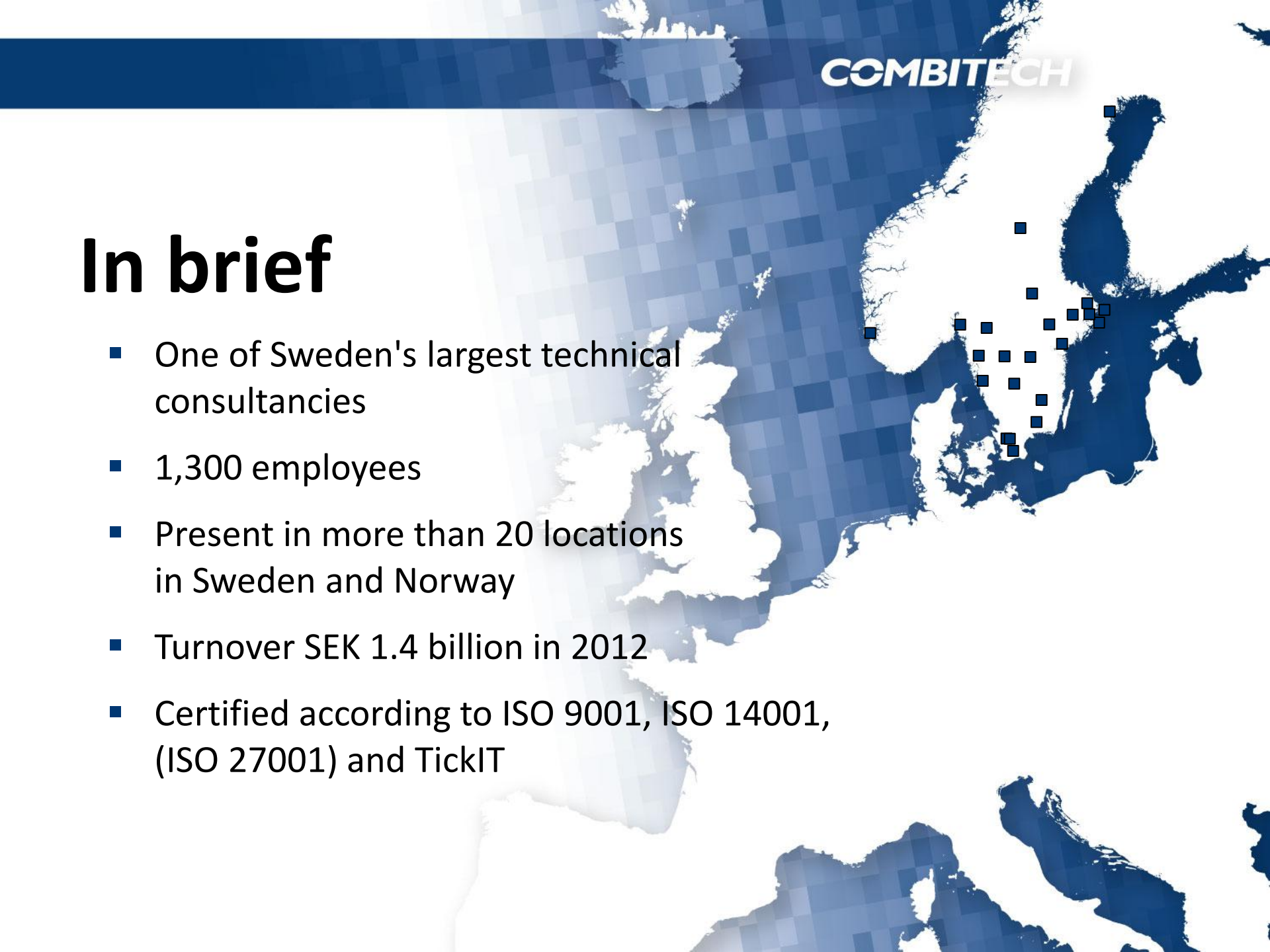
Combitech

COMBITECH

Winterwind 2014

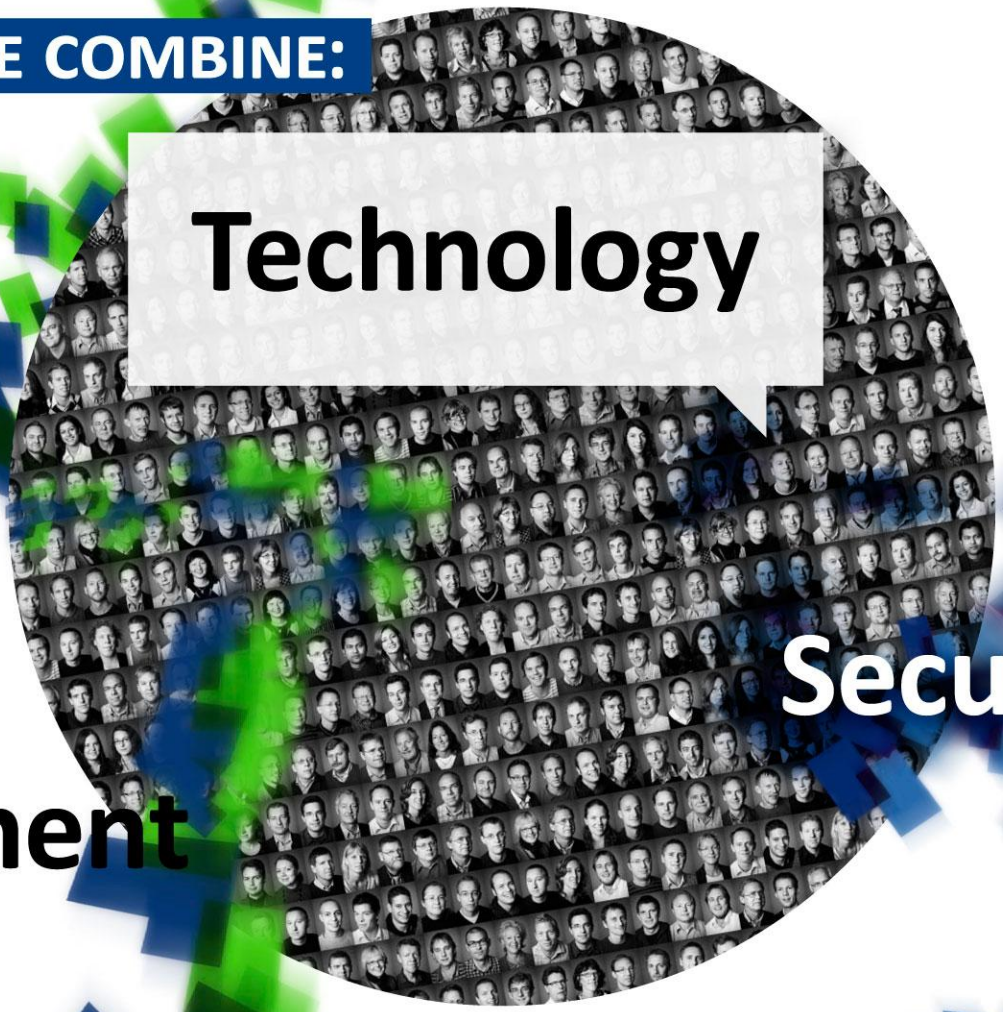
In brief

- One of Sweden's largest technical consultancies
- 1,300 employees
- Present in more than 20 locations in Sweden and Norway
- Turnover SEK 1.4 billion in 2012
- Certified according to ISO 9001, ISO 14001, (ISO 27001) and TickIT



COMBITECH

WE COMBINE:



Technology

Security

Environment

Combitech AB

Experienced consultants within

- Weather sensors
- Field computers development and usage
- Communication solutions
- Monitoring systems
- Sensor research and development

IceMonitor™

- IceMonitor™ designed according to the **ISO 12494** specification (Atmospheric icing of structures)
- The output signal standard 4–20mA
- **Optional logger** and communication unit

Using image analysis for ice detection on rotor blades

- Optimize production
- Activate de-icing system
- Warning system for service personell, ice throw warning

Advantages of image analysis

- Easy installation
- Measuring directly on the rotor blade
- In operation even when the wind turbine isn´t operating
- Useful for general surveillance of the site

