GE Energy

# From Scanwind to GE – becoming a global player anchored in Mid-Norway

Trondheim
January 2011

Martin Degen
GE Wind Energy
Nordic Region

imagination at work

# What did GE aquire with Scanwind…?

→ …Established in 1999 for marketing of large wind turbines suited for harsh environments based on own design.

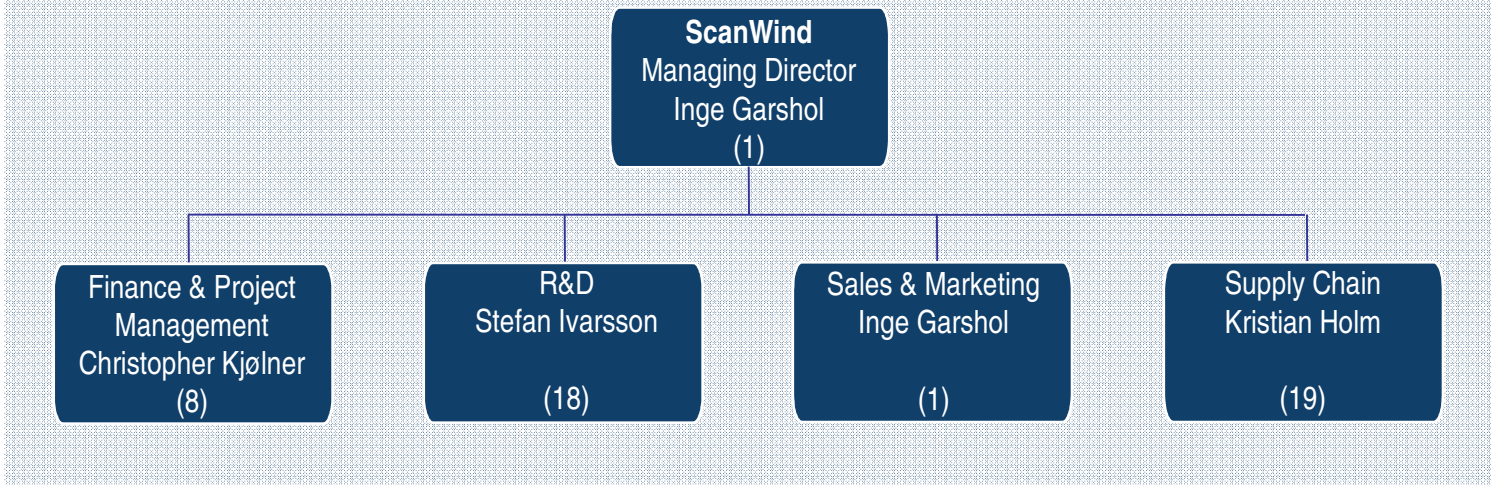
→ …ScanWind has developed a superior product platform especially designed for harsh environments with high winds and turbulence like the Northern European coastal onshore and offshore markets

→ …ScanWind's platform has been proven over 25 years accumulated, of successful operations, in one of the toughest wind farms in the world; Hundhammerfjellet Wind Farm.

