



National Wind Plant Reliability Database & Analysis Program

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Wind Turbine Reliability Workshop
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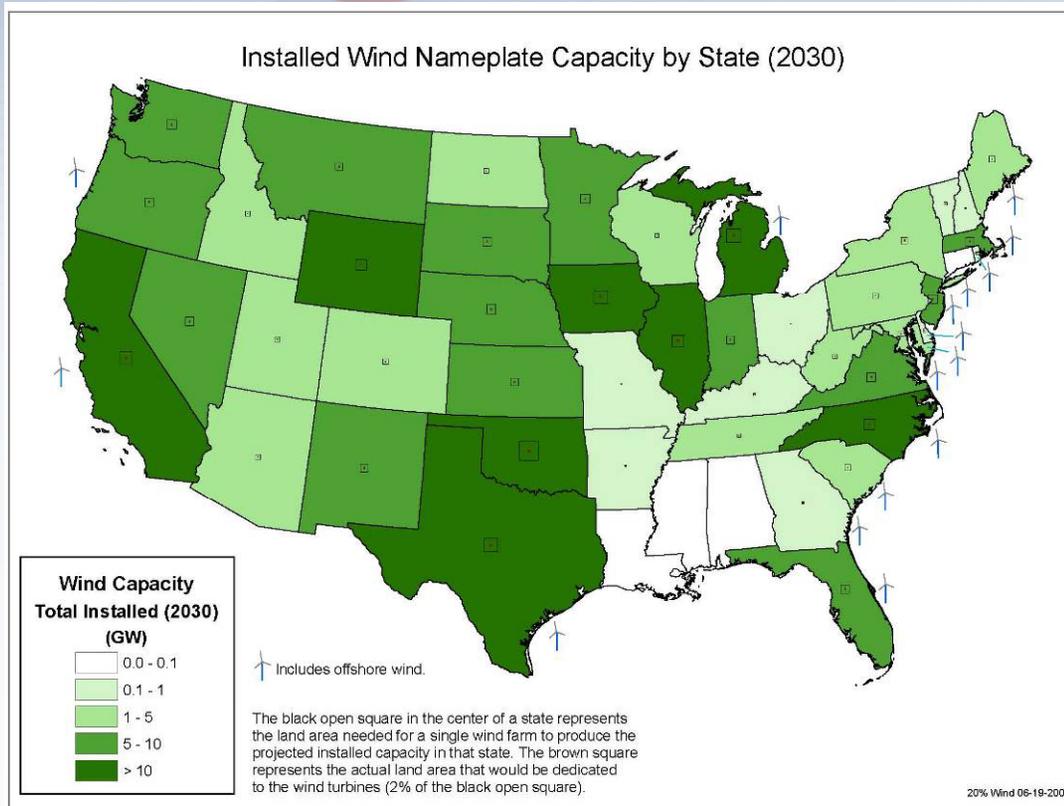
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The 20% Report: Challenges for Technology



- **Massive growth in installations**
 - ~12GW in 2006
 - over 300GW in 2030
- **Technology performance assumptions**
 - Capital cost: down 10%
 - Capacity Factor: up 15%
 - O&M cost: down by 35%
- **Foster confidence to support continued 20% per year growth in installation rates from now until 2018**

