance Reporting Issues

- Hours and MW must properly total
  - The Unavailable hour categories must equal the total Unavailable hours value:
    (Planned Outage hrs + Maintenance outage hrs + Forced Outage hrs + Outage Extension hrs = Unavailable hrs)
  - The Net Actual Generation (NAG) should not exceed the product of the Period hours and the Net Maximum Capacity (NMC) in a month
<table>
<thead>
<tr>
<th>Source/Product</th>
<th>Features</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-House Programs</td>
<td>• Variable</td>
<td>Variable</td>
</tr>
<tr>
<td>Integ / PowerGADS</td>
<td>• Data entry and edit</td>
<td>Contact vendor</td>
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<tr>
<td></td>
<td>• Validation</td>
<td></td>
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<tr>
<td></td>
<td>• Reporting and analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data portal is possible</td>
<td></td>
</tr>
<tr>
<td>Microsoft Windows application –</td>
<td>No validation</td>
<td>Component of MS Windows OS or</td>
</tr>
<tr>
<td>Notepad or Excel</td>
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<td>common product</td>
</tr>
<tr>
<td>Navigant Consulting / MicroGADS</td>
<td>• Data entry and edit</td>
<td>Contact vendor</td>
</tr>
<tr>
<td>Gold</td>
<td>• Validation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reporting and analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data portal is possible</td>
<td></td>
</tr>
<tr>
<td>GADS Open Source</td>
<td>• Data entry and edit</td>
<td>Free</td>
</tr>
<tr>
<td>*The NYISO does not endorse any</td>
<td>• Validation</td>
<td></td>
</tr>
<tr>
<td>software product or vendor</td>
<td>• Reporting and analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Data Portal Facilities built-in</td>
<td></td>
</tr>
</tbody>
</table>
Use of GADS Data

- We have covered the creation of GADS Data

- Let’s look at one of the processes – Equivalent Forced Outage Rate on demand (EFORd)
Calculation of EFORd

- The Services Tariff* defines it as: “The portion of time a unit is in demand, but is unavailable due to forced outages”

*Market Services Tariff-Definitions 2.5
Calculation of EFORd

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH</td>
<td>Service Hours</td>
</tr>
<tr>
<td>RSH</td>
<td>Reserve Shutdown Hours</td>
</tr>
<tr>
<td>AH</td>
<td>Available Hours</td>
</tr>
<tr>
<td>FOH</td>
<td>Full Forced Outage Hours</td>
</tr>
</tbody>
</table>

All hours are weighted by the monthly Net Maximum Capacity (NMC) in the NYISO calculation of EFORd.
Calculation of EFORd

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDC</td>
<td>Net Dependable Capacity</td>
</tr>
<tr>
<td>NAC</td>
<td>Net Available Capacity</td>
</tr>
<tr>
<td>D</td>
<td>Capacity derate for outage (NDC - NAC)</td>
</tr>
<tr>
<td>C</td>
<td>Net Maximum Capacity (NMC) during derate event</td>
</tr>
<tr>
<td>T_{D_s}</td>
<td>Start of derate event</td>
</tr>
<tr>
<td>T_{D_e}</td>
<td>End of derate event</td>
</tr>
</tbody>
</table>
Calculation of EFORd

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_D$</td>
<td>Time accumulated during outage/derate</td>
</tr>
<tr>
<td>EFOH</td>
<td>Equivalent Full Forced Outage Hours</td>
</tr>
<tr>
<td>EFDH</td>
<td>Equivalent Forced Derated Hours</td>
</tr>
</tbody>
</table>
Calculation of EFORd

\[
\text{EFORd(\%)} = \frac{f_f \ast \text{FOH} + f_p \ast \text{EFDH}}{SH + f_f \ast \text{FOH}} \ast 100
\]

- Formulae used in calculation of Unforced Capacity for Installed Capacity Suppliers:

  * NERC GADS DRI, Appendix F: Performance Indexes and Equations
## Outage/Derating States and EFORd

<table>
<thead>
<tr>
<th>Outages and Startup Failure</th>
<th>Impact on EFORd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Outage PO</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Outage MO</td>
<td>No</td>
</tr>
<tr>
<td>Planned Outage Extension PE</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Outage Extension ME</td>
<td>No</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Immediate U1</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Delayed U2</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Outage Postponed U3</td>
<td>Yes</td>
</tr>
<tr>
<td>Startup Failure SF</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Derates</th>
<th>Impact on EFORd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Derate PD</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Derate D4</td>
<td>No</td>
</tr>
<tr>
<td>Planned Derate Extension DP</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance Derate Extension DM</td>
<td>No</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Immediate D1</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Delayed D2</td>
<td>Yes</td>
</tr>
<tr>
<td>Unplanned (Forced) Derate Postponed D3</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Derates and Outages

