



International
Energy Agency

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***Wind leading the clean energy transition
Navigating the investment and
integration issues ahead***

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www.iea.org

Wind Europe Summit 2016, Hamburg, 29 September 2016

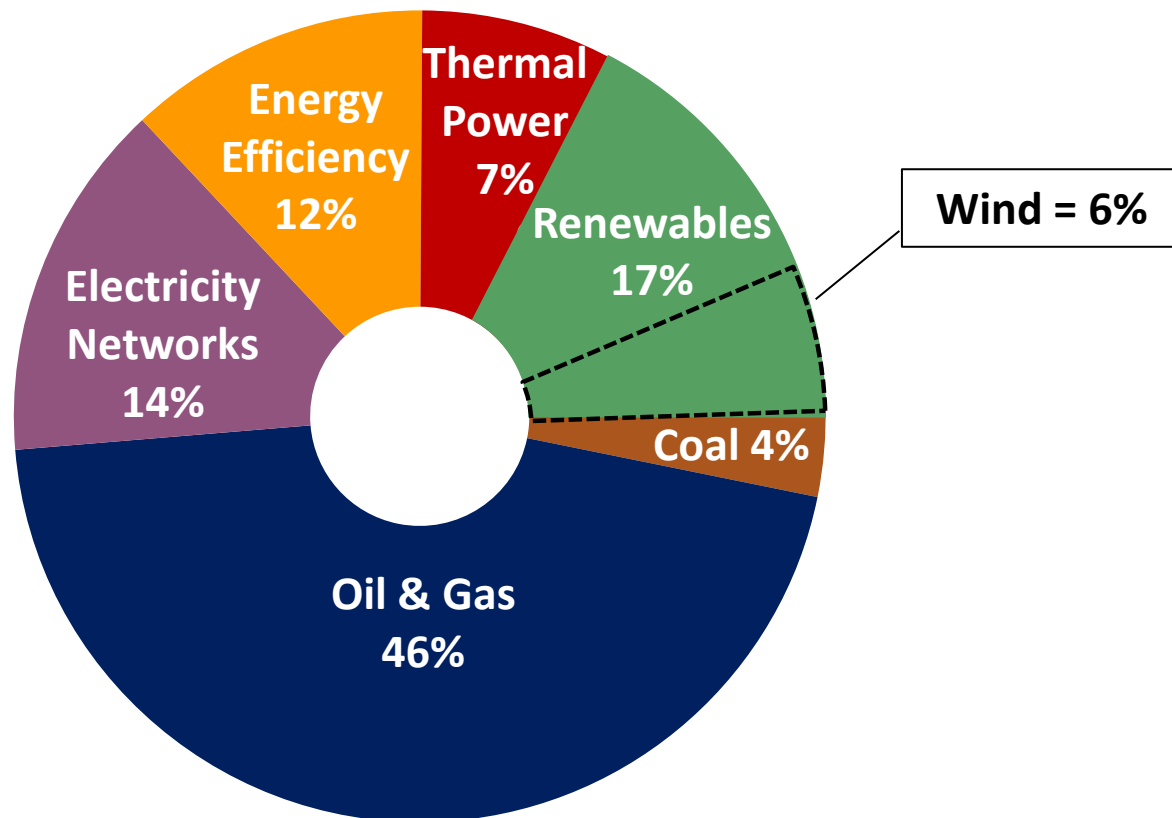
New records – are they enough?

- **New deployment records for renewables, led by wind**
- **Positive policy momentum in the months following COP21**
- **Investment flows signal move towards cleaner energy**
- **Still, policy makers need to heighten their commitments, providing clarity and certainty to investors**

