

# Safety issues (in cold climate)

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- ✓ Wind measurement
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# Wind turbine (personal) safety



- The Machinery Directive 2006/42/EC
- En 50308:2004 Wind turbines – Protective measures – Requirements for design, operation and maintenance



- AFS 2008:3 Maskiner
- SS-En 50308

## Revision of the En 50308

### Wind turbines

Protective measures – Requirements for design, operation and maintenance

- update of content

Stem – Strömsund:

- harmonization with the new MD

Competence group on maintenance and safety

- draft before summer 2011

# Wind turbines and safety

## 1. Maintenance personal

- Falling and stumbling
- Crushing – squeezing
- Caught in rotating parts
- Heat
- Noise
- Poisonous gas or vapour
- Fatigue

## 2. Public or 3rd party

- Hit by falling object

# Risk - Possibility

**Risk**  $\Leftrightarrow$  probability for something **bad** to happen x the consequence



**Possibility**  $\Leftrightarrow$  probability for something **good** to happen x the consequence



# Are wind turbines dangerous?

## Figures from Caithness Windfarm Information Forum:

In 10 years of production they report

- 40 fatal incidents
- 68 human injuries

2001 – 2009 total wind production 1300 TWh

Assuming average power 400 kW means  $3,3 \times 10^9$  operating hours

⇒ 3,1 accidents/100 million operating hours

Traffic incidents in Värmland (Sweden) 2008, population 312.000

- 28 fatal incidents
- 1970 human injuries

290.000 people spend 1 h/day in traffic ⇒ 100 million operating hours

# Risks for the public

Ejected parts from

- ice
- loose items
- collapsed turbines

Has anyone heard of any private person being hit by such parts?





# Any ice incidents at Fjällberget 34 MW windfarm?

Googling on "accident, skiing, Ljungåsen" resulted in the news that skier collided with car! It is good news for us all that cars are not covered by the MD.



The screenshot shows the website 'Dalarnas Tidningar' with a navigation menu including 'ort', 'Nöje', 'Kultur', 'Brottsplats', 'Pralin', 'Familj & Vänner', 'Ung', 'Opinion', 'Blogg', 'Bostad', and 'Motor'. Below the menu, there are location links: 'in | Borlänge | Hedemora | Ludvika | Mora | Avesta | Gagnef | Leksand | Malung/Sälen | Orsa | Rättvik | Smedje'. A search bar is visible with the text 'Sök'. The main headline is 'Skidåkare kolliderade med bil' in large black font, with the sub-headline 'Nyheter/ Ludvika' above it. The location 'LJUNGÅSEN' is listed below the headline. The article text reads: 'En äldre man, hemmahörande i trakten, fick på söndagen föras i ambulans till lasarett för vård efter att som skidåkare ha kolliderat med en bil i närheten av spårcentralen på Ljungåsen.' Below the text, there is a comment section with 'Kommentarer (3)'. To the right of the article, there is a 'Google-annonser' section with a link to 'Rabattkuponger Stockholm' and a description: '1 erbjudande/dag, löjligt lågt pris Det bästa av Sthlm till 50-70% ! www.GROUPON.se/St...'. On the left side of the screenshot, there is a sidebar with a search bar, a date '72023', and a photo of a skier.

# The directive says...

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 17 May 2006  
on machinery, and amending Directive 95/16/EC (recast)

”Machinery must be designed and constructed so that it....can be operated, adjusted and maintained without putting persons at risk”

*Risks due to falling or ejected objects*

Precautions must be taken to prevent risks from falling or ejected objects.

# Wind turbines can cope with the MD

*Miljödomstolen vid Vänersborgs tingsrätt har den 9 mars 2010 i mål nr M 3735-09 avgjort ett mål där det yrkats på förbud mot uppförande av vindkraftverk på grund av bland annat skyddsanordningar och olycksrisker enligt EU:s Maskindirektiv (2006/42/EG) och Arbetsmiljöverkets föreskrifter (AFS 2008:3). I det avgörandet har Miljödomstolen konstaterat att direktivet och föreskriften, vid en miljöbalksprövning, inte utgör hinder mot att uppföra och driva vindkraftverk.*

The Swedish Environmental Court has concluded that the MD is no obstacle for building and operating windfarms.

But we don't want to see this....

# The Newspaper

## Wind turbine kills young skier in north Sweden

Umeå 9 February 2011

A 5 year old girl out skiing with her parents was killed yesterday in western Lapland as she was hit by a huge ice block falling off a nearby wind turbine.

