

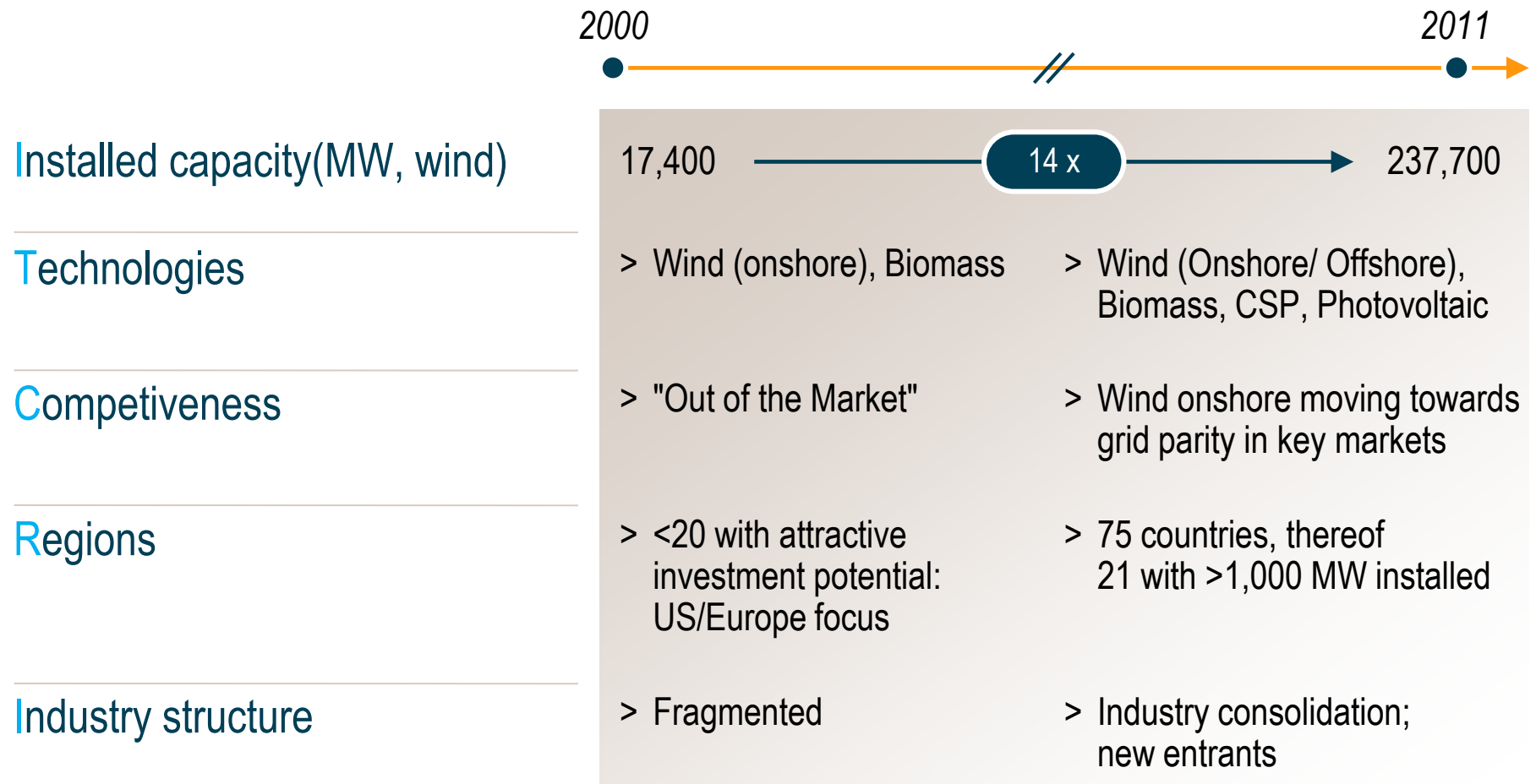
A photograph of several white offshore wind turbines in a blue ocean. The turbines are arranged in a line, receding into the distance. The sky is a clear, pale blue. The water has a slight ripple. The overall scene is clean and modern, representing renewable energy.

