NERC GADS – Collecting Data on Wind Turbines

Presented by

GADS Services of the

North American Electric Reliability Corporation

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What is NERC?

- November 9,1965 Northeast black out
  - 30 million people affected
  - $100 million of economic losses
- 1968 Regional groups formed NERC
- Mission: to ensure that the North American bulk electric system is reliable, adequate and secure

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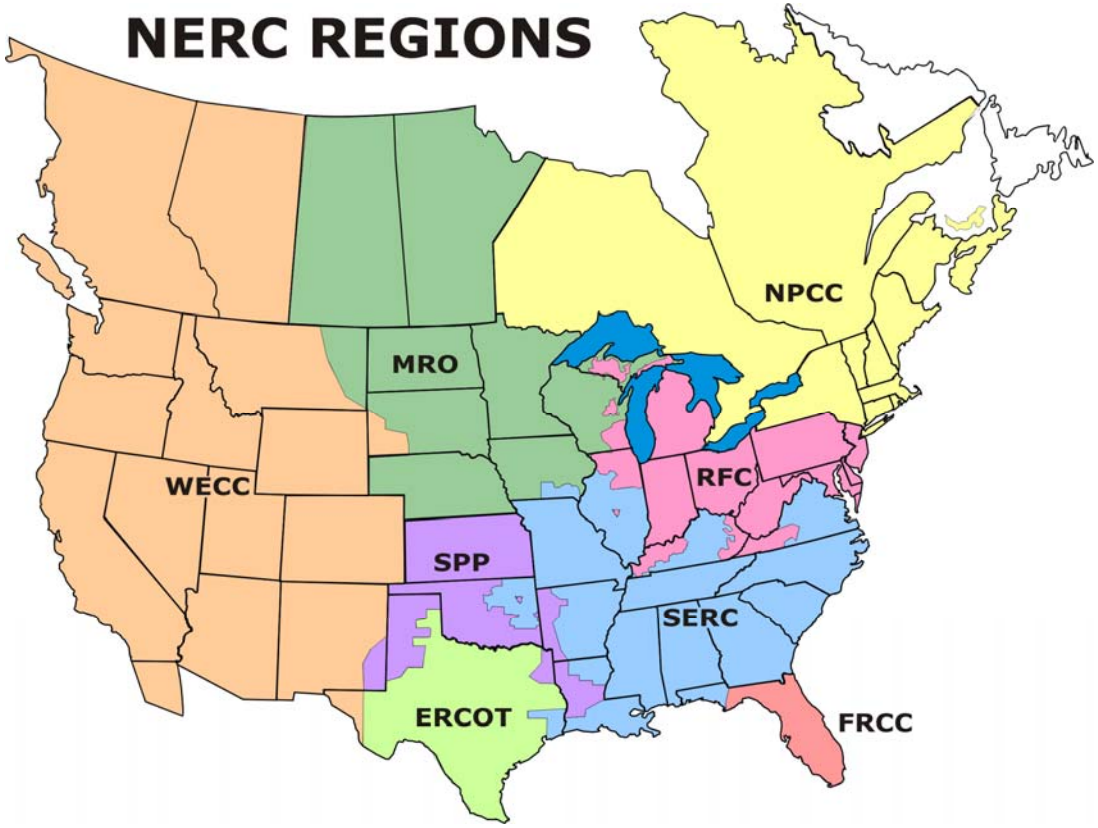
NERC Regional Councils



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Energy Policy Act of 2005

- Signed by President Bush in August 2005
- The reliability legislation amends Part II of the Federal Power Act to add a section 215 making reliability standards for the bulk-power system mandatory and enforceable.
- Electric Reliability Organization (ERO)
  - Self-regulating reliability organization
  - Not a governmental agency or department
- NERC was chosen as the ERO for the USA in July 2006.

