

What Is The Future Of Renewable Energy

Siemens Renewable Energy Division

A winning portfolio for today and the future



Renewable Energy markets and drivers

Market drivers

Energy demand



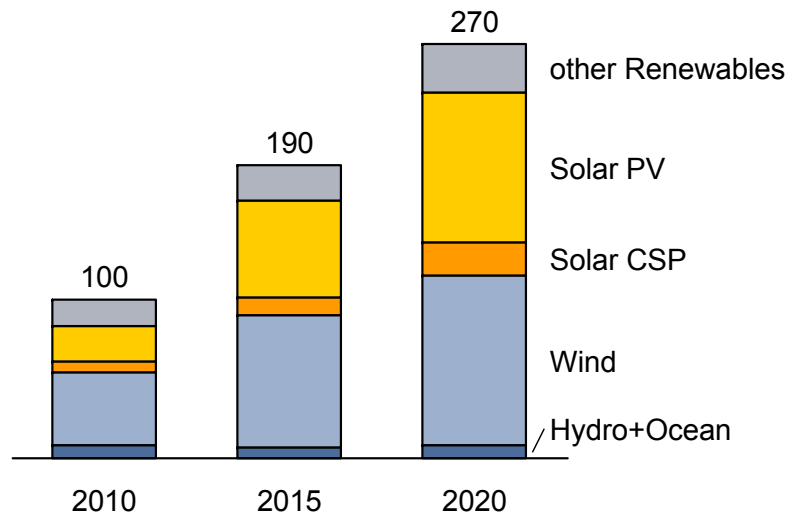
Oil & gas price hike



Political targets



€ bn



Renewable Energy portfolio

- Wind offshore



- Wind onshore



- Concentrated Solar Power (CSP)



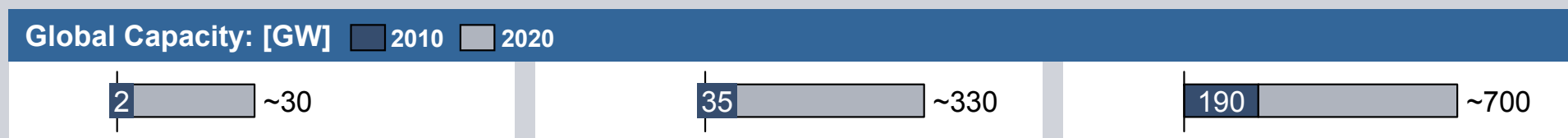
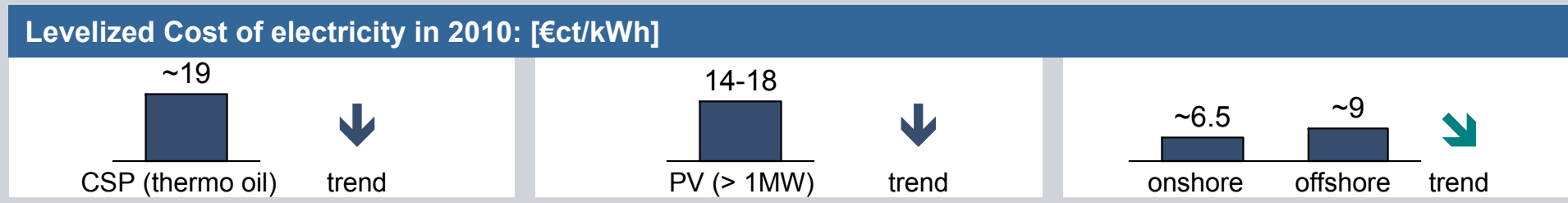
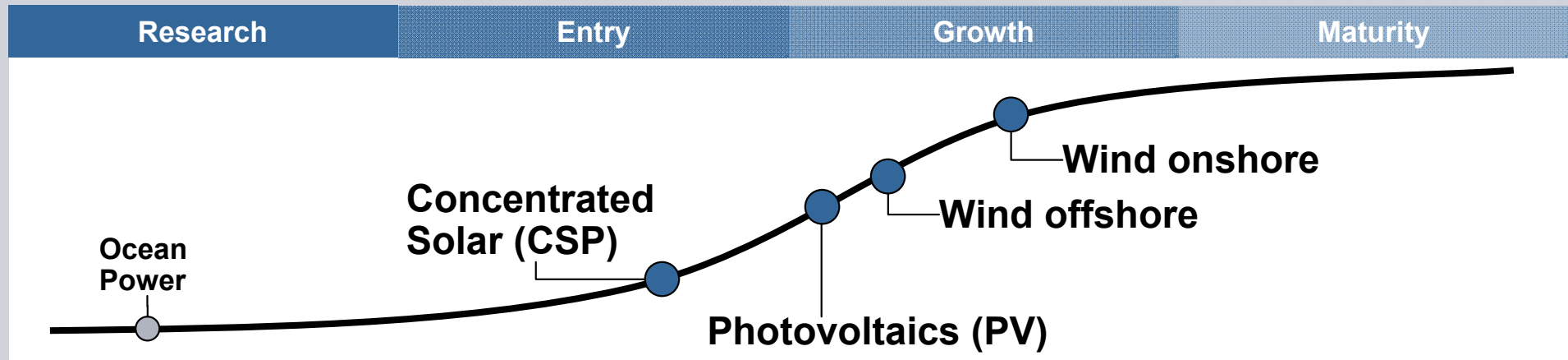
- Large scale photovoltaic EPC



