



# Risk Management Onshore Windfarms

Seminar presented to:  
Association of Irish Risk Management  
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by:  
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Professional Safety Engineer  
**WindSafety**



Innovative Lösungen in der Sicherheitstechnik  
**WIND SAFETY**  
Innovative Solutions in Safety Engineering

## **Jack Hennessy**

*Professional Safety Engineer*

*Chartered Safety and Health Practitioner*

*Temporary Traffic Management Designer*

*18001 Auditor*

*Member of NSAI /TC30 Risk Management Consultative Committee*

### ***Expertise:***

Onshore windfarms / major utilities: 20kV – 400kV

Project Supervisor Design and Construction

Safety Engineering and Risk Management

Expert Witness | Accident Investigation

### ***Sample projects ongoing:***

PSDP – Galway Wind Park

169MW / 190k T CO<sub>2</sub> / 84k homes

Moneypoint 400kV GIS substation

Belcamp 110+220kV substations



68-80t rebar  
420-500m<sup>3</sup>  
concrete



# Wind Industry in Ireland

June 2015

228 wind farms online and operational  
in 27 counties on the island of Ireland

Grid connected and operational installed  
wind capacity on the island of Ireland  
is 3025MW.


# Wind Industry in Ireland

1MW of wind capacity  
= electricity to supply approx. 650 homes.

Based on this figure,  
an installed capacity of 3025MW  
= enough electricity to power over  
1.97 million homes.

# Legislation

Main legal instruments:

- Safety, Health and Welfare at Work Act 2005
  - General Applications Regulations 2007-2012
  - Part X, General Application Regulations 1993
  - Construction Regulations 2013
  - Machinery Directive 2006/42/EC
  - PSDP + PSCS
- 

# Legislation

## Machinery Directive 2006/42/EC

- Electrical aspects of machine compliance
- The detailed requirements entailed in EN60204-1: protection against electric shock, earth bonding, wiring, control circuits, testing etc
- Developing a Safety Strategy
- Hazard ID and Risk Assessment (ISO 12100)
- Risk Reduction/Mitigation
- Safety related parts of control systems (ISO 13849-1)



# Enforcement

- Enforcement is by H.S.A.
- Small group of inspectors now trained to climb
- Enforcement notices –  
prohibition / improvement
- To date, majority of interface with H.S.A. is  
during construction of wind farms rather than  
during O+M

# Insurance Claims

Info from *GCube Underwriting* - UK and USA

- Greatest USA losses 2008-2013:
  1. Blade damage 41.4%
  2. Gearbox failure 35.1%
  3. Damage to generators 10.2%
  4. Damage to transformers 5.1%
  5. Damage to foundations - not available

# Insurance Claims

Info from *GCube Underwriting* - UK and USA

- Causes

1. Poor maintenance	24.5%
2. Lightning strikes	23.4%
3. Design defect	11.5%
4. Wear and tear	9.3%
5. Mechanical defect	6.2%

# Insurance Claims

## Average costs per claim

- Gearbox = €340,000
  - Turbine blade = €216,000
  - Foundations = €1,170,000 – €2,250,000
- 
- 2008-2013, GCube paid out over €200,000,000 in claims to the renewable energy industry, with the majority of this figure coming from the wind sector.

# Risk

Simple and straightforward

versus

Hidden and a little more complex

# Risk

## *Construction*

- Lifting operations  
(1200t mobile cranes and tandem lifts)
- Work at height
- Rotating parts
- Mobile plant
- Electricity (interface between contractors)
- Roadworks
- Earthworks and civils

# Risk

## O+M

- Work at height
- Rotating parts
- Electricity
- Component failure
- Lack of oversight
- Insufficient training
- Insufficient planning



Risk exists with independent O+M

# Risk

- Not appointing a PSDP early in the project
- Insufficient analysis of the needs of persons working in the tower, especially with regard to climbing and hauling gear up to the nacelle: e.g.
  - fixed rail system for climbing, or
  - a wire system... what are the advantages of one or other?



