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NRG FAC-008 Facility Ratings Compliance Program

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NRG At A
Glance

NRG
Methodology

Unit
Template

Internal
Controls

Change Management

Periodic Review

Comparison with TO Ratings

Summary

Total SCOPE

Over 25 generating assets in 8 states

Approximately 6 Million Customers

NRG in Texas

OUR POWER TAKES MANY FORMS.



RETAIL BRANDS

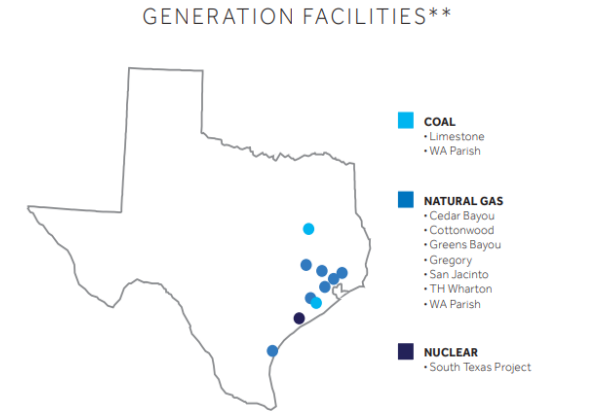
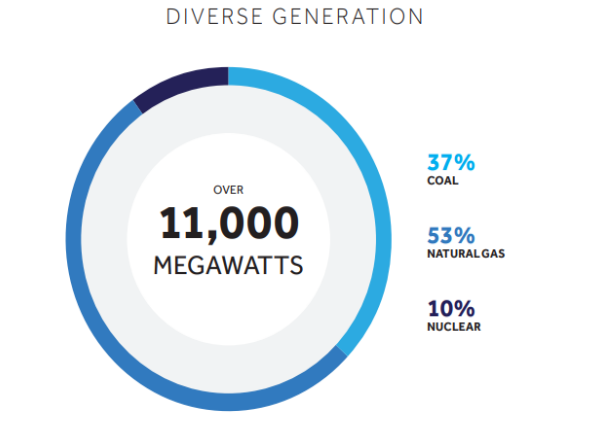
~2.3M recurring customers

reliant[®] an NRG company | Green Mountain Energy[®] | Stream | cirro ENERGY | GOALZERO | XOOM energy

GENERATION

40% of NRG capacity based in Texas

world's largest post-combustion carbon capture project



As of 12/31/2021

- FAC-008 R1 requires each GO to have documentation for determining the Facility Ratings of its solely and jointly owned generator Facilities), including the main step-up transformer.
- FAC-008-5 R2 requires each GO to have a documented methodology for determining Facility Ratings of its solely owned and jointly owned equipment connected at the POI.
- FAC-008-5 R6 requires each GO to have a Facility Ratings that are consistent with the GOs established methodology and documentation.
- FAC-008-5 R8 requires each GO to provide Facility Ratings upon request, including the next most limiting equipment of the Facility if applicable.

- NRG uses two primary documents to comply with the standard:
 - EG-010 - the Electrical Engineering guidance document used to establish the methodology for the Facility Ratings implementation, factoring all components used in the transfer of power from the generator to the TO interconnection.
 - OCC-FAC-008 – a guidance document used to assign roles and responsibilities to fulfill the requirements of and demonstrate compliance to FAC-008.

- At each nominal voltage level, the methodology identifies how to determine the maximum continuous ampacity rating of each discrete element, using the appropriate design basis at the typical upper limit of ambient operating temperatures. Also, it identifies and justifies the assumptions that are used.

- Information and data is collected from electrical drawings including one-line diagrams, manufacturer information, ampacity tables, test reports, engineering analysis, and field walkdown. The information is organized in an excel datasheet.

- Each unit datasheet lists the electrical conducting elements and ratings from the generator to the POI to identify the most limiting component and associated Facility Rating as well as the next most limiting element. Facility Ratings are established as follows:
 - (R1) the main generator through the high side terminals of the main step-up transformer
 - (R2) for Facilities connected from the main step-up transformer high side terminals to the point of interconnection

- The datasheet was developed in a tabular format for ease of comparison and identification of the most limiting component.