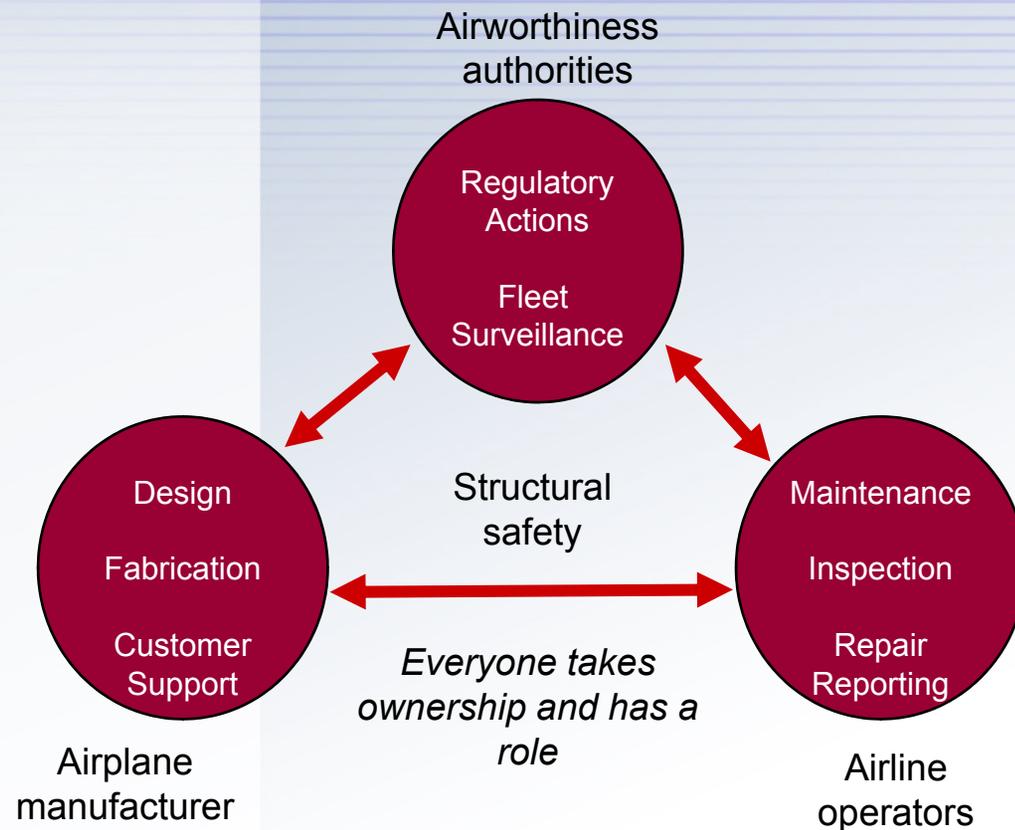
**The costs and benefits of wind reliability
will be borne by the national economy**



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One Approach: High-Reliability, High-Safety

Commercial Aircraft



- Provides continuous feedback to manufacturers
- Drives component specification & improvement

