

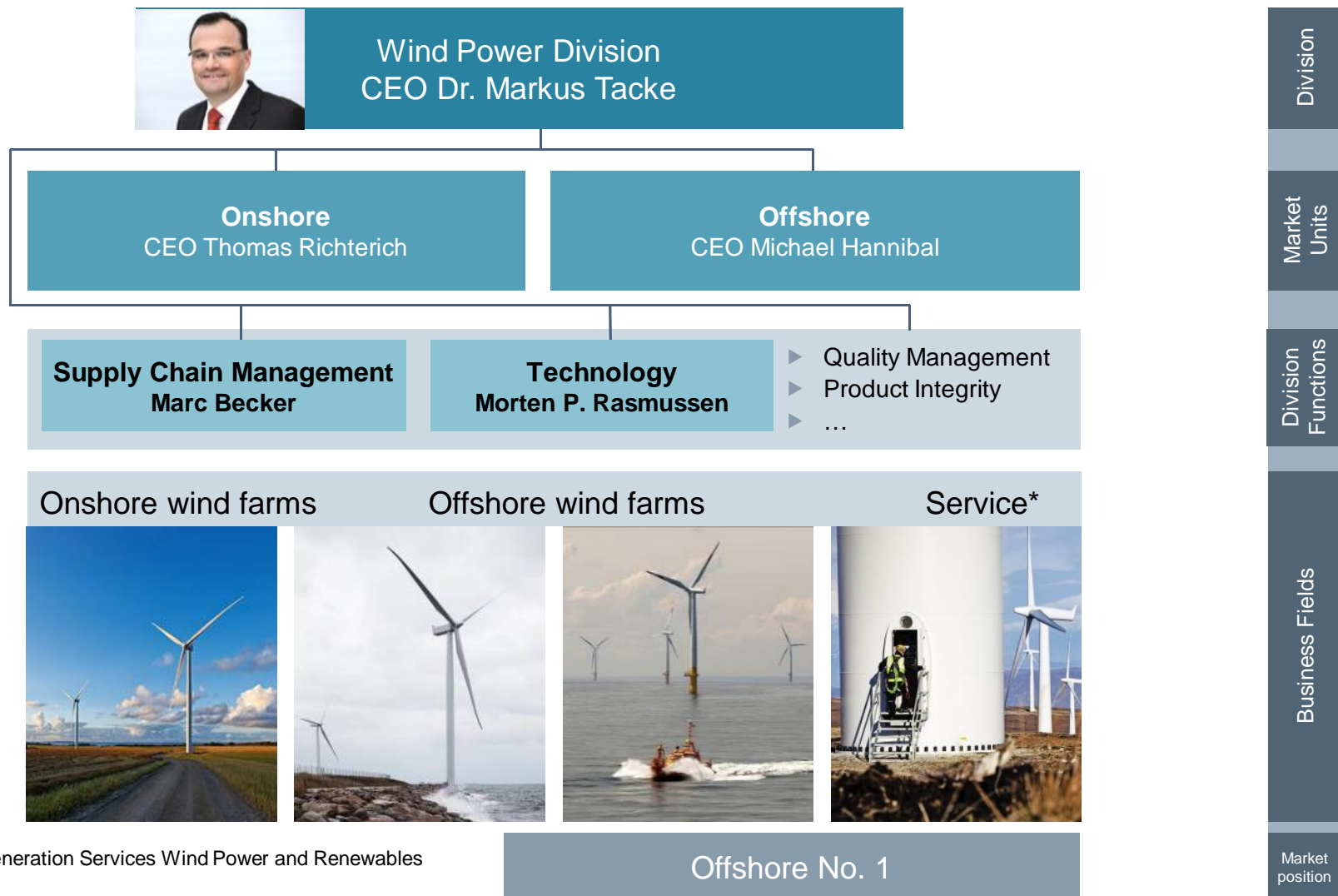


**SIEMENS**

Company Presentation, FY2015

# Siemens Wind Power and Renewables Division

# Siemens Wind Power organization



\*Power Generation Services Wind Power and Renewables

# The Siemens Wind Power product platforms



## Platforms

**Siemens  
G2  
Platform**

**Siemens  
D3  
Platform**

**Siemens  
G4  
Platform**

**Siemens  
D7  
Platform**

## Products

**SWT-2.3-101  
SWT-2.3-108  
SWT-2.3-120**

**SWT-3.0-101  
SWT-3.2-101  
SWT-3.0-108  
SWT-3.2-108  
SWT-3.0-113  
SWT-3.2-113  
