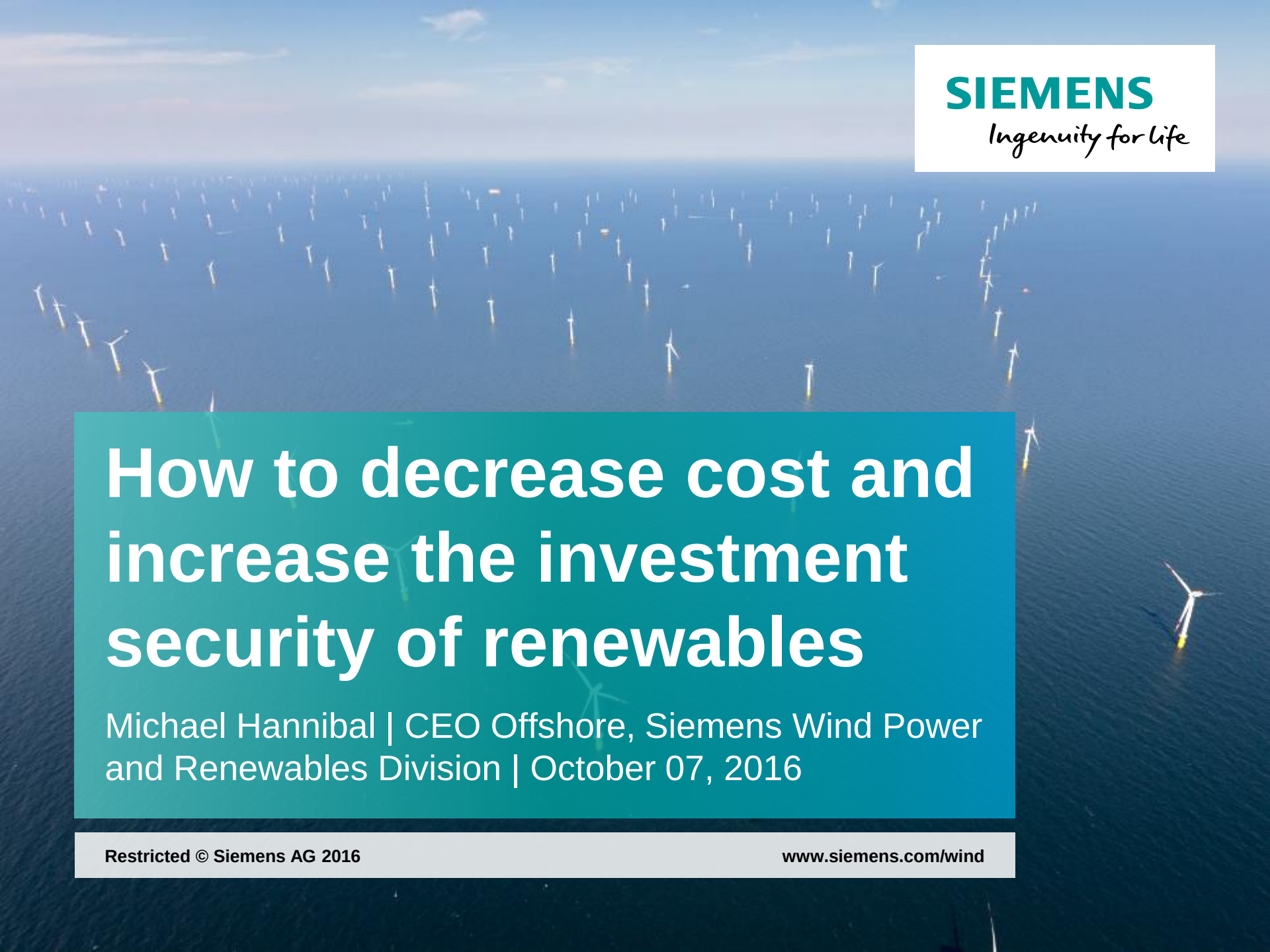

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Ingenuity for life

How to decrease cost and increase the investment security of renewables

Michael Hannibal | CEO Offshore, Siemens Wind Power and Renewables Division | October 07, 2016

