



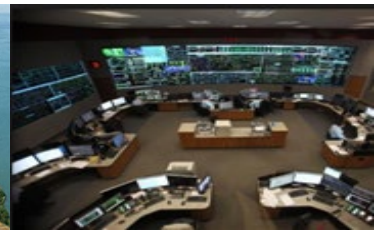
**RELIABILITY FIRST**

# RF Winter Recap Performance during the Winter of 2021-2022

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**July 18, 2022**

**PUBLIC**



# GADS History

- Electric utility industry initiated in 1963
- Contains 90% of installed generation capacity in the U.S. and Canada
  - 7,700 generating units
- Became mandatory for certain units in 2012
  - Conventional generating units 20 MW and larger
- Widely used across industry to assess and improve generator performance



# GADS Database

- Fundamentals of the three GADS data types:
  - **Design** - equipment descriptions.
  - **Performance** - summaries of generation produced, fuels units, start ups, etc.
  - **Event** - description of equipment failures.
  
- Data submission follows quarterly schedule
  - When quarter ends, registered entities have 45 days to submit data



# Selection Criteria

## ➤ **Identify Winter Outages**

- Narrow Months to (Nov-Feb)
- Review Verbal Descriptions

## ➤ **Performance – lost MW hours**

- Forced and Derates
- Prioritize based on largest to smallest MW hours



# Selection Process

## ➤ Existing Generation

- Review two years of seasonal performance related to cold weather causes
- Candidates considered based on the following:
  - Responses to the plant winterization survey
  - Repeat cold weather outages
  - Cold weather outages resulting in large amounts of lost MW hours
  - Cold weather outages for plants greater than 500 MW capacity
  - Plants in-service less than three years

## ➤ New Generation

- Experience first plant winterization survey since registry
- Candidates considered based on the following:
  - Responses to the plant winterization survey
  - Plants greater than 100 MW capacity



