CREW
(Continuous Reliability Enhancement for Wind)
Database and Analysis Program
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CREW Database Project Team
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Wind & Water Power Technologies
Sandia National Laboratories
Operators are at the hub of all reliability activities

- Plant Developers – builders of wind plant
- Grid Operators – transmission of wind generation
- Institutes – Wind Industry
- Turbine Suppliers (OEMs) – designers & manufacturers of wind generators
- Component Suppliers – designers and manufacturers of parts
- General Public – users and controllers of electricity

High quality data

Statistically valid data (quantity)

Available data (automated gathering)

Data analysis tools
Subcomponent and Materials – Supply Chain

Components

Turbines

Plant Development

Plant Operations

Data Warehouse

Reliability Analysis

Individual Reports

Baseline Reliability Information

Technology Improvement Opportunities (TIO’s)

Value: Increase industry reliability and advance the technology maturity level

This information will influence expectations for the market: provide confidence for 20% by 2030

Contributes to increased availability of data partner operations

Challenge: Size of database – Dozens of operators, Thousands of turbines, Millions of data records

Data Driven Analysis Improves Reliability

A Comprehensive Data Model for Reliability
A Feasible Future Scenario

Industry Aggregated Data / Benchmarks for US Fleet

Company-Wide Wind Plant Data: Single Owner/Operator

Wind Plant Data: Single Owner/Operator

Turbine Level

Improving Reliability

Improvements

Failure Event

Actions & Operations

Tag/Fault (symptom)

Power Production

Work Order (resolution)

Root Cause Analysis
CREW: Continuous Reliability Enhancement database for Wind

- Create national reliability database of wind plant operating data to enable reliability analysis
  - System, component, and part levels – identify root cause of failures
  - Identify issues and technology improvement opportunities
- O&M cost reduction
- Industry RAM benchmarks
- Protect proprietary information
- Increase confidence: financial sector and policy makers
Industry Challenges

Three types of data needed:

- **SCADA Data (time series and events)**
  - Lack of data consistency and completeness across SCADA systems

- **Maintenance Data**
  - Paper work orders not scalable to high volume data analysis; low deployment of CMMS systems and data historians

**Operational support and business growth**

- Data support requires bandwidth from sparse internal resources
- Cultural: “just fix it” attitude
- Concern regarding sharing of proprietary data
FY10: Partnership - Sandia & Strategic Power Systems (SPS)

- **SPS**: a reliability engineering and information technology company
- **Operational Reliability Analysis Program (ORAP)**
  - Over 20 years experience in reliability tracking and benchmarking
  - Gas and steam combustion turbine operations
- **ORAP for Wind**
  - Capture RAM data at component level
  - Close relationship with OEMs and operators
  - Customer-specific data treated as proprietary
  - Minimize human input
  - Internet-enabled reporting and feedback
- **Industry-driven methodology**
  - IEEE, IEC and ISO standards
  - NERC compliant
CREW Database Growth

1 plant, 1 year = 138 Gigabytes of CREW data
NOW: Owner/Operator

- Reduced Downtime
- Effective Maintenance
- Improved Performance
- Better $ Decisions
- Lower Costs

LONG-TERM: US Fleet

- Improved Quality of Next-Generation System and Components
Development Phase

**Critical Roles:**
- Sandia National Labs: manage project and develop CREW database
- Strategic Power Systems (SPS): develop a wind plant version of ORAP
- Pilot Partners: demonstrate high-volume data flow
- Advisory Board: provide input and influence industry adoption
- Early Adopters: demonstrate scalability of ORAP

We Are Here