



# Siemens Wind Power

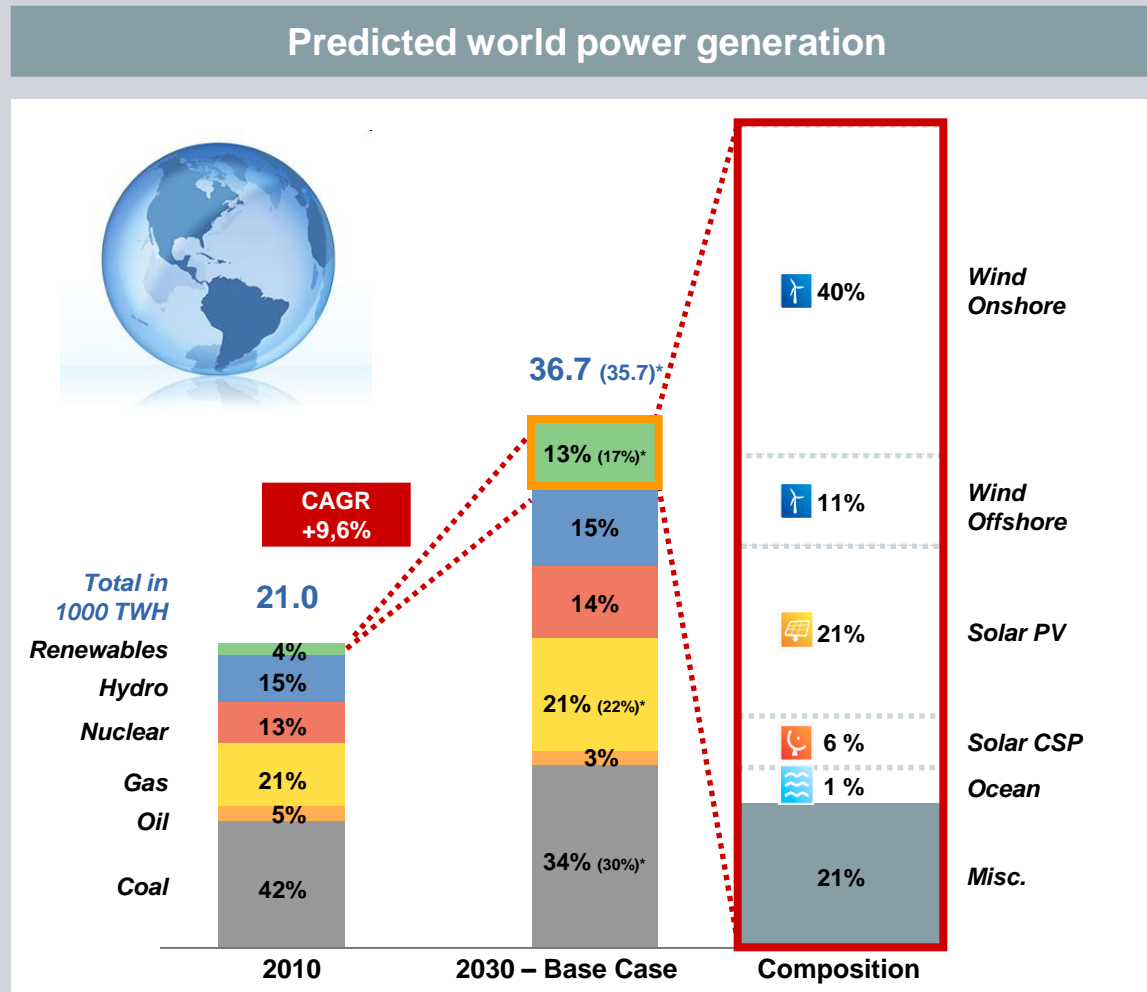
Solutions for 2020/2030

IENE Energy & Development 2012  
30-31 October 2012

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Head of Wind Power  
Siemens S.A.