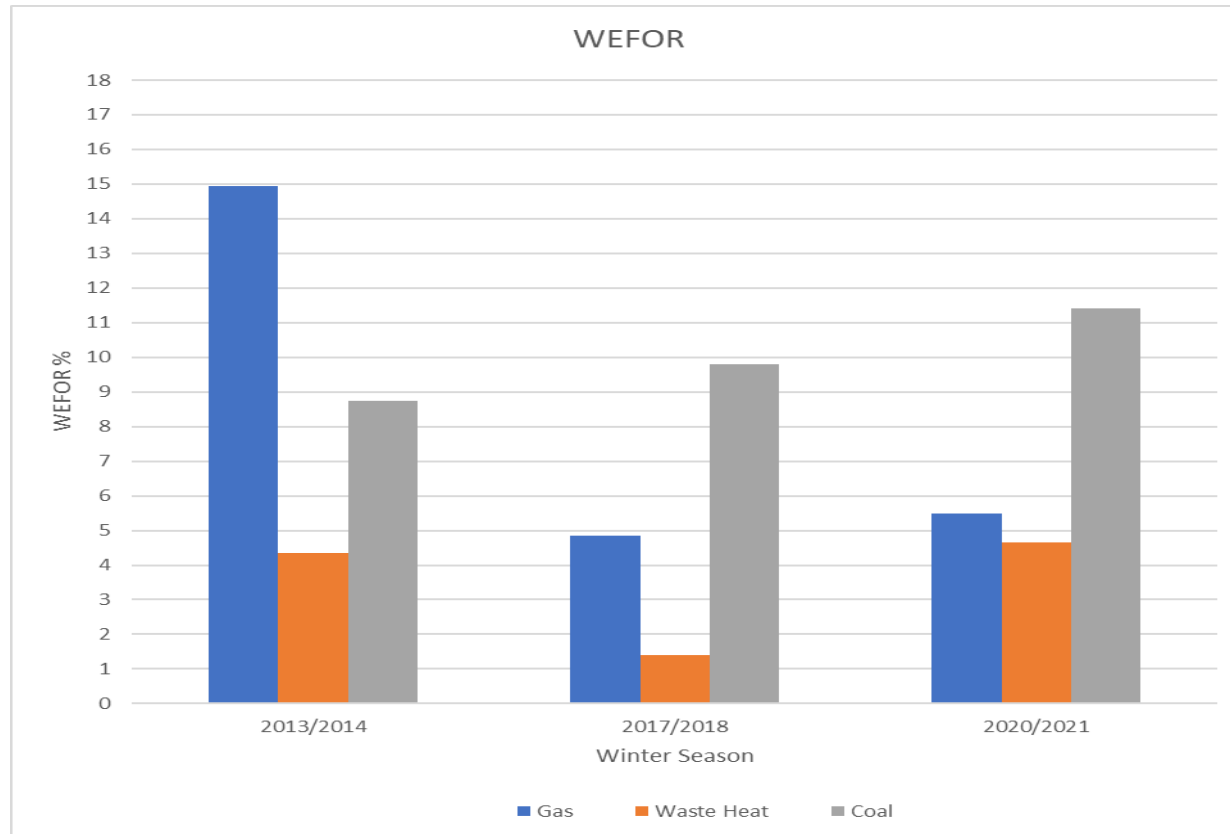
# Winter Performance

- **Weighted-Equivalent Generation Forced Outage Rate (WEFOR)** - measures the probability that a unit will not be available to deliver its full capacity at any given time due to forced outages and derates.
- Individually, these statistics provide important information to plant owners in an effort to benchmark and improve the performance of their own generators
  - Lower is better
  - This indicator answers the following questions:
    - On average, how often are generators out of service?
    - What is the trend of generation outages?
    - How do generator outages differ between different fuel types?



