

Wind Turbine Fire Safety

AWEA 2010 Health & Safety Conference

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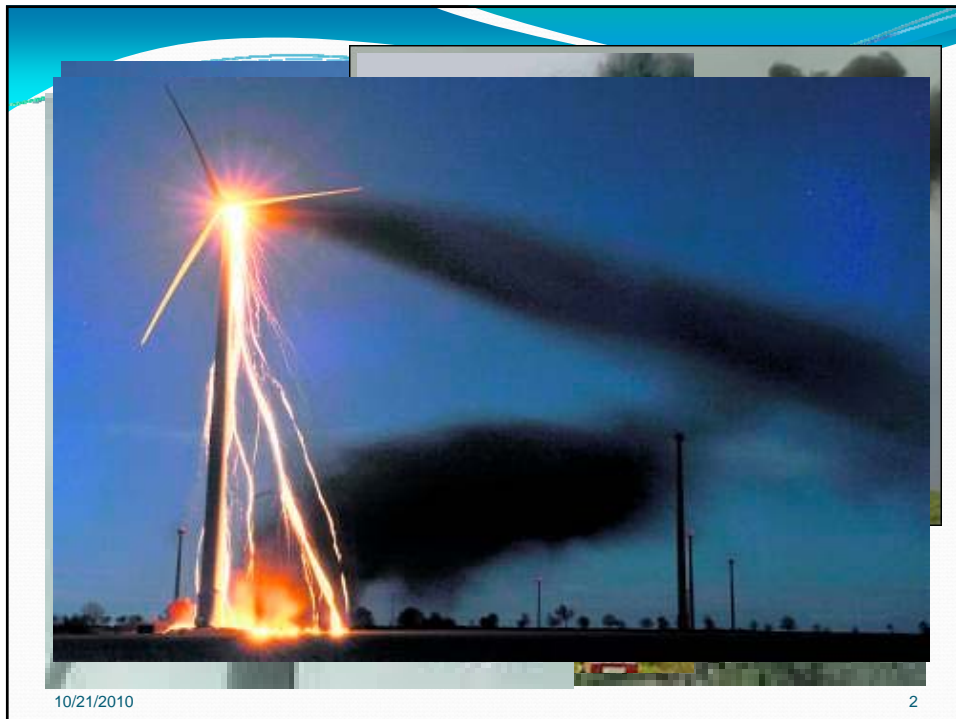
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Ron Adcock – Marsh USA, Inc

Dale Lindstrom – Vestas American Wind Technology, Inc.

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Wind Turbine Fire Safety

- Goals
 - Awareness of current wind turbine fire protection issues
 - Awareness of changing role of wind turbine generation within utility portfolio
 - Knowledge of where to go for design guidance for fire suppression of wind turbines
 - Additional considerations to reduce fire risk

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What is Fire Safety?

Materials, measures, and practices for preventing fire or for minimizing the probable loss of **life or property** resulting from a fire, *by proper design and construction, by the use of detection and extinguishing systems, by the establishment of adequate fire fighting services, and by the training in fire safety and evacuation procedures*



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Fire Safety

Every sector of the power industry has faced the challenge of :

1. Developing fire safety guidelines and standards
2. Complying with new regulations

- Nuclear Industry
 - NFPA 805
 - NRC Appendix R



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Fire Safety

- Coal, Gas, Hydro Industry
 - NFPA 850
 - Factory Mutual



The Wind industry is no different.