SWT-3.3-130**

**SWT-4.0-107  
SWT-4.0-120  
SWT-4.0-130**

**SWT-6.0-154  
SWT-7.0-154**

# Wind Power and Renewables Division

## Market and locations

### Market

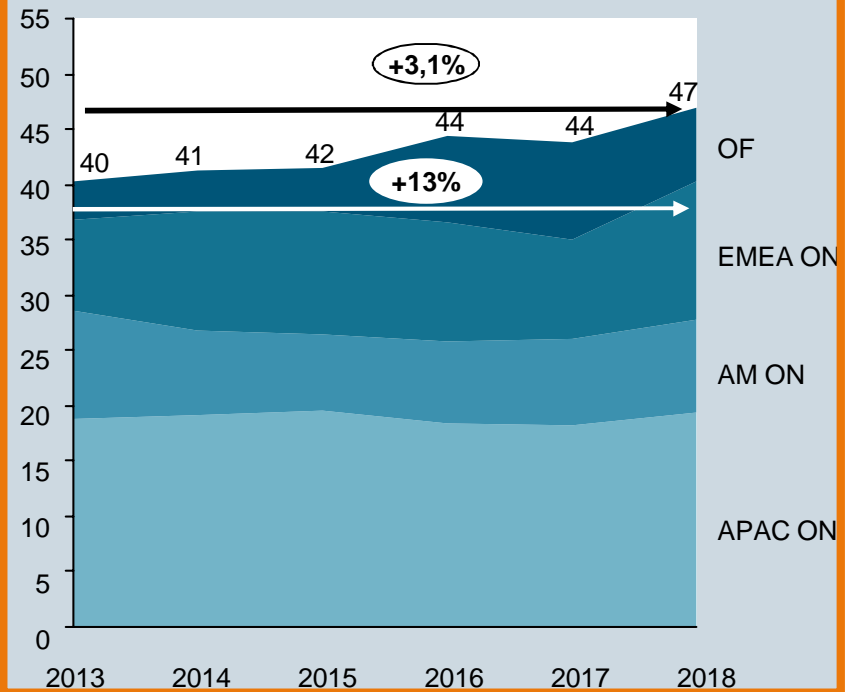
Market growth for wind energy (installed capacity in MW) is estimated at 2% a year (2012 - 2018)\*:

- ▶ Onshore (2012 - 2018): 0.7% p.a.
- ▶ Offshore (2012 - 2018): 13.4% p.a. (Offshore market to grow from 3.6GW additions in 2013 to 6.6GW in 2018)

Market position:

- ▶ No. 1 in offshore market
- ▶ No. 4 in global installations (2013)