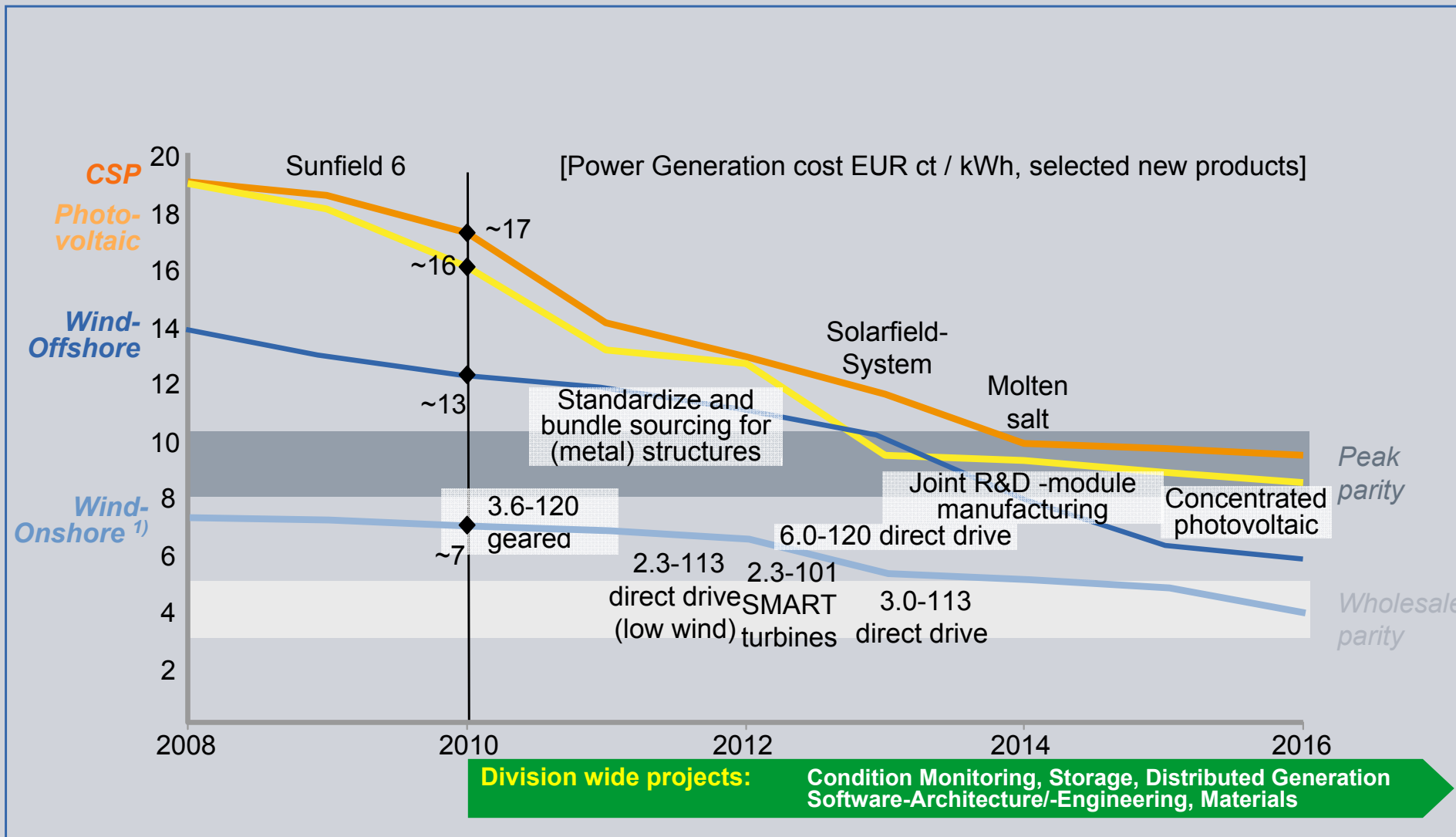
- Small Hydro / Ocean energy



Wind, PV and CSP – 3 renewable technologies envisaging further growth

