

World Energy Investment | 2016

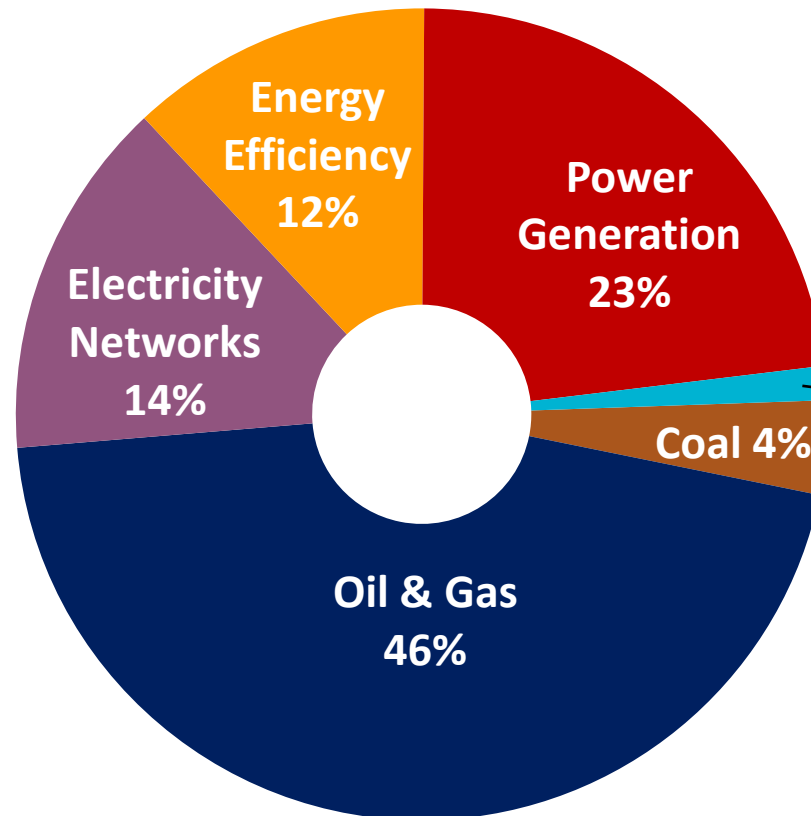
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IEA Economics and Investment Office
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- **Investment is the lifeblood of the energy system, which determines long-term trends of supply, emissions and fuel demand**
- **Investors face new challenges and opportunities from recent trends**
 - *Macroeconomic uncertainty and structural change affects demand patterns*
 - *The energy sector faces accelerated technological change*
 - *Lower energy prices and increasing inter-fuel competition reshape investment*
 - *New business models and investors are transforming the electricity sector*
- **Global energy investment declined in 2015, mainly due to lower oil and gas spending**
- **Share of renewables in investment boosted by technology progress, strong policy support and growth in good resource markets**

Investment flows signal a reorientation of the global energy system

Global Energy Investment, 2015

USD 1.8 trillion

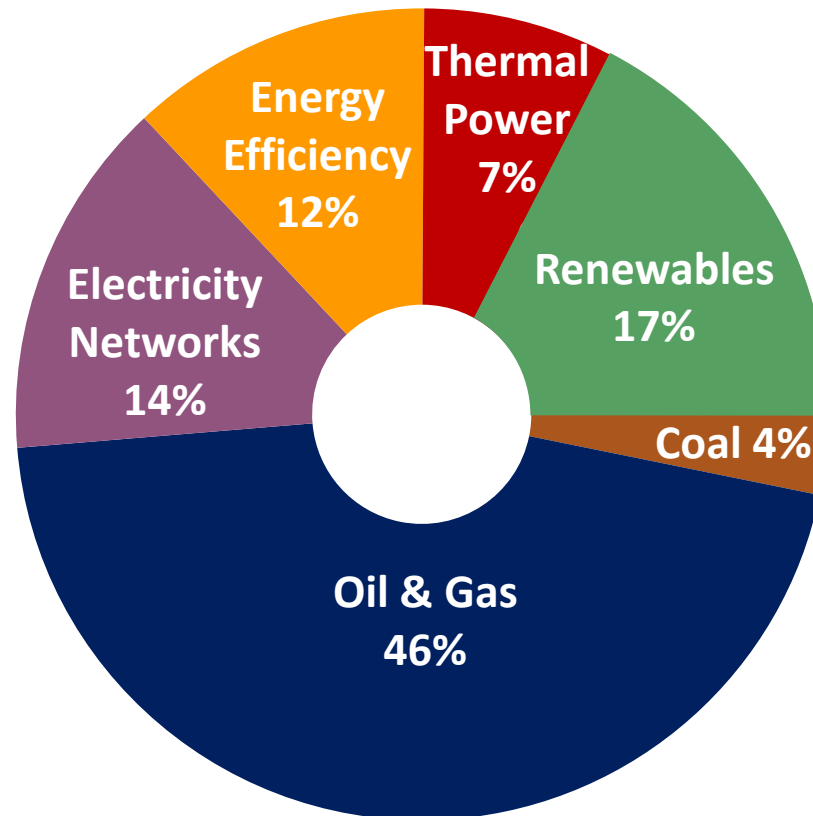


An 8% reduction in 2015 global energy investment results from a \$200 billion decline in fossil fuels, while the share of renewables, networks and efficiency expands