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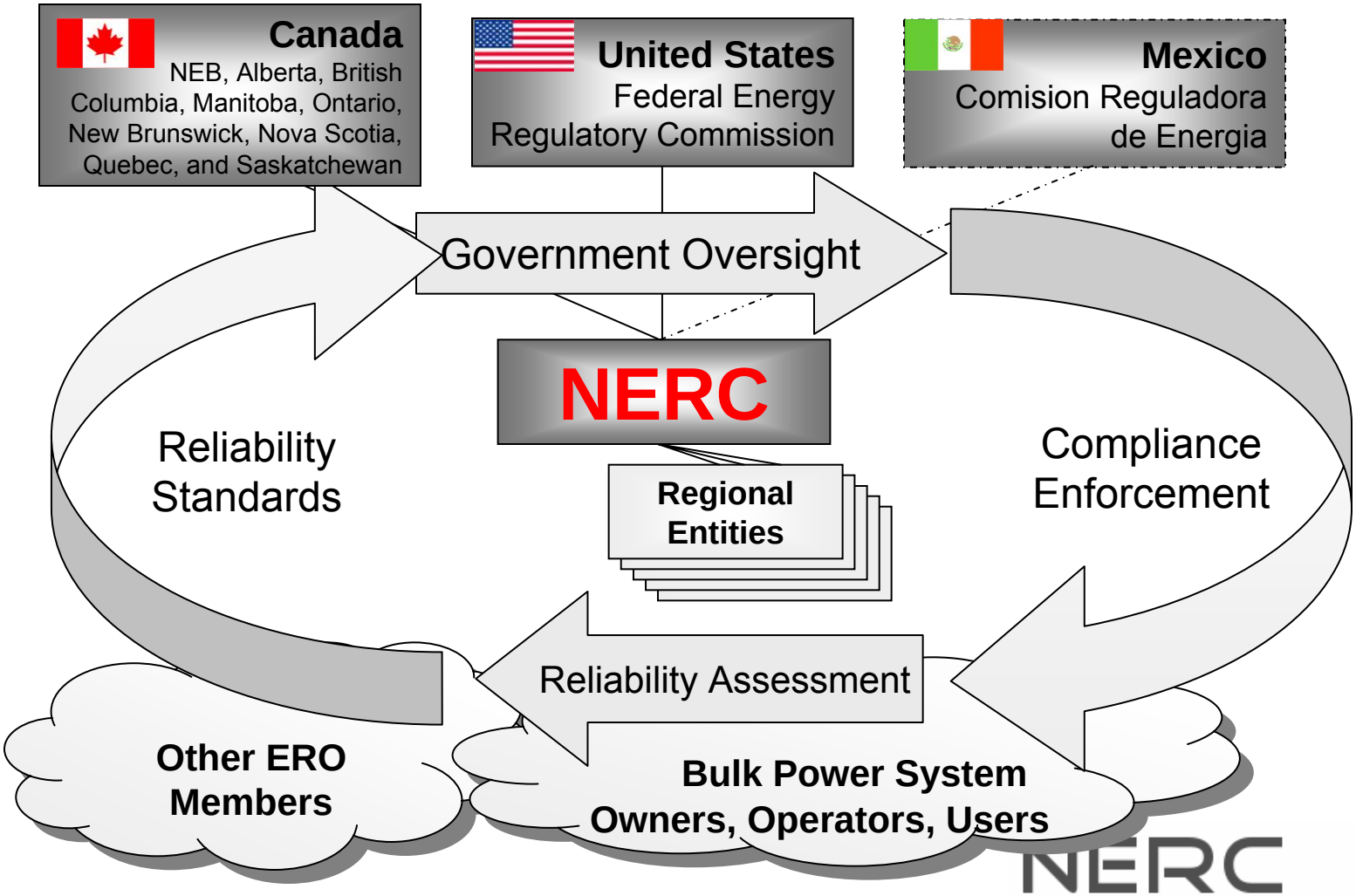
Need for an Electric Reliability Organization



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What Does NERC Do?

- Sets reliability standards (83 Stds in place.)
- Monitors compliance with reliability standards
- Provides education and training resources
- Conducts reliability assessments
- Facilitates reliability information exchange
- Supports reliable system operation and planning
- Certifies reliability organizations and personnel
- Coordinates security of bulk electric system

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Energy Policy Act of 2005

- "Bulk-power System" means the facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof) and electric energy from generation facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy.

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What is GADS?

- ***G*** - Generating
- ***A*** - Availability
- ***D*** - Data
- ***S*** - System

