

The Siting of Wind Turbines Next to Hazardous Pipeline

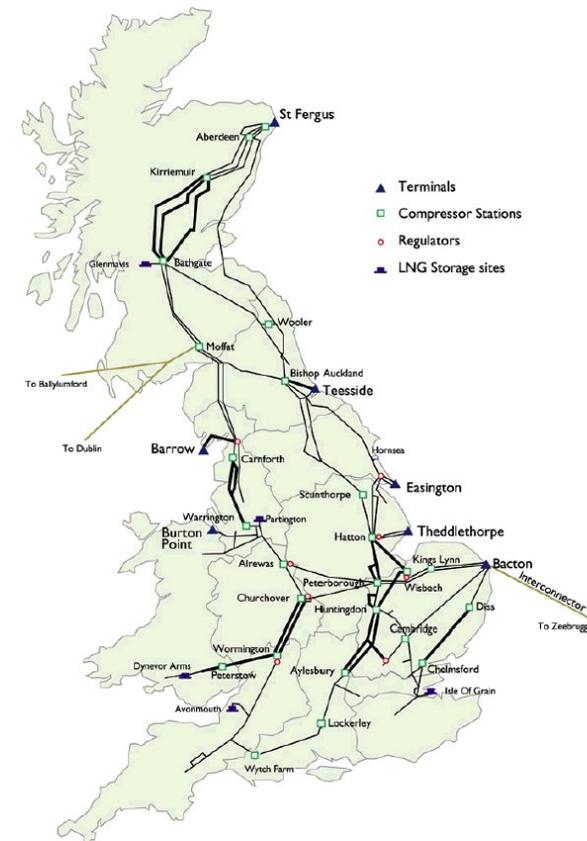
Presentation on behalf of UKOPA to the
British Wind Energy Association 22-06-06

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Working Group

The UK Gas Transmission System

- 12,230 km of above 7 bar pipeline in the UK operated by National Grid
- In addition there are over 7,400 km above 7 bar gas pipelines operated by other (UKOPA) pipeline operators
- There are also significant lengths (> 2,000 km) of pipelines carrying other hazardous fluids e.g. ethylene and gasoline



Pipeline Hazards

- Failures of the gas transmission system and failures of pipelines containing other hazardous fluids are very rare in the UK but the consequences can be significant if a full bore pipeline rupture did occur.
- Individuals would be casualties up to 800 m away for the larger diameter higher pressure gas pipelines.



Nelson's column to same scale

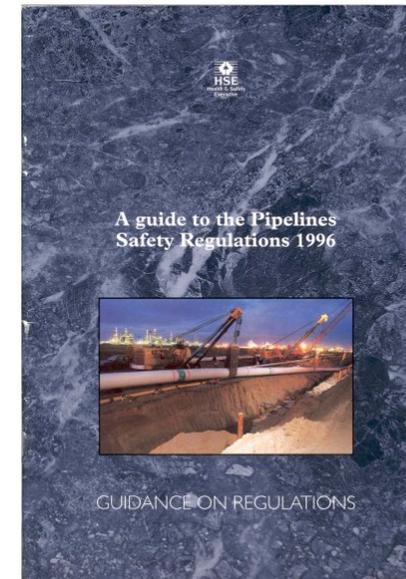
Duties under the Pipelines Safety Regulations

Regulations not to damage pipelines

Regulation 15

Damage to pipeline

- No person shall cause such damage to a pipeline as may give rise to a danger to persons.