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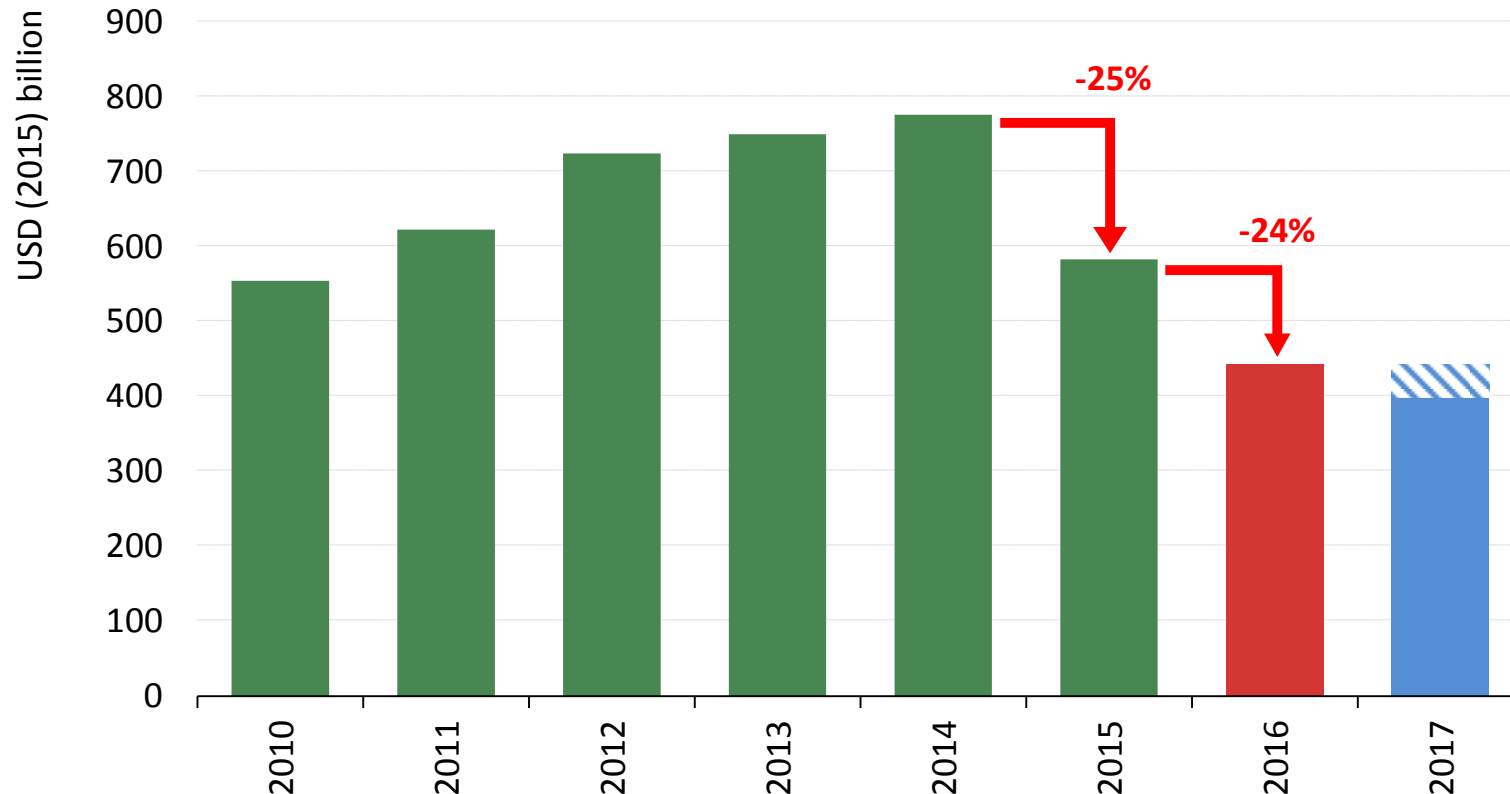
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Unprecedented wave of investment cuts in the upstream oil and gas industry