From Boutique to Industrial and Beyond

Developments and Trends in Renewable Power Generation

4th International Forum ATOMEXPO 2012

Renewable power generation has experienced a truly dynamic development over the last 10 years – "From Boutique to Industrial"



In the "early days", strategies and business models focused on realization of strong growth, industrialization and "technical flexibility"

MISSION –
Become a Leading Global Player

PARTICIPATION STRATEGY

- > Substantial presence in selected focus countries
- > Early significant position in emerging markets
- > Full value chain coverage
- > Focus on onshore wind
- > Monitor other technologies

COMPETITIVE STRATEGY

- > Drive changes in value chain
- > Set pace in technology development
- > Initial ties with other group activities

ORGANIZATION STRATEGY

- > Centralized key functionalities
- > Local presence
- > Direct report to parent company board
- > "Armth length" steering by parent company
- > In some cases 3rd party shareholders (floatation)

Industrialization along the value chain delivered substantial results over a short timeframe

"From Boutique to Industrial" – Concrete Example

KEY TARGETS

- > Increase availability
- > Reduce costs
- > Build capacity at GW-scale

- > Focus on **asset performance**: driving return improvements through both costs (efficiency) and revenues (e. g. availability) – Target of 98% availability and -10% O&M cost reduction by 2011
- > **Large projects** with lower costs per installed Megawatt
- > Close cooperation with **industrial partners**
- > Pro-active O&M approach focused on increasing **availability**
- > **Standardized** components and processes

RESULTS

Comparison 2007 vs. 2009

Wind farm Size [MW]

15 >>> 75

Wind turbine size [MW]

1.4 >>> 1.9

Wind turbine OEMs

9 >>> 8

Wind turbine types

53 >>> 13

Wind turbine availability

91% >>> 94%

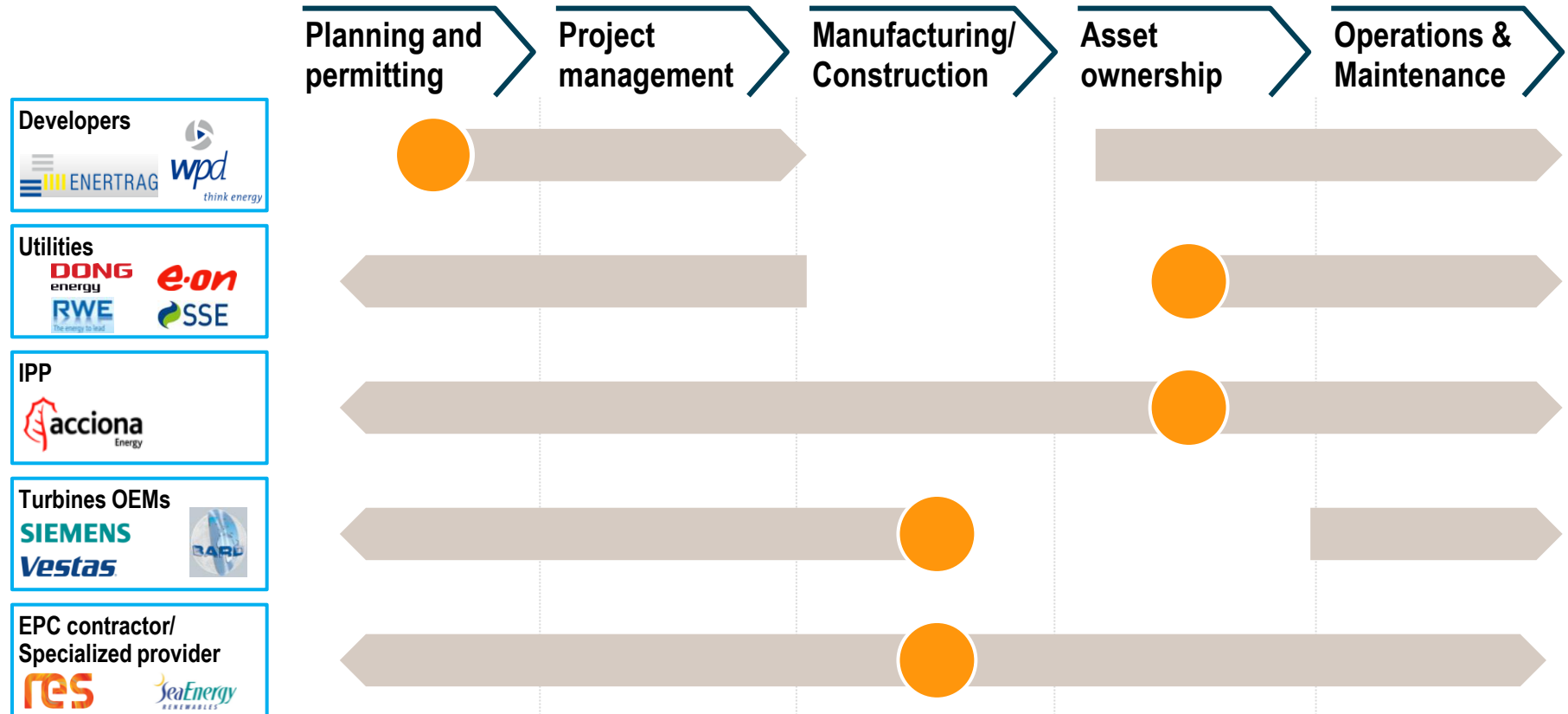
The coming years – fast development and significant change will most likely persist