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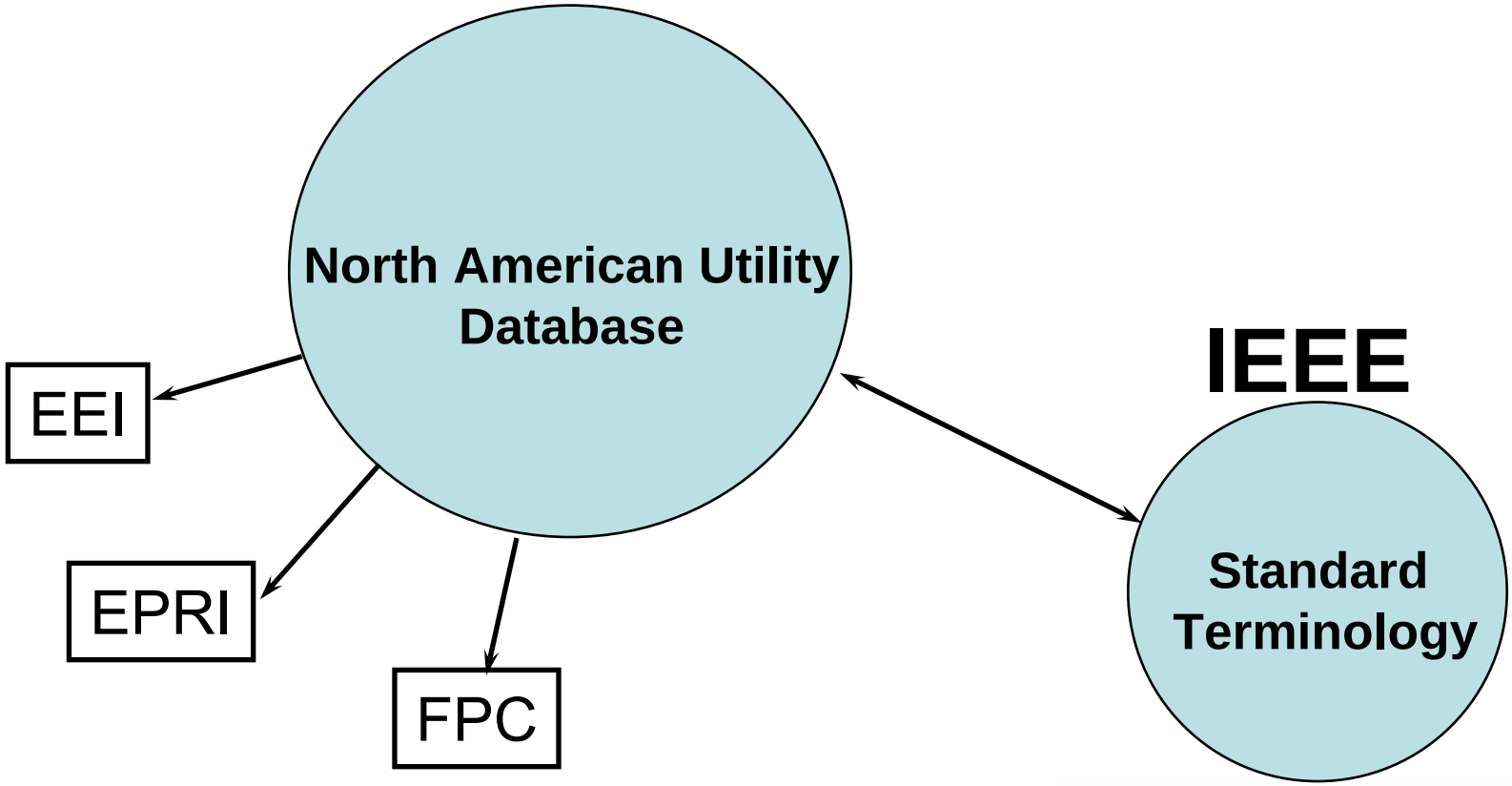
Generating Unit Database

1960's - 1970's



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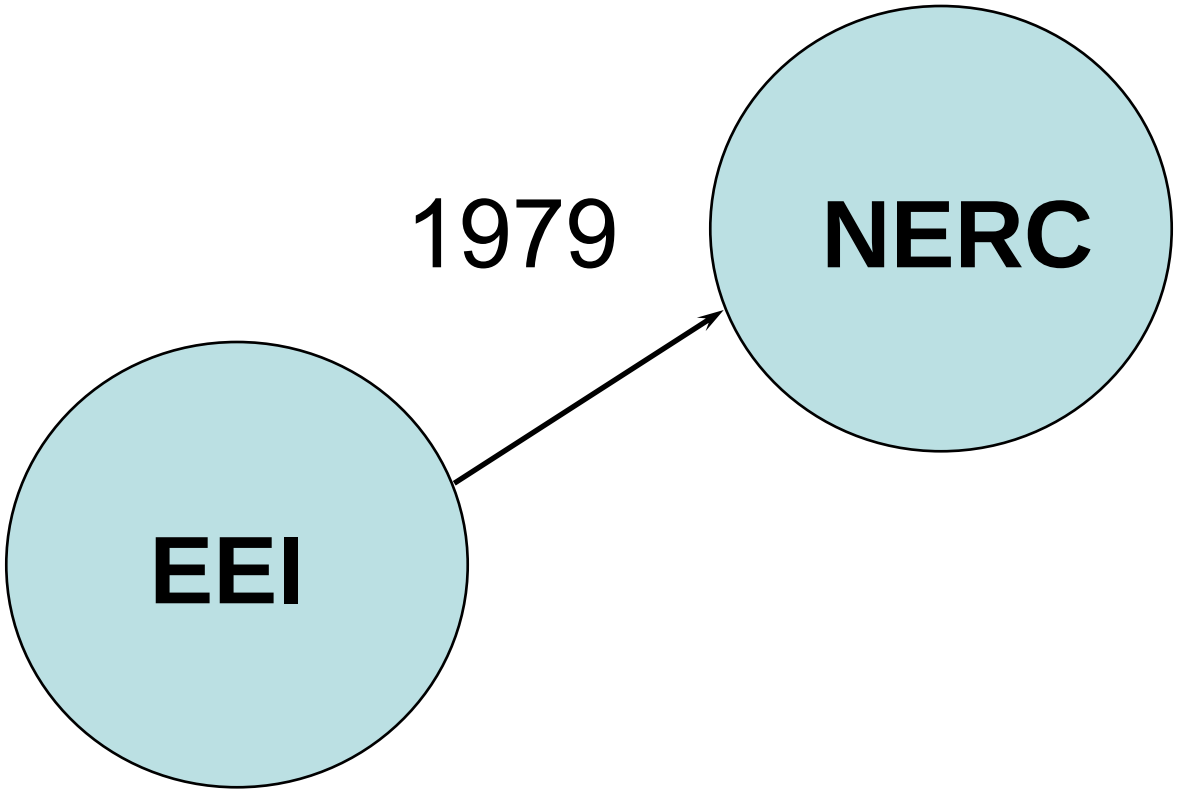
GADS is Born!