→ …ScanWind's platform is scalable

# VI. Organization
## - Organization structure

### Organization chart



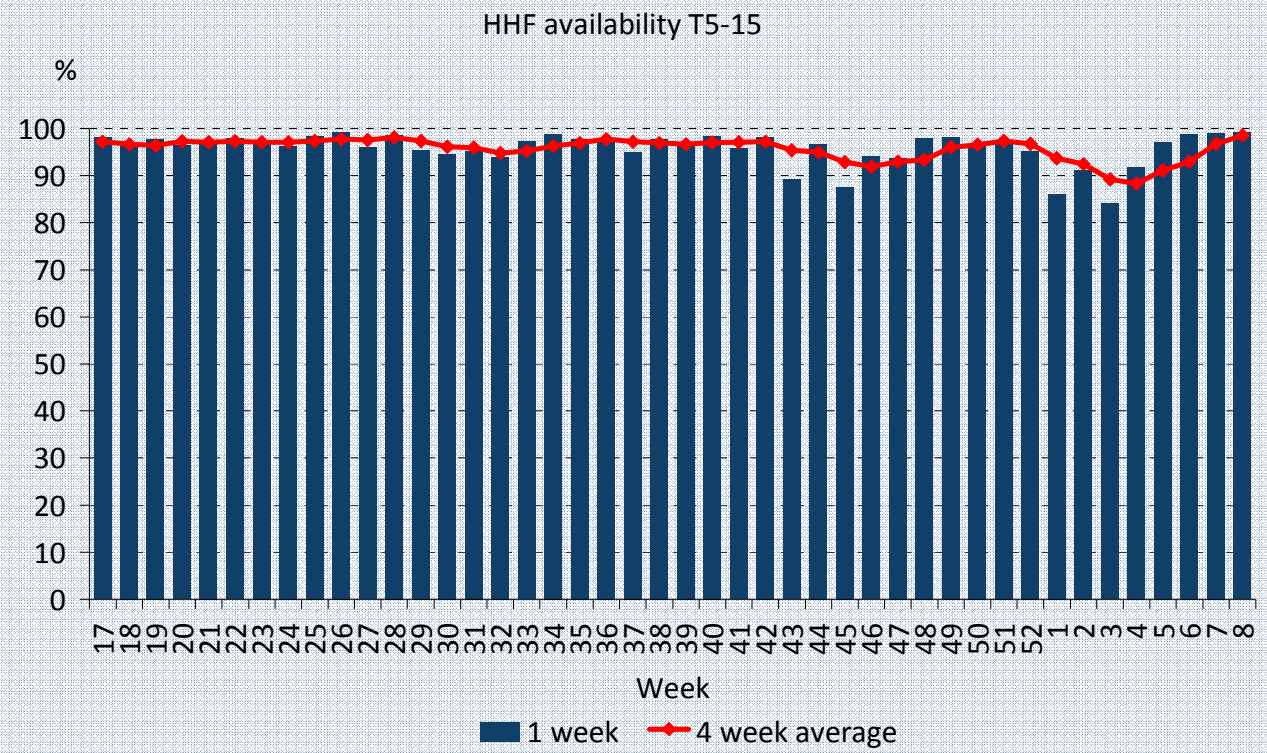

- 42 employees and 5 consultants
- Average age ~38
- HQ in Trondheim incl. Sales & Marketing, Finance & Project Management and Purchasing & Logistics
- Manufacturing & Services in Verdal
- R&D is located in Karlstad (Sweden)

# IV. Technology

## - Availability

### ScanWind (product generation 3) average availability 2008 and 2009

Average availability of more than 96% and improving




# We are GE

We are a global infrastructure, finance, and media company taking on the world's toughest challenges.


GE Capital
$51B / 32%


GE Technology Infrastructure
$42B / 27%


GE Consumer & Industrial
$10B / 6%


GE Energy
$37B / 24%

**2009 revenue $157 billion and profit $11.2 billion**
**300,000 employees across 100 countries**

imagination at work



2009 Revenues / % of total revenues

# Global Research

Began in Schenectady,
New York in 1900

Founded with the focus to improve businesses through technology


Today: One of the world's most diverse industrial labs and the cornerstone of GE's commitment to technology


Niskayuna, New York


Munich, Germany


Bangalore, India


Shanghai, China

2,800 research employees
26,000 GE technologists worldwide
GE technology spend: ~$6B