**Derate**
\[
\text{EFORd} = .05
\]
- 5%
- Available all the time but at a reduced output

**Forced Outage**
\[
\text{EFORd} = .05
\]
- 5%
- Available at full output but for less than 100% of the time
NYISO uses an average of six 12-month EFORd calculations to establish a Summer ICAP to UCAP derating factor (Avg EFORd, AEFORd_{summer}).
NYISO uses an average of six 12-month EFORd calculations to establish a Winter ICAP to UCAP derating factor (Avg EFORd, AEFORdwinter)
Example - Seasonal AEFORd determination

Calculation 1: (Aug 15 – Jul 16) = 0.95
Calculation 2: (Sep 15 – Aug 16) = 1.04
Calculation 3: (Oct 15 – Sep 16) = 4.75
Calculation 4: (Nov 15 – Oct 16) = 8.47
Calculation 5: (Dec 15 – Nov 16) = 11.41
Calculation 6: (Jan 16 – Dec 16) = 13.80
Average of 6 EFORd calculations = 6.736666667%
Derating factor (AEFORd) as a decimal = 0.0673

If generator has a Summer 2017 ICAP Available of 79.6 MW, then UCAP for Summer 2017 capability period is:

\[
UCAP = ICAP \text{ Available} \times (1 - \text{AEFORd})
\]

\[
= 79.6 \text{ MW} \times (1 - 0.0673)
\]

\[
UCAP = 74.2 \text{ MW}
\]
The Derating Factor, for units with Mothball, ICAP Ineligible Forced Outages, or a period in an Inactive State, during the 17 month period that is used to develop seasonal EFORds, will be calculated using data from the most recent set of 17 months (not necessarily consecutive) for which GADS operating information is available for the entire month. Therefore, this 17 month period excludes months in which these outages occurred.

A unit returning to service which, while in one of these outages, made modifications to its operating characteristics that are determined to be material by the NYISO and which require the submission of a new Interconnection Request, will receive the derating factor it would have received as a newly connecting unit in lieu of a derating factor developed from unit-specific data.

- A unit returning with an increase in its capability but not as the result of a material change in its operating characteristics would receive a derating factor under the rule discussed in the first bullet above, not under this rule.
What is EFORd Used for?

- Installed Capacity Market Calculations

  - The market product is Unforced Capacity (UCAP)

    \[ \text{UCAP} = \text{ICAP Available} \times (1 - \text{Derating Factor}) \]

  - Exceptions are noted on next slide

* See the ICAP Manual, Section 4, or MST Section 5.12.6.1 for more information
EFORd equivalent situations

- Resources for which the NYISO does not use EFORd to determine Unforced Capacity values – they have comparable derating factors
  - Solar/Wind & Landfill Gas
    - Actual production data during peak load periods is used to calculate the Derating Factor
  - Run-of-River Hydro
    - Actual production data during peak load hours is used to calculate the Derating Factor
  - Special Case Resources (SCRs)
    - Performance Factor (PF) value calculated with data supplied outside of the NERC GADS process
# References for Derating Factors

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Derating Factor</th>
<th>ICAP Manual Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Generator, Energy Limited Resource (ELR), Capacity Limited Resource (CLR)</td>
<td>Equivalent Demand Forced Outage Rate: EFORd</td>
<td>Section 4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 4.4.4</td>
</tr>
<tr>
<td>Special Case Resources (SCR)</td>
<td>Historical Performance Factor</td>
<td>Section 4.12</td>
</tr>
<tr>
<td>Intermittent Power Resources (Wind, Solar, Landfill Gas)</td>
<td>Actual Performance “Production Factor”</td>
<td>Section 4.5.1</td>
</tr>
<tr>
<td>Limited Control Run-of-River Hydro</td>
<td>Actual Production Data</td>
<td>Attach J Section 3.4</td>
</tr>
</tbody>
</table>
Penalties for Noncompliance with GADS Reporting to NYISO

- Failing to submit data
  - Service Tariff section 5.12.12.1
    - Starting on third day – greater of $500 or $5/MW for each day
    - Starting on the tenth day – sanction increase to greater of $1,000 or $10/MW for each day
    - These are discretionary penalties
Penalties for Noncompliance with GADS Reporting to NYISO

- Inaccurate data submission
  - Groups within NYISO examine GADS data submitted
  - Generation owner/operators are required to correct inaccurate data
Penalties for Noncompliance with GADS Reporting to NYISO

- Inaccurate data submission
  - Corrections to data may cause adjustments to Derating Factor values
    - A correction that generates a higher Derating Factor value will reduce the unit’s UCAP value
      - The unit may have already sold more UCAP capacity than it was qualified to sell
      - NYISO may apply deficiency charges of oversold amount plus a 50% penalty
Event Type Reporting
- Scenarios
Scenario #1: Forced Outage or Maintenance Outage?

Event Description:

Boiler tube leak detected 4 days before scheduled Planned Outage (PO) (36 hour repair time)

The unit cannot stay online until the start of the PO, must come down within 6 hours of notification

NYISO allows unit to come off early for repairs and PO

What type of outage is this?
Scenario #2: Forced Outage or Maintenance Outage?

**Event Description:**

Alarms indicated vibration on unit’s #1 ID Fan on Tuesday 10 a.m.