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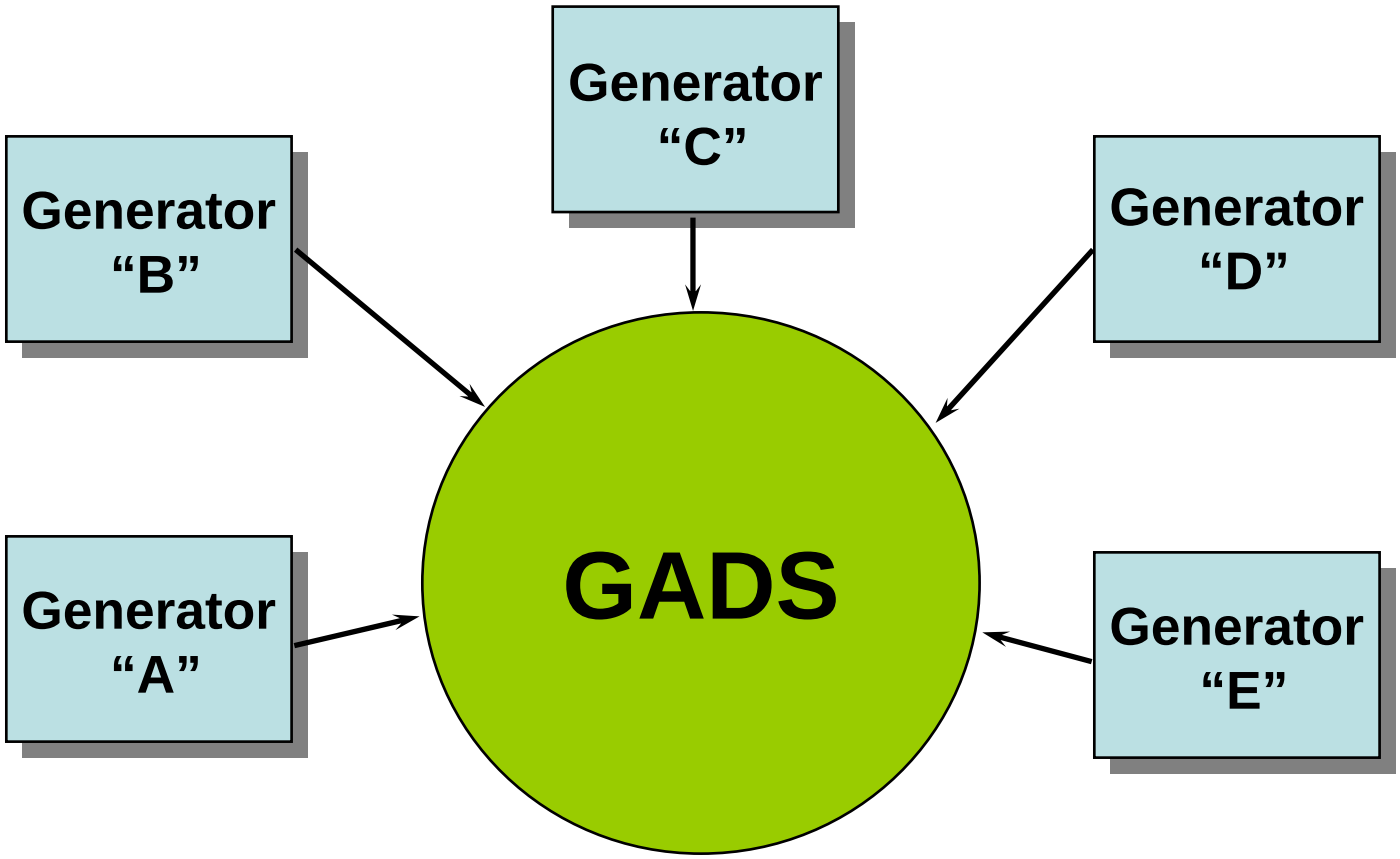
Monitor the present



5,000+ generating units including several international affiliates.