KEY TRENDS

- > Increasingly a **large utilities game**; strong push for
 - Active consolidation
 - Vertical integration
 - Economies of scale / industrialization
- > **New players** (insurance, consumer goods) enter the market
- > **Technological progress** and **set-backs** (wind-offshore, CSP)
- > **USA** and **China** settings the pace – new market entries and sourcing options
- > Stability and reliability **concerns about renewable incentive regimes** – country portfolio management
- > **"Fukushima"** and **Shale Gas** as "Wild Cards"

Leading players are systematically broadening their activities

Positioning on the wind value chain



● Core business / Primary focus

Non-energy players increasingly invest in renewables

Renewable energy activities of non-utilities



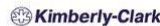
WIND



- > > 300 m USD assets in on/offshore wind farms
- > 22 GWh per year to ensure green energy supply
- > 53 GWh/a offshore wind production to support green mobility
- > Heinz explores wind mills to generate 15% of its energy demand with RES by 2015



BIOGAS/ENERGY-FROM-WASTE



- > 7% of the energy demand is generated from waste wood and coffee grounds
- > 220 GWh/a energy from waste
- > Biomethane generation to support green mobility with alternative fuel
- > Extensive energy-from-waste program reduced Kraft Food waste by 30%



PHOTOVOLTAIC



- > Large-scale installation of roof-top PV in California and Ontario
- > 13 MW of ground-mounted and roof-top PV panels
- > Revenue of 0.7 m USD due to on-site solar panels
- > Roof-top solar panels provide 3 GWh/a