- NRG Facility Rating Template is shown here. It is built to represent the information of the cohort of equipment.
- The Main Generator and GSU have their own columns to tabulate their parameters.
- All equipment has a column to show its Description, Rating Method, Information Source, and Current Ampacity value.
- The template also have optional fields to consider GSU losses and Auxiliary power load (house load).

NRG Facility Ratings Template



GENERATOR FACILITY RATINGS ANALYSIS OF A SINGLE GENERATOR, RADIALLY CONNECTED ELEMENTS



Generating Station: Plant NRG
Unit: A

Season: Winter or Summer Design Ambient : 40 °C

PRC-025 COMPLIANCE ACHIEVED
Implementation of PRC-025 for loadable relays prevents relays from being the most limiting factor.

GENERATOR RATING			
Rating Method / Data	Equipment Nameplate Rating or Manufacturer's Data	20 kV, 3 Ph, 60 Hz, 815.7 MVA, 0.90 PF, 75 PSIG H ₂ , Water-Cooled Stator	
	Rated [kV]	Rated Output [MVA]	Rated Current
Generator Rated Output →	20.0	815.7	23,547 [A]
Rated Gen Power Factor →	0.90		
Select Generator Output	[MW]	[MVAR]	[MVA]
Generator Rated Output	734.13	356	815.7
			23,547 [A]

GSU RATING			
Rating Method / Data	Equipment Nameplate Rating or Manufacturer's Data	Step-Up XFMR 6, 362.25 - 25/24/20 kV, 3 Ph, 60 Hz, 850 MVA, Type FOA, 65°C Rise, 9.65 %Z, 43.62 X/R Ratio	
	Rated [kV]	Z %	Z Base
GSU Low Side Ratings →	20.0	9.65%	850 [MVA]
GSU High Side Ratings →	362.25	Rated Output [MVA]	Current
GSU High Side Tap →	362.25	850	1,355 [A]

OPTIONAL - CONNECTED GENERATOR BUS AUX LOAD	
Optional provisions to calculate the generator gross operating limit supported by the GSU low side winding, factoring in bus connected auxiliary load.	
Enter Gen Bus Aux Load Active Power →	44.0 [MW]
Enter Gen Bus Aux Load Reactive Power →	27.3 [MVAR]

OPTIONAL - GSU LOSSES	
Optional provision to calculate the generator gross operating limit supported by the GSU low side winding, factoring in GSU losses.	
GSU Active Power Losses →	1.4 [MW]
GSU Reactive Power Losses →	61.9 [MVAR]

R1. ELEMENTS FROM GENERATOR TO GSU			
List current rating in [A] for elements from the generator to the GSU LV terminals.			
EQUIPMENT/DESCRIPTION	RATING METHOD	INFORMATION SOURCE	CURRENT
Isolated Phase Bus - 25000A	Equipment Nameplate Rating or Manufacturer's Data	GE Isolated Phase Bus Equipment Summary	25,000 [A]
Most Limiting Current Transformer Rating (Bushing) 30,000/5A	Engineering analysis	EG-010 Facility Rating Methodology	[A]
			[A]
			[A]
	[MW]	[MVAR]	
Generator Output	734.13	356	23,547 [A]
MOST LIMITING GENERATOR GROSS OUTPUT			
	[kV]	[MVA]	Output Current
Generator Output	20.0	816	23,547 [A]
			0.900 pf
NET GENERATION OUTPUT ON HIGH VOLTAGE SIDE OF GSU			
Net generation output on the high voltage side of the GSU is based on the lesser of the GSU rated output, calculated net generation output, or the most limiting gross generation output. Auxiliary load and GSU losses are included if provided.			
Net-Generation Output on GSU High Side	[MW]	[MVAR]	
	688.7	266.4	0.933 pf
GSU Rating	[kV]	[MVA]	Current
	362.25	738.4	1,177 [A]
Net GSU HV Output	[kV]	[MVA]	[A]
	362.25	850.0	1,355 [A]
	[kV]	[MVA]	[A]
	362.25	738.4	1,177 [A]