## Substantial growth potential for Renewables



Source: "Markttag" Discussion Status Jan 31, 2011 | Note: \*Terms in brackets based on "Bright green scenario"

## Sectors and Divisions

### Energy

#### Divisions

- Fossil Power Generation
- Wind Power
- Hydro
- Oil & Gas
- Energy Service
- Power Transmission



### Healthcare

#### Divisions

- Imaging & Therapy Systems
- Clinical Products
- Diagnostics
- Customer Solutions



### Industry

#### Divisions

- Industry Automation
- Drive Technologies
- Customer Services



### Infrastructure & Cities

#### Divisions

- Rail Systems
- Mobility and Logistics
- Low and Medium Voltage
- Smart Grid
- Building Technologies
- OSRAM <sup>1)</sup>



1) In fiscal 2011, Siemens announced its intention to publicly list OSRAM and, as an anchor shareholder, to hold a minority stake in OSRAM AG over the long term

# Siemens Wind Power Facts at a glance

**SIEMENS**

One of the world's leading suppliers of wind power solutions

Acquired Danish wind turbine manufacturer Bonus Energy A/S in 2004

Installed Base: > 11,500 turbines with > 17,930 MW capacity<sup>1)</sup>

Installed in 2011: > 2,900 MW

More than 8,000 employees globally

Record order backlog of ~ € 8,6 billion

Revenue in 2011: ~ € 3,9 billion<sup>2)</sup>

1) October 2012

2) consolidated on Renewable Energy Division level

## No. 1 in offshore wind power <sup>1)</sup>

World's 1 <sup>st</sup> offshore wind power plant	World's 1 <sup>st</sup> offshore wind power plant w/ MW turbines	World's largest offshore wind power plant in operation	World's 1 <sup>st</sup> floating offshore wind power plant in operation	World's largest offshore wind power plant in installation	World's largest offshore wind power plant in installation
1991	2000	2003	2009	2009-10	2012
					
Vindeby	Middelgrunden	Nysted	Hywind	Greater Gabbard	London Array
5 MW	40 MW	166 MW	2.3 MW	504 MW	630 MW

### Our performance

- Unsurpassed reliability and performance: proven 20+ year product lifetime and 95% real availability
- Installed base: > 8600 turbines with > 2.5 GW capacity
- Our turbines from the first offshore wind power plant are still up and running

1) Megawatts commissioned, EWEA, January, 2012

# Recognized technology leader with more than 30 years of experience in the wind industry



## Siemens product portfolio track record<sup>1)</sup>

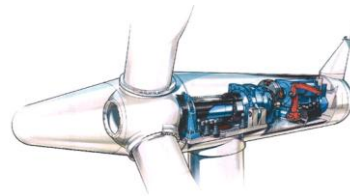
### MW class

- CombiStall technology
  - SWT-1.0-54: 356 WTG
  - SWT-1.3-62: 1,545 WTG
  - SWT-2.0-76: 165 WTG
  - SWT-2.3-82: 524 WTG



