

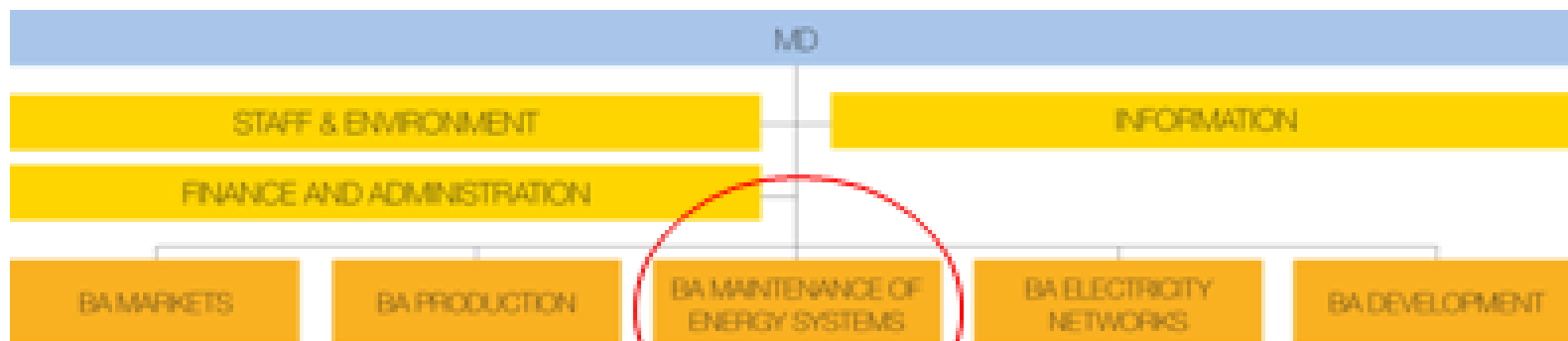
# SEU Operation and Maintenance experiences of wind turbines in Cold Climate



## Wind power

- Billions invested
- 79 (91) wind turbines
- Blaiken to be biggest
- Technology for cold climates





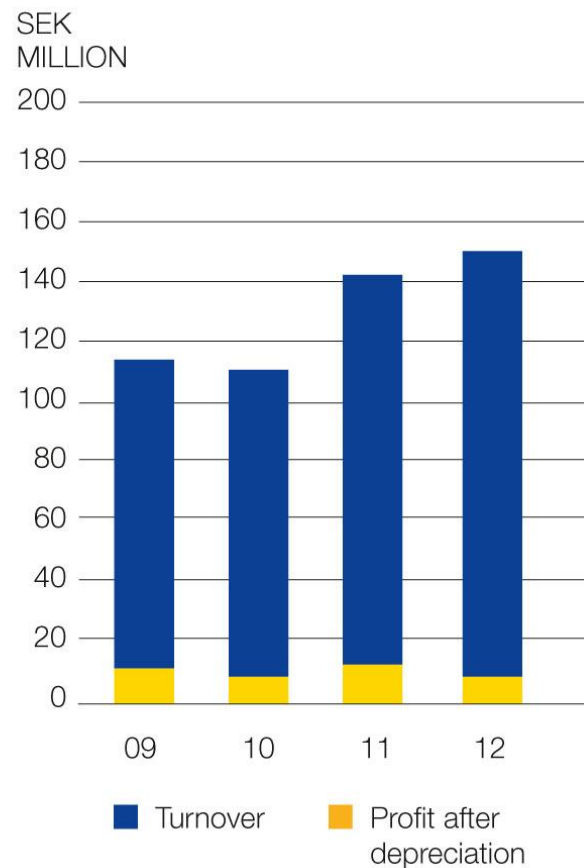
# Business area Maintenance of energy systems

## KEY FIGURES

MAINTENANCE OF ENERGY SYSTEMS	2012	2011
Number of full-time employees	132	104

INCOME STATEMENT	SEK million	SEK million
Revenue	147.4	141.0
Costs	-135.4	-124.1
Planned depreciation	-4.1	-3.9
Profit after depreciation	7.9	13.0
Investment for the year	0.1	0.2
Total assets	38.9	43.8
Turnover/employee	1.0	1.36
Operating margin, %	5.9	9.2
Return on total capital, %	19.1	59.4