Investment flows signal a reorientation of the global energy system

Global Energy Investment, 2015

USD 1.8 trillion

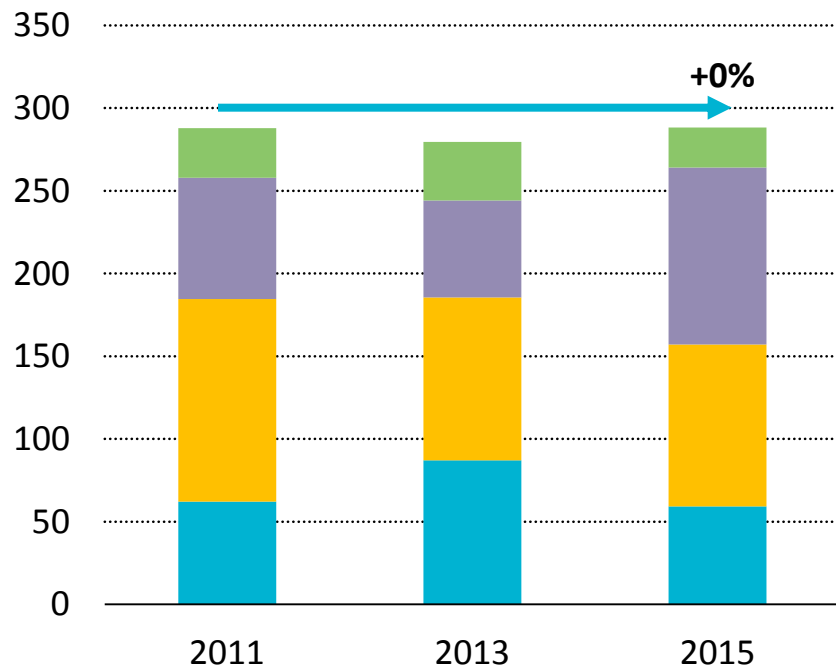


An 8% reduction in 2015 global energy investment results from a \$200 billion decline in fossil fuels, while the share of renewables, networks and efficiency expands