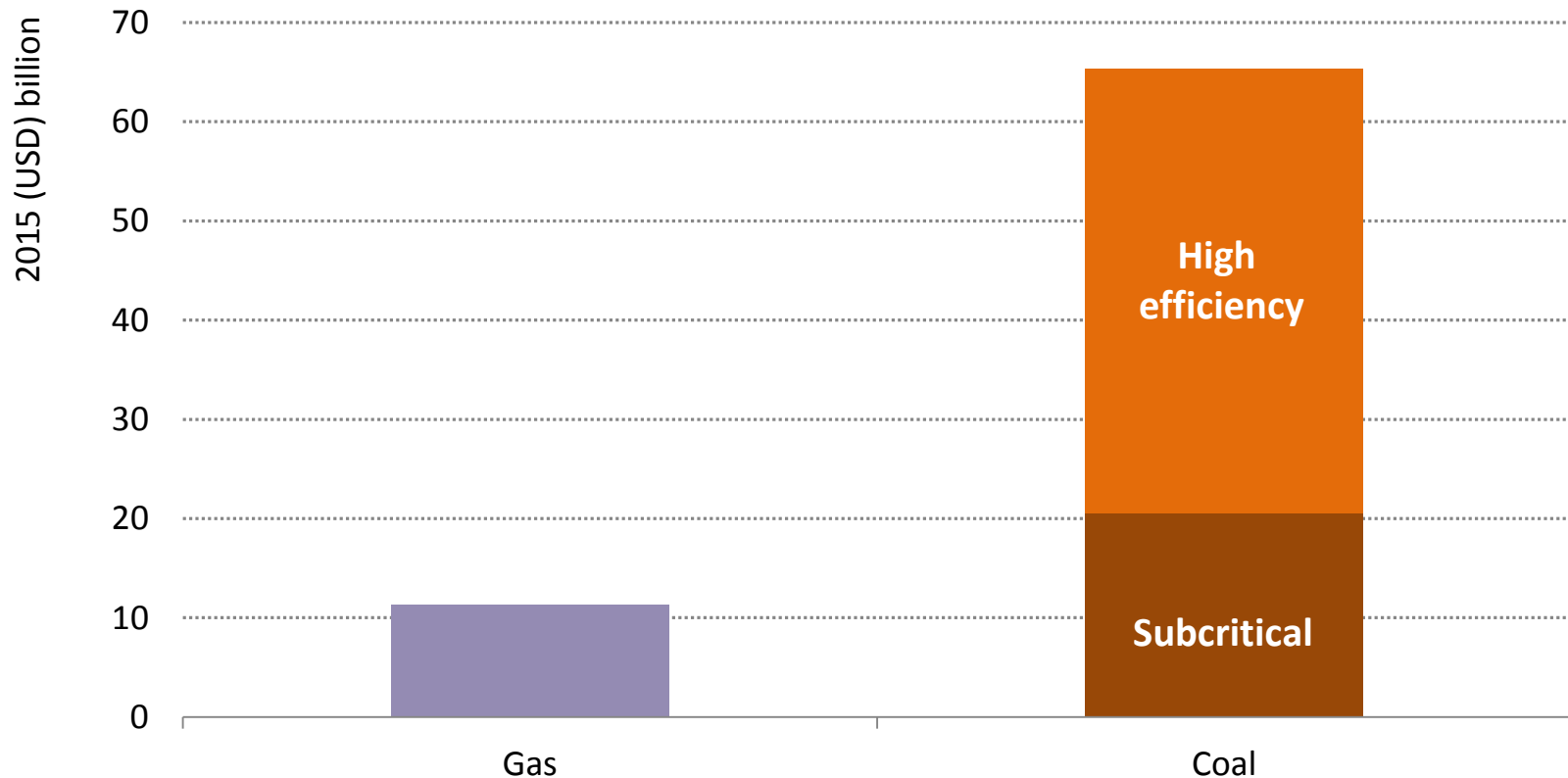
Global upstream capital spending 2010-2017



Cost deflation, efficiency improvements and reduced activity levels might lead for the first time to three consecutive years of investment decline

Infrastructure costs favour coal power over gas in Asian energy importers

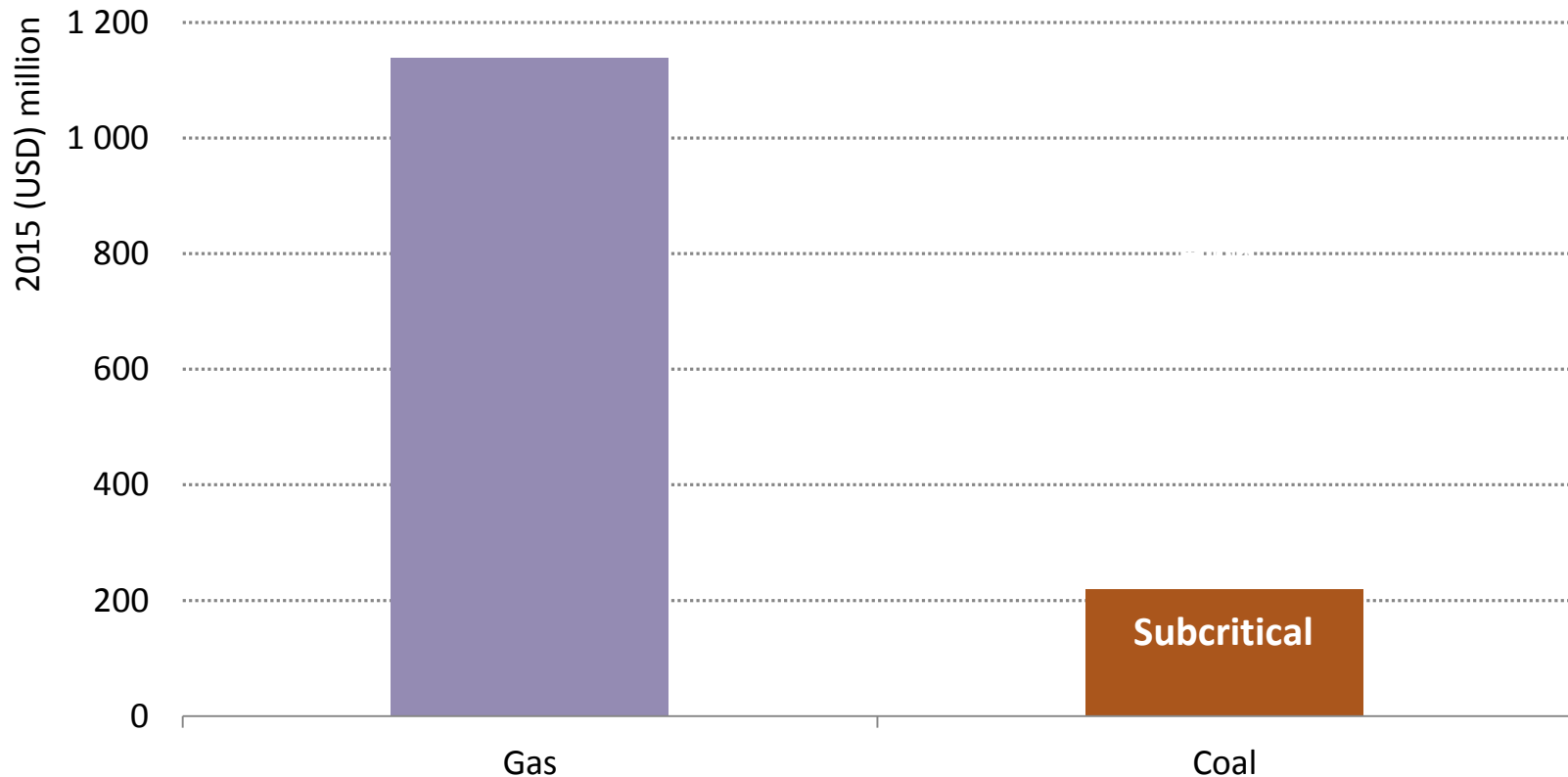
Coal and gas-fired power investment in Asian markets (2015)