# Winter Performance – WEFOR by Fuel Type

## Weighted-Equivalent Generation Forced Outage Rate (RF)

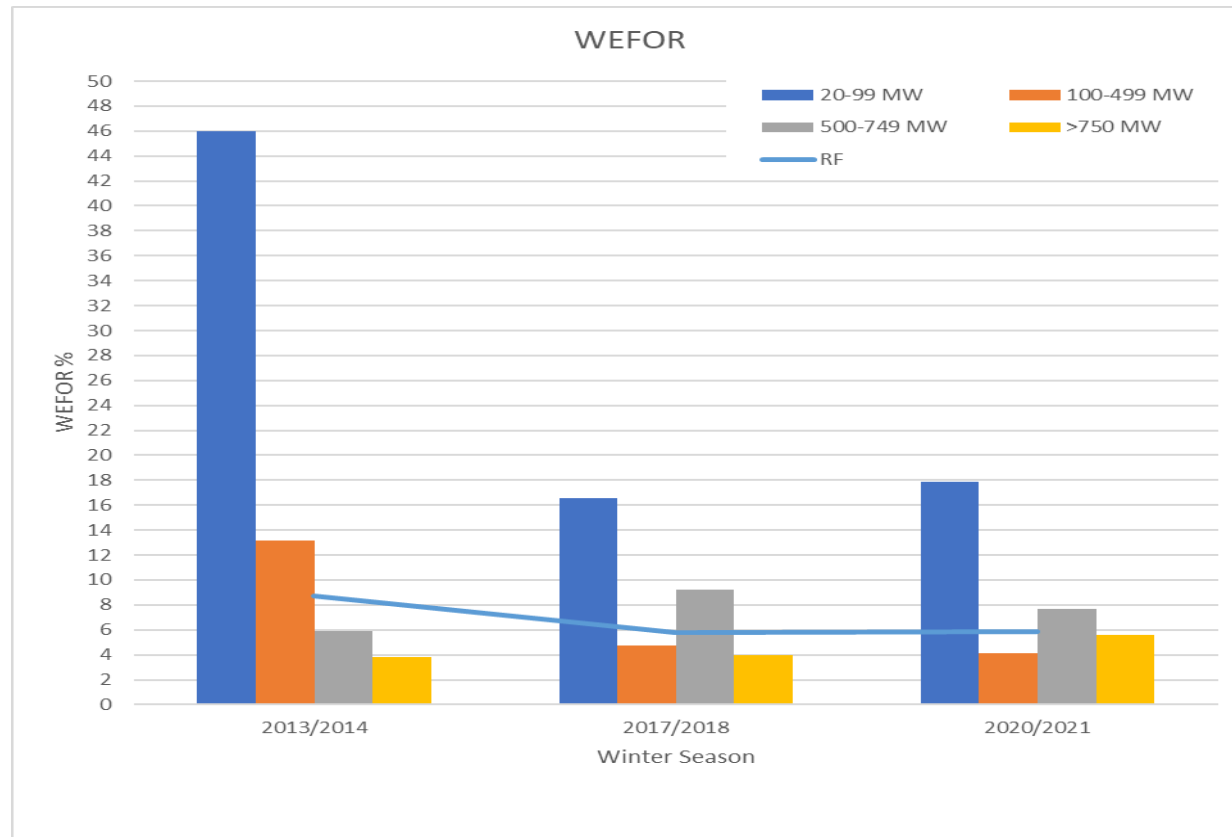


WEFOR during the last cold weather events by fuel type during the winter months of November - February



# Winter Performance – WEFOR by MW Grouping

## Weighted-Equivalent Generation Forced Outage Rate (RF)



WEFOR during the last cold weather events by MW grouping during the winter months of November - February