### Global wind market in GW installations 2012-2018



# Wind Power and Renewables Division

## Facts at a glance

SIEMENS

### Siemens Wind Power facts

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

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

Installed Base: > 15,300 turbines with ~ 28,000 MW capacity

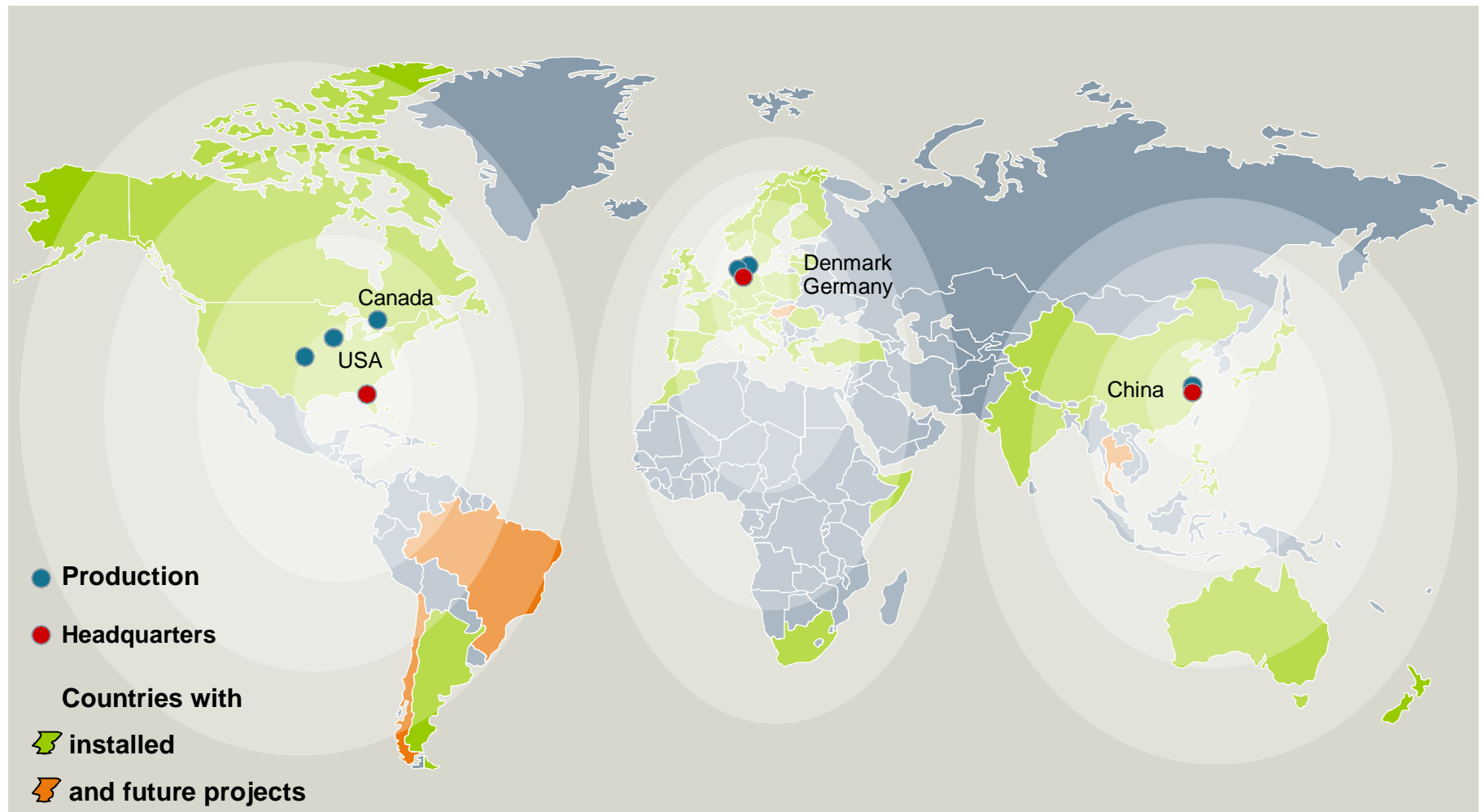
Installed in CY 2014: > 1.930 turbines with ~ 5 GW capacity

~12,200 employees globally incl. Wind Service

Revenue in FY 2014: €5,5 billion



# Wind Power is an international business – Our regional set-up secures customer intimacy



# **Siemens Wind Power Offshore Facts at a glance**

**SIEMENS**

**Pioneered the offshore market and current market leader**

**More than 24 years of experience**

**Sold more than 3100 WTGs**

**Installed base: > 1,470 turbines with > 4.7GW capacity**

**A robust design with innovative solutions**

**Unsurpassed reliability and performance:  
A proven 20+ year product lifetime and 95% real availability**

# Project Capacity

## From 5 MW to 630 MW in 22 years

1991	2000	2003	2011	2012	2013
Vindeby	Middelgrunden	Nysted	Rudong Intertidal	Greater Gabbard	London Array
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 largest wind power market entered in China	World's largest offshore wind power plant in operation	World's largest offshore wind power plant in operation
					