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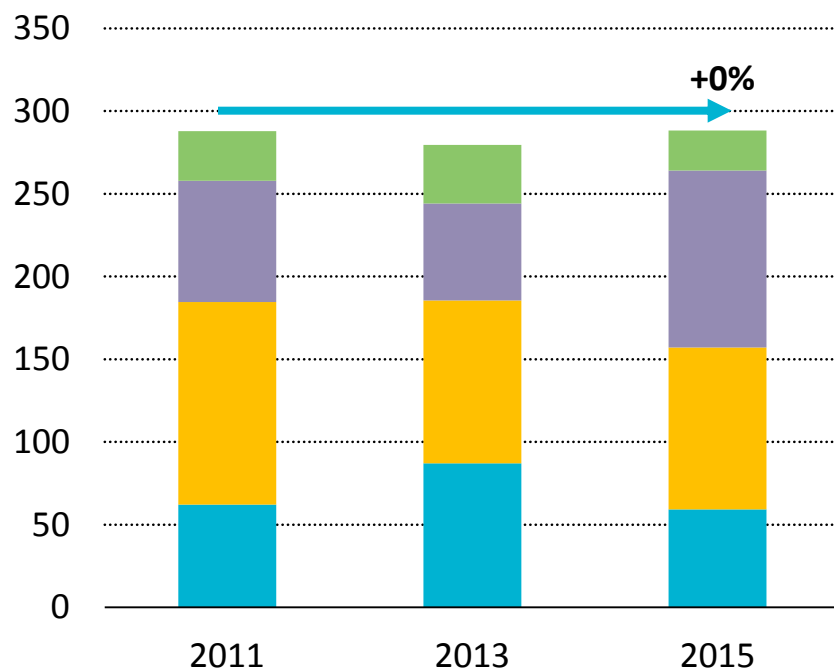
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Renewables investment buys much more electricity

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Global renewable power investment