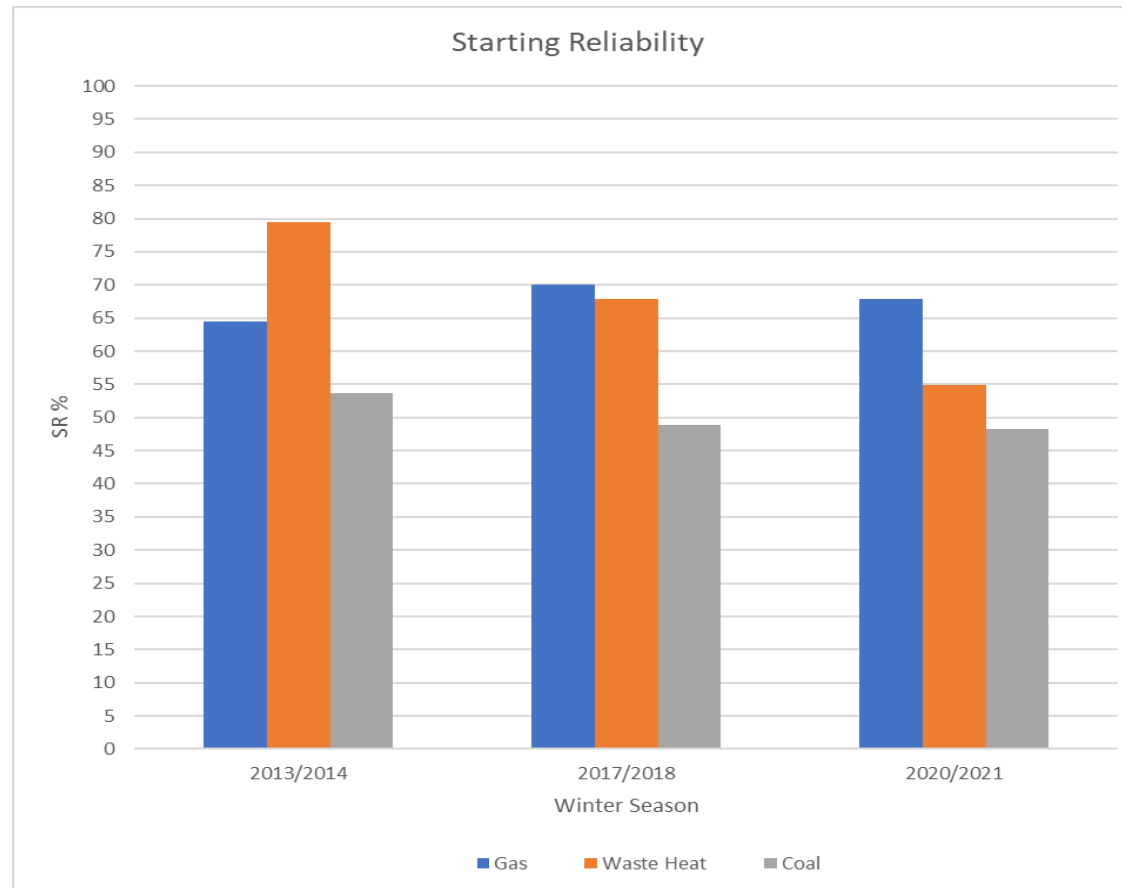
# Starting Reliability

- **Starting Reliability (SR)** – Measures the total amount of Actual Unit Starts divided by the amount of Attempted Starts multiplied by 100%
  - Base load units are identified as lower due to no actual starts vs attempted for the month
  - Highly dependent on what happens immediately before and/or immediately after a startup



# Winter Performance – Starting Reliability by Fuel Type

## Starting Reliability (RF)



SR during the last cold weather events by fuel type during the winter months of November - February



# Winter Performance – Starting Reliability by MW Grouping

## Starting Reliability (RF)



SR during the last cold weather events by MW grouping during the winter months of November - February