GEOTHERMAL



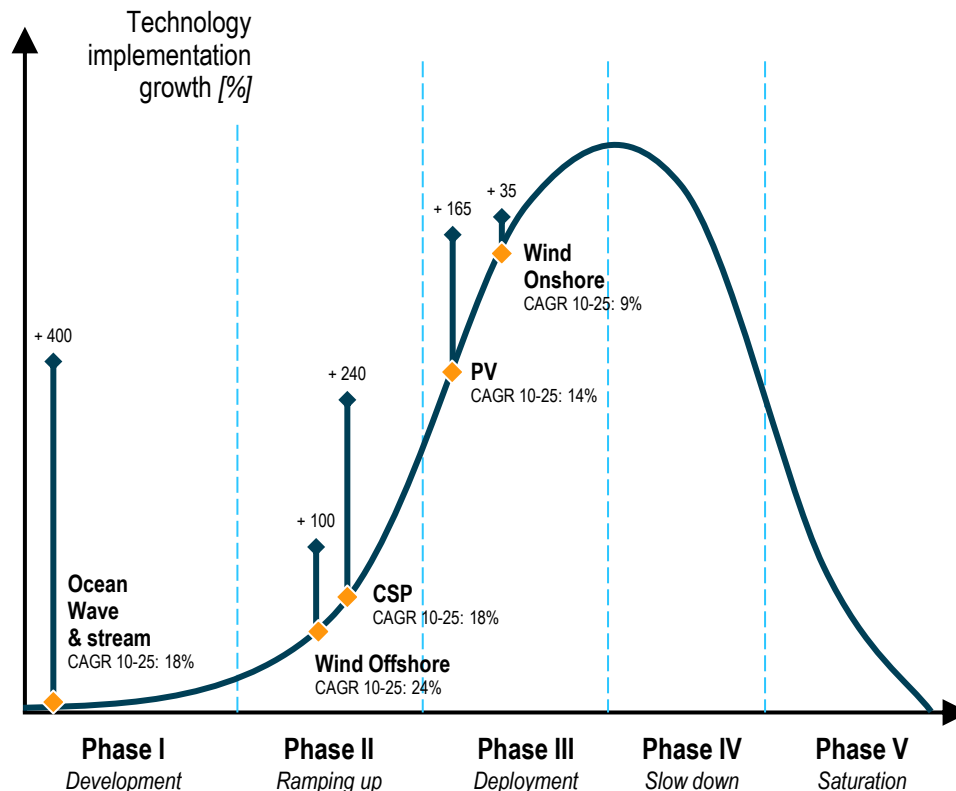
- > Stores with geothermal energy supply as part of the 100% renewable program
- > Declared investments on geothermal technologies



- > Green energy projects are often used as mere 'CSR investments'
- > Steady low risk cash flows attract non-utilities as well as financial investors
- > Increased demand for projects drives up prices

Among scalable technologies CSP and wind offshore will be the "next horizon technologies"

DEVELOPMENT PHASE OF SCALABLE TECHNOLOGIES



↑ Δ 2010 = Technology cost - Wholesale price (50€/MWh) [€/MWh]