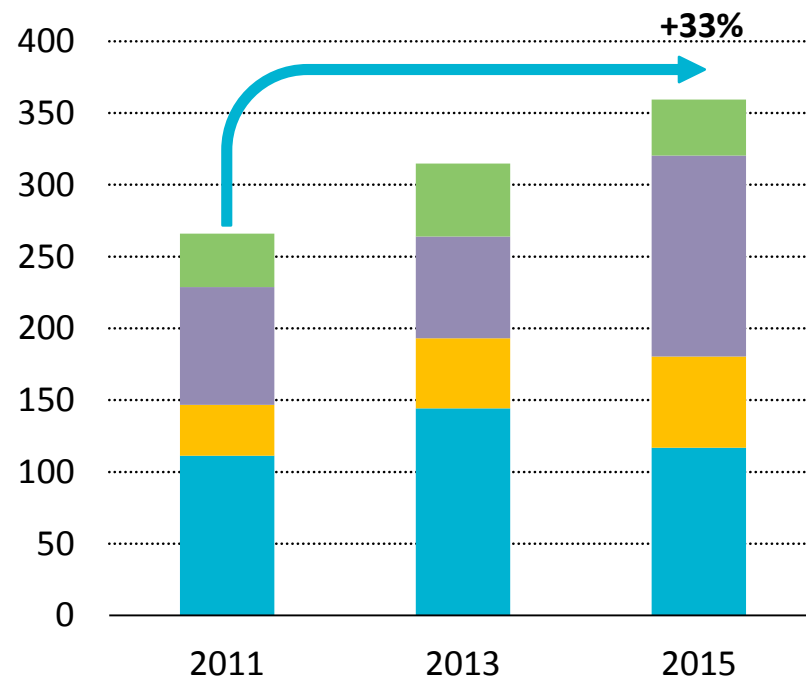
USD (2015) billion



■ Hydropower ■ Solar PV ■ Wind ■ Other renewables

Expected generation from investment

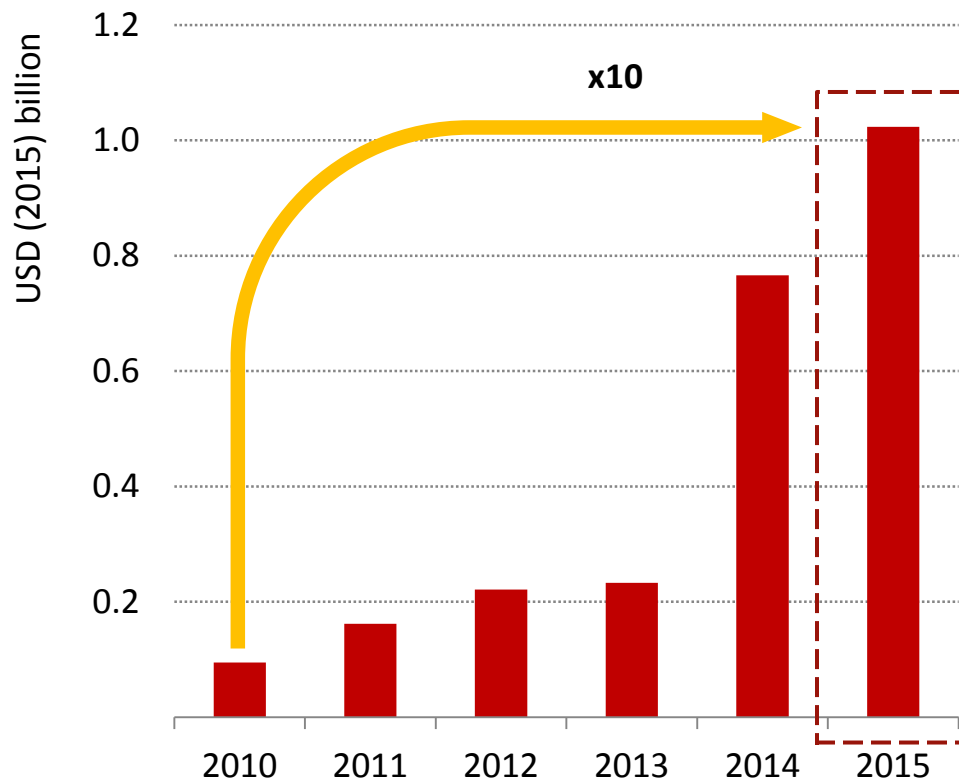
TWh



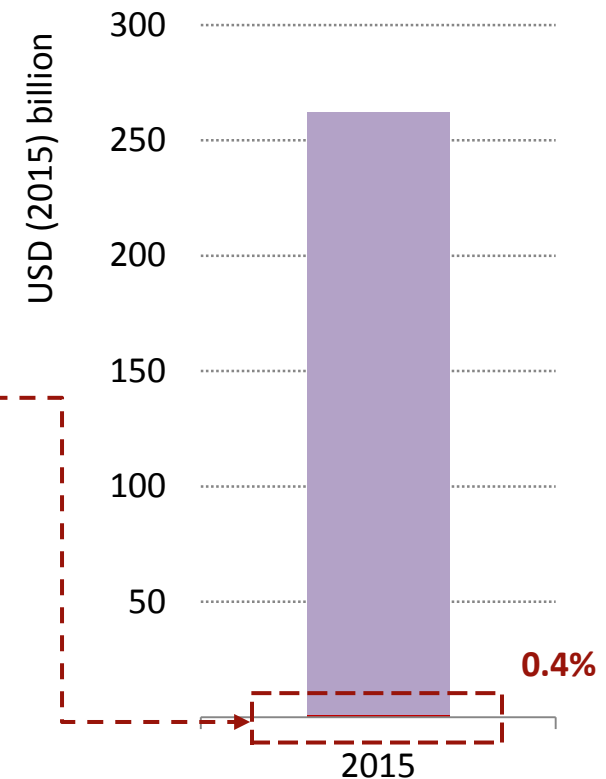
Investment in renewables will generate annually more than 2015 global electricity growth. Wind leads, surging 35% in 2015 on economics and record offshore growth

In electricity networks, batteries accelerate though grids comprise most investment growth