imagination at work

# GE's Global Renewables Footprint


**Employees**

- Wind globally: 3200
- Wind Europe: 1200

imagination at work

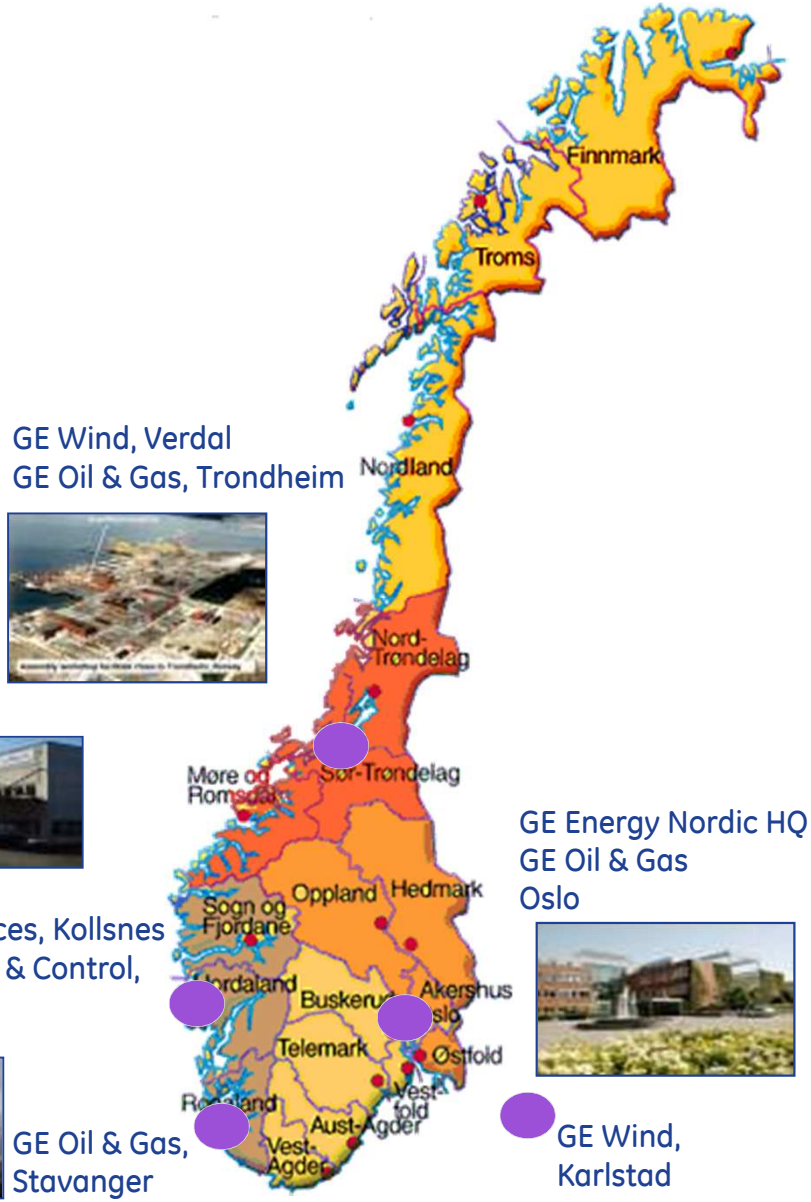
# GE Energy in Norway

## GE Footprint

- 2300 GE Employees in Norway
- 850 GE Energy…Growing 10%+
  - •400 Mfg & Services
  - •370 Engineers
  - •80 Project Mgmt & Sourcing

- •Thermal Fleet … ~3.5GW offshore
  - ~150 GE Aero Gas Turbines
  - ~135 GE O&G NP Compressors
  - ~130 GE VG Service Wells

- •Wind Fleet … ~35MW onshore
  - •11 GE direct drive turbines (former Scanwind)
  - •1 x 1.5MW Cold Weather test unit, Tromso



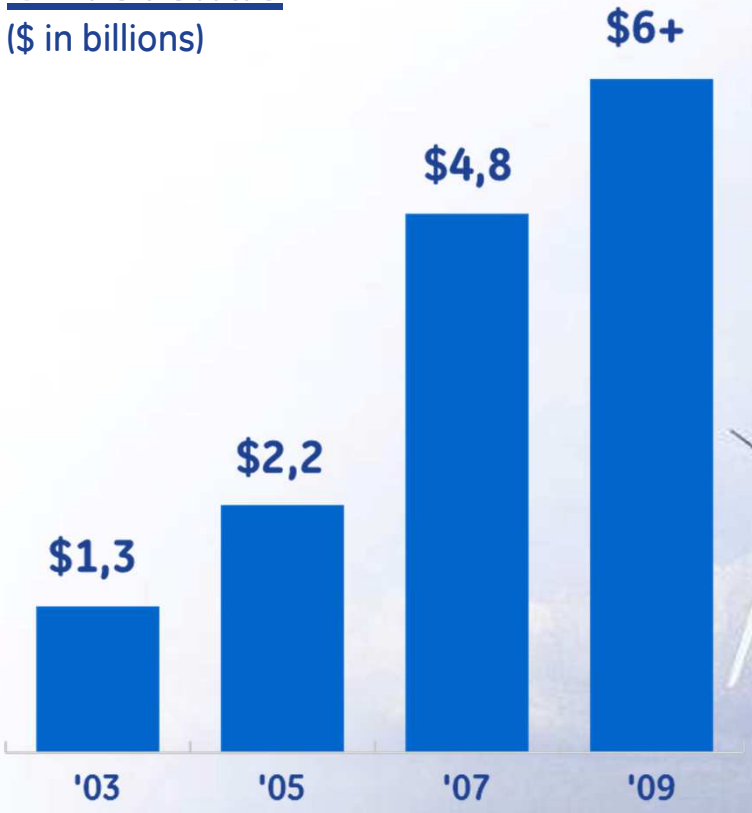

**Strong Presence … Growing …Green Jobs**

imagination at work

# GE Renewables business journey

## GE revenue

($ in billions)