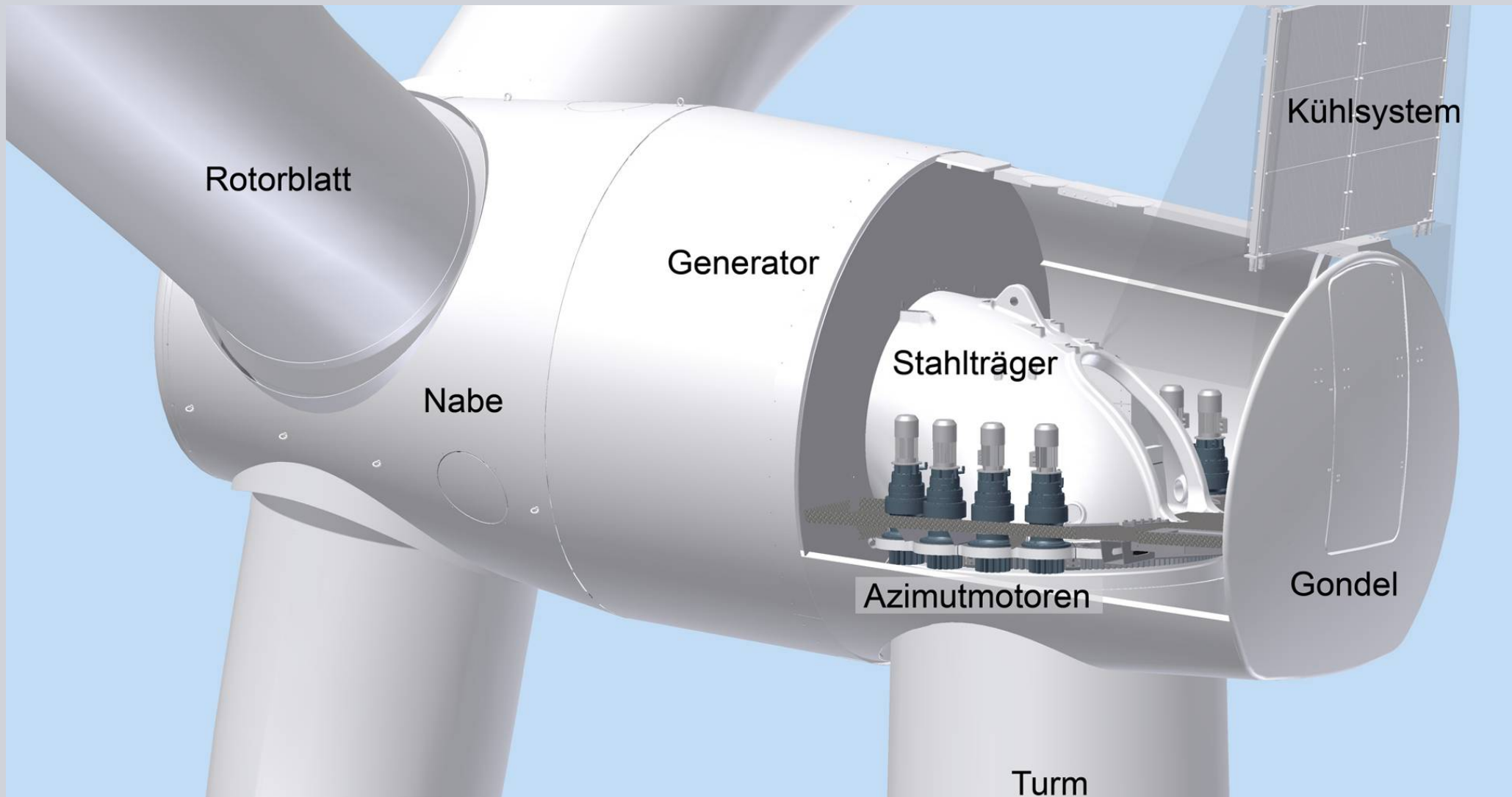


Compete with Coal-Cost of Energy Roadmap to Grid-Parity



Innovationen – Getriebelose Antriebstechnik