Global grid-scale battery storage investment



Total networks investment

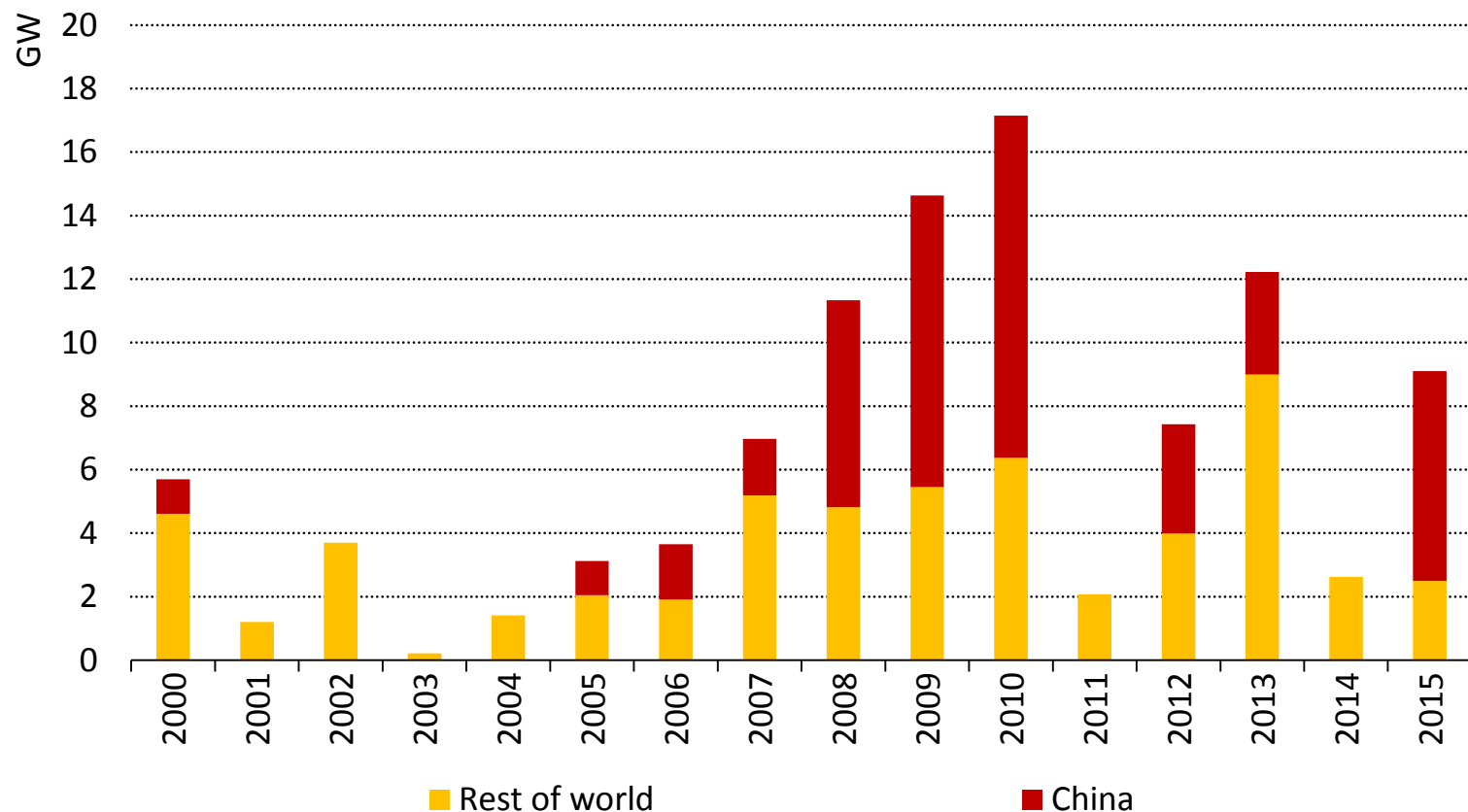


Grid-scale battery storage spending has expanded tenfold since 2010. Their value lies most in complementing grids that constitute the bulk of investment

Global nuclear investment remains robust due to China

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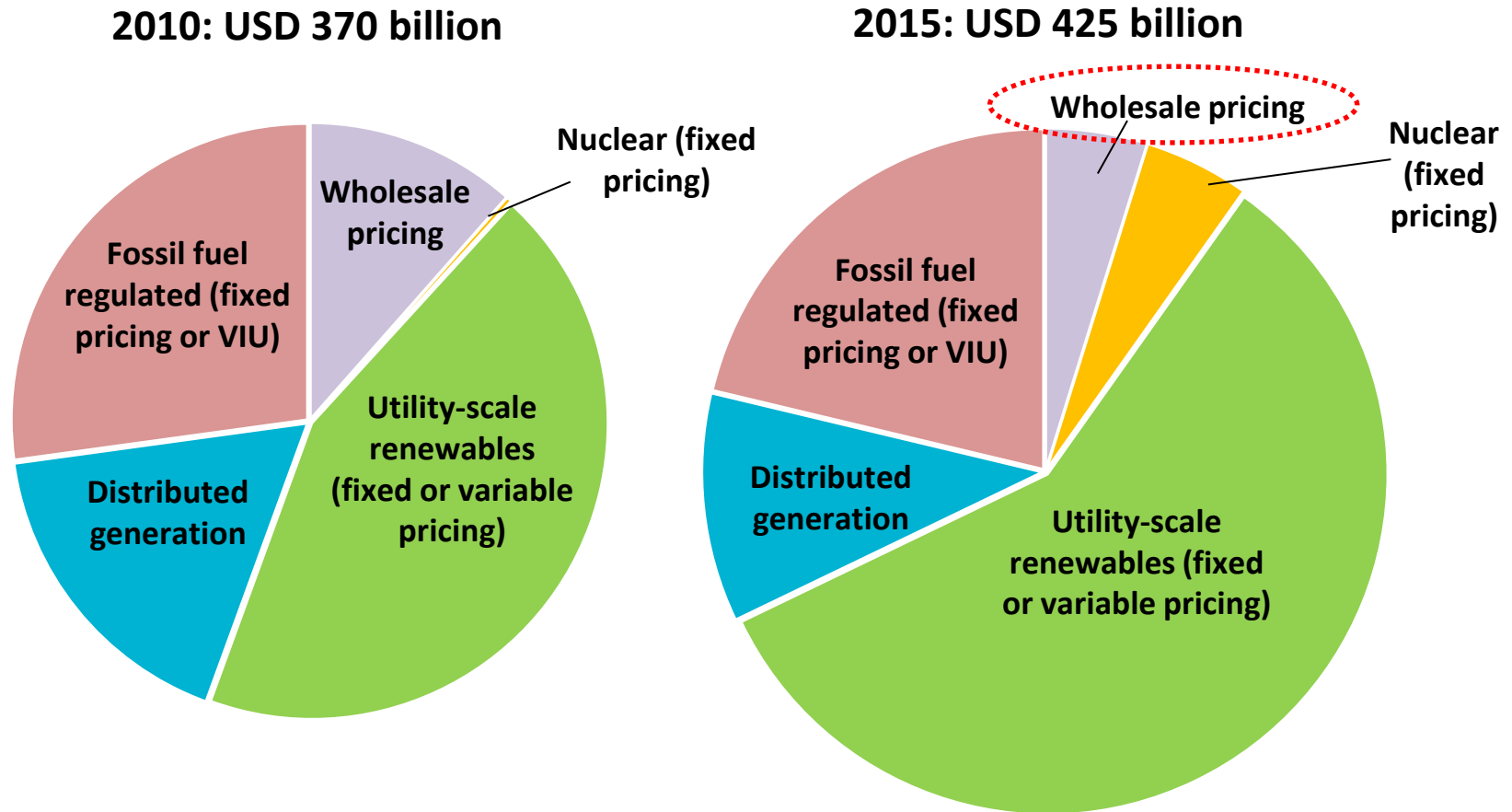
Nuclear construction starts, 2000-2015