## FINANCIAL DEVELOPMENT



# Handling Risk of Ice and Ice Throw (Safe Access to the WTG)

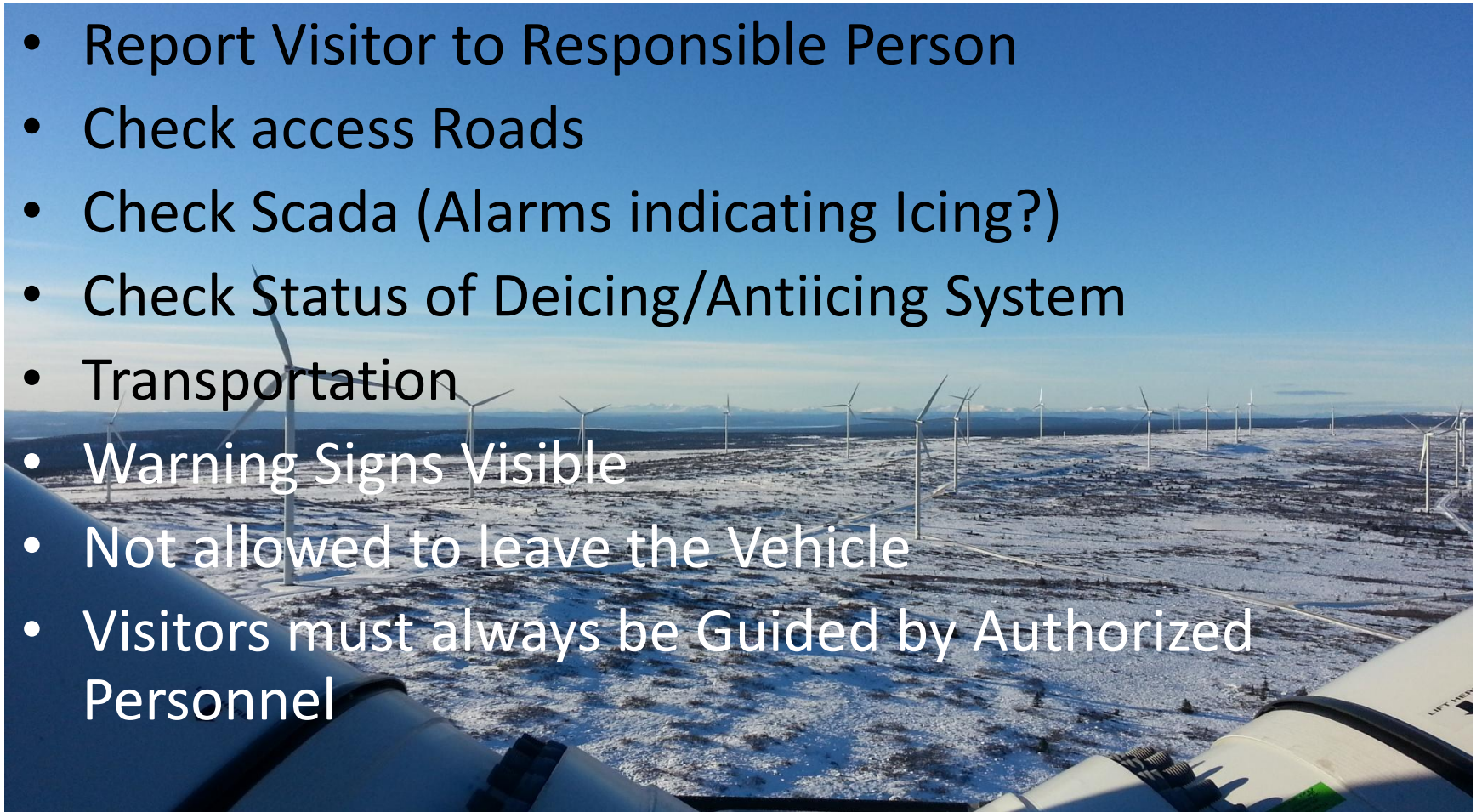
## ✓ Risk Analysis

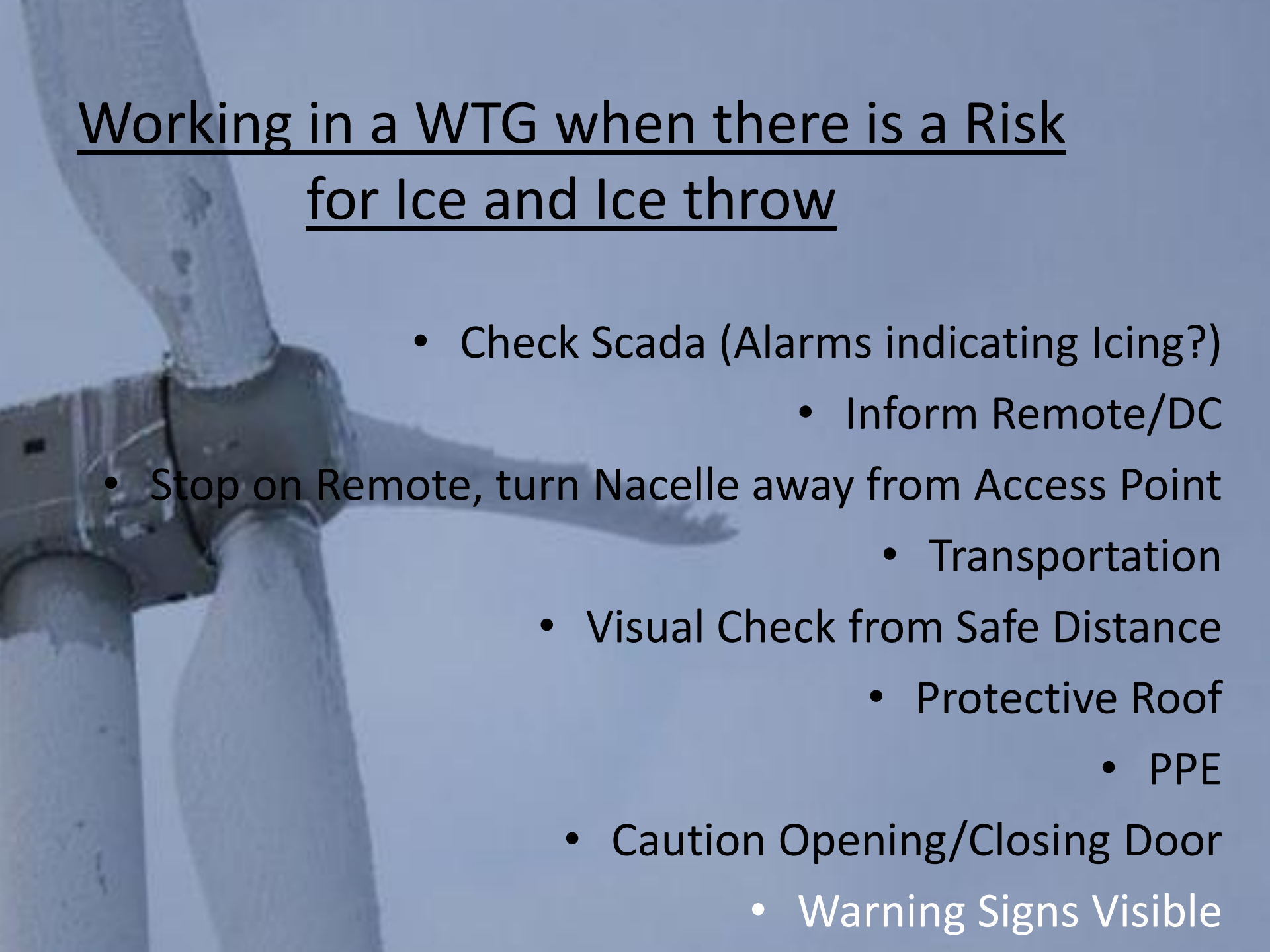
- Safety Distance, 300/150m
- Reliable Weather Service
- Vehicles with Protected Roof
- PPE

- 1. Visitors at the Wind Site when there is a Risk for Ice and Ice throw**
- 2. Working in a WTG when there is a Risk for Ice and Ice throw**
- 3. Working in a WTG when there is a Risk for Ice and Ice throw and Poor Visibility**
- 4. Restart of WTG when there is a Risk for Ice and Ice throw**
- 5. Transportation with Snow Mobile**

# Visitors at the Wind Site when there is a Risk for Ice and Ice throw

- Report Visitor to Responsible Person
- Check access Roads
- Check Scada (Alarms indicating Icing?)
- Check Status of Deicing/Antiicing System
- Transportation
- Warning Signs Visible
- Not allowed to leave the Vehicle
- Visitors must always be Guided by Authorized Personnel





## Working in a WTG when there is a Risk for Ice and Ice throw

- Check Scada (Alarms indicating Icing?)
  - Inform Remote/DC
- Stop on Remote, turn Nacelle away from Access Point
  - Transportation
- Visual Check from Safe Distance
  - Protective Roof
  - PPE
- Caution Opening/Closing Door
  - Warning Signs Visible



# Working at Wind Site when Risk for Ice and Ice throw with poor Visability

- ✓ If possible check a close-by WTG for Ice Conditions
- ✓ Determining Risk for Ice Throw
  - Wind Speed/ Direction
  - Temperature
  - Fault messages from WTG
- ✓ Wind Technician has always Last Call!