Cameras and IR search light

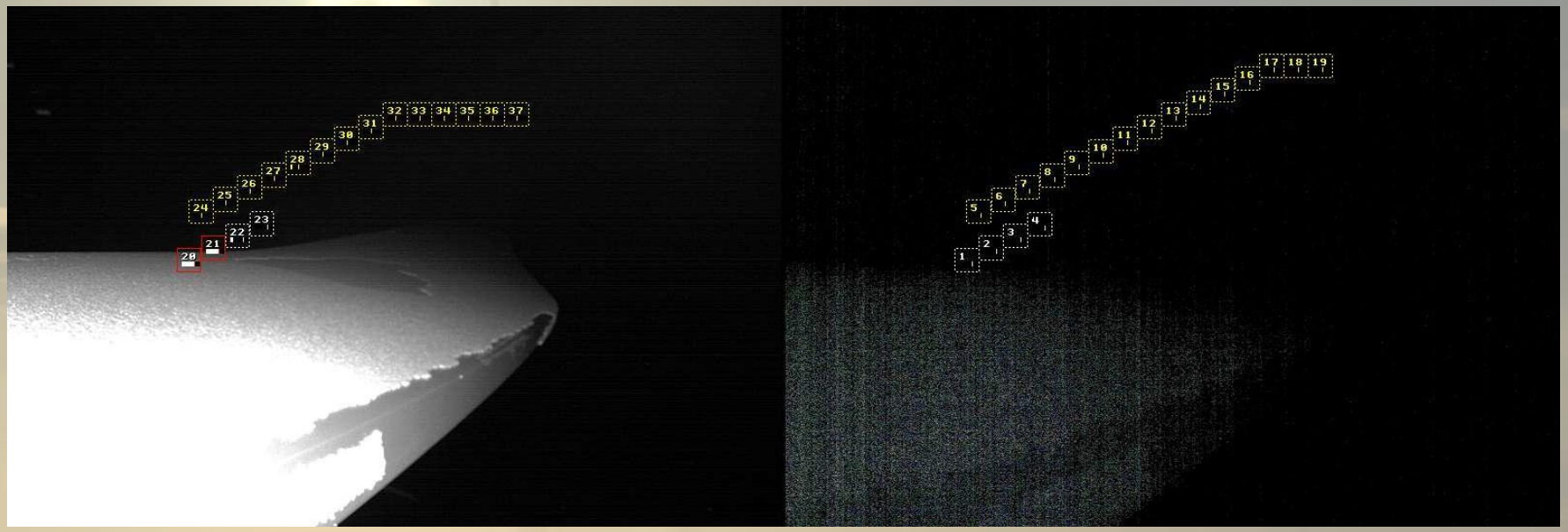
Imaging systems for blade observation

IR image

color image

- Motion detection
- Future image analysis of blade status and icing condition

Imaging system, night images



IR image

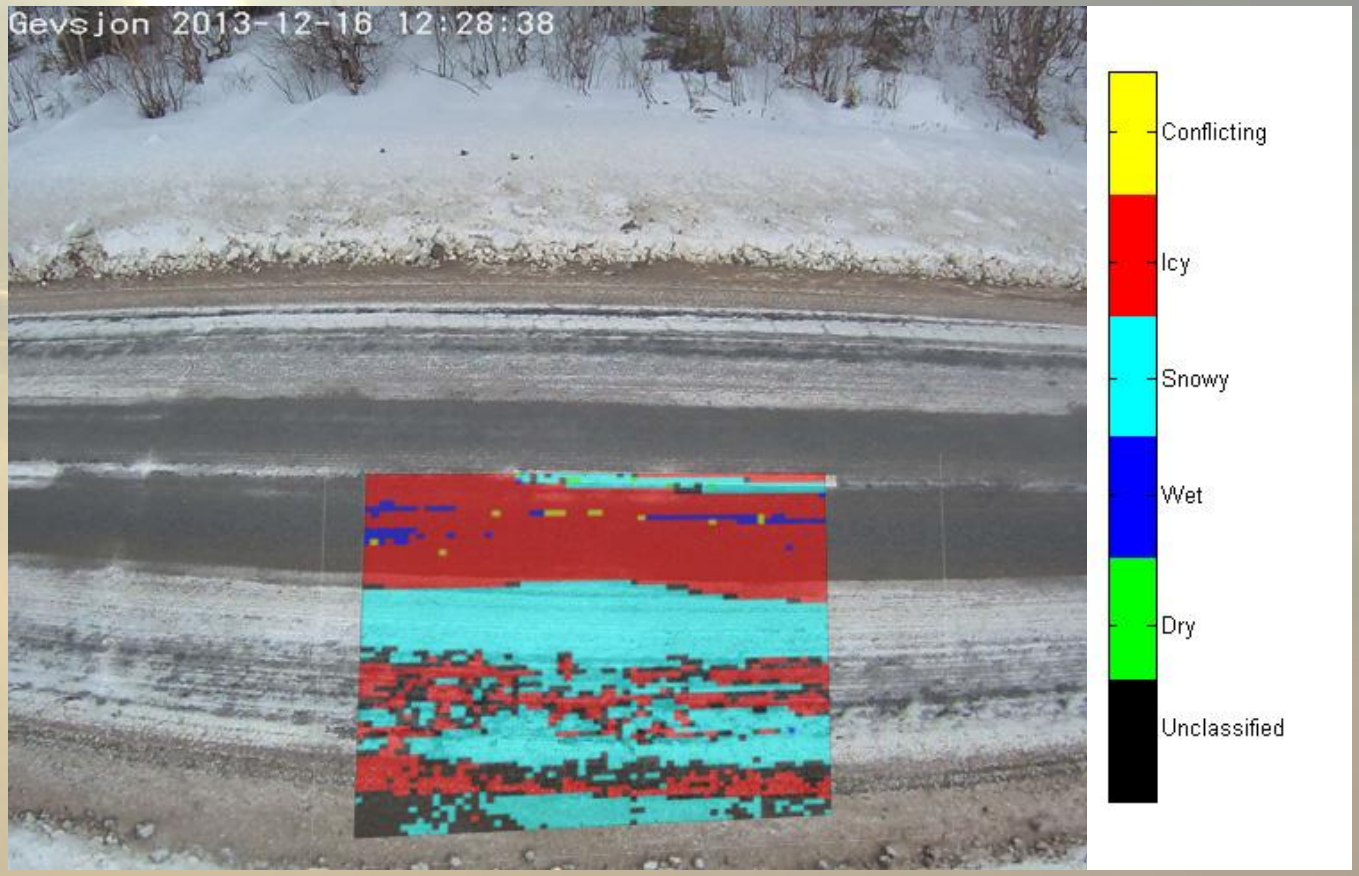
color image

Night image taken with IR searchlight illumination

Advantages of image analysis

- Together with IceMonitor™ the ice density can be found
- Cameras are often present at sites, just add software

Ice detection using NIR



- Based on Combitech research on icing condition at roads

Local monitoring and control system

State of the art ruggedized embedded computer system ODIN

Integrated **database** support

Can perform **real time image analysis**

Can act as **local control unit**

Integrated web server for remote operation

Designed for cloud computing

Installed measurement systems in icing conditions

INSTALLATIONS	Customer	Installation site	Date
5 pcs complete systems *	Wind turbine supplier	Sweden	Autumn 2010
8 pcs complete systems *	O2 Vindkompaniet	Nationwide Sweden (Bliekevare, Sveg, Glötesvålen, Tåsjö)	2009-2010
1 pcs complete system	O2 Vindkompaniet	Aapua, Sweden	2008
4 pcs complete systems	Elforsk	Sveg, Sweden	2008
6 pcs IceMonitor	Cost727 project	Germany, Finland, Sweden, Switzerland, Poland and Japan	2007
19 pcs IceMonitor	Varying customers		2006-2014

*These systems are installed on top of wind turbines and tall masts. These systems collects data from integrated meteorological sensors (wind speed/direction, humidity, air temp/pressure, ice load, ice detection, visibility, cloud height). They are also equipped web **cameras** with motion detection for taking pictures of the blades.

Why cooperate with Combitech

- Long time experience:
  - Electronic construction and development
  - Construction of measurement systems
  - System installations in harsh climate
  - Use of camera systems (color and NIR with search lights)
  - Operates an own server facility with a variety of communication means (GSM, GPRS, 3G, Net1, Radio…)
  - Research together with Mid Sweden University regarding ice detection methods and equipment

Further information

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