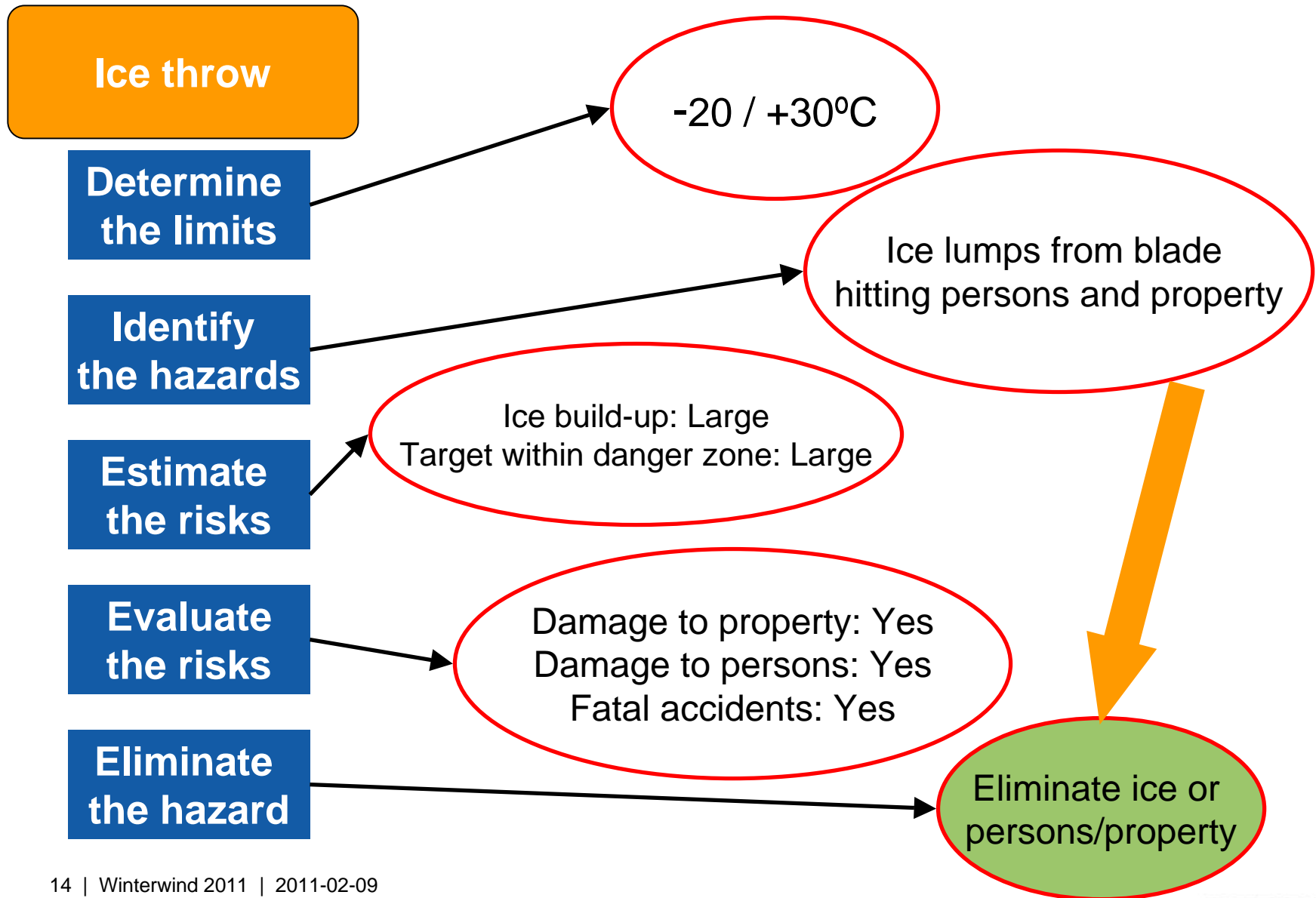
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# Safety integration procedure as per MD

- 1 Determine the limits of the machinery
- 2 Identify the hazards
- 3 Estimate the risks
- 4 Evaluate the risks
- 5 Eliminate the hazard or reduce the risks

# Safety integration for a wind turbine (example)



# Safety integration for a wind turbine (example)



- Warning signs?
- Closed roads?
- Closed-down turbines?

My conclusion I:  
**This is not enough  
to fulfil MD!**

# Safety integration for a wind turbine (example)

My conclusion II:

If the owner does not accept 5-30 % energy loss...

**A system for preventing ice build-up  
is a must**

(to avoid fencing-in)