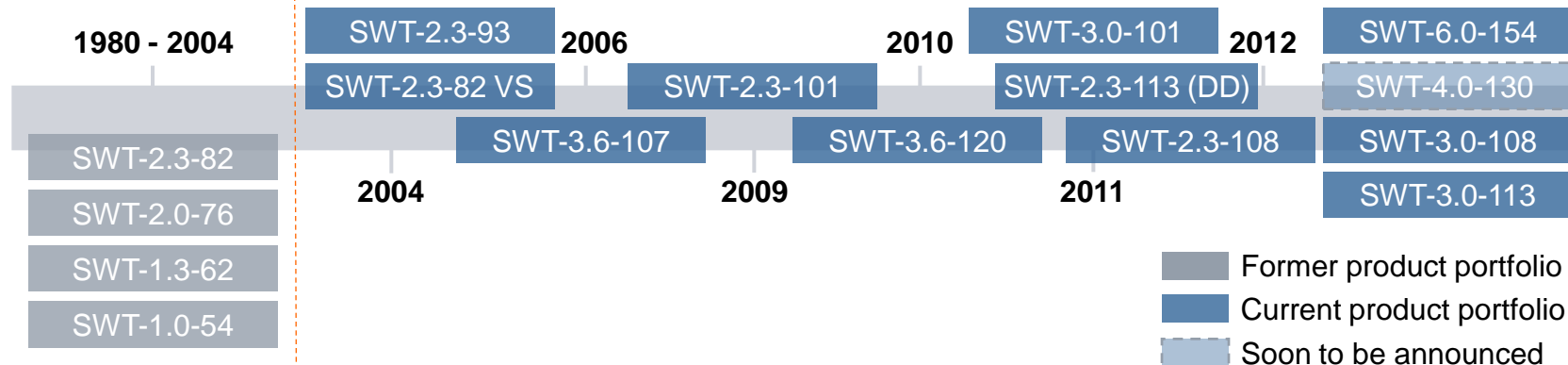
### Multi-MW class

- Pitch technology with variable speed
  - SWT-2.3-82VS/93/101: 4,269 WTG
  - SWT-3.6-107: 399 WTG
  - SWT-3.6-120: 72 WTG



### Multi-MW Direct Drive class

- Direct drive technology with no gearbox
  - SWT-3.0-101 DD: 42 WTG
  - SWT-2.3-113 DD 2 WTG
  - SWT-6.0-120/154 DD testing



**Installed base worldwide: > 11,500 turbines with > 17,930 MW capacity**



# SWT-6.0-154: Direct drive turbine with 154 m rotor

## Description & Application

### Technical data

IEC class:	IA
Nominal power:	6,000 kW
Rotor diameter:	154 m
Blade length:	75 m
Swept area:	18,600 m <sup>2</sup>
Hub height:	Site specific
Annual output at 10 m/s (gross):	31,000 MWh
Tower head mass:	< 360 t
Power regulation:	Pitch regulation, variable speed
Prototype installed:	2011 (SWT-6.0-120) 2012 (SWT-6.0-154)
Pre-series release:	2012-2013
Serial production:	2014





# Streamlined and effective design with few and highly efficient components

SIEMENS

Technology: Direct Drive design

- Direct drive generator with permanent magnets, no gearbox.
- Innovative simplified design with 50% fewer parts reduces complexity and increases reliability.
- Increased efficiency due to minimum losses in drive train, generator and cooling system.
- Scaling of proven technologies and re-use of well-proven solutions such as NetConverter® and blade technology.
- Redundancy in critical components.



# 75 m one-piece innovation based on well-proven Siemens experiences and quality

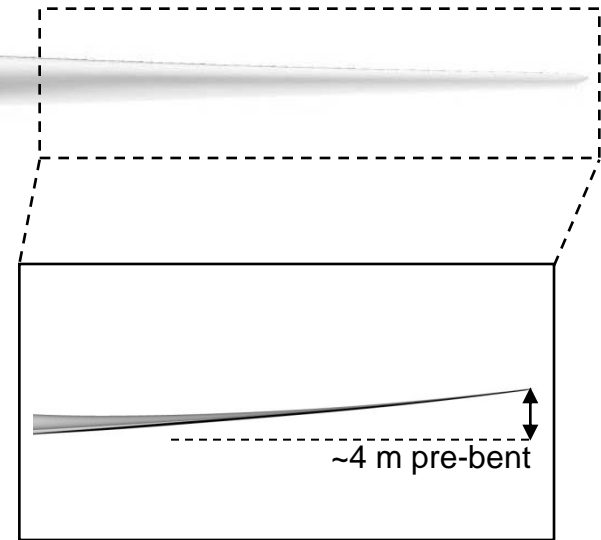
SIEMENS

Technology: B75



B75 blade

- Quantum Blade design for load-reducing structural dynamics and advanced aerodynamics.
- Optimized design and manufacturing process setting new standard for low weight blades.
- Material flexibility in pre-bent tip reduces peak loads and structural stress.



Pre-bent tip design

**Controlling deflection is key for longer blades**

# Proven IntegralBlade® technology eliminates glue joints and ensures blade strength

SIEMENS

Technology: IntegralBlade®

- IntegralBlade® technology is a closed manufacturing process invented by Siemens offering high quality in an optimal working environment.
- One-shot manufacturing process eliminating the presence of glue joints in the blade for a robust design.
- The IntegralBlade® process is based on vacuum-assisted resin transfer molding.
- The blade is not gel coated as part of the manufacturing process, making it possible to visually inspect the blade to ensure high quality.



**Thank you for your attention!**