R6. Most Limiting Output of Generator to Interconnection Point			
Ratings of elements from the GSU HV terminals to the interconnection point at nominal operating voltage.			
EQUIPMENT/DESCRIPTION	RATING METHOD	INFORMATION SOURCE	CURRENT
Overhead Jumpers from GSU to Disconnect Switch - 2 - 795 AAC/Ph (Arbutus), 105°C, 40°C ambient	Methods consistent with industry standards (e.g. ANSI and IEEE)	Field observation, EG-010 Facility Rating Methodology; Bill of Material Frontline	1,988 [A]
GSU Disconnect Switch B069-2000A	Engineered Drawings or Documents	Field observation of nameplate; Nameplate pictures	2,000 [A]
Most Limiting Current Transformer Rating - 2000/5A (Bushing)	Engineering analysis	EG-010 Facility Rating Methodology	[A]
			[A]
			[A]
			[A]
			[A]
			[A]
Net Generator Output on High Side of GSU			1,177 [A]
MOST LIMITING GENERATOR GROSS OUTPUT			
	[kV]	[MVA]	CURRENT
Generator Output	20.0	815.7	23,547 [A]
NET GENERATION OUTPUT ON HIGH VOLTAGE SIDE OF GSU			
	[kV]	[MVA]	CURRENT
GSU HV Output	362.25	738.4	1,177 [A]
NEXT MOST LIMITING ELEMENT ON HIGH VOLTAGE SYSTEM			
	[kV]	[MVA]	CURRENT
Overhead Jumpers	362.25	1,247	1,988 [A]

- For managing changes and NERC Compliance related impact, NRG uses a checklist that is grouped by types of changes. These types of changes include the following.
 - a. Protection System and Remedial Action Scheme changes
 - b. Generator Control changes (Exciter, AVR, or PSS)
 - c. Turbine Control changes (DCS, Governor, etc.)
 - d. Major Equipment alterations or replacements (Turbine, Generator, GSU)
 - e. Electrical Equipment replacements or modifications (Conductors, IPB, Tap Settings, etc.)

- Each group has an associated list of impacted NERC Reliability Standards. This list specifically pinpoints the requirements to be addressed.

- Those responsible for the change are required to use this checklist and identify the impact; the Plant Manager is accountable to ensure execution of Change Management process.

- The completed checklist and the Change Management plan is reviewed by a cross functional team including Engineering and Technical Services, Regulatory Compliance, and Operation Support.

E. Electrical Equipment (Generator, GSU, Tap settings, Conductors, Disturbance Monitoring Equipment (DME), etc.): Replacement or Changes.

- ❖ FAC-008- Facility Ratings Methodology for changes in equipment that can be used between the Main Generator and the Point of interconnection with the interfacing Transmission Owner. These typically include:

- Generator Capacity or Ratings
- GSU transformer ratings or tap settings
- Generator Bus
- Connector leads
- Rigid Bus
- Transformer Drop Conductors
- Overhead Conductors
- Transition jumpers
- Disconnect switches

- To structure the action plans associated with the different types of NERC impacts, NRG uses individual workbooks specific to each NERC Reliability Standard, identifying the actions needed for compliance. The workbook summarizes the following:
 - a. Applicability Checklist
 - b. Types of changes that can impact a given standard.
 - c. Change Date
 - d. Description and details of change
 - e. Action plan steps to address change

- The workbook includes a checklist to be used by the project manager to track the action plan. This checklist includes:
 - a. Assigned personnel
 - b. Each action plan
 - c. Milestone dates for each step
 - d. Reviewer information for each step
 - e. Signoff information for each step
 - f. Comments for clarification

Internal Controls: Periodic Review



ATTACHMENT:
Requirements 1 and 6:
Attach evidence demonstrating that the Facility Ratings documentation has been reviewed as consistent with the associated Facility Rating Methodology and updated if needed to reflect changes in equipment ratings. Acceptable evidence includes: Facility Rating template with associated supporting evidence such as drawings, and engineering specifications for equipment, etc.

Requirement 7:
A. If a schedule has NOT been established to provide Facility Ratings and/or a request was NOT received for the ratings from the RC, PA, TP, TO or TOP, please make an Attestation Statement to that effect. No documentation will be attached.
B. Attach evidence that Facility Ratings were provided to the RC, PA, TP, TO or TOP as scheduled, updates as required or requested, such as:
a. Actual request, schedule or ISO manual assigning responsibility to the Generator Owner to update when changes occur,
b. Documentation that Facility Ratings were provided as required i.e., email distribution, confirmation of email receipt, etc.

Requirement 8:
a. Request received from the external entity(ies),
b. Evidence that the request was submitted within the requested timeframe,
c. Documents submitted.

