

# NERC

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# GADS Examples

## Usage Examples Of The GADS Data

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2018 GADS Data Reporting Workshops  
June & October, 2018

**RELIABILITY | ACCOUNTABILITY**



- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - Acquisitions, Mergers, And Bankruptcy are:
    - Potentially painful transactions that occur in business
    - They are often very secret
    - You may be the last one to know about them
    - There will be great pressure to provide work output
  - What affect on GADS data do Acquisitions, Mergers, And Bankruptcy have?
    - Management will want additional GADS reports adjusted for the transaction
    - Internal GADS reporting is typically year over year so you will need to -
      - Create an adjusted GADS data set for the transaction
      - Use it to produce adjusted reports for the next two (2) years

- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - NRG acquired Texas on 02/02/06
  - NRG merged with GenOn on 12/15/12
  - NRG acquired EME on 04/01/14
  - GenOn declared bankruptcy on 06/13/17
  - And the list will continue to grow . . . .

- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - NRG acquired Texas Genco LLC on 02/02/06
    - For two years I had to produce adjusted reports that:
      - Excluded all Texas Genco LLC data  $\leq$  2006/01
      - Excluded February 1
      - Included February 2 – 28
      - Included all Texas Genco LLC data  $\geq$  2006/03
    - Excluding a month or month(s) of data is easily done in the data extract SQL:
      - $(\text{Year} * 12) + \text{Month} < (2006 * 12) + 1$  And Company = "Texas Genco LLC"
    - Excluding February 1<sup>st</sup> was more complicated:
      - Adjust fuel and generation
      - Adjust monthly performance data
      - This must be done within the data extract as it cannot be done within the database

- Adjusting GADS Data for Acquisitions, Mergers, And Bankruptcy
  - NRG merged with GenOn on 12/15/12
    - For two years I had to produce adjusted reports that:
      - Excluded all GenOn data <= 2012/11
      - Excluded December 1 - 15
      - Included December 16 – 31
      - Included all GenOn data >= 2013/01
    - I was asked to provide an adjusted report early one morning at work . . .
      - Constantly received phone calls and emails the rest of the day demanding results
      - Worked until 3AM to create an adjusted data set completely by hand
      - 175 units x 24 monthly performance parameters = 4200 potential data adjustments
      - Worst day at work, ever!

- Adjusting GADS Data for Acquisitions, Mergers, And Bankruptcy
  - NRG acquired EME on 04/01/14
    - For two years I had to produce adjusted reports that:
      - Excluded all EME data  $\leq$  2014/03
      - Included all EME data  $\geq$  2014/04
    - Excluding a month or month(s) is easily done in the data extract SQL:
      - $(\text{Year} * 12) + \text{Month} < (2014 * 12) + 4$  And Company = "EME"
    - This acquisition was easy to do!
      - If at all possible: acquire, merge, or go bankrupt at the end of a month!

- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - GenOn declared bankruptcy on 06/13/17
    - For the next two years I will have to produce adjusted reports that:
      - Include all GenOn data  $\leq$  2017/05
      - Include June 1 - 13
      - Exclude June 14 – 30
      - Exclude all GenOn data  $\geq$  2017/07
    - My first thought was, “Oh, no! Not again!”, but –
      - Had ample notice for this one
      - Was given a reasonable amount of time to complete the task
      - The next few slides will explain how I did it

- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - GenOn declared bankruptcy on 06/13/17
    - Step 1 – Fuel and Generation data
      - Put together a survey requesting the fuel data for June 1 – 13 only from each plant
      - Gave the plants ten (10) days to respond
      - Wrote some code to produce total MMBTU from volume and heating value by fuel type
      - Downloaded the hourly generation for June 1 – 13
      - Downloaded 17 months of historical performance monthly data and estimated the fuel flows using  $(\text{Average Gross Heat Rate} * \text{Gross Generation June 1 - 13}) * 1000$  as it wouldn't vary with auxiliary usage and would produce the most accurate fuel estimate
        - For comparison to see if I was getting good data from the plants
        - As an alternate source for a value to use in the adjustment
      - All the plants responded and I only had to verify five (5) odd values for:
        - Full speed, no load tests
        - Auxiliary boiler usage
        - Noisy generation data



- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - GenOn declared bankruptcy on 06/13/17
    - Step 2 – Monthly Performance data
      - Downloaded the full monthly performance data for 2017/06 on the GenOn units
      - Downloaded the event data for 2017/06 on the GenOn units
      - Analyzed the event data to produce a picture of the events
        - Added a dividing line between June 1 – 13 and June 14 - 30
      - Wrote some code to produce the monthly performance data by event type
        - Compared two time periods to do this, event duration vs June 1 - 13
      - Calculated FOH, MOH, POH, RSH, SH for June 1 – 13 from the data by event type
        - Shortened the Period Hours =  $13 \times 24 = 312$  hours
        - Accounted for inactive states, such as MB, to get the SH correct
      - Calculated the equivalent hours by:
        - Examining the event picture for derates during June 1 – 13
        - Summing the monthly performance data by event type
        - Adjusting the sums if they were shadowed
        - Only 26 calculations had to be made

- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy

- GenOn declared bankruptcy on 06/13/17

- Step 2 – Monthly Performance data (cont.)

- Calculated the number of actual and attempted starts during June 1 - 13 by counting the offline/online event transitions and the SF events in the event picture
      - Calculated the forced outages during June 1 – 13 by counting the forced outages in the event picture
      - Chalk Point 2 = 1 start, Chalk Point 3 = 2 starts, Chalk Point 4 = 2 starts

Unit	1	2	3	4	5	6	7	8	9	10	11	12	13
Chalk Point 2	RS											D1	
Chalk Point 3	RS												D1
Chalk Point 4	RS											RS	

- Brunot Island 2A = 1 forced outage, Brunot Island 2B = 2 forced outages

Unit	1	2	3	4	5	6	7	8	9	10	11	12	13
Brunot Island 2A	RS		MO			RS						RS	
Brunot Island 2B	RS		MO			RS	U	RS				RS	

- This process took about an hour to complete and verify

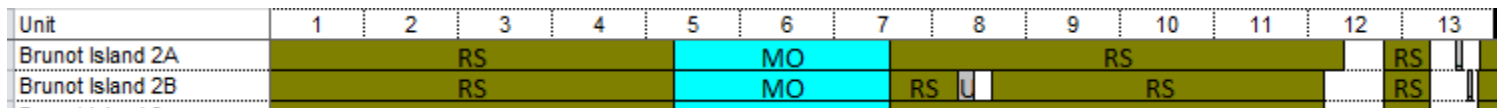
- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
  - GenOn declared bankruptcy on 06/13/17
    - Step 3 – Using the adjusted data set
      - Adjusted reports can only be produced externally since the data adjustments cannot be made within your in-house GADS database
      - Copied the adjusted data set into a storage area within my external report and wrote some code to copy it to the end of the data extract from my in-house GADS database each time the report is run
      - This is what it looks like in VBA:

```
' Copy post bankruptcy adjusted data set.  
Range("rngAdjusted").Select  
Selection.Copy  
Range("K" & Application.WorksheetFunction.CountA(Worksheets("Input").Range("K6:K65536")) + 6).Select  
ActiveSheet.Paste
```

- Tracking The Available MW On A Unit
  - The Available MW of a unit at any time is an indicator of how much of it's NMC rating a unit can make. Mathematically:
    - Available MW = NMC – Total Reduction
      - NMC = Net Maximum Capacity
      - Total Reduction = total Unavailable MW from outages and derates
  - The purpose of this example is to demonstrate how to format GADS event data for use in calculations of all kinds:
    - Financial
    - Engineering
    - GADS
    - Et cetera

- Tracking The Available MW On A Unit

- Normally we view events along a horizontal timeline:



- However, a vertical timeline is more suited to tracking Available MW:

Date	Hour	Event Type (#)	Event Reduction	Event Minutes	Reduction MW
1/1/2017	1	D1(71)	125	s60	125
1/1/2017	2	D1(71), D4(1)	125, 285	e47, s13	160
1/1/2017	3	D4(1)	285	c60	285
1/1/2017	4	D4(1)	285	c60	285
1/1/2017	5	D4(1)	285	c60	285
1/1/2017	6	D4(1)	285	c60	285
1/1/2017	7	D4(1)	285	c60	285
1/1/2017	8	D4(1)	285	c60	285

- A vertical time line will allow us to format the events into a row and column format more suited to calculations

- Tracking The Available MW On A Unit

- To track Available MW using vertically formatted event data:
  - A time period range consisting of one hour intervals is created

Date	Hour
1/1/2017	1
1/1/2017	2
1/1/2017	3
1/1/2017	4

- Event Types and numbers are listed with overlapping events concatenated

Event Type (#)
D1(71)
D1(71), D4(1)
D4(1)
D4(1)
D4(1)

- Event Reductions are listed with overlapping events concatenated

Event Reduction
125
125, 285
285

- Tracking The Available MW On A Unit

- To track Available MW using vertically formatted event data (cont.):
  - Events are compared against each interval and the following is calculated:
    - The start of each event, in minutes before the end of the first interval
      - s10 = the event started 10 minutes before the end of the first interval
    - Continuation of an event through an entire interval
      - c60 = the event continued through the entire interval
    - The end of each event, in minutes after the start of the last interval
      - e20 = the event ended 20 minutes after the start of the last interval
    - The duration of an event less than one interval long
      - d35 = the event lasted for 35 minutes within the interval

Event Minutes
s60
e47, s13
c60

- Tracking The Available MW On A Unit

- To track Available MW using vertically formatted event data (cont.):

- Reduction MW is calculated:

- Reduction MW =  $\text{Sum}(\text{Event Reduction} * \text{Event Minutes}) / \text{Interval Minutes}$

Reduction MW
125
160
285
...

- Available MW is calculated:

- Available MW = NMC – Reduction MW

Available MW
400
365
240

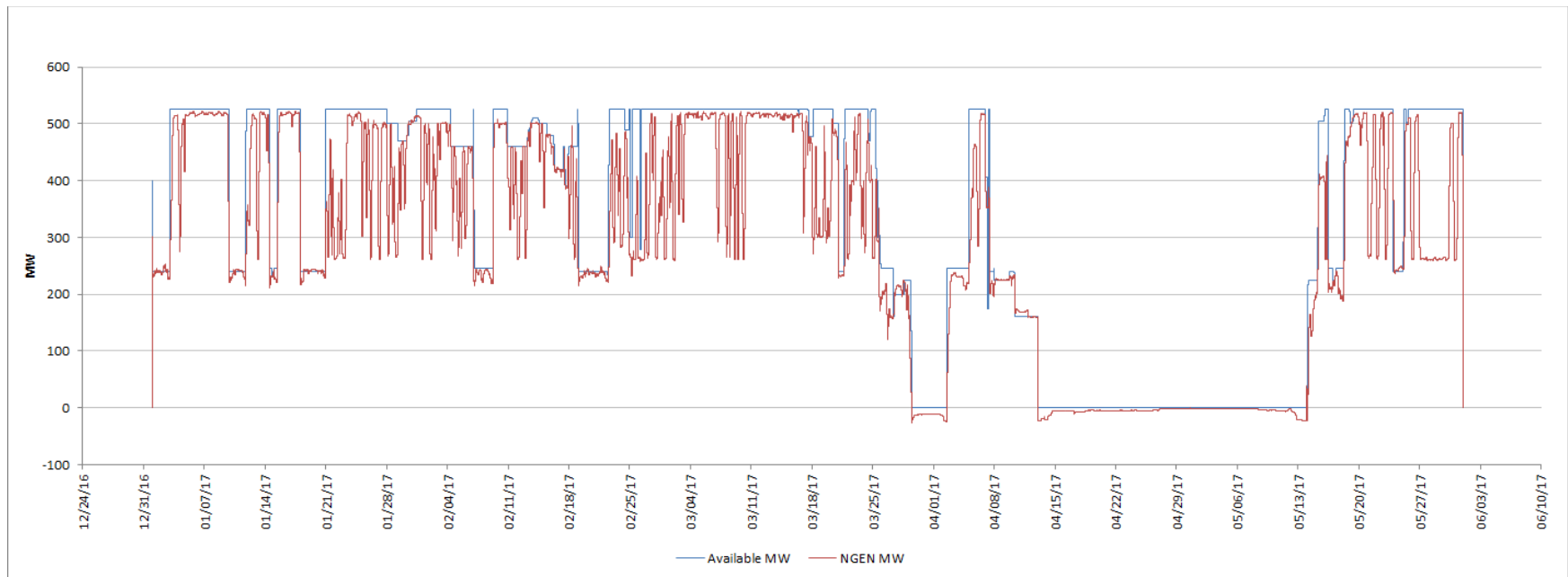
- Event interval row counts are calculated to aid in verifying the results