Renewables investment buys much more electricity

Global renewable power investment

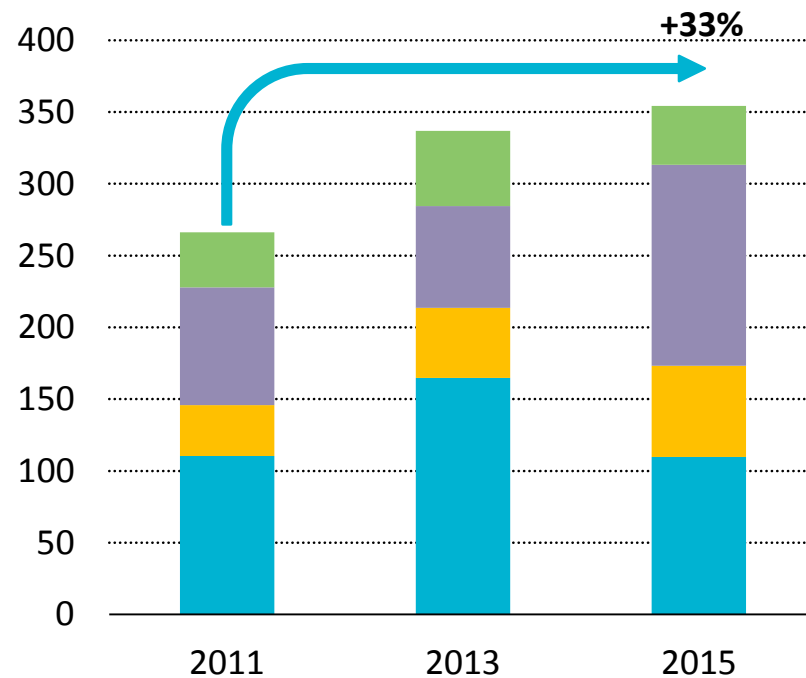
USD (2015) billion



■ Hydropower ■ Solar PV ■ Wind ■ Other renewables

Expected generation from investment

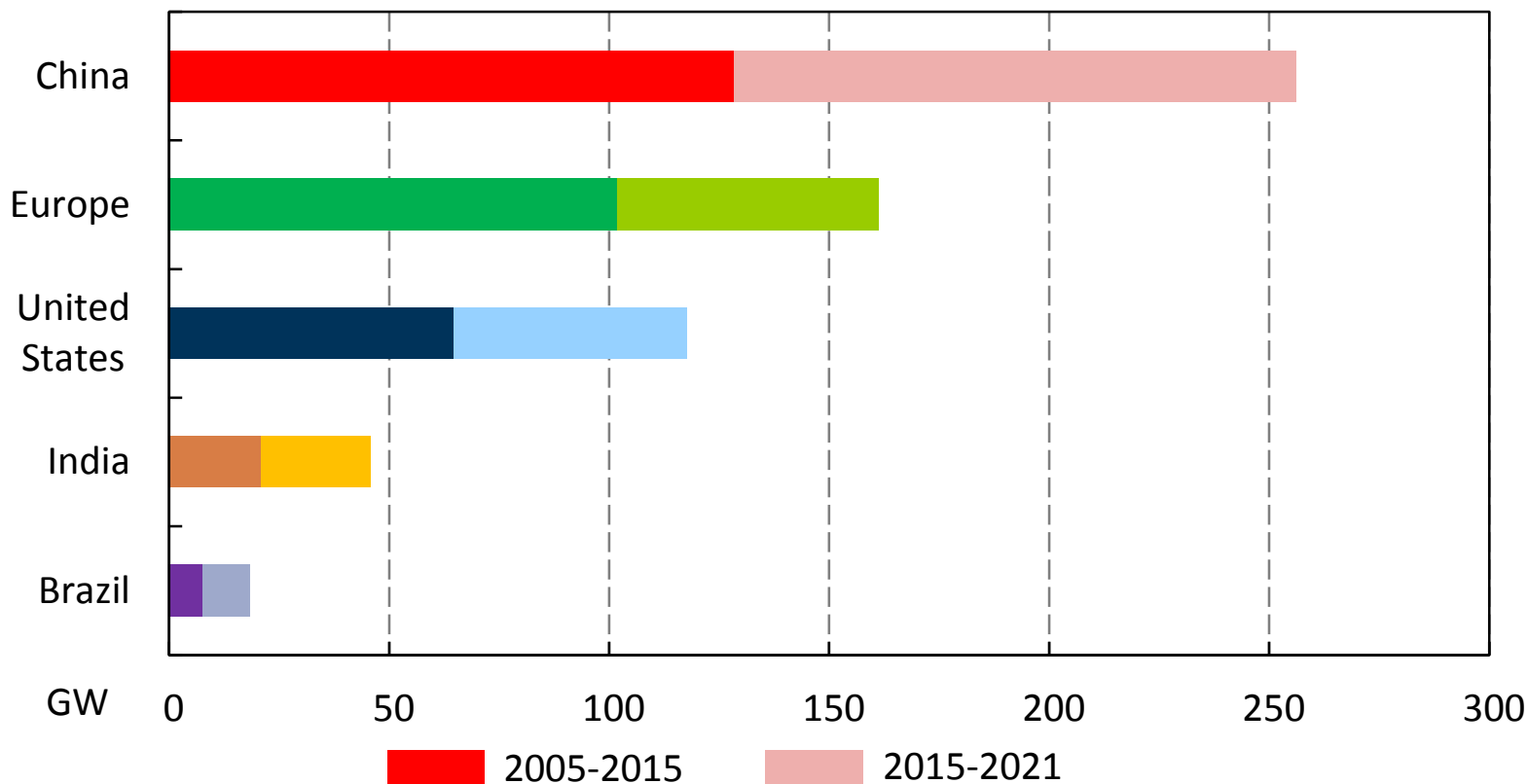
TWh



Renewables capacity additions in 2015 will generate more electricity per year than the UK; Wind capacity surged by 35% on improved economics & record offshore growth