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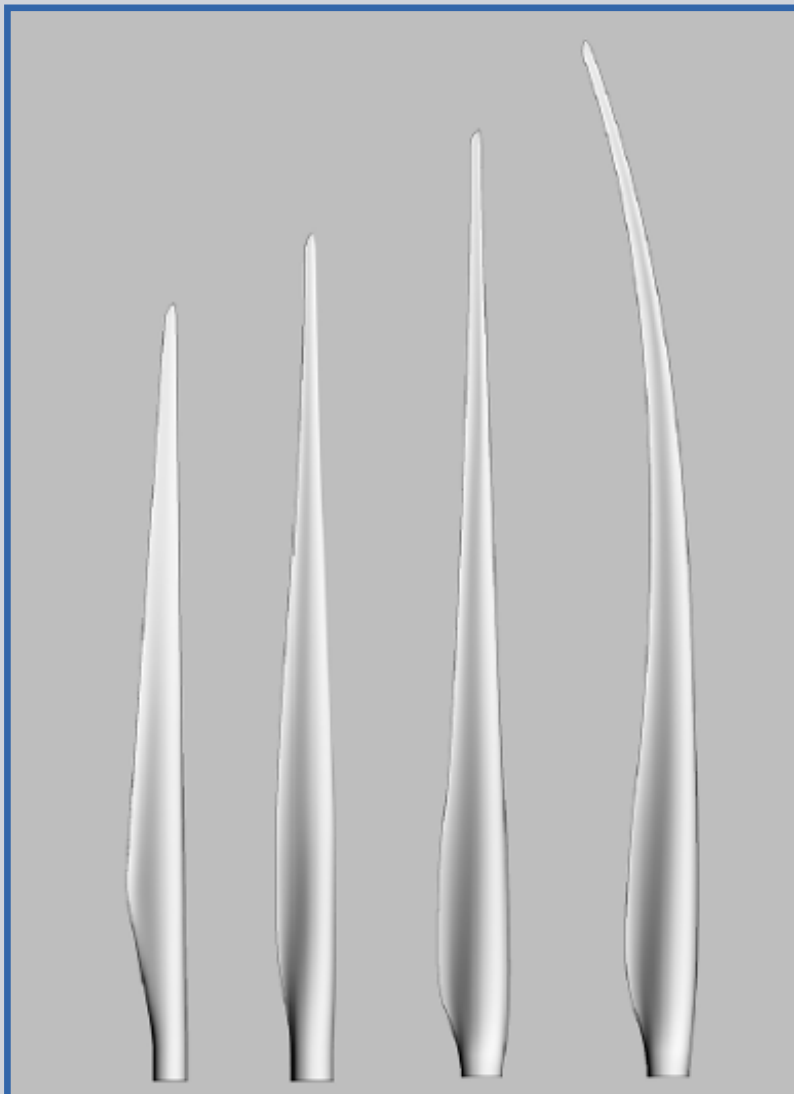
Innovationen – Neue Blades-Technologien für mehr Leistung