# Risk

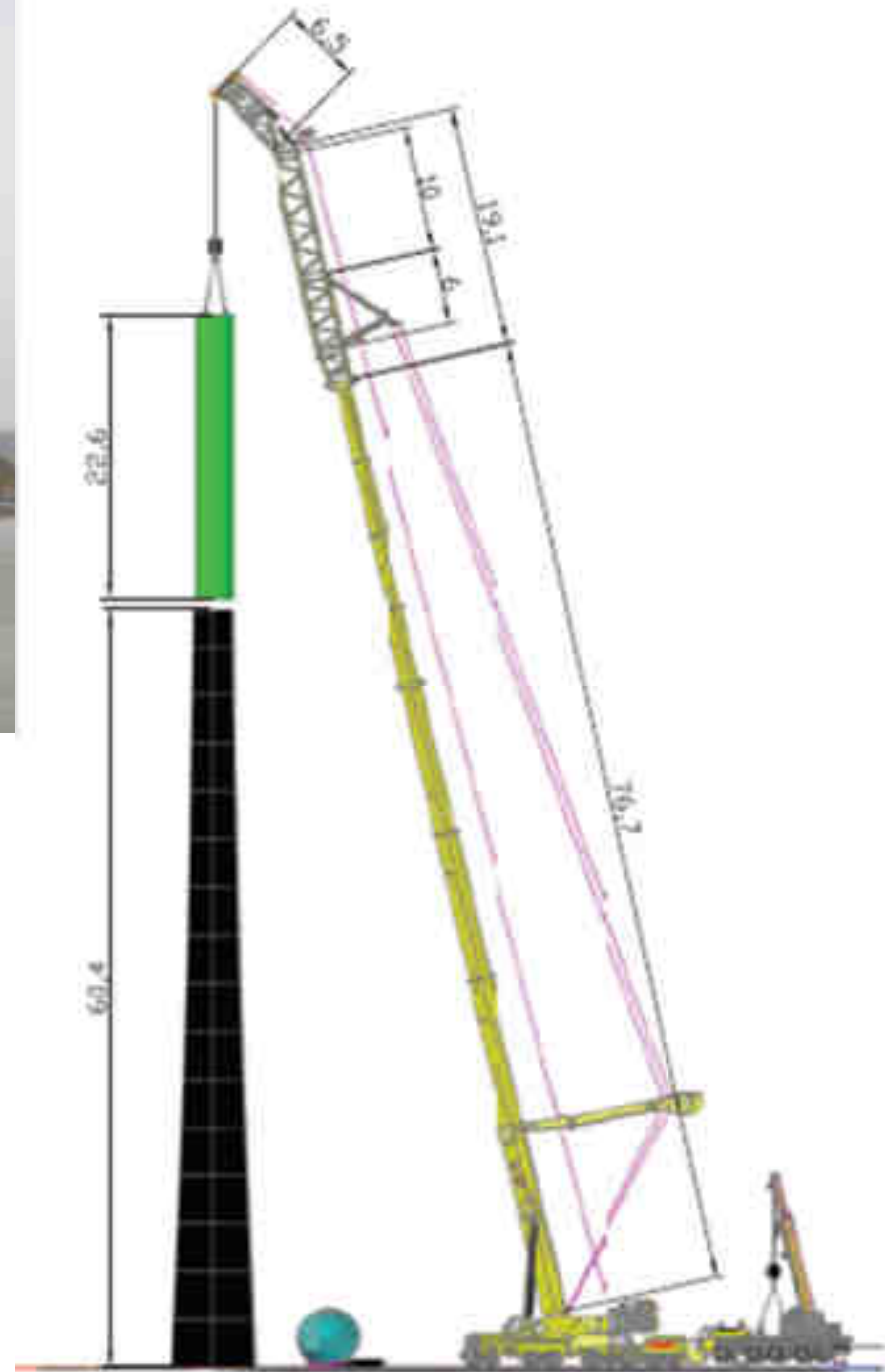
- Commercial sensitivity -v- lessons learned
- Remoteness and lack of oversight
- Non-participation in manufacturer-led planned preventative maintenance agreements  
... getting in “others” to do maintenance



Planning – building a TC2800 crane – space?



Planning –  
building a TC2800 crane  
-v-  
LTM 11200-9.1 ?