ATTESTATION: Select the appropriate statement from below, and copy/paste the text into the Compliance Comments field:
COMPLIANT: During the review period, NO updates were needed to be reported, NO schedule has been established and/or NO request has been received from the RC, PA, TP, TO or TOP. The Facility has confirmed that the Facility Ratings for its plant located in the NRG Asset Sharepoint has been reviewed, is consistent with the Facility Ratings Methodology, is correct and up-to-date.
OR
COMPLIANT: During the review period, a schedule was established to provide Facility Ratings and/or a request was received from the RC, PA, TP, TO or TOP. The ratings have been provided in accordance with the schedule or request and appropriate documentation is attached. The Facility has confirmed that the Facility Ratings for its plant located in the NRG Asset Sharepoint has been reviewed, is consistent with the Facility Ratings Methodology, is correct and up-to-date.
OR
POTENTIAL NON-COMPLIANCE: The Facility acknowledges that during the review period, a discrepancy occurred regarding the Company's obligation to review and update, report or provide Facility Ratings as requested or as scheduled. The associated documentation is attached.

NOTE: If none of the above statements apply to your situation or if a discrepancy related to compliance with this NERC Standard Requirement occurred, please contact a member of the NERC Compliance Team.

RELATED STANDARDS / REQUIREMENTS

Assurix CATSWEB NERC Prod V8
User: Murphy Christopher (NERC Compliance)
may have pending external links

Home MetaSite Logout My_CATSWeb About Help
Go to: Issue Action External
Addressed Status

Edit Add Note Add Link Attach File Forward Copy by E-mail View Issues View Edit History Highlight Changes Print View

FAC-008-3 Annual Verification of Operational Capability ETS (Regional Control)

INSTRUCTIONS:
Supplemental Control
When notified of changes impacting facility ratings within the scope of R1 and R6, NRG ETS (Engineering & Technical Services) will update the Unit FAC-008 analysis in the site-specific folder in the Engineering ETS SharePoint.
A rating change also requires an update in the Regional FAC-008 Ratings Assessment chart indicating ratings at the interconnection point with the TO and a comparison of the ratings to the maximum operating capability reported to the ISO.
If the maximum reported operating capability exceeds the Facility Ratings or discrepancy exists with ratings at POI, then ETS Engineering will assist in the analysis and corrective action to resolve the discrepancy.

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ATTACHMENTS NEEDED:

1. For scenarios where there has not been a change in electrical equipment that impacts FAC-008 Facility Ratings attest to no change and close task.
2. For scenarios where there has been a change in electrical equipment that impacts FAC-008 Facility Ratings, provide update and:
a. Link to Current facility ratings for each unit in the site-specific folder
b. Link to respective Regional FAC-008 Assessment chart in the Regional FAC-008 Assessment folder located in the Engineering ETS at: [ETS Electrical SharePoint for Unit Specific Files](#)
3. For scenarios where there is a discrepancy between the ISO reported max capability as higher than the individual unit ratings, provide updated analyses and justification where possible that there is not a reliability risk with operation at the ISO reported capability, and:
a. Link to Current facility ratings and summary of analyses supporting operation at reported capability for each unit in the site-specific folder: [ETS Electrical SharePoint for Unit Specific Files](#)
b. Link to respective Regional FAC-008 Assessment chart in the Regional FAC-008 Assessment folder located in the Engineering ETS at: [Facility Ratings ISO - Interconnection Coordination](#)

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ATTESTATION STATEMENTS:
Select the appropriate statement from below, and copy/paste the text into the Compliance Comments field:
COMPLIANT: There have been no notification of changes impacting facility ratings with the scope of R1 & R6 communicated to ETS. The unit facility ratings and associated Regional FAC-008 ratings assessment chart remain unchanged.
OR
COMPLIANT: Within the assigned generating stations, notification was provided of changes to equipment within the reporting period. Upon review, the facility ratings and associated Regional FAC-008 Rating Assessment chart were updated accordingly.

➤ Annually, personnel at each plant review the facility ratings to verify existing ratings or identify changes that would impact the Facility Rating. The review includes design change reviews maintenance impacts, or walkdown verification.

➤ An annual review to confirm the Facility Ratings methodology by Engineering is performed.

➤ The tool used to perform these reviews is called CATSWEB. It is a compliance database that is used to assign actions, respond to the actions, and store information used to address the actions.