Economics and public concerns remain a challenge to significant nuclear expansion

Governments increasingly in the driving seat of electricity security

Global power generation investment by main business model

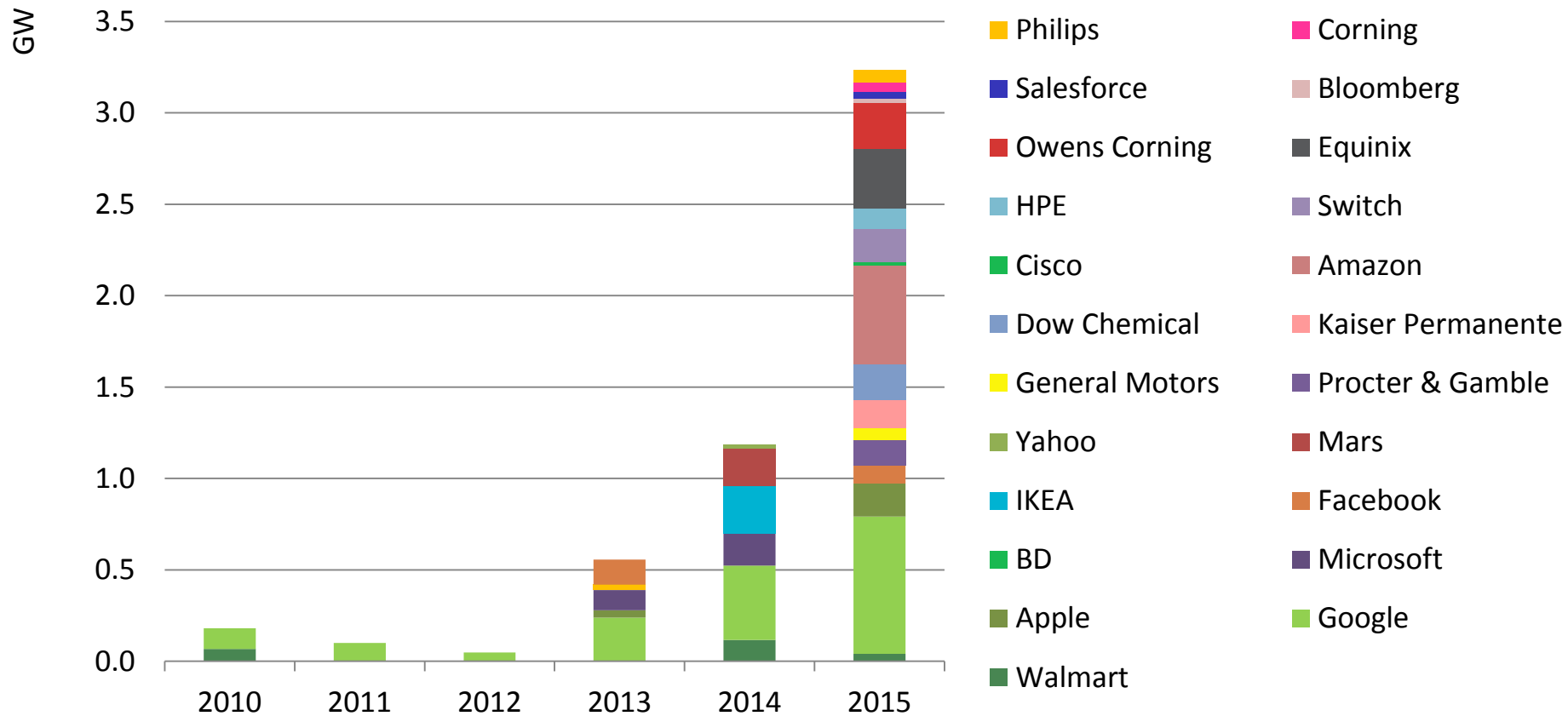


95% of generation investments rely on contracts or price regulation, with a narrower role for wholesale pricing, as regulators pursue adequacy and low carbon aims