## Risk Perception

- Blades c.40m long
- Boys at fence less than 20m from tower
- Blade installation is oversailing the boys



# Risk

- No concept of risk management
  - Variation in risk management understanding and emphasis
    - banks
      - owners
        - suppliers
          - insurers
            - O+M companies
- Lack of operational management

# Accidents

- When it goes wrong ...
- 1,500 accidents and incidents on UK wind farms including 4 deaths and 300 injuries, over a 5 year period up to 2011
- No member of the public injured
- Risk to public estimated at 1 in 100 million
- 1 fatality in Co Wexford – entanglement



**29 Oct 2013**  
**Ooltgensplaat, Netherlands**  
**2 technicians killed in a Nordex turbine**













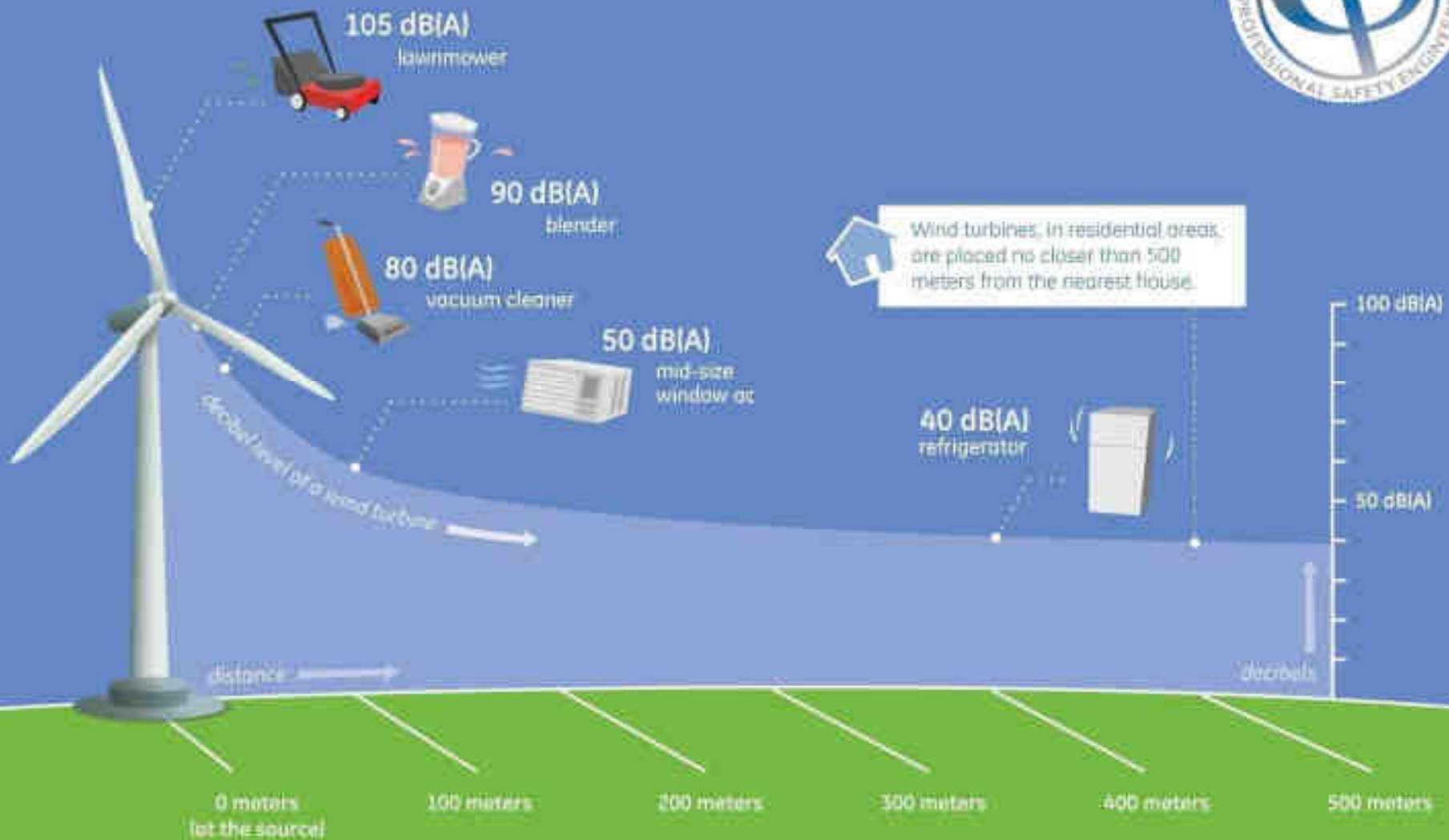








# How Loud Is A Wind Turbine?







[www.windsafety.ie](http://www.windsafety.ie)