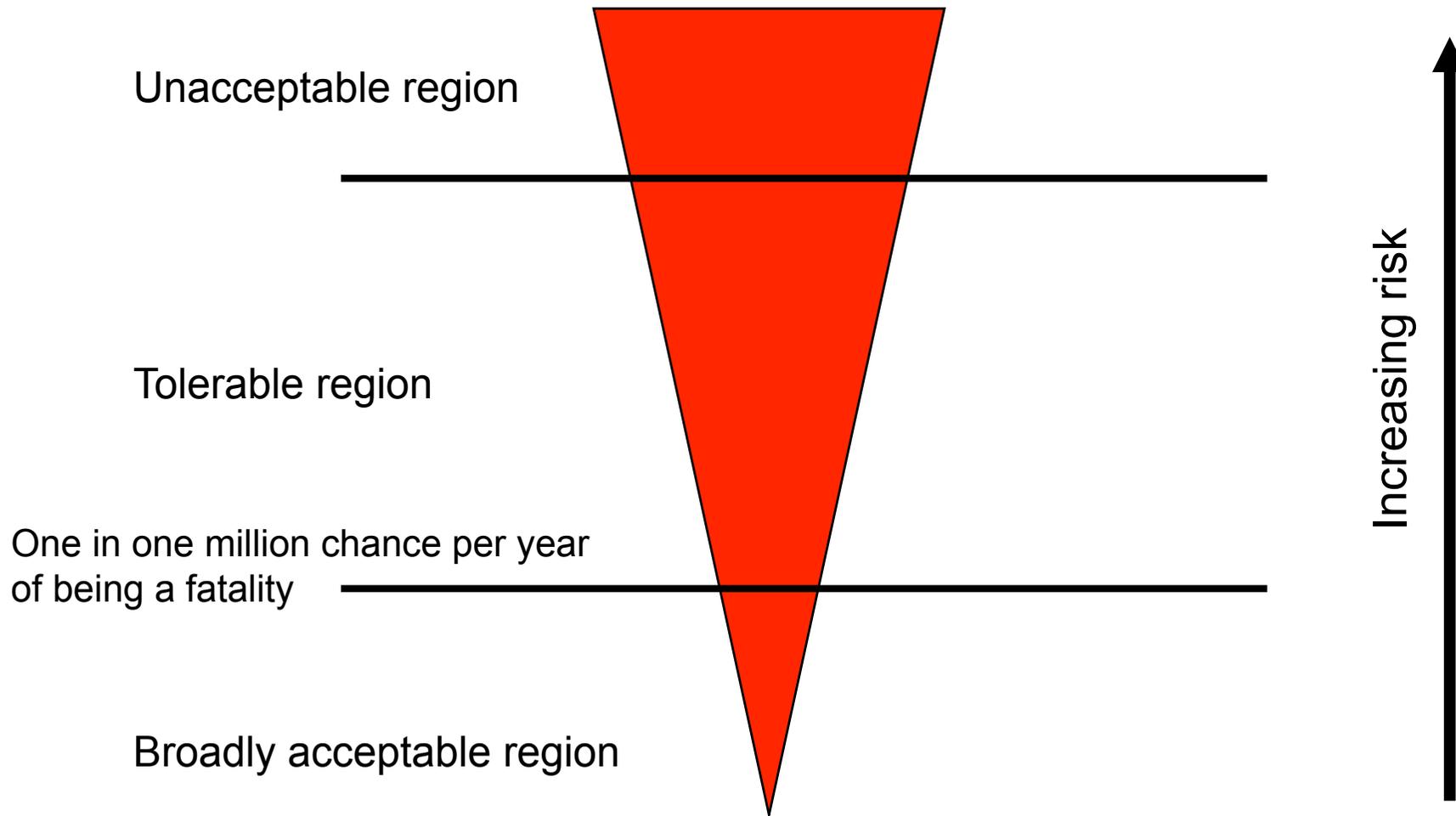


Issue

- Wind turbines are increasingly being built close to buried hazardous pipelines
- Although the risk is very low wind turbines have the potential to fail and cause these pipelines to fail
- Any failure of a pipeline following impact by parts of a wind turbine is likely to result in a full bore rupture
- National Grid have therefore commissioned some work by Advantica (the National Grid research division) to identify what is an appropriate separation distance

