World Energy Outlook 2018

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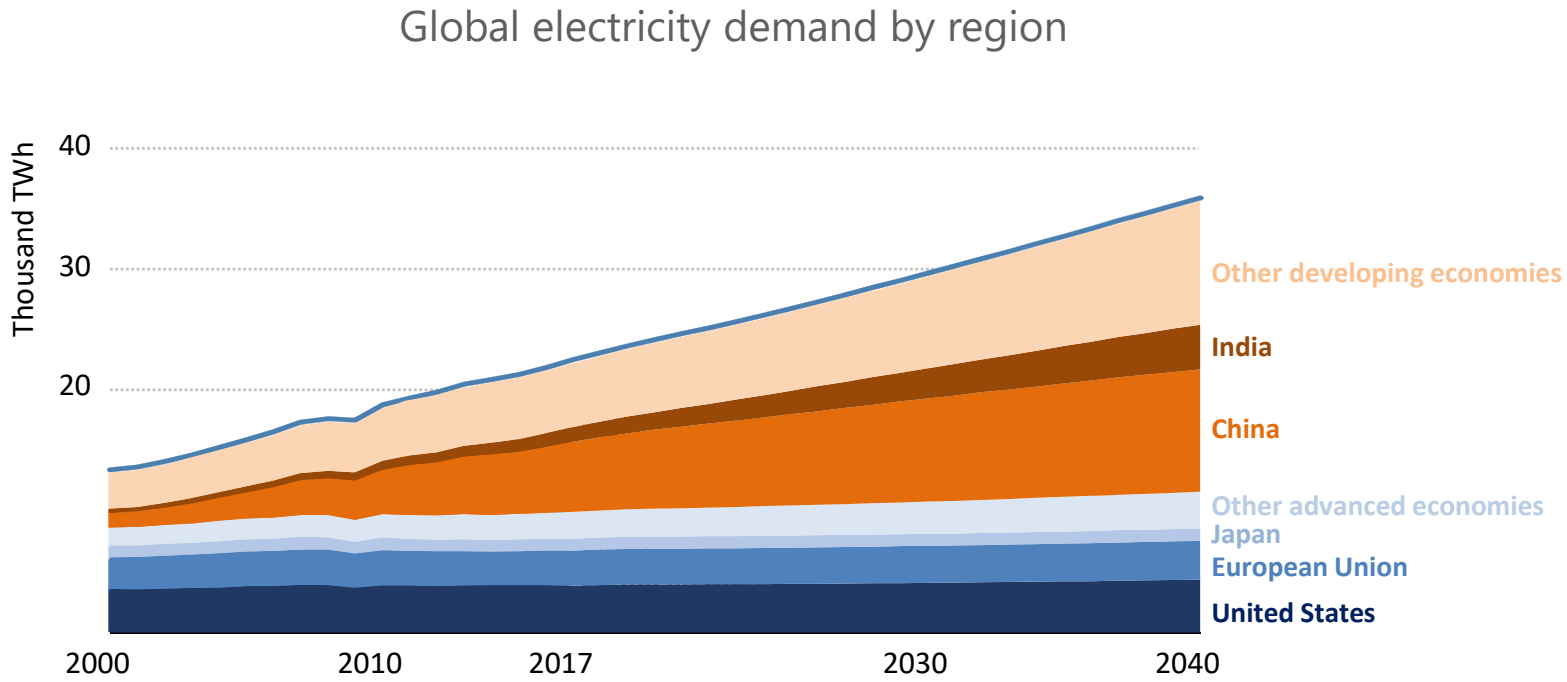
Electricity, the fastest growing "fuel"



In 2000, developing economies accounted for one-third of electricity demand, by 2040, their share doubles as they account for most of the electricity growth

Solar PV outpaces all other technologies

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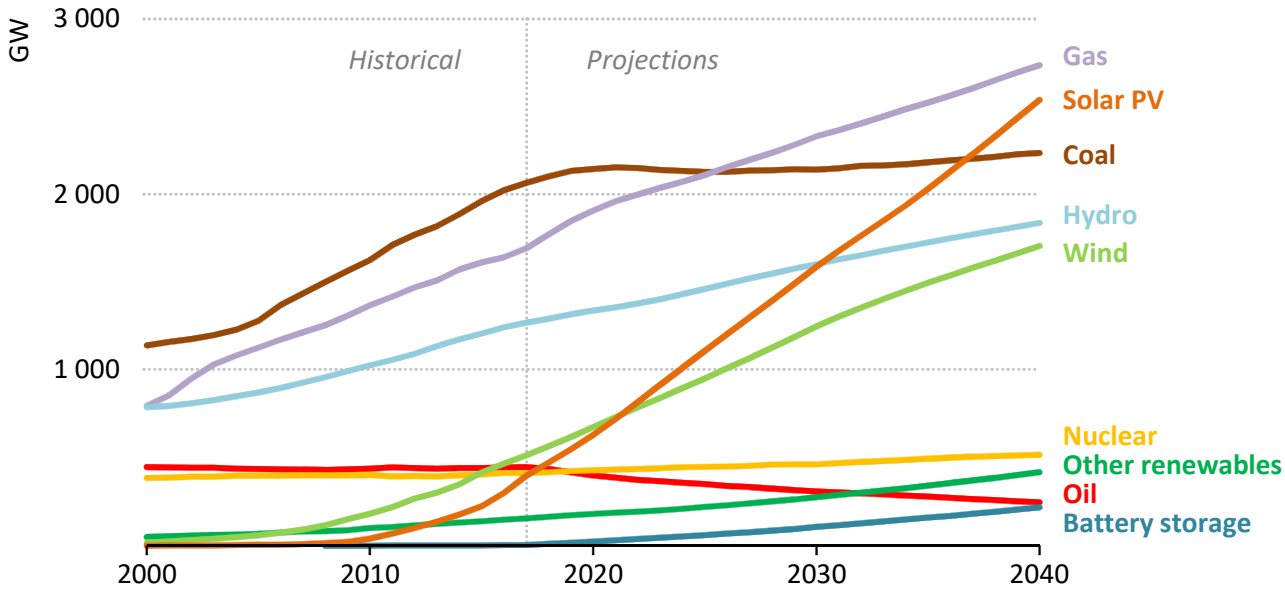