New business models expanding the sources of investment for clean energy

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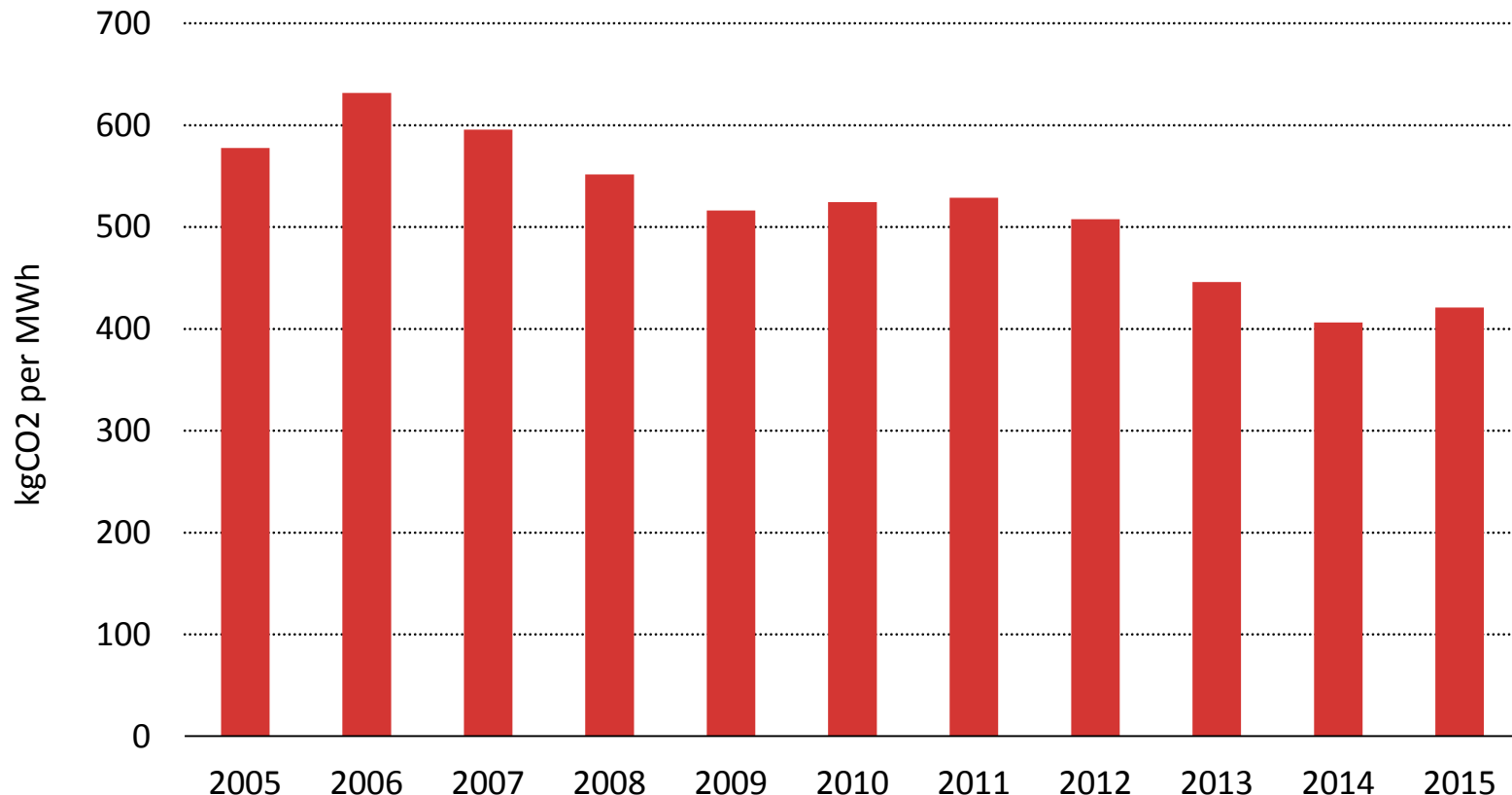
Contracting of utility-scale renewables by non-energy companies in North America



Consumer-led spending – e.g. distributed solar PV and corporate buying – comprised over USD 50 billion of renewable investment, led by United States, Europe and Japan

Carbon intensity of new power capacity down 20% since 2010

Global average CO₂ emissions per MWh from new power generation capacity



At 420kg CO₂/MWh, generation investments slowly reduce emissions intensity of existing power fleet (530kg/MWh), but remain well above 100kg/MWh to meet 2DS

- Global energy investment in 2015 is 8% lower. The share of oil & gas declined, while that of renewables, efficiency and nuclear rose
- Massive cost deflation across the entire energy spectrum is reshaping competition between fuels and technologies
- Unprecedented cuts in upstream investment are shifting the geography of oil production
- Renewables investment accounts for more than two-thirds of power generation and more than covers global electricity demand growth
- New business models are transforming electricity, but policies drive most investment; governments play a key role in supply security
- The IEA will continue to measure investment flows and assess their implications for the global energy sector