China accounts for 40% of medium-term growth

Top five markets for wind capacity growth, 2005-2021

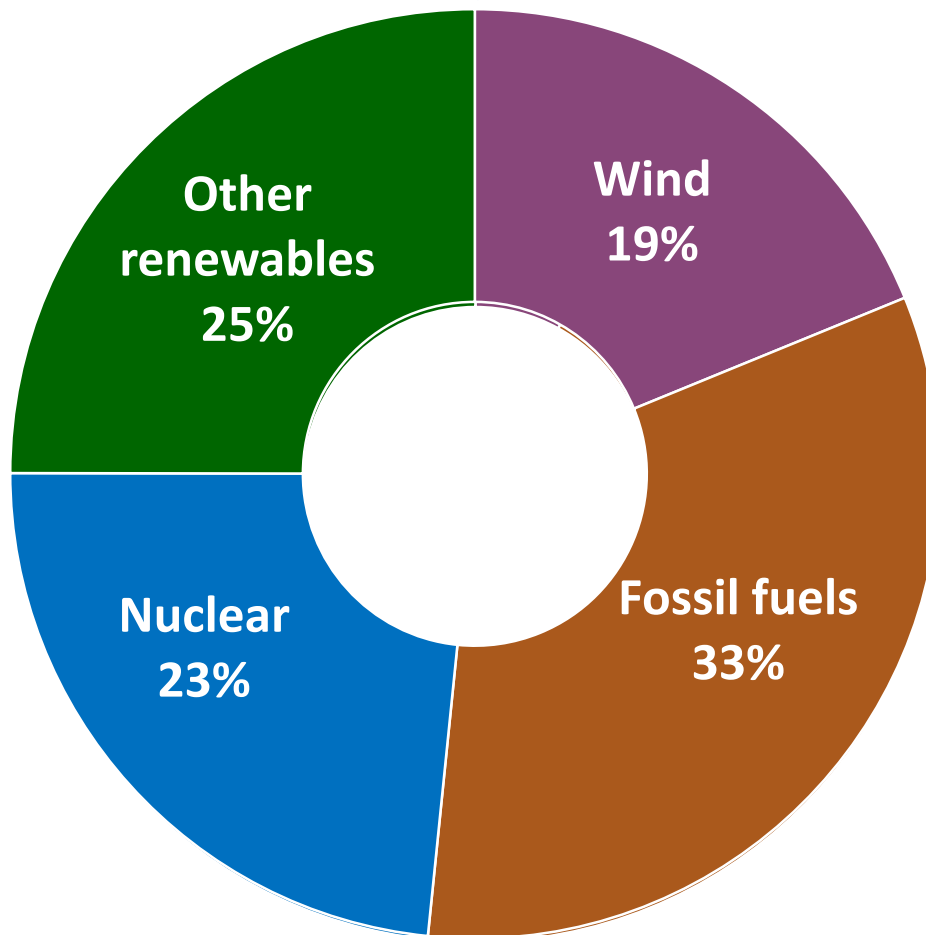


Source: *Medium Term Renewable Energy Market Report 2016, forthcoming*

Europe will remain a leading market for wind, even though over 80% of capacity additions in 2015-2021 will occur elsewhere

Wind's share of Europe's electricity mix doubles by 2030

Europe power generation mix, 2030



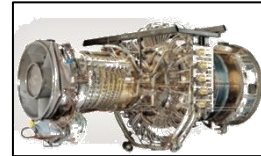
Confidence in remuneration, including through carbon pricing and complementary long-term transactions, will be critical for investment in capital-intensive assets

System integration will be key

Grids



Generation



Storage



Demand Side



- The integration challenge depends on the flexibility of the overall system
- No major problems at low shares of wind and solar PV
- Cost-effective integration of large shares of variable renewable requires mobilising *all* forms of flexibility
 - *Grids, flexible generation, storage & demand side response*
- A policy paradigm shift is needed that addresses system value, compared to a narrow focus on technology costs
- The IEA is providing best practice guidance on system integration and is enhancing international collaboration

Concluding remarks

- **Wind will be Europe's fastest growing source of electricity (and also the world's in a 2°C Scenario)**
- **Falling costs continue to improve the attractiveness of renewables, but persistent policy uncertainty raises risks**
- **An integrated policy approach is needed, covering market design, CO₂ pricing & system integration, including storage & demand response**
- **IEA contributes to the energy transition by its work on renewables, system integration & global clean-energy technology collaboration**