

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

GADS Examples

Usage Examples Of The GADS Data

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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 1st 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

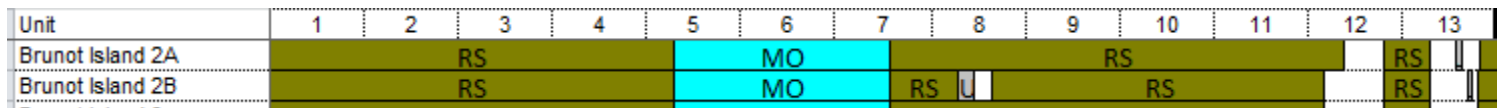
- Adjusting GADS data for Acquisitions, Mergers, And Bankruptcy
 - GenOn declared bankruptcy on 06/13/17
 - Step 3 – Using the adjusted data set
 - Adjusted reports can only be produced externally since the data adjustments cannot be made within your in-house GADS database
 - Copied the adjusted data 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:

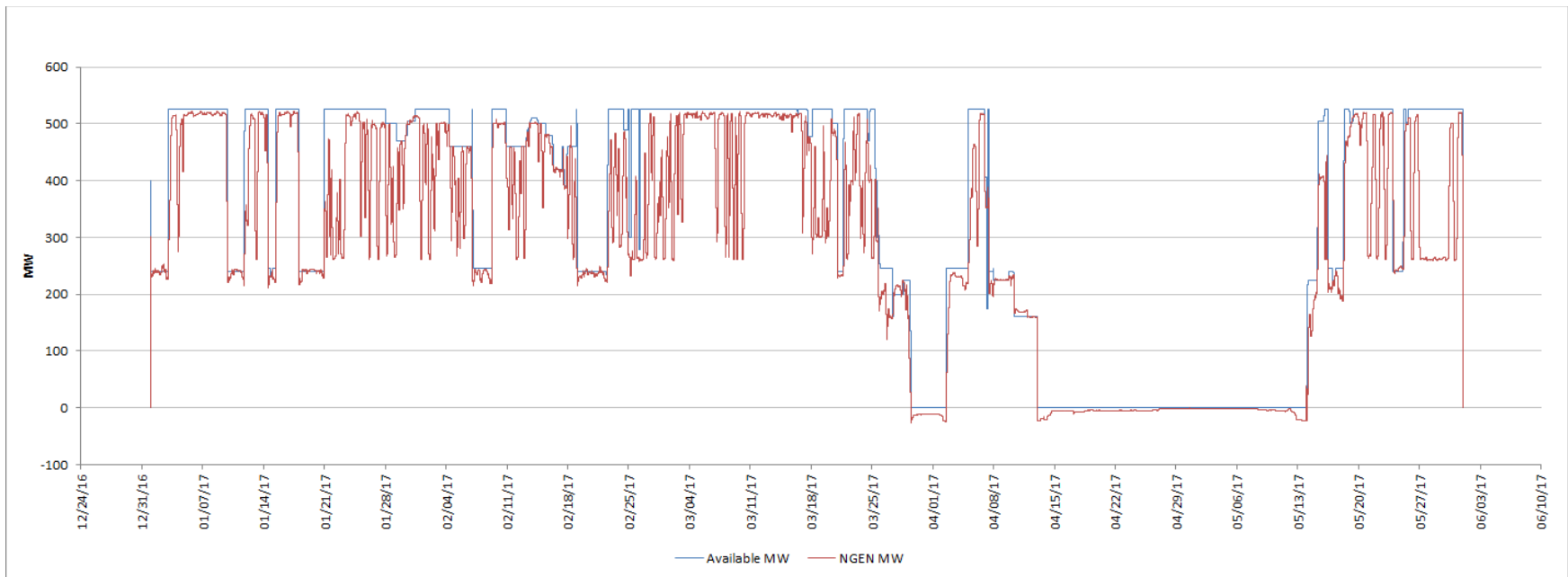
- Available MW = NMC – Reduction MW

Available MW
400
365
240

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

Event Rows
2
48

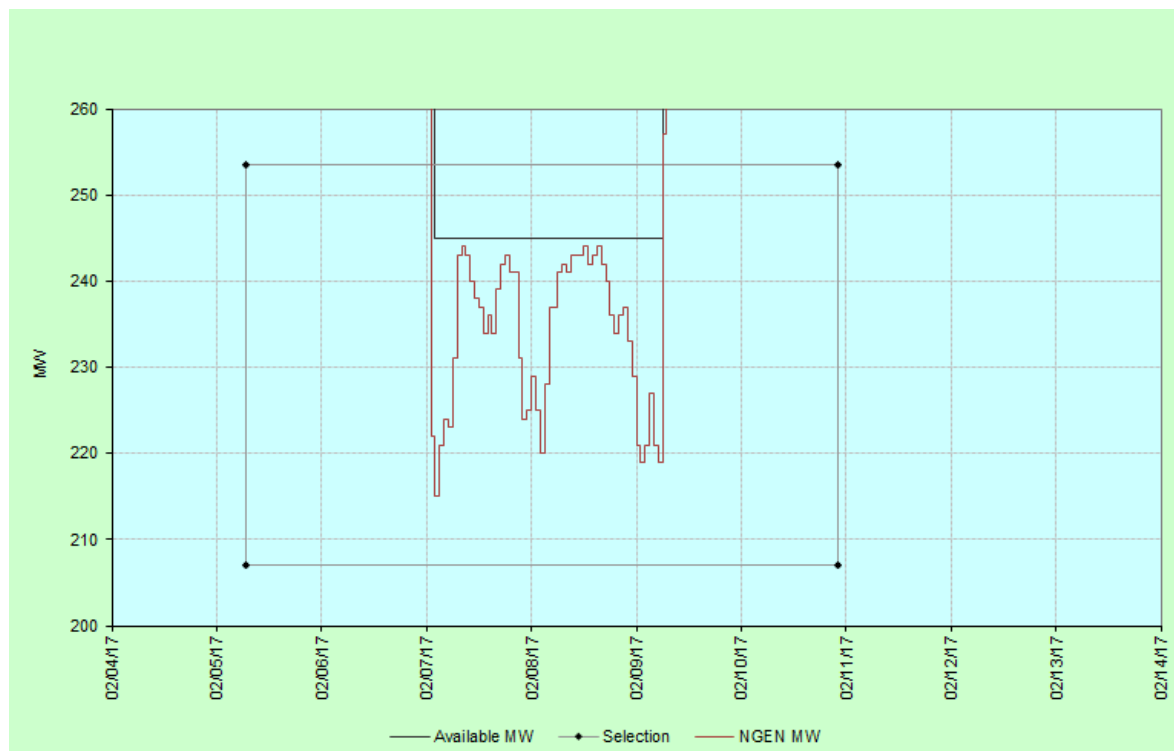
- Tracking The Available MW On A Unit
 - Using the Available MW data:
 - Compare it to the generation on the unit in a static graph to investigate the accuracy of event reporting



- 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