Onshore wind power becomes market competitive by cost decrease

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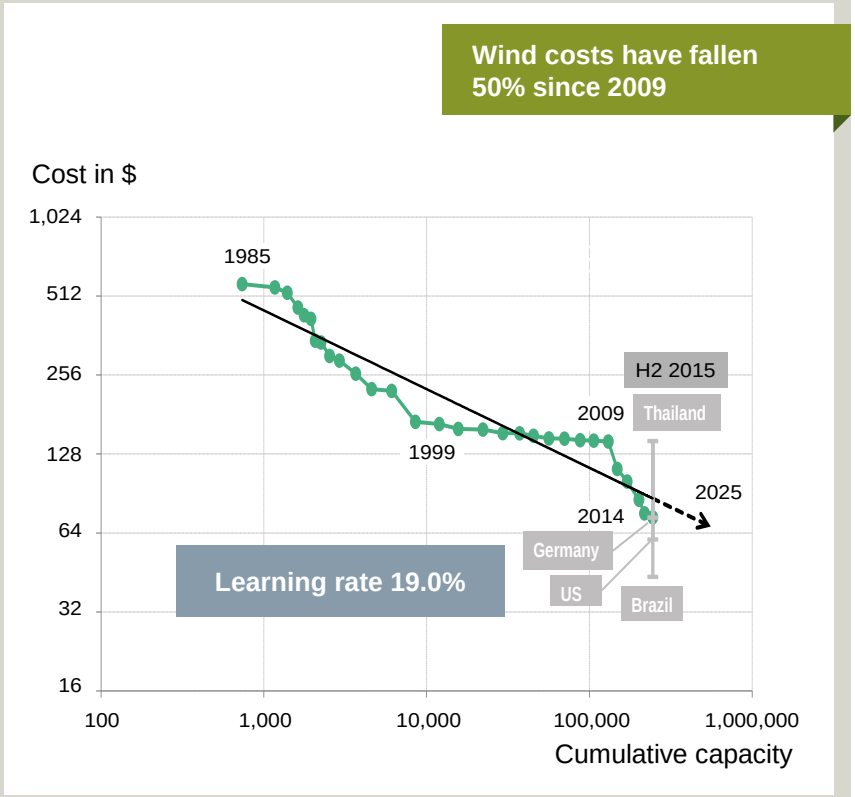
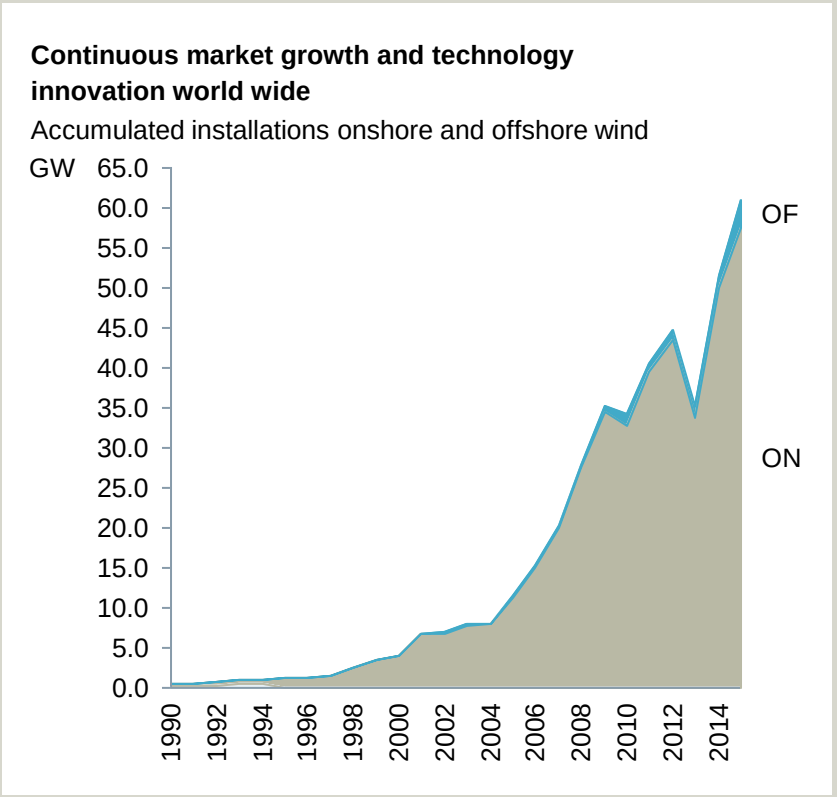
Onshore wind levelized cost ($/MWh)



Wind energy with rapid growth in the past decade



Source: Bloomberg New Energy Finance (BNEF)

Onshore wind – what we do to lower cost further and improve on capacity factor

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Examples for measures to optimize turbine for sites and further reduce cost

Optimal turbine fit for every site

Longer blades

Higher towers

Optimization of project execution

Continuous costs out offshore wind – Ambition to reach LCoE of below 8 ct €/kWh by 2025