The unit could stay on line until the next Monday but NYISO Operations authorizes an outage for Friday morning.

On Friday, the NYISO approves the unit outage.

What type of outage is this?
Scenario #3: Forced Outage or Reserve Shutdown?

Event Description:
Combined cycle unit had a Heat Recovery Steam Generator tube leak. NYISO Operations said CC was not needed for remainder of week. Management decided to repair the unit on regular maintenance time. Over the next 36 hours, the HRSG was repaired. It took 12 hours of maintenance time.

What type of outage is this?
Scenario #4: Planned Outage
Extension or Forced Outage?

**Event Description:**

During the 4 week PO, it was discovered that the repairs on Electro-Static Precipitator (ESP) were more extensive than planned. At the end of 4th week, the ESP work is not completed as outlined in the original scope of work. 3 more days is required to complete the work. What type of outage is the extra 3 days?
Scenario #5: Planned Outage Extension or Forced Outage?

Event Description:
During 4 week PO, mechanics discovered a Boiler Feed Pump (BFP) packing needed replacement (not part of scope)
At the end of 4th week, the BFP work was not completed due to no parts on site
12 hour delay in startup to complete work on BFP
What type of outage is the extra 12 hours?
Scenario #6: Planned Outage or Forced Outage?

Event Description:

During the 4 week PO, mechanics discovered Induced Draft fan blades needed replacement (outside the scope)

Parts were ordered and ID fan was repaired within the 4 week period

No delays in startup

Does the outage change from PO to FO and then back to PO due to unscheduled work?
Scenario #7: Reserve Shutdown or Forced Outage?

Event Description:
A small fossil unit experienced a Forced Outage failure in its boiler. However, the unit will not be needed the remainder of the week. Management decided to repair the unit on standard work time, w/o overtime or weekend hours. Working standard 8-hour days, the repairs were completed with 12 hours over a day and a half (36-hour) period.

Is this a Forced Outage or Reserve Shutdown event?
Scenario #8: Planned Outage or Forced Outage?

Event Description:

A boiler tube leak is detected two days before an approved Planned Outage.

The severity of leak requires the unit to shutdown before the start of the PO.

The repair time for the tube leak is 96 hours.

How should this event be reported?
Scenario #9: Planned Outage or Forced Outage?

Event description

A gas turbine has an approved PO which includes reblading one or more stages.

Can the unit be started and operated before the end of the PO in order to balance the rotor?
Scenario #10: Planned Outage or Forced Outage?

**Event Description:**

On Wednesday, Jan. 20, the Transmission Owner notified a Generator Owner and the NYISO that the output transmission lines for their generating facility will be taken out-of-service for repairs on Tuesday, June 1, and will remain inactive for 1 week; returning to service on Tuesday, June 8.

The generator owner has begun preparing for the outage.

How should this event be reported?
Scenario #11: Maintenance Outage or Forced Outage?

Event Description:

On Monday, July 20, the local water district notified the generator owner that the water line used by their facility will be taken out of service for upgrades on Tuesday, August 11, and will not return to service for 5 days. This is the only source of cooling water at the generating facility.

The generator owner has begun preparing for the outage. How should this event be reported?
Panel Discussion
Panel Discussion

- Wade Bennett
  Supervisor, Scheduling
  Energy Market Operations/Scheduling

- James Pratico
  Senior ICAP Market Operations Analyst
  Installed Capacity Market Operations

- Biagio (Gino) Insogna
  Senior Performance Monitoring & Compliance Engineer
  MMA/ Performance, Monitoring & Compliance
Online GADS Portal Demo

James Pratico
Senior ICAP Market Operations Analyst
Installed Capacity Market Operations
GADS Portal

- Portal Requirement - Users
  - NAESB Digital Certificate (linked to MIS User Account)
  - MIS User Account
  - User Account must have the “GADS – GADS Observer” privilege
  - Contact NYISO GADS Administrator to add User to the Portal — Internal User’s List
GADS Portal

- gads.nyiso.com

- Link to the Portal exists on the main ICAP page
- Login with MIS User Name (lowercase only)
- Password is the MIS Password
GADS Portal – Link
Portal Login Screen

NYISO GADS Portal

Enter User Name & Password

User Name: [blank]
Password: [blank]

(User Name and Password are case sensitive)

Log In
Portal Options

Generating Availability Data System (GADS) Portal

Hello MPUSER

Upload & Process
Upload GADS ASCII files to the NYISO server, process uploaded files or check status of processing.

Edit Data
View and correct uploaded data.

Reports
View reports from results of last processed files.

Version 14.8.15.118
Summary of Process

- Upload file
- Correct errors through portal directly or User’s GADS and upload corrected file
- Select ‘Submit’ each time you make a correction directly in the portal
- Run Final Validation/Error Check for each unit corrected in the portal
- Select ‘Process Data’ (Edit Screen) one last time to commit the corrections to the NYISO’s GADS database and start the Data Analysis.
Additional Resources

- GADS Portal User’s Guide
- NYISO Installed Capacity Manual
- Installed Capacity Manual Attachments
- GADS Training Course Material
Questions?