# Restart of WTG when there is a Risk for Ice and Ice throw

- ✓ Always Restart on Remote
- ✓ During Maintenance secure that there are no one outside
- After Maintenance done, stop WTG before leaving

Transportation by Snow Mobile

# Conclusions

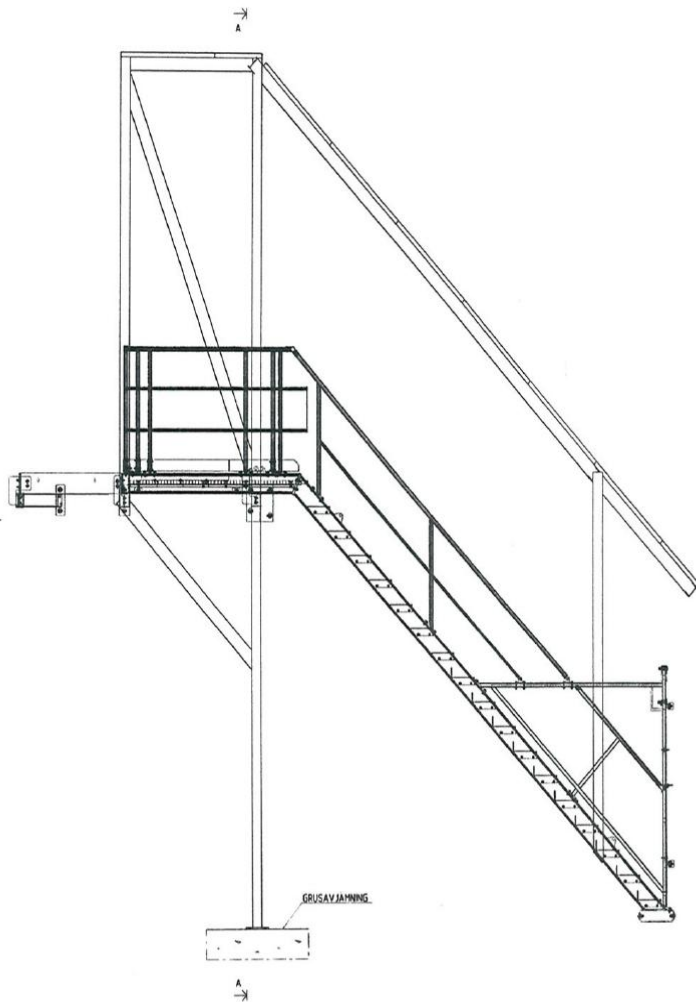
Handling Risks

Gain Experience

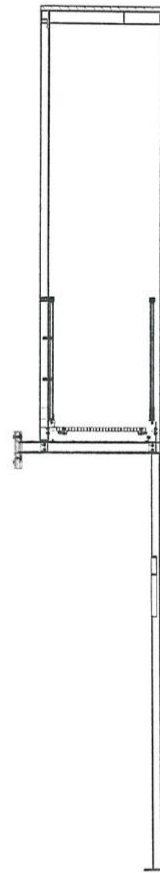
Act Accordingly



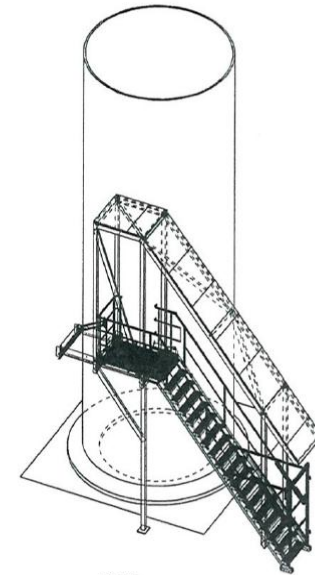
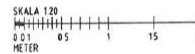




SEKTION 120



A - A 120



3D 150

BYGG	BYGG	BYGG	BYGG
FÖRFÄRINGSUNDERLAG			
<b>BLAIKENVIND</b>			
sernägt av Skellefteå Kraft och Fortum			
YMBRETT FÖRBYGGNING BLAIKEN VINDS 1 (SALURAN OCH KÖRSLÄ) LÖPPLAN			
WSP Byggservice AB Svea Jernvägsgatan 43 901 30 Skellefteå Tel: 090 722 58 00 Fax: 090 722 61 15			
PROJEKTANT	BYGGNADSTYP	BYGGNADSTYP	BYGGNADSTYP
10109997	YH	YH	YH
2013-10-16	ANDERS ENOJST		
SKYDD 1			
MÄTT			
(A) = 120	(A3) = 140	K-100	









Ice Armor

Mini Scandinavia  
XWM 647

ML

**SEU**  
Skellefteå Energi Underhåll





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