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Lots of MWs …

Represents 726,141 MW NMC
(About 72% of the
install capacity of
North America)

Is this enough information
to make important decisions?

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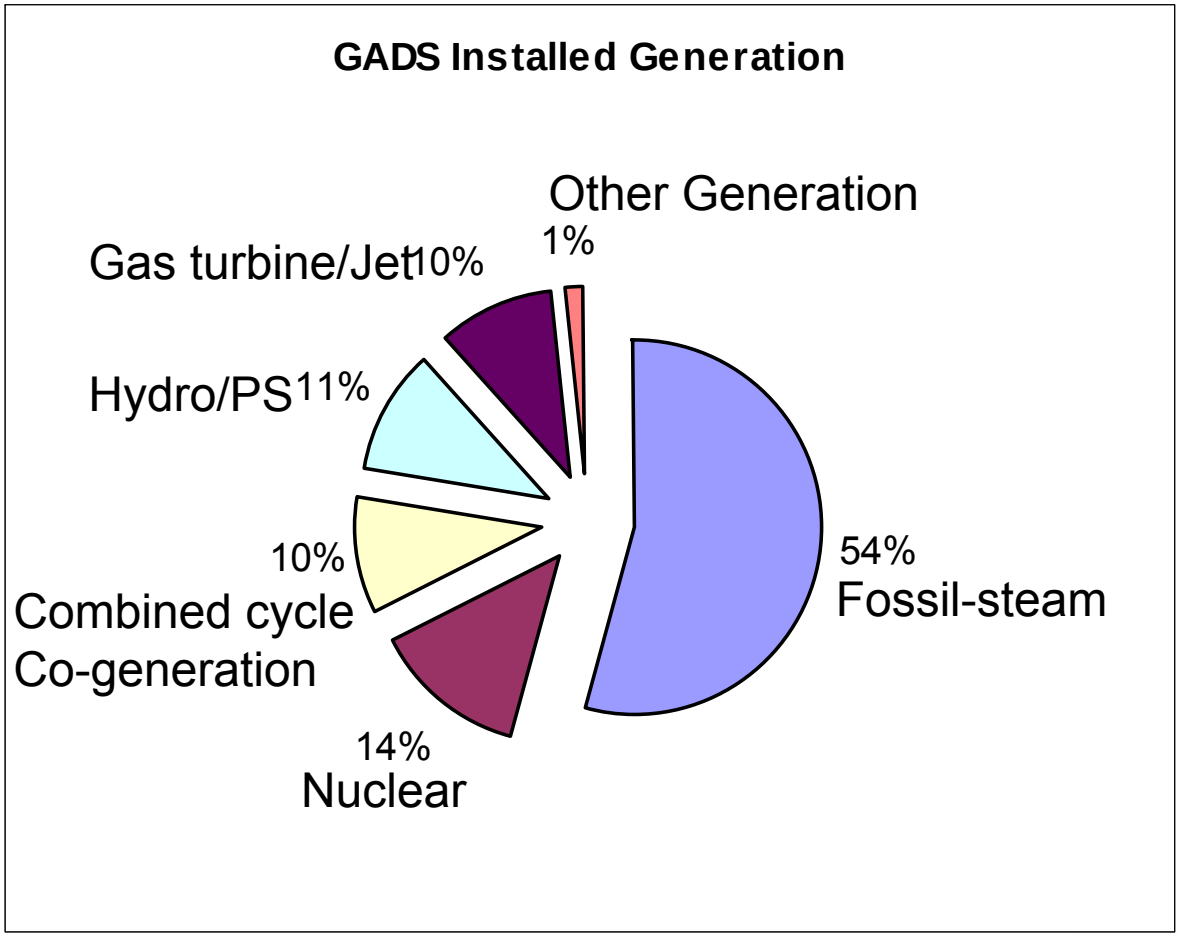
Generation Reporting to GADS



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Combined Cycle Work

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Combined Cycle Update

- For many years, combined cycle data was collected as if it were a “black box”
  - No gas turbine specific data
  - No steam turbine specific data
  - No design characteristics for analysis
- New methodology allows collection of each gas turbine/HRSG train and analysis of data for analyzing design and operation.