5 MW	40 MW	166 MW	48,3 MW	504 MW	630 MW

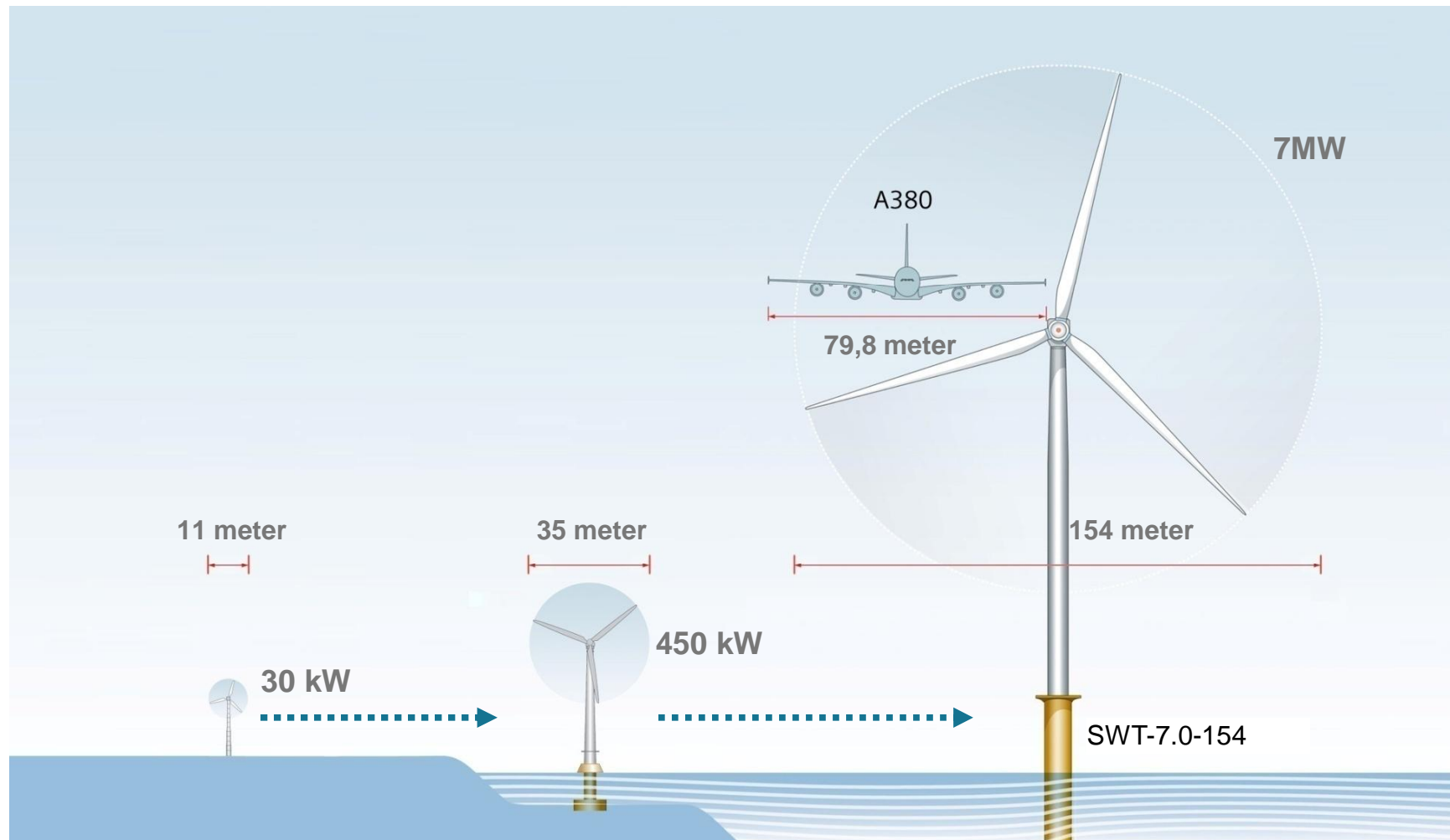
### Our performance

- Leading market share and number one in offshore<sup>1)</sup>
- Industrialized offshore wind power (from 5 MW to 630 MW wind power plants)
- Market entry into the Asia Pacific region