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5 levers for cost reduction

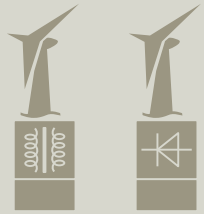
Turbine

Foundations

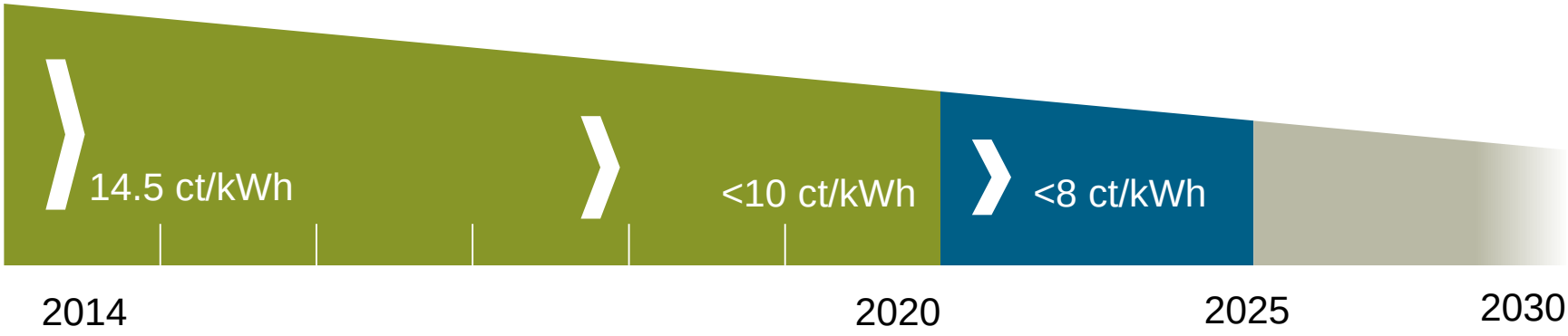
OPEX

AEP (Annual energy production)

Grid connection



Cost out path until 2030



Siemens as offshore leader drives innovations to further reduce costs

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Innovation on turbine

Innovative turbine: SWT-8.0-154

- Built on proven 6.0/7.0-154
- 10% more AEP vs. 7 MW
- Leverage existing supply chain

Innovative diagnostics

- 200 Gigabyte of data per day
- Detecting damage before it occurs
- Remotely fixing the problems

… and beyond

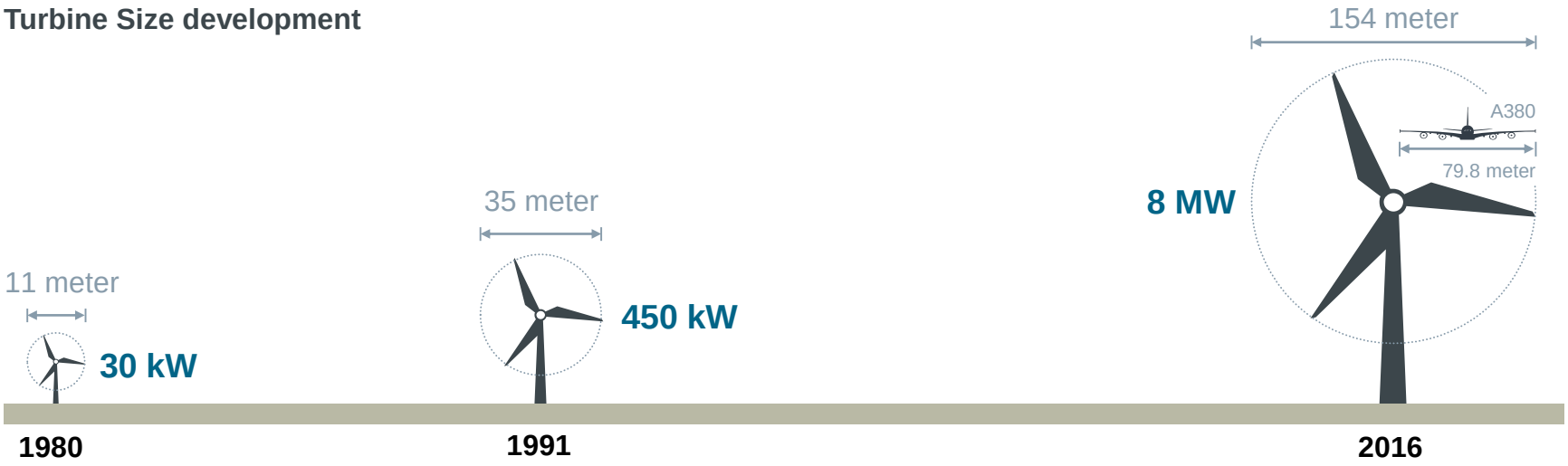
Industrialized jacket foundation

~40% cost reduction compared to traditional concepts

Innovative grid access

- E.g. new HVAC solution requires no separated platform
- 40% cost reduction

Turbine Size development



Cost reductions through industrialization – New factories in the UK and in Germany

Nacelle production site (SWT-7.0-154)

- Investment of **€200 million**
- Up to **1,000 jobs**
- Allows loading via a Ro/Ro ramp directly on a transport vessel
- Start of production in 2017

Blade production (B75) assembly plan and installation facility

- Up to **1,000 direct jobs**
- Allows loading via a Ro/Ro ramp directly on a transport vessel
- Start of production in late 2016

Cost improvement of wind energy enables further market growth

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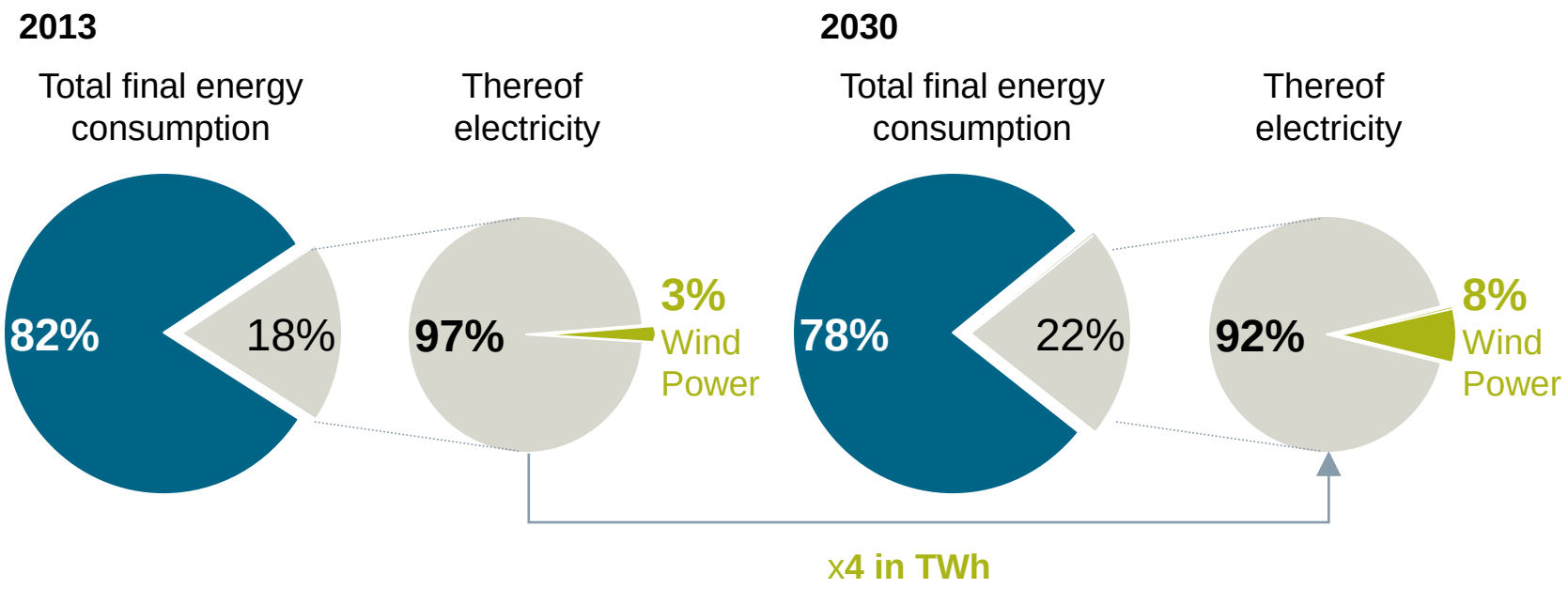
World Energy mix development[1)]



- **Electrification will play a major role in decarbonization**
- **Wind power contribution of total energy consumption is still at nascent phase**

1) IEA Word Energy Outlook 2015, New Policies scenario

Non- electricity energy consumption e.g. Oil & Gas

Electricity

New installations and reduced growth – Europe risks falling behind

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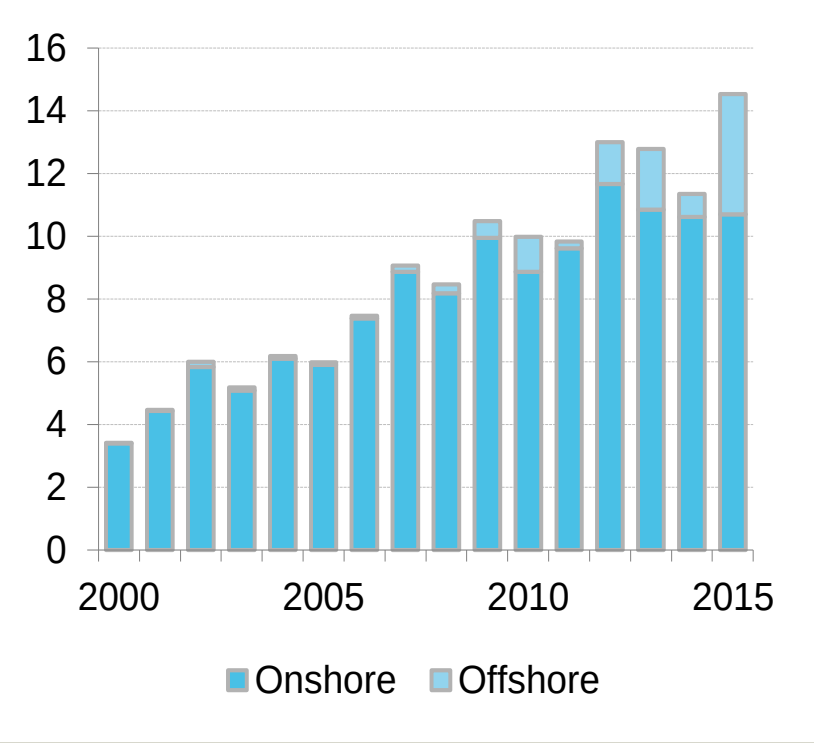
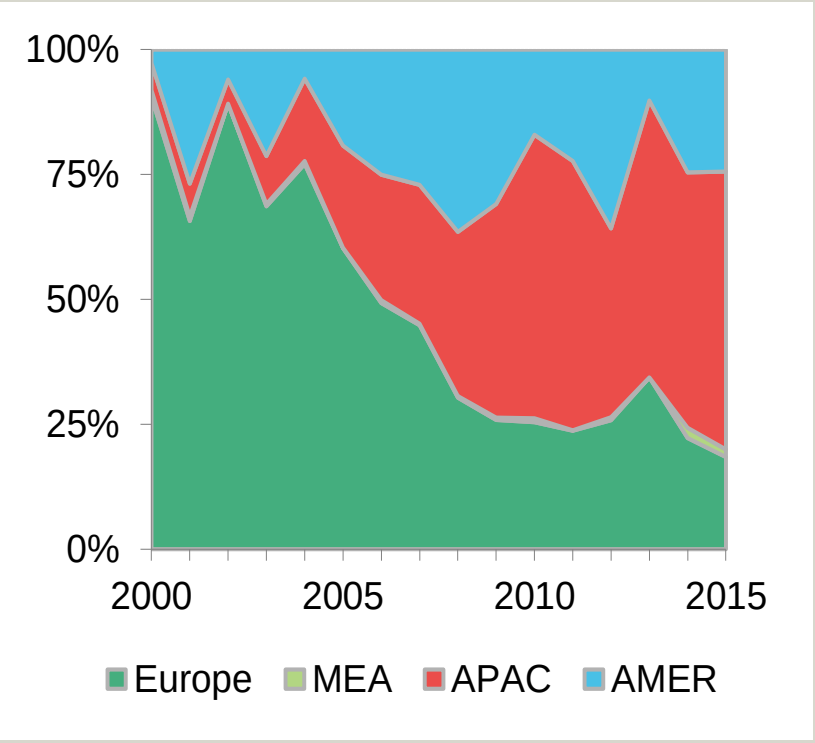
Europe wind installations, 2000 – 2015 (GW)



Global wind installations, 2000 – 2015 (%)



Source: Bloomberg New Energy Finance (BNEF)

Our industry needs a predictable policy framework and sufficient market volume

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Currently planned EU legislation

New Renewables Directive

- **Targets:** Member States should publish their individual targets for post-2020 period as soon as possible, strong governance legislation
- **Reporting mechanism:** European Commission to design scheme including planning and reporting obligations by Member States as well as European Commission oversight

Market scale and concrete volume commitments are key to ensure investments and continued cost reduction

Electricity market design

- **Electricity market design fit for renewables**: Includes priority dispatch for renewable generation, clear curtailment and congestion management rules for TSOs/DSOs
- Flexibility needs to be properly remunerated

European Energy Union

- Interconnectors, cross-border trading, regional balancing and capability markets

Prerequisite for successful integration of renewables in the electricity market


THANK YOU FOR YOUR ATTENTION!
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