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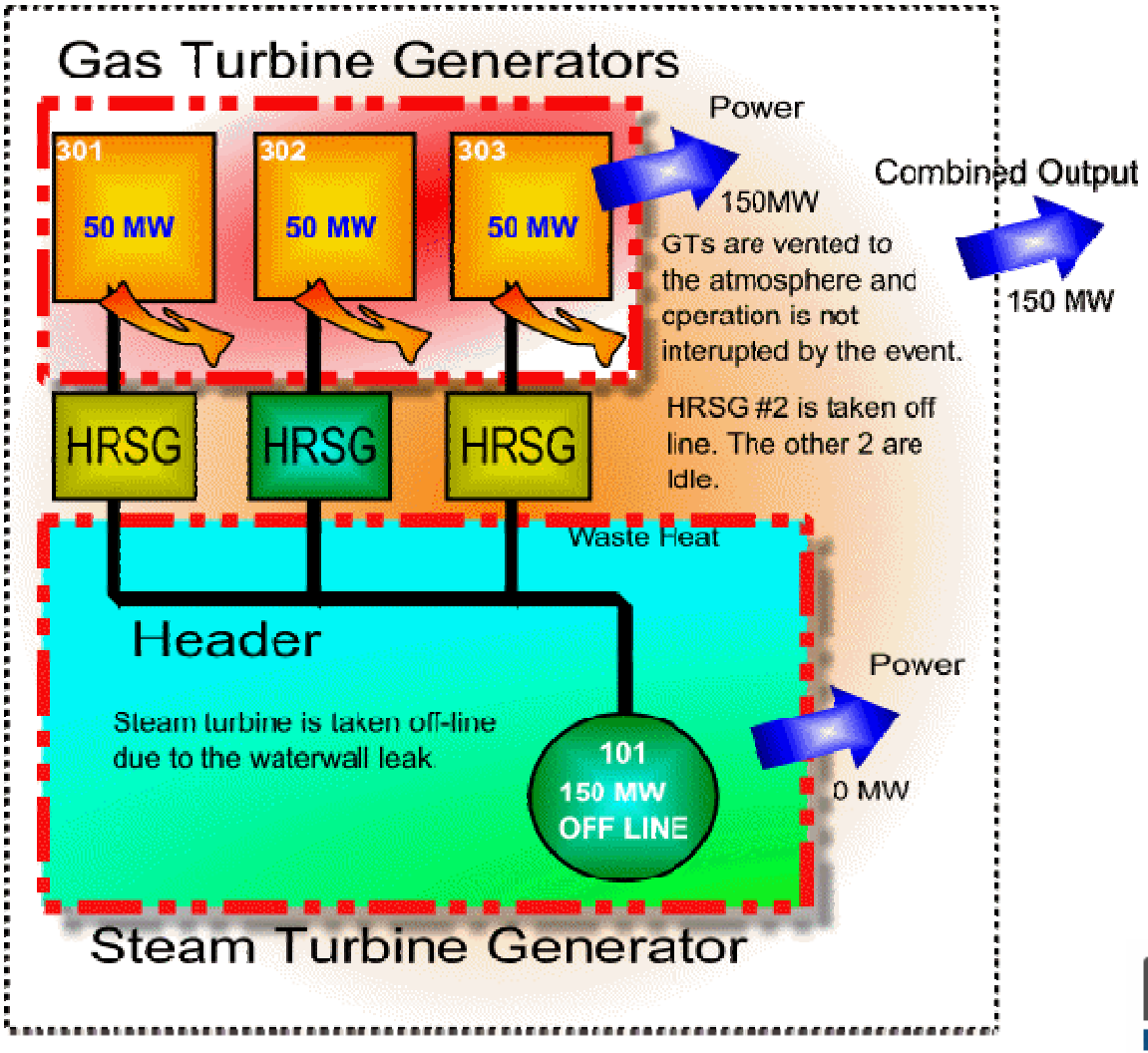
Combined Cycle Update



Combined Cycle Generator (801)

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New Database for Renewables

- Adding wind turbines to GADS
  - Working group formed to determine design, event, cause codes, etc for data collection.

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GADS Collects Wind Turbine Data

- Growth of industry and need for new, clean sources of power requires that GADS investigate and provide performance data for wind turbines.
- Industry interest and request for data for making wind turbines a part of their power portfolio.