GE internal data

### Keys to success

- Focusing on customer value
- Product leadership
  - Technology differentiation
  - Efficiency/reliability
  - Low Cost of Energy
- Global supply chain
  - High quality
  - Rapid response
- Flawless execution … project management & logistics

**Wind … GE's #1 ecomagination play**

# Renewable Energy Portfolio

**1.5 - 77**
**1.6 - 77**

- 97% availability
- Enhanced controls

**1.5 – 82.5**
**1.6 – 100**

- Lower wind speeds
- Performance ↑

**2.5 - 100**
**2.75 - 103**

- Expanding MMW reach
- Advanced load controls

**Offshore**
**4.1 - 113**

- Utgrunden 7 x 1.5
- Arklow 7 x 3.6
- ScanWind Acquisition

**Services**

- Performance Upgrades
- Diagnostics & Life Extension

**Systems**

- Grid Management
- Plant Optimization

**Nearly $1B invested in technology**

imagination at work

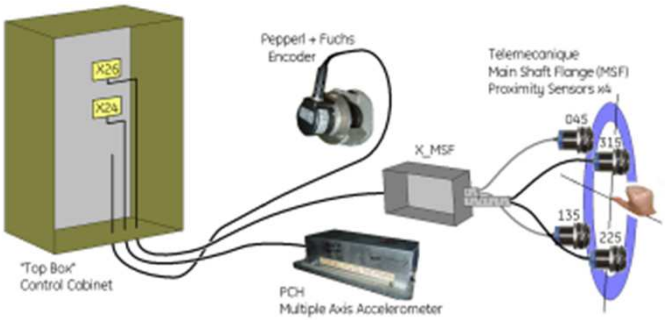
# Design Evolution through proven technology

## Built on solid ScanWind platform

- Enhance generator rating to 4MW with improved cooling
- Minimal changes to base design… Scale-up of structural components only where required

## Leverage GE technology portfolio

- Reduction of loads with GE's Advanced Loads Control… In commercial operation on GE 2.5xl and GE 1.5xle
- Grow rotor size to 113m with advanced blade technology… leverage 100m blade experience
- Wind Power Plant solution for seamless grid integration




**Combining solid ScanWind platform with proven GE load reducing technology**

imagination at work

# GE 4MW… the evolutionary next step

| Direct-Drive MMW<br>Introduction | SW 3<br>2005 | SW 3.5<br>2007 | GE 4MW<br>2011** |
|---|---|---|---|
| Rotor Diameter (m) | 90 | 90 | 113 |
| Capacity Factor* (%) | 48 | 44 | 53 |
| AEP (GWh) | 12.7 | 13.4 | 19.2 |

+9 pts

+43%

* Estimated AEP at 10 m/s and 98% availability

** Fleet Leader target COD

## Features

- ✓ Reliability… gearless machine
- ✓ Product competitiveness… 113m rotor
- ✓ Maintainability and safety… spacious nacelle and ease of access
- ✓ Seamless grid integration
- ✓ Designed for IEC Ib environment

## Proven Experience

13 direct-drive machines installed at Hundhammerfjellet (Norway)

- COD Dates: Two SW 3/90 in 2005, Four SW 3.5/90 in 2007, Seven SW 3.5/90 in 2008
- Design validated in very challenging site conditions
  - Coastal location: high salinity and lightning
  - High wind speed: 9.2 m/s
  - Temperature ranging from –25°C to +25°C

**Enhancing performance of proven platform**

imagination at work


Right Technology
Industry's lowest LCOE in average water depth
High Reliability and Production
Low Opex
Right Partner
Through technology, supply chain, and safety
Technology Leader
Energy industry Leader
Right technology from the right partner... at the right time


Thank you
a product of
ecomagination℠