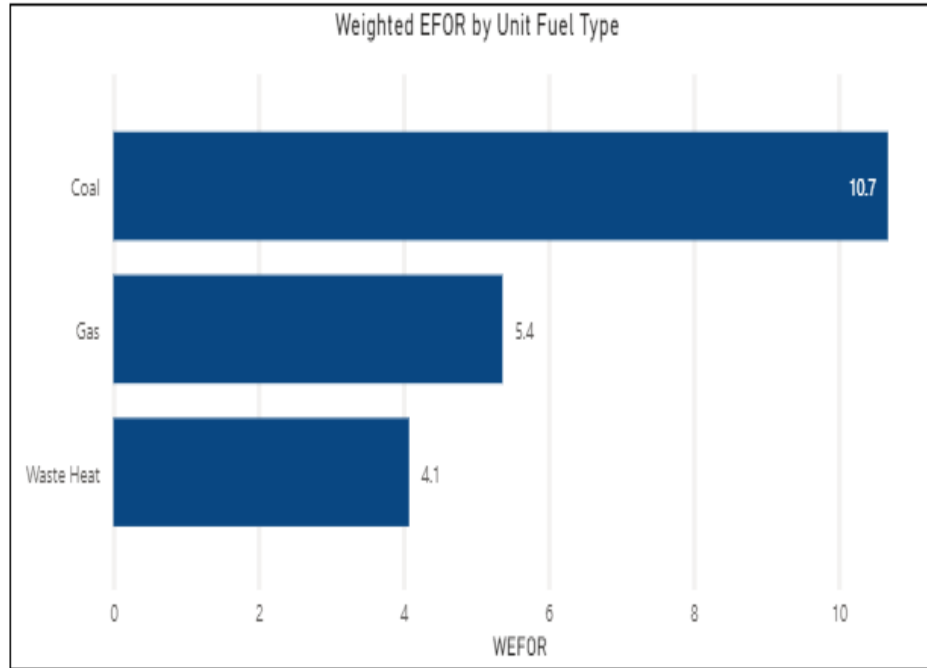


# Questions & Answers

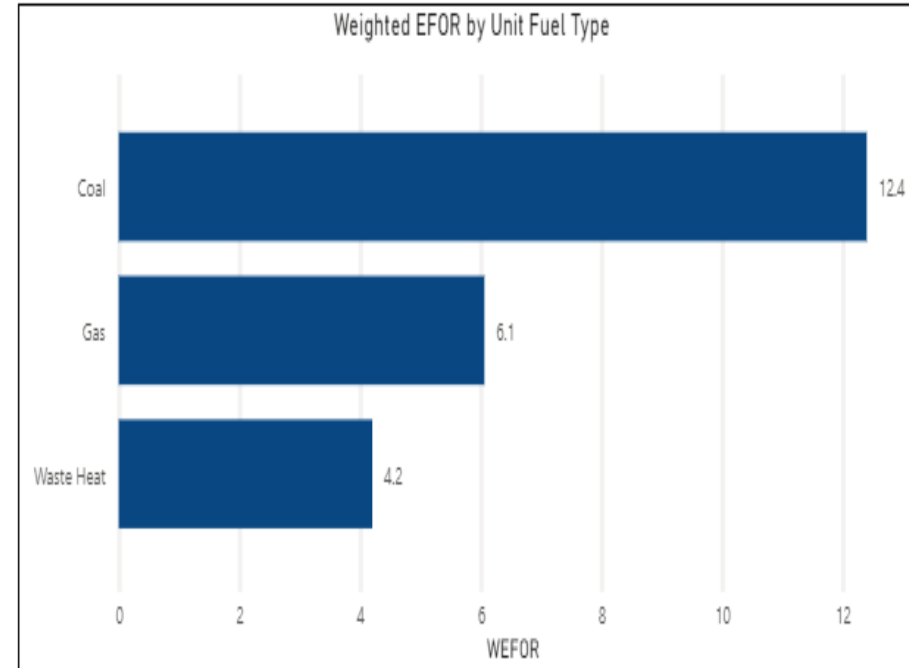
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# Winter Performance (GADS)

## Weighted-Equivalent Generation Forced Outage Rate (RF)



WEFOR over the last four years during the winter months of November - February

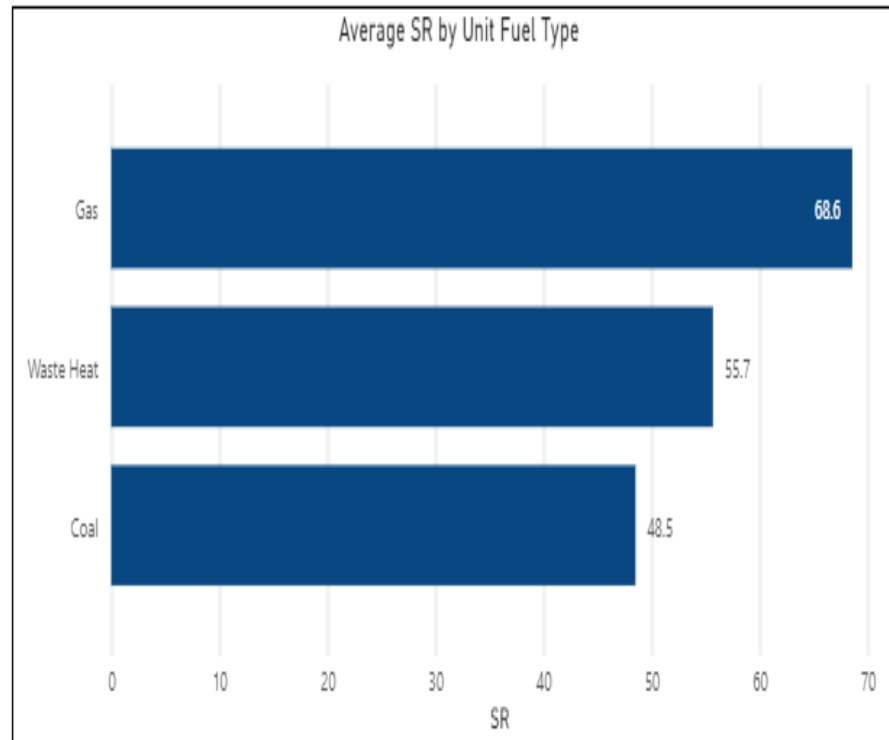


WEFOR over the last winter season during the winter months of November - February