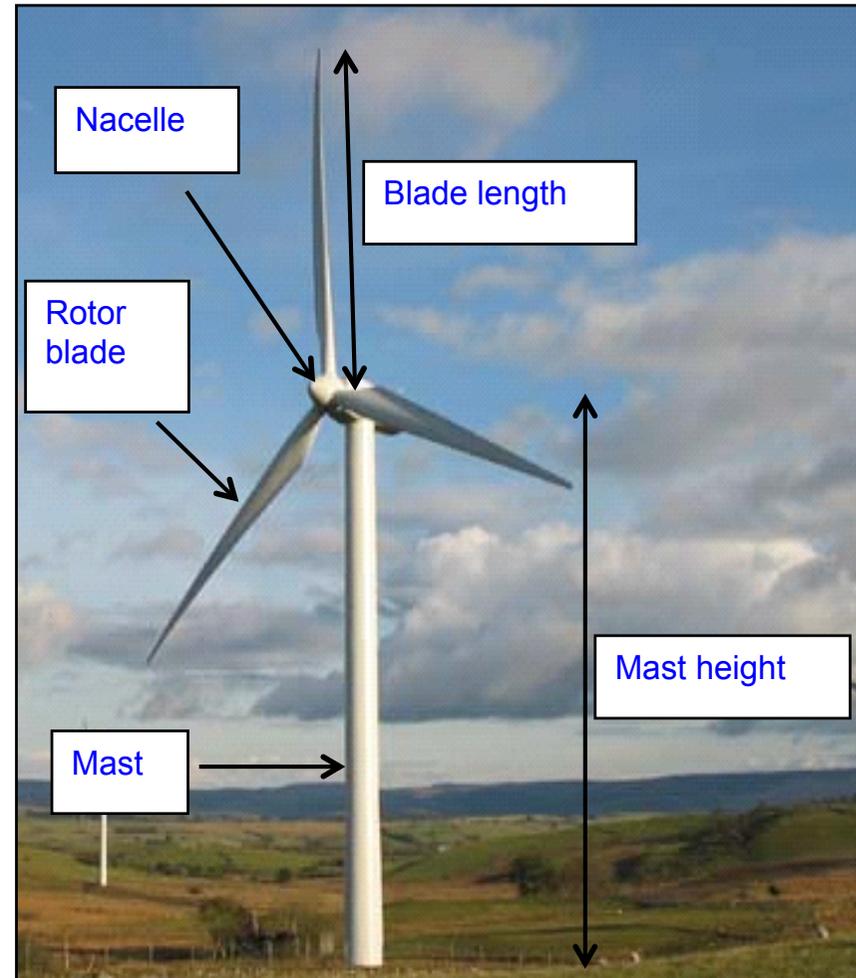
How safe is safe enough

HSE CRITERIA FOR THE TOLERABILITY OF RISK

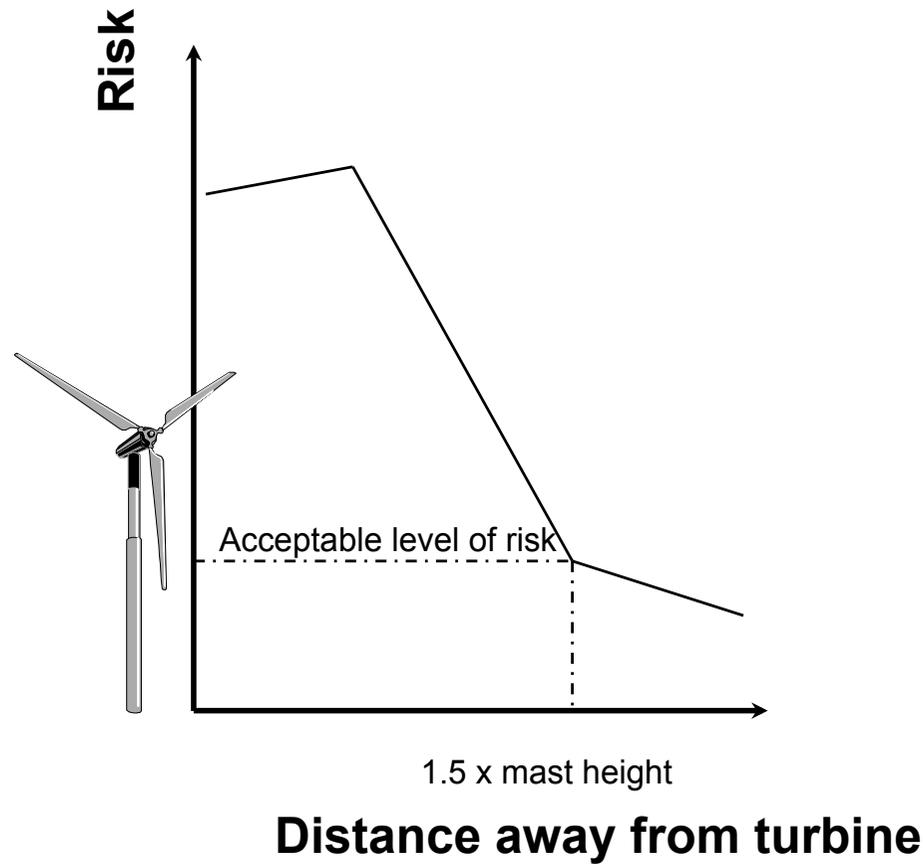


Basis of risk assessment

- The Dutch have carried out a significant amount of research in this area and their published methodology for assessing risk from wind turbines represents current best practice
- Gasunie the Dutch gas company have used this to develop a methodology for pipelines, this has been used as the basis for the Advantica study
- Uses historical failure data for wind turbines and a mathematical model to determine the likelihood of any failed components hitting the pipeline
- 3 Failure modes are considered in the model:
 - Failure of the tower
 - Blade failure
 - Failure of the nacelle



Separation Distance Based on Risk



Conclusions of Risk Assessment

- When the wind turbine is 1.5 x the mast height from the pipeline the risk of pipeline failure reduces to the broadly acceptable level
- This criterion has been agreed by UKOPA and has been adopted as a pipeline industry requirement
- UKOPA would look for BWEA to acknowledge the criterion of 1.5 x the mast height controls the risk to a level that is acceptable in accordance with the HSE risk guidelines