Event Rows
2
48



- Tracking The Available MW On A Unit

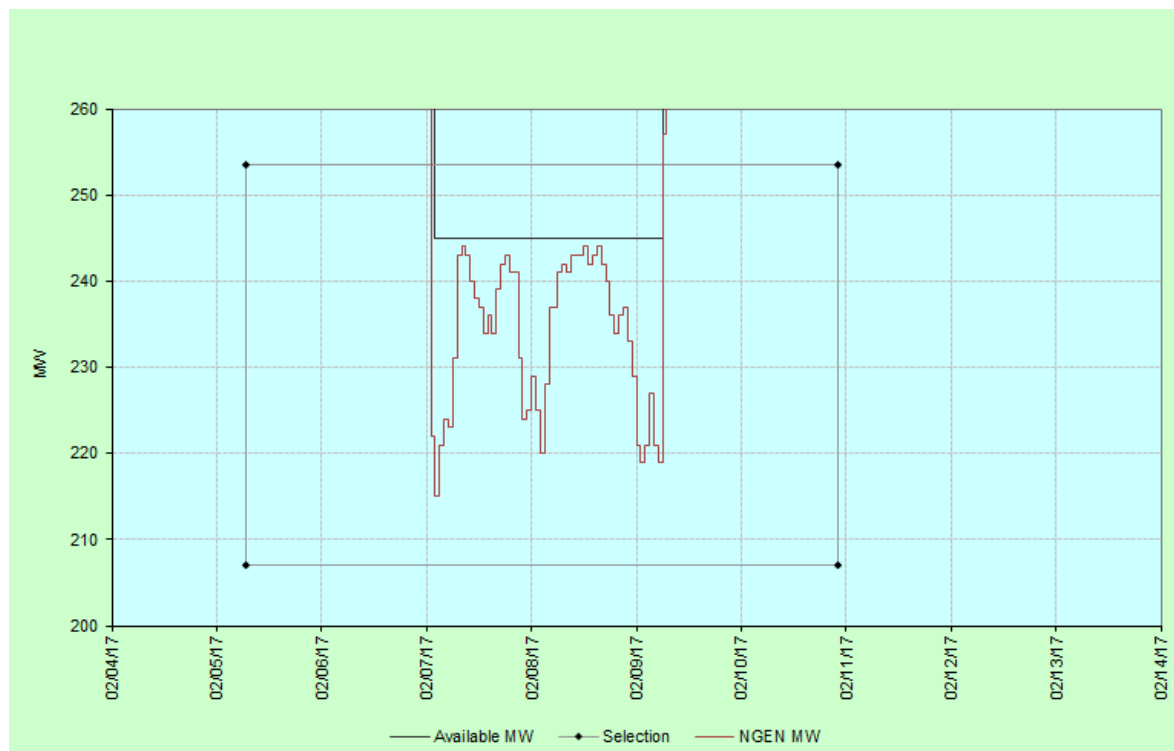
- Using the Available MW data:
  - Compare it to the generation on the unit in a static graph to investigate the accuracy of event reporting



- Tracking The Available MW On A Unit

- Using the Available MW data:

- Compare it to the generation on the unit in a dynamic graph to investigate the accuracy of event reporting.





# Questions and Answers