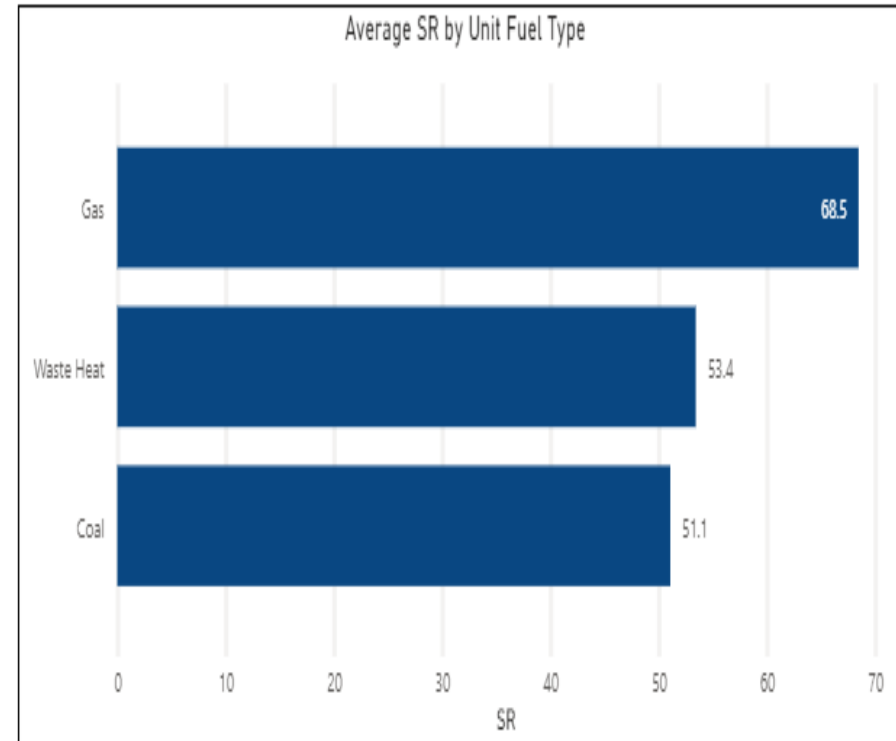


# Winter Performance (GADS)

## Starting Reliability (RF)



SR over the last four years during the winter months of November - February



SR over the last winter season during the winter months of November - February



# GADS Data Uses

Below is an example of how RF takes the GADS data and uses it to help identify cold weather issues with generating units within our footprint.

Cause Code	Amplification Code	Verbal Description
5054 - Water Injection System (Gas Turbine)	T2 - Tripped/shutdown grid separation - manual	Frozen water li
5002 - Inlet air filters A	T2 - Tripped/shutdown grid separation - manual	CT1/CT2 Inlet Filter High dP due to major snow event
5002 - Inlet air filters A	T2 - Tripped/shutdown grid separation - manual	CT1 Inlet Filter High dP due tomajor snow event
5002 - Inlet air filters A	T2 - Tripped/shutdown grid separation - manual	CT2 Inlet Filter High dP due tomajor snow event
1760 - Feedwater instrumentation (not local controls)	T1 - Tripped/shutdown grid separation - automatic	unit trip-loss of fw flow indication due to frozen sensing line at fw
5002 - Inlet air filters A	T1 - Tripped/shutdown grid separation - automatic	Clogged inlet filters due to snowfall.This is a result of marginal des
5019 - Other high pressure problems A	T2 - Tripped/shutdown grid separation - manual	Snow strom - buildup on the inlet filters causing Low CT inlet suction pressure.
5019 - Other high pressure problems A	T2 - Tripped/shutdown grid separation - manual	Snow strom - buildup on the inlet filters causing Low CT inlet suction pressure.
5019 - Other high pressure problems A	T2 - Tripped/shutdown grid separation - manual	Snow strom - buildup on the inlet filters causing Low CT inlet suction pressure.
0690 - Other feedwater problems downstream of feedwater regulatin	T1 - Tripped/shutdown grid separation - automatic	Drum Level Trip due to Instrument Freezing
5002 - Inlet air filters A	T1 - Tripped/shutdown grid separation - automatic	icing on filter
5409 - Other inlet air problems B	T1 - Tripped/shutdown grid separation - automatic	Snow clogged inlet filters and tripped unit on high filter DP
3149 - Loss of vacuum not attributable to a particular component such	T1 - Tripped/shutdown grid separation - automatic	False loss of vacuum indication due to frozen transmitter
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3149 - Loss of vacuum not attributable to a particular component such	T1 - Tripped/shutdown grid separation - automatic	False loss of vacuum indication due to frozen transmitter
1400 - Forced draft fans	T2 - Tripped/shutdown grid separation - manual	TRIPPED DUE ETO FD FANS (AIR FLOW FROZE)