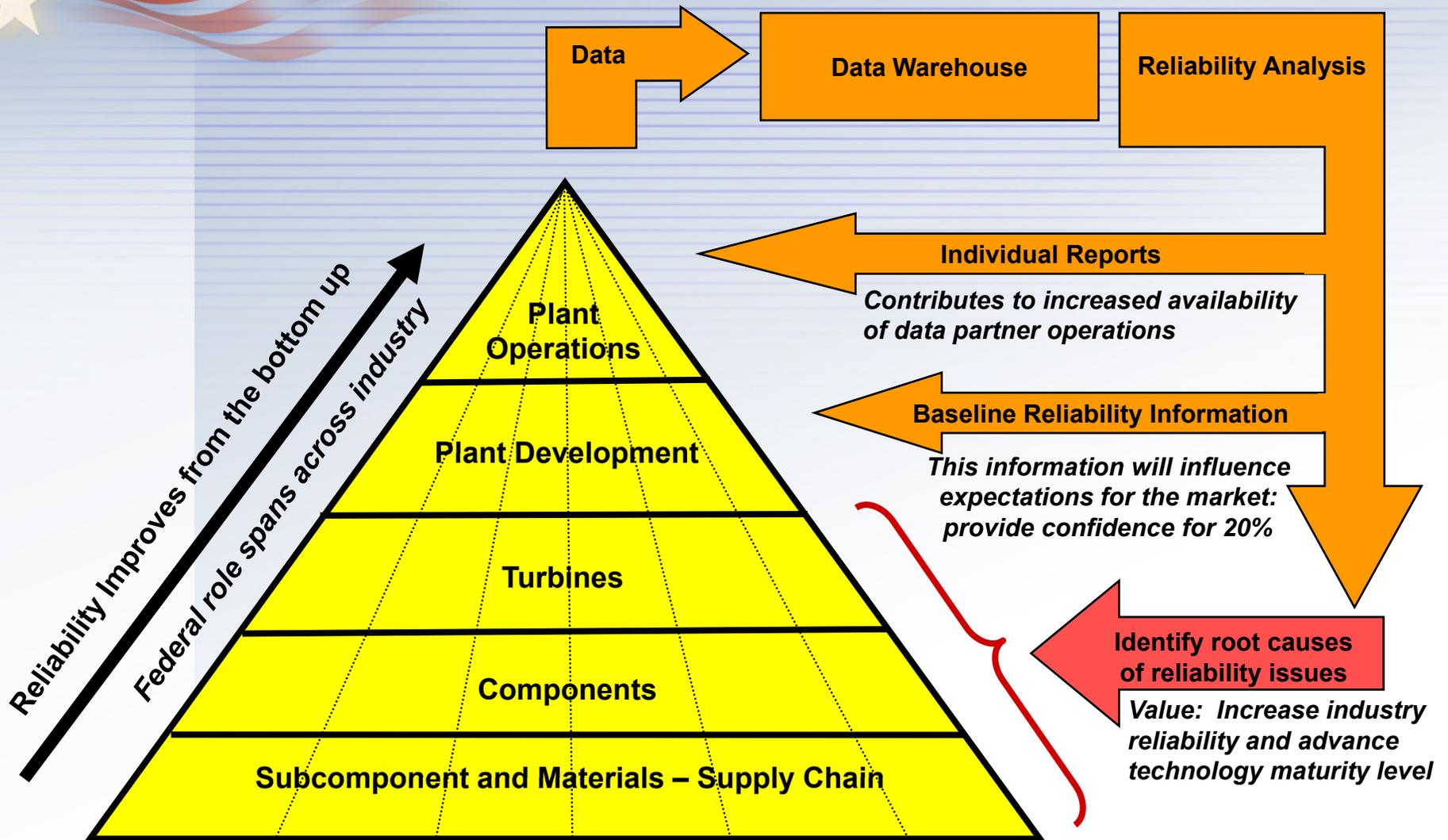
BUT



- Involves regulatory authorities in the operations of the fleet
- Has a high cost to meet requirements

**Wind challenge:
Create a structure with these benefits, without unnecessary overhead and cost**

Another Approach: National Wind Plant Reliability Program



Data Driven Analysis Improves Reliability



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National Wind Plant Reliability Program Mission

- **Characterize** reliability performance issues and **identify** opportunities for improving reliability and availability performance of the national wind energy infrastructure



**Benchmarking
for Improvements**



National Wind Plant Reliability Program Objectives

- Guide DOE program R&D investment through identification of critical issues
 - TIOs – Technology Improvement Opportunities



- Guide industry action for improved equipment performance and operating practices
 - Benchmarking & Best practices
 - Facilitate a culture change to more effectively monitor reliability