1) Megawatts commissioned, EWEA, June 2013



# Technology Development of Siemens Wind Power From 30 kw to 7 MW in 30 years



# SWT-6.0-120 at Høvsøre, Denmark, May 2011

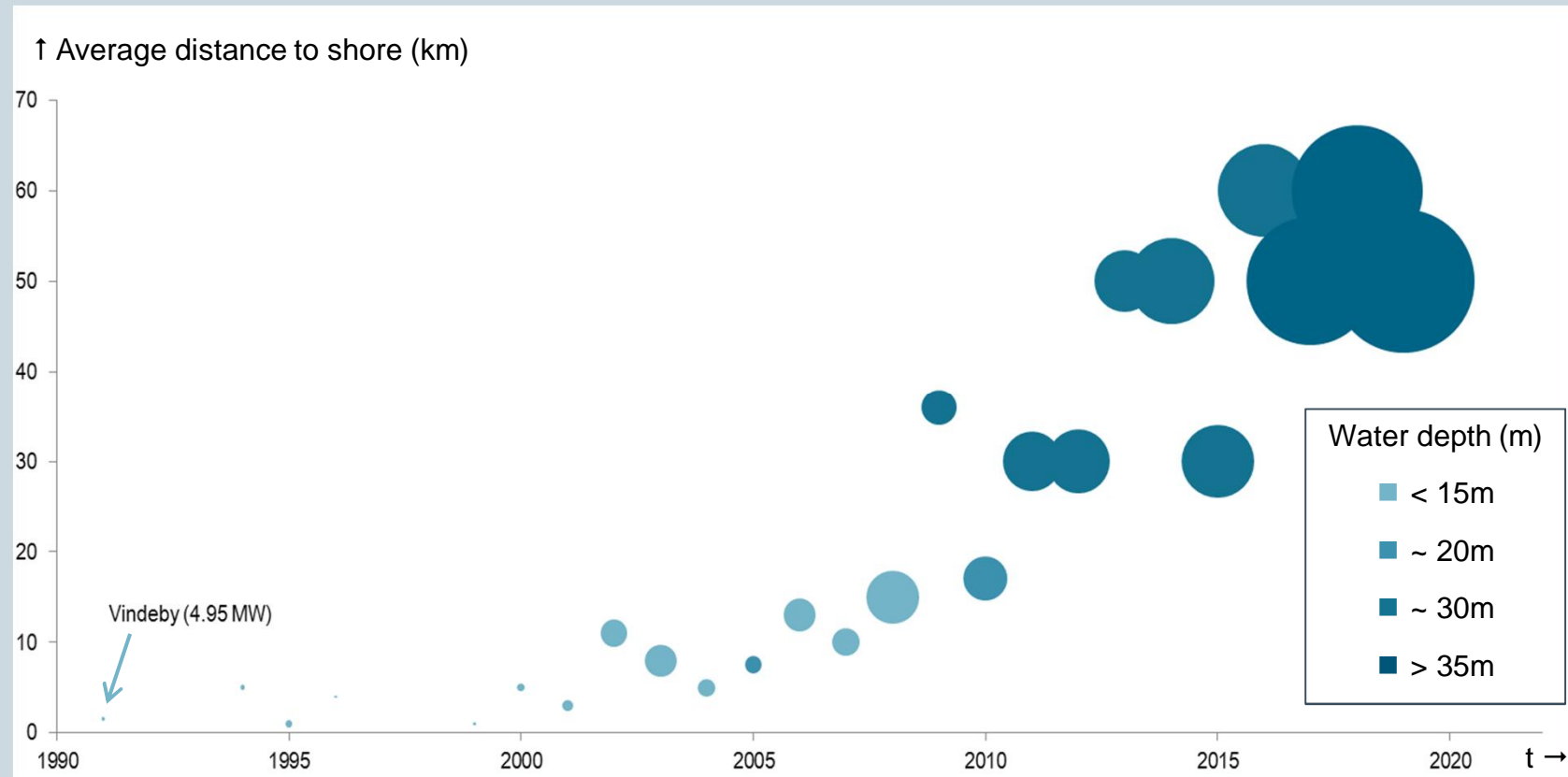
## When new technology requires new processes