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Fire Safety

Windfarm Defense in Depth Philosophy:

Fire Prevention

- Control of ignition sources
- Materials of construction
- Use of combustible/flammable fluids
- Procedures and Training

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Fire Safety

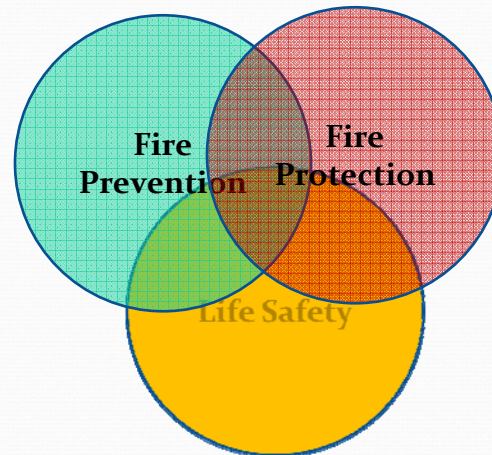
Windfarm Defense in Depth Philosophy:

Fire Protection

- Manual Extinguishers
- Fire Detection
- Automatic Fire Suppression

Life Safety

- Emergency evacuation



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The Earlier Years

- Background
 - Remote Location
 - Non-regulated
 - Smaller scale
 - Relative low value
 - Small revenue impact



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Today's Environment

- Present
 - Critical part of utility renewable capacity
 - Larger scale: Equivalent to coal, oil, gas power plant
 - Output impacts earnings
 - Corporate governance
 - EHS compliance



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EHS Compliance

- Worker safety
 - Enclosed space
 - Limited egress
- Awareness
 - Fire Hazards
 - Electrical Hazards



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Regulatory/Standards

- OSHA General Workplace Safety
- NFPA
- European Guidelines – Confederation of Fire Protection Associations – Europe (CFPA E)
- Property Insurance

Property Insurance

- FM Global Data Sheet 13-10 (Published 2010)
- NFPA 850 (Chapter 10 of 2010 Edition)
- Insurers expect consistent protection with other utility site hazards
- Newer technologies for fire protection of nacelle

Protection Issues

- Combustible Hydraulic and Lubricating Fluids
- Use of Foamed Insulation and Glass Reinforced Plastics
- Energized Electrical Equipment
- Control of Other Ignition Sources: Hot Surfaces, Cutting & Welding, Spontaneous Ignition
- Limited Separation of Equipment
- Manual Fire Fighting Capability???

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Nacelle Fire Detection/Suppression

- Detection Technologies
 - Smoke/Heat Detectors
 - Vesda Air Sampling Detection
 - Video Fire Detection: ETL



Electro Technology International, Inc.

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Nacelle Fire Detection/Suppression (cont.)

- Suppression Technologies
 - Water Mist Systems:
Minimax,
Danfoss, Tyco
 - Gaseous Systems: Firetrace
 - Compressed Air Foam: ??



FIRETRACE
AUTOMATIC FIRE SUPPRESSION SYSTEMS

In all cases - Remote Alarm Transmission and Monitoring

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Reducing the Risk

- Energized Electrical Systems – Immediate disconnect at the source and controlled shutdown of the wind turbine
- Cutting & Welding – Preplanning and Avoidance
- Combustible Fluids – Use of non-combustible, less hazardous or high flash point fluids
- Foamed Insulation - Eliminate
- Combustible Shell – “Non-combustible” Glass Reinforced Plastic/Fiberglass



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Reducing the Risk – Non-combustible Fiberglass??

- Lessons Learned – Semiconductor Industry
 - “Non-Combustible Plastic” Wet Benches
 - Developed in the mid to late '90s
 - A collaboration among:
 - Plastics Industry
 - Equipment OEM
 - Owners/Operators
 - Insurance Industry
 - Wet bench strength and integrity not compromised
 - Today, known as FM4910 Plastics



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Property Insurance and Fire Risk

- Factors/Drivers Contributing to Premium Rates
 - Deductible/Retention
 - Insuring Loss of Revenue/Business Interruption
 - Type and Manufacture of WTG
 - Attention to Fire Protection



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Wind Turbine Fire Safety

- Summary
 - Wind turbine generation increasingly important in utility portfolio
 - Fire protection assessment needed to address fire hazards
 - Regulators, “Authority Having Jurisdiction” and insurers are expecting the design to incorporate a fire hazards assessment
 - Utilizing fire detection/suppression for the residual risk
 - Developing a “FM4910 Plastic” like fiberglass

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Your Presenters

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