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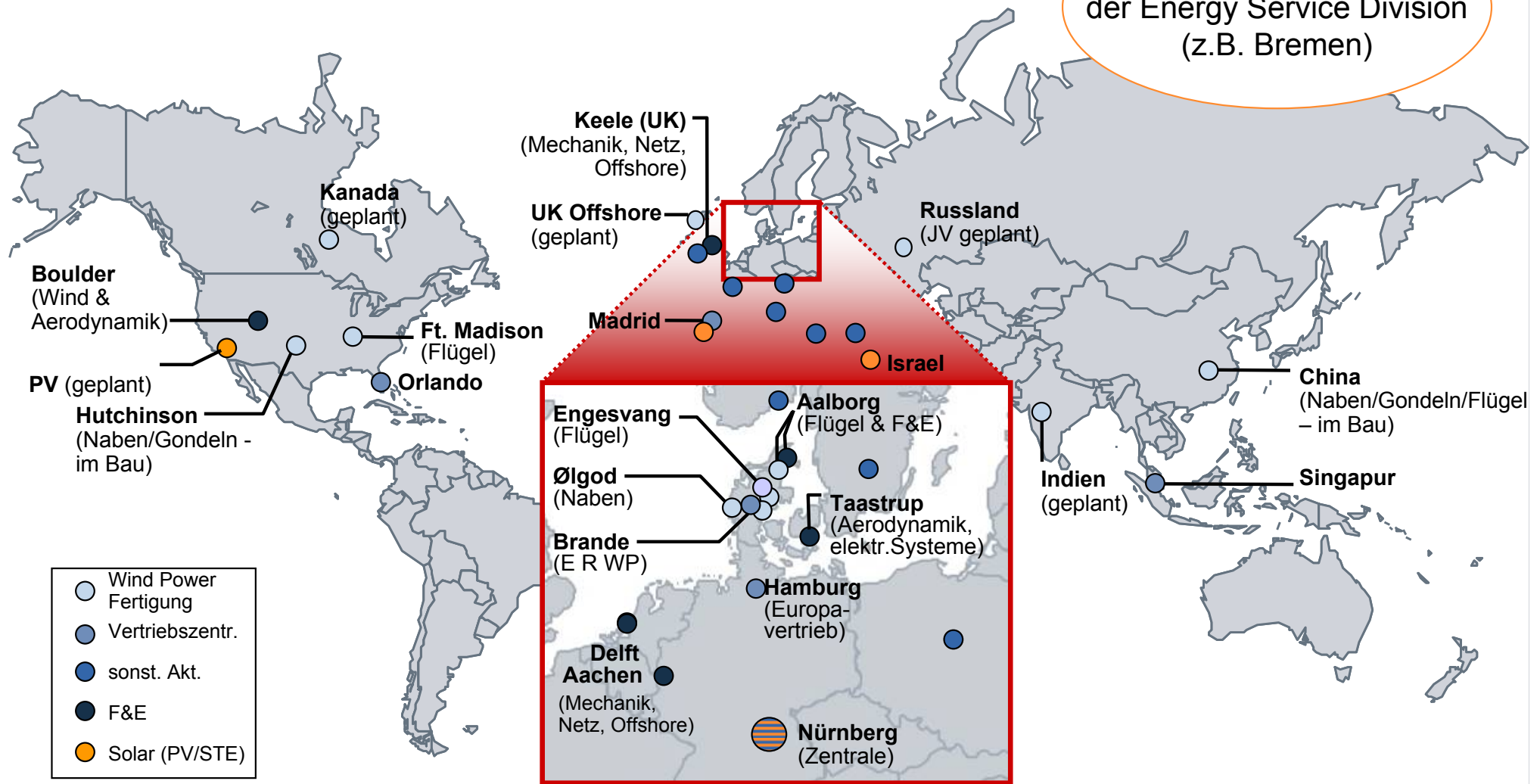
Weitere Neuerungen – Neue Aerodynamik und mechanische Fertigung QBII