- NRG compares the Facility Rating MVA value on the High Voltage side of the station to the Facility Rating MVA value on the TO side of the Point of Interconnection.
- NRG also compares the Facility Rating MVA value on the High Voltage side of the station to the maximum (historical) MVA value on the TO side of the Point of Interconnection (RF/RIOO).
- CATSWEB

FAC-008-3 Annual Verification of Operational Capability (ComOps Regional Task)

INSTRUCTION(S):

Supplemental Control
Each year, Commercial Operations personnel are instructed to review and update the net max operational capability in MWs and MVARs for each NRG managed unit as reported to the appropriate ISO and enter criteria for value of net max operational capability value used (seasonal DMNC, etc.) in the comment section. An auto-generated comparison will be made with the Facility ratings by design to ensure consistency in NRG's position that units are not bid into markets and operated above max design criteria of the most limiting electrical component. Refer to the Regional FAC-008 Ratings Assessment chart - Reported to ISO tab - highlighted column located in the region-specific folder in the Engineering ETS located at: [Facility Ratings ISO - Interconnection Coordination](#)

If any changes are identified, record the MWs and MVARs as necessary for the identified unit and note that changes are made in the attestation.
[Refer to the Facility Ratings Annual Review Process located here](#)

IMPORTANT: If the operational capability for a specific unit is found to be higher than that defined in the design ratings as shown in the "Assessment: Reported Values Do Not Exceed Rating Column" as a FAIL, notify RC and Engineering to review and provide analyses and a summary to confirm that there is no impact to reliability.

ATTACHMENTS NEEDED:

- For scenarios where there has not been a change in reported max capability (MWs, MVARs) that impacts FAC-008 Facility Ratings Assessment Chart:
Link to respective Regional FAC-008 Assessment chart in the Regional FAC-008 Assessment folder located in the Engineering ETS at: [Facility Ratings ISO - Interconnection Coordination](#)
- For scenarios where there has been a change in reported max capability (MWs, MVARs) that impacts FAC-008 Facility Ratings Assessment Chart as a "OK" on the Assessment chart:
a. Provide notification to Engineering and RC concerning the update in reported max capability and specific unit via email.
Link to respective Regional FAC-008 Assessment chart in the Regional FAC-008 Assessment folder located in the Engineering ETS at: [Facility Ratings ISO - Interconnection Coordination](#)
- For scenarios where there is a discrepancy between the ISO reported max capability as higher than the individual unit ratings by design and shown as "FAIL" on the Assessment chart:
a. Provide notification to Engineering and RC concerning the identified discrepancy via email, meeting minutes, etc.
Link to respective Regional FAC-008 Assessment chart in the Regional FAC-008 Assessment folder located in the Engineering ETS at: [Facility Ratings ISO - Interconnection Coordination](#)

ATTESTATION STATEMENTS:

Select the appropriate statement from below, and copy/paste the text into the Compliance Comments field:

COMPLIANT: Commercial Operations has reviewed the current max unit capabilities (MWs, MVARs) in the FAC-008 Facility Ratings Assessment Chart for this region and no changes have been made within this period that impact the current facility ratings of each unit. The Regional FAC-008 ratings assessment chart remains unchanged.

OR

COMPLIANT: Changes to reported max capability (MWs, MVARs) within this region that impact the current ratings facilities have been communicated to the RC and Engineering group within this period. However, reported max capability does not exceed design criteria.

OR

COMPLIANT: Changes to reported max capability (MWs, MVARs) within this region now exceed the current design ratings and this has been communicated to the RC and Engineering group within this period. Additional analyses are required.

OR

POTENTIAL NON-COMPLIANCE: It is acknowledged that during the review period, an issue occurred to meet compliance with this requirement(s). Regulatory Compliance has been notified and any relevant documentation is attached.

NOTE: If none of the above statements apply to your situation or if a discrepancy related to compliance with this NERC Standard Requirement occurred, please contact a member of the NERC Compliance Team.

- For a complete and ongoing Facility Ratings Program, it is important to have the following in place:
 - Governing procedures.
 - Well Defined Technical Methodology.
 - A Change Management process and tools to address change that will impact Facility Ratings.
 - Tracking tool and process that prompt the periodic review of Facility Ratings and examination of the program.



Questions?