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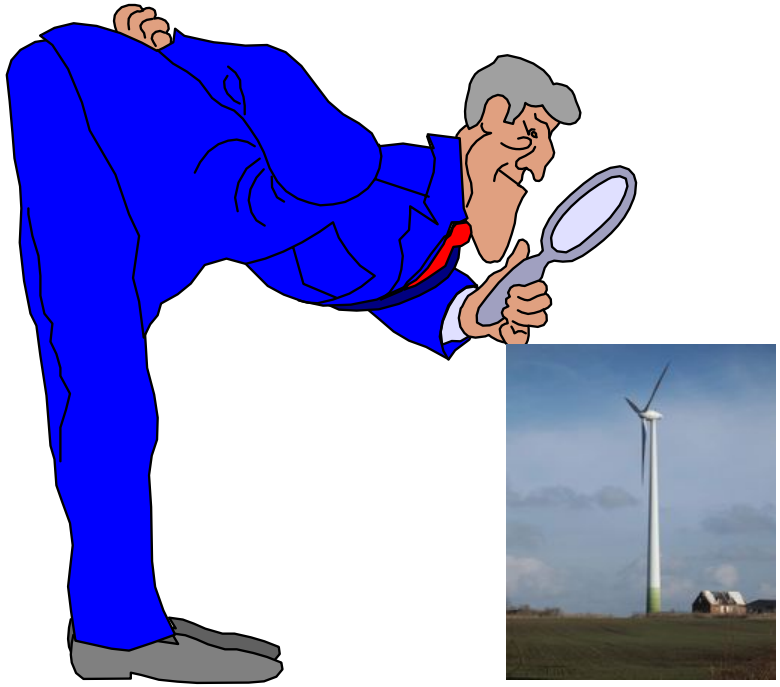
GADS Collects Wind Turbine Data

- The GADS Wind Turbine Working Group is completing its investigation as what data should be collected and what performance indices should be calculated as part of the first phase of WT data collection.



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Groups Interested in WT Data:

- Operators and owners
  - Equipment performance on both turbine and entity basis
- Independent System Operators (PJM, NYISO, ISO-New England, CAISO)
  - Wind farms only
- Manufacturers
  - Individual turbine basis

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Where to Start Data Collection?

Revenue Meter

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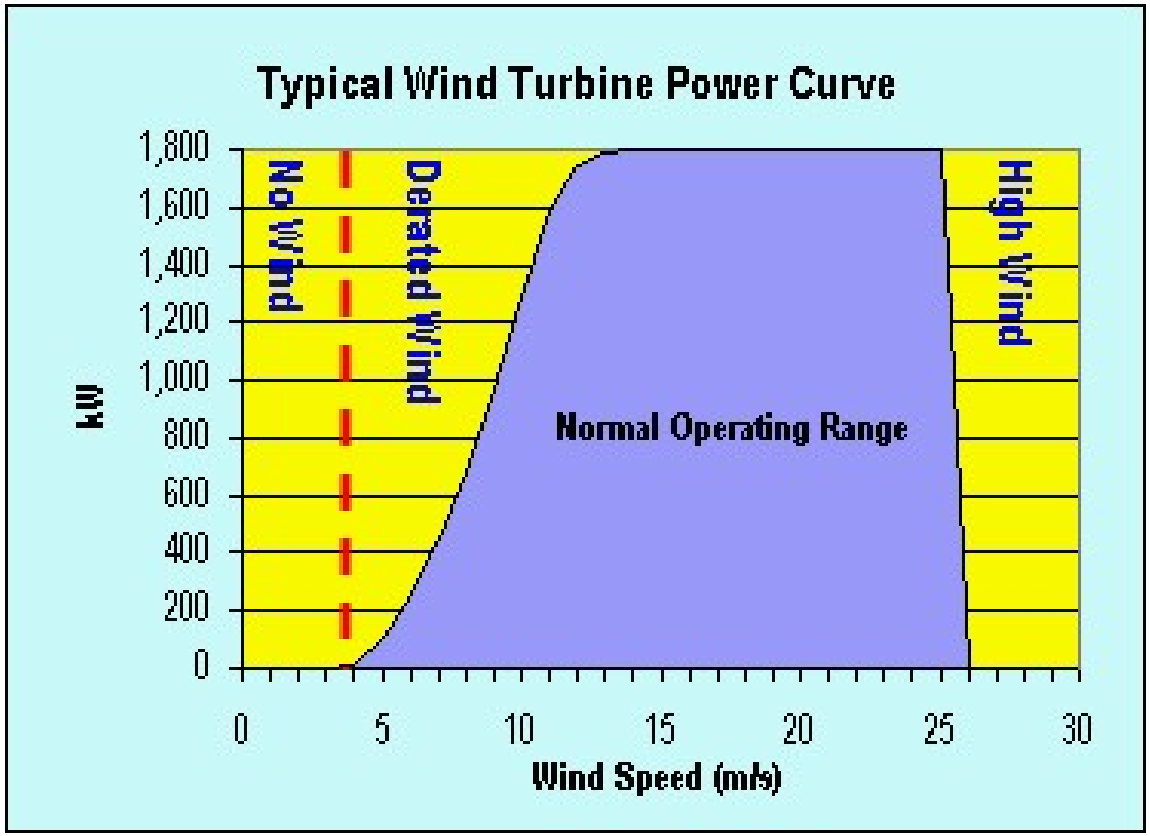
How Do You Measure Performance?