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Internationalisierung – Ausbau der Standorte

ohne Standorte
der Energy Service Division
(z.B. Bremen)



Wind: New technologies driving LCoE towards wholesale parity

Global Challenges for Wind



Reduction of FIT

→ Drive wind towards wholesale parity



Grid integration & storage

→ Transmission solutions and large scale storage



Location constraints

→ Develop new solutions

Our Answer: Innovation



3 MW Direct Drive

- 50% less parts
- 20% less costs per MW



6 MW Direct Drive

- Next era starts in 2012



Siemens unique value proposition

- Wind turbine to grid connection

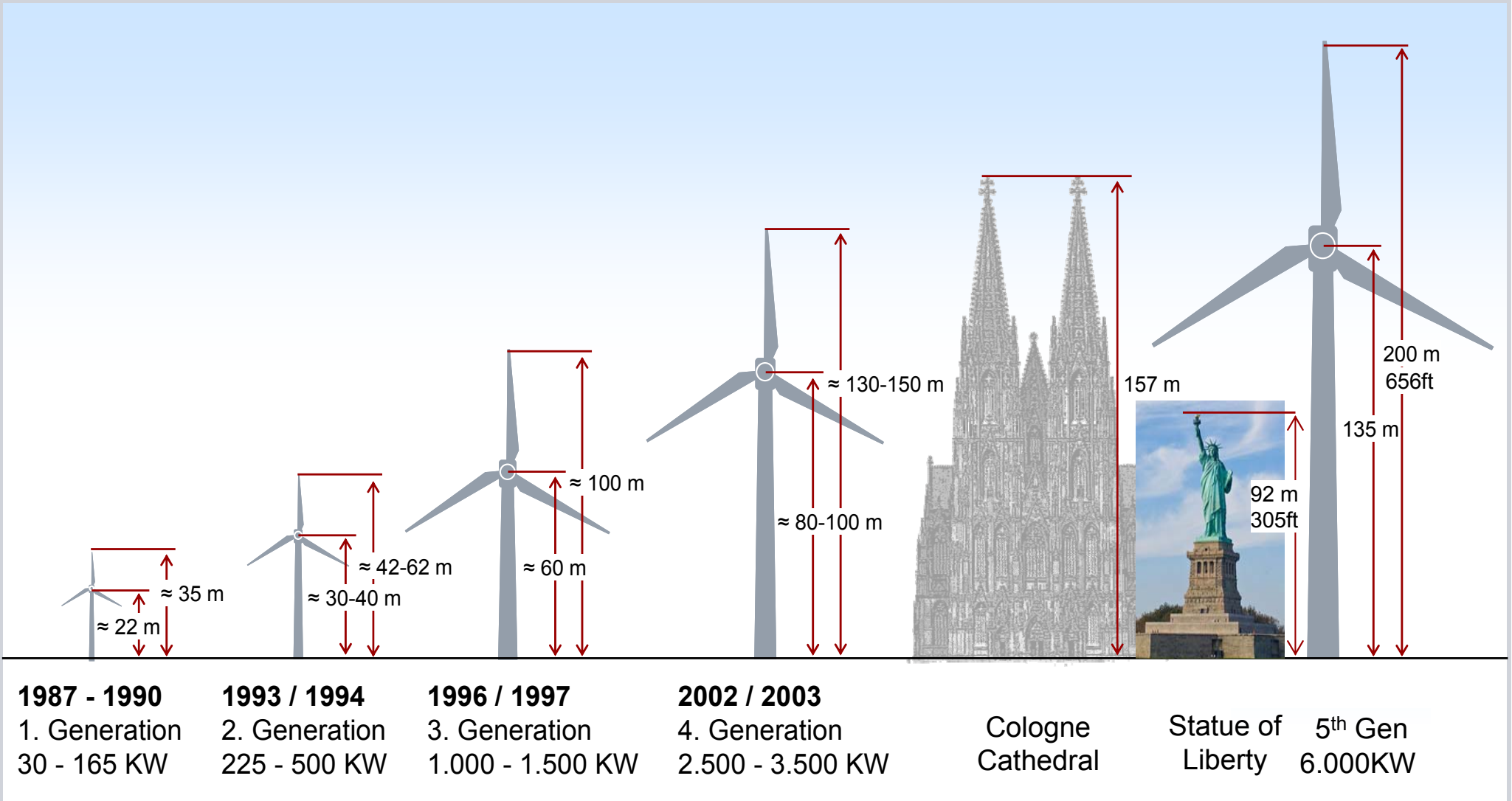


Floating turbine in operation

- Open new offshore locations






Consolidation of wind vendors ahead

Innovation in wind – The next generation of wind turbines








Solar: Strong portfolio as opportunity for utilities

Global Challenges for Solar

- 
High cost of electricity
 → Drive cost towards grid & wholesale parity
- 
Incentive driven markets
 → Attract sunbelt region with high potential
- 
No clear technology winner
 → Concentrate on most promising technologies
 → Consider environmental issues
- 
CSP: Proof of concept
PV: Attract utilities
 → Establish successful large scale projects
- 
Grid integration & storage
 → Enable decentralized energy solutions