SIEMENS



## Development of offshore wind farms: Larger, deeper and further from shore

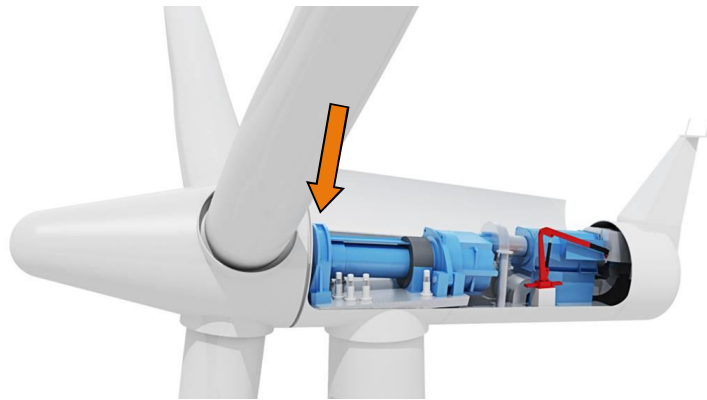
### Offshore wind projects, yearly installed capacity\*



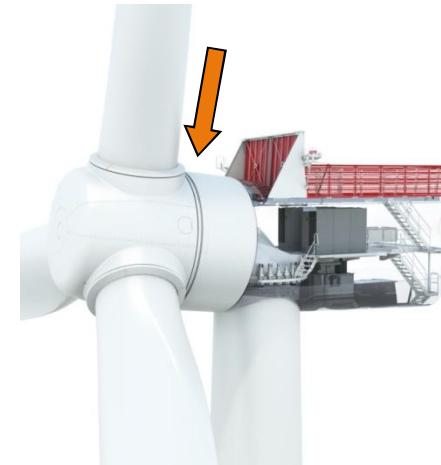
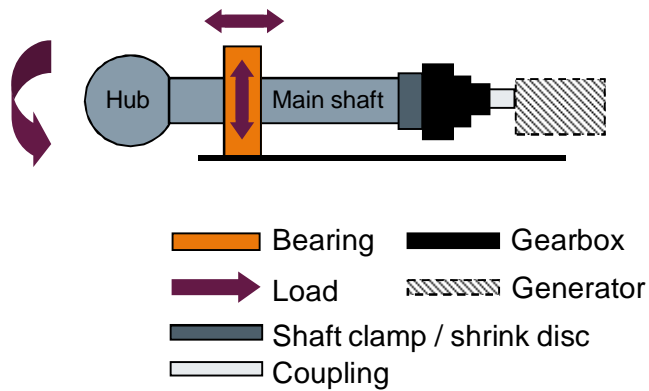
\*Projects bundled by year, estimated up to 2019

# Direct drive; reduced complexity for increased reliability

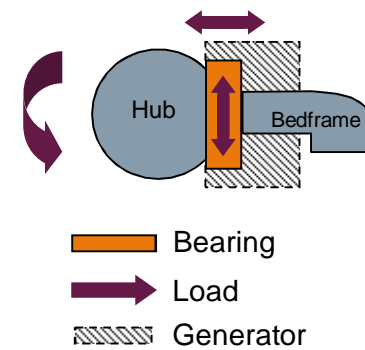
- Single bearing design for the G2 and DD platforms (shown)



G2 drive train



DD drive train



## SWT-6.0-154; reduced complexity for increased reliability

### Robust and reliable technology

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- **Direct drive generator**
  - Permanent magnets; no gearbox
  - Increased efficiency; minimum losses
  - Simplified design reduces complexity
  
- **Scaling and re-use of in-house design**
  - E.g. SICS and IntegralBlade
  - Redundancy in critical components



# Patented IntegralBlade® manufacturing; blade robustness through reduced complexity

## In-house design

### ■ IntegralBlade technology

- One-shot process eliminating the need for glued joints
- Process based on vacuum-assisted resin transfer molding
- No gel coating as part of the manufacturing process allows for improved quality inspection



Siemens blade manufacturing



# From 6 to 7 MW; most components will be re-used

## Minimal upgrade

### ■ Minimal upgrade

- Segments and magnets
- Converter
- Transformer

### ■ Re-use of components and supply-chain

- B75 IntegralBlade
- Nacelle
- Mechanical structure
- Tower / foundation