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Examples: Service Hours

- (Per IEEE 762):
  - SH is the number of hours the unit was synchronized to the system. It is the hours that the breakers are closed and generation is provided to the grid. For units equipped with multiple generators, count only those hours when at least one of the generators was synchronized, whether or not one or more generators were actually in service.

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Examples: Service Hours

- (Per one WTWG member):
  - (same as IEEE 762 plus)Wind has not considered low wind conditions as abnormal to the technology. The condition for SH / AH has been the turbine is ready, willing and able to produce power. If EFOR is calculated using the above definition, site performance will vary wildly across the year and not be comparable to other groups.

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Example: Out of Spec Hours

- OSH is the number of hours the Group was not producing electricity due to the wind too low, wind too high, icing, or other weather-related problems that is outside manufacturer's specifications. OSH also includes equivalent hours (or not produced energy) where the Group was not operating to full load because the wind was not sufficient for maximum capacity. This will be the majority of hours as the whole wind plant is seldom at maximum capacity.

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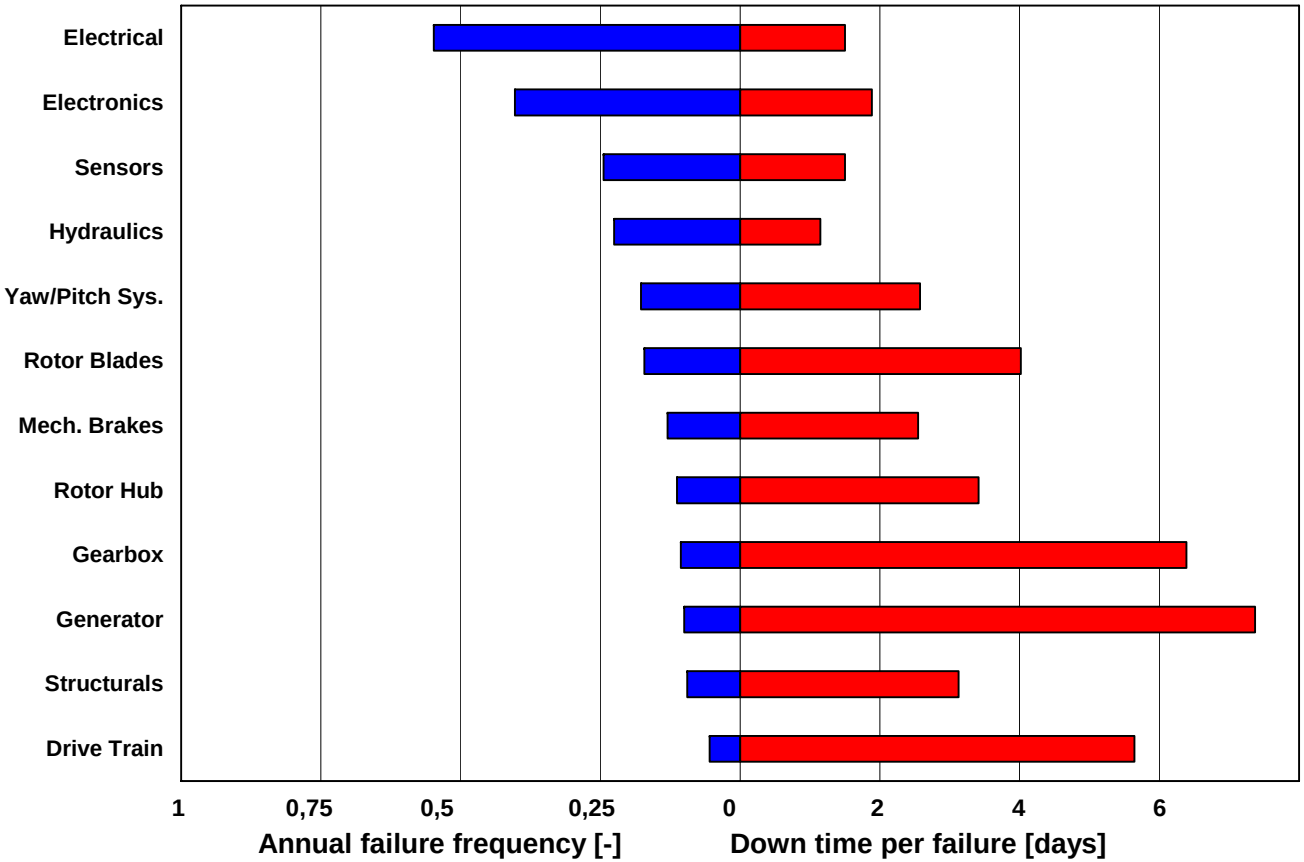
Uses of GADS - Failure Analysis



Courtesy of ISET 2005

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GADS and the Standards

- No standard for GADS reporting at this time. It is still a voluntary database.

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