 → Long distance transmission to consumer

Strong portfolio & Pioneer

- 
UVAC 2010 Receiver
 → Output increase
 - 
Cloud management
 → Operations improvement
 - 
Developing new solutions
 → New heat transfer media & direct steam
-
- 
Reliable technologies
 → Parabolic Trough (CSP)
 → Crystalline & Thin film (PV)
-
- 
Large scale power plants
 → EPC competence
 → Large scale power block
-
- 
Solutions for integration
 → Smart grid & high voltage
 → Hybrid solutions



Coverage of energy value chain is key

First wind project without subsidies realized



New Zealand: Westwind Park

Key facts

- Operator: Meridian Energy
- Year installed: 2009
- Number of turbines: 62
- Capacity of turbine: 2.3 megawatts
- Installed capacity: 142.6 megawatts

Source: Siemens E R WP OF BD

What is coming next? Entry into promising ocean power market



Marine Current Turbines

- Acquisition of a minority stake in Marine Current Turbines Ltd.
- By 2020 double-digit growth rates for the ocean power market expected
- The „underwater wind turbine“
- The generated power is predictable in the tidal cycle
- First commercial demonstrator project SeaGen in Strangford Lough in Northern Ireland implemented

Portfolio von Siemens Renewable Energy

Onshore
Windpower



Offshore
Windpower



Solarthermie
(CSP)



Photovoltaik



Small Hydro