- (Long term) Transition to an industry led and self-sustaining program



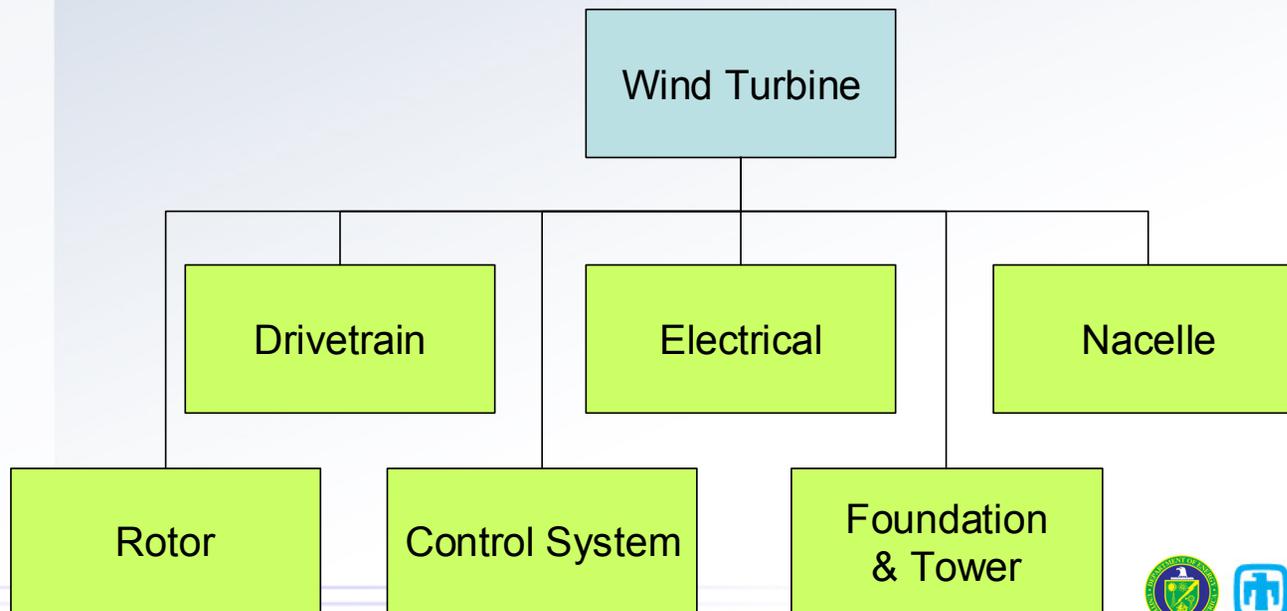
Wind Plant Taxonomy

5 Levels

- Equipment Type
- Major System
- System
- Component Group
- Component

Example

Wind Turbine
Control System
Rotor Controller
Sensors
Pitch Sensor



Wind Plant Reliability Infrastructure

■ National Reliability Database

• Equipment

- ◆ Wind Plant (Turbines, Substations, etc.)

• Data

- ◆ Work Orders

- Connected to Taxonomy

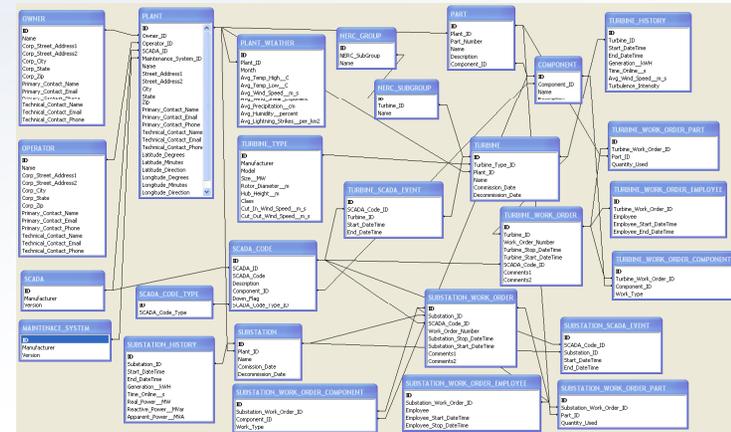
- ◆ SCADA Alarms/Events

- Connected to Taxonomy

- ◆ Time Series Data

- Per Time Period

- Average Wind Speed
- Total Energy Generated
- Equipment Status & Condition



Challenges

■ Functional Challenges

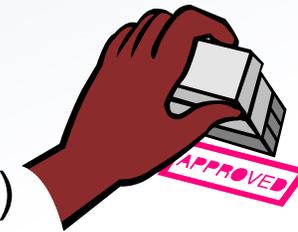
- **Creating coherent “timeline”**

- ◆ Connecting maintenance activities (work orders) to SCADA information and equipment downtime



- **Gathering high-quality data**

- ◆ Obtaining information from experts (operators)
- ◆ Quality Assurance



- **Managing large quantity of data & information**



Challenges

■ Programmatic Challenges

- **Developing “enough” partnerships**
 - ◆ Representative of industry
 - ◆ Statistical validity
- **Developing universal, useful reliability analysis, metrics, and reporting**



Pilot Project

■ Pilot Project Goals

- Address challenges
- Develop infrastructure & processes

■ Strategic Power Systems (SPS)

- Reliability tracking tools for gas turbine generation



■ Partners

- Number of committed partners already signed up
- Seeking additional motivated operators for breadth of experience
- More turbine manufacturers
 - ◆ Equipment Breakdown Structure from each OEM



A decorative graphic in the top left corner featuring a stylized American flag with white stars on a blue field and red and white stripes, set against a blue background.

Thank You!

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