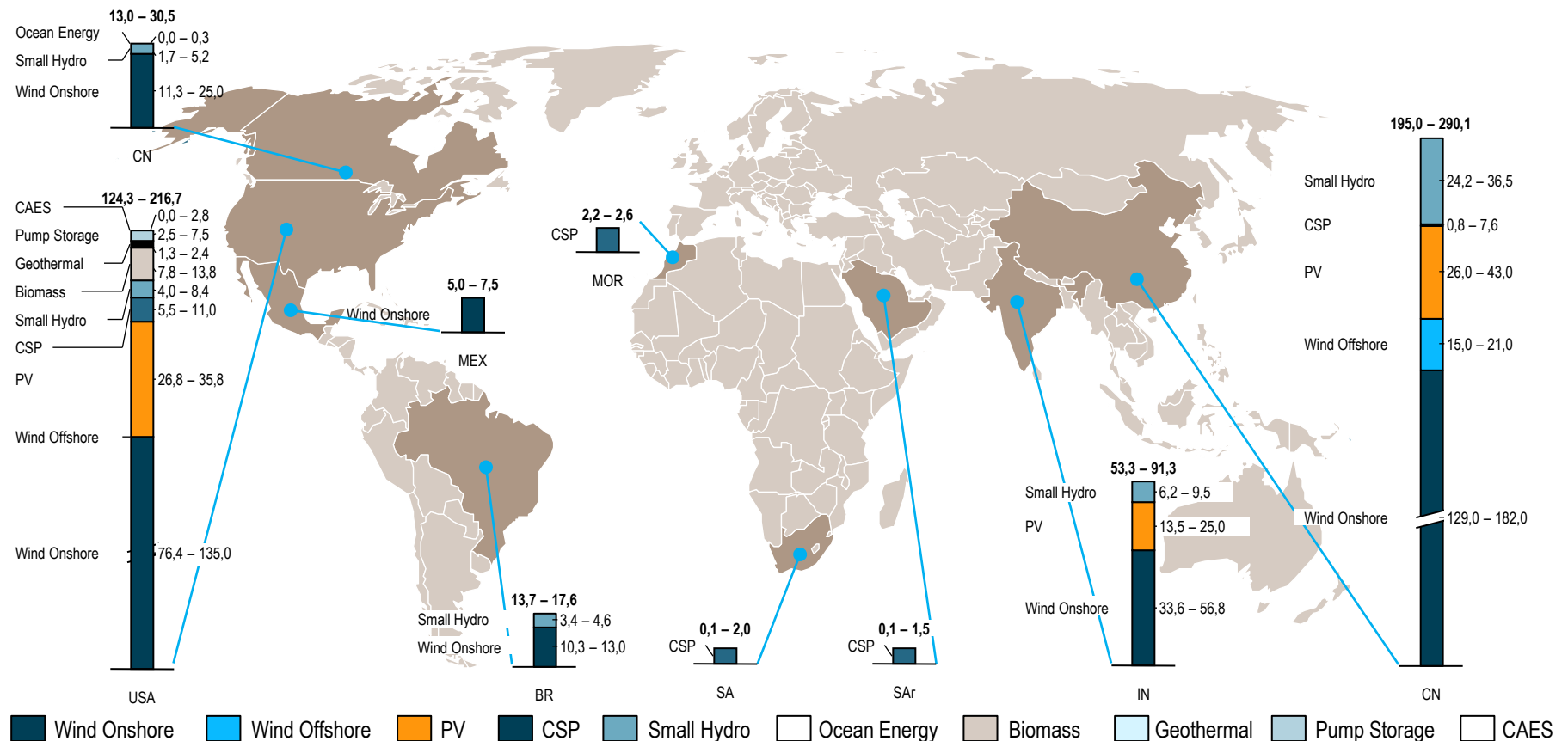
COMMENTS

- > **Wind Onshore: close to maturity**
 - Development programs for 6+ MW turbines
- > **PV: second wave**
 - Development of new cell materials
- > **CSP: projects ramp up**
 - 4 technologies
 - Switch from demonstrators to optimized systems
- > **Wind Offshore: Industrialization**
 - Installation, floating turbine projects
 - Implementation, Reliability, Optimization
- > **Ocean (Wave & Stream): R&D**
 - Demonstrators only

SCALABLE

USA and China will lead the worldwide renewable market in volume over the 2010-2025 period – Overall dominance by Wind and PV

Outside Europe renewable development – 2010-2025 – [Min – Max added GW]



Stability of incentive regimes is a key concern to investors after recent attempts in some countries to retroactively change incentives



- > Short term introduction of cap in solar PV for 2009 at end of 2008 – counterproductive discussions about retroactive changes of incentives



- > Reduction of incentives for PV installations stronger than originally planned; strong hit for PV ground-mounted installations
- > Increased reductions in wind onshore
- > Cap of overall RES cost ("EEG Apportionment")



- > Concerns about stability of attractive solar PV and wind incentive scheme
- > The "next Spain"?



- > Retroactive introduction of "solar tax" on freestanding installations >30 kW
- > Overall melt down of PV market as consequence

- > Increasing concerns about RES incentive stability dominate the debate
- > Increasing constraints on fiscal budgets fuels the debate further

Persisting change requires adaptation of strategies and resulting business models

The coming years

- > **Further increasing performance pressure** – Lean organization, efficient processes, continued supply chain optimization, incl. global sourcing, synergies with parent company
- > **Broadening technology portfolio** – Focus on scalability, growth potential, financial attractiveness and capability fit – Offshore wind, Concentrated Solar Power (CSP)
- > Increasing **orientation** towards **USA** and **China** – Capability, market knowledge and local presence
- > **Proficient investment governance** and **project management** – Due to strongly increasing project volumes and risks
- > Assessment of **country risk** exposure and **portfolio management**
- > **Integration of renewables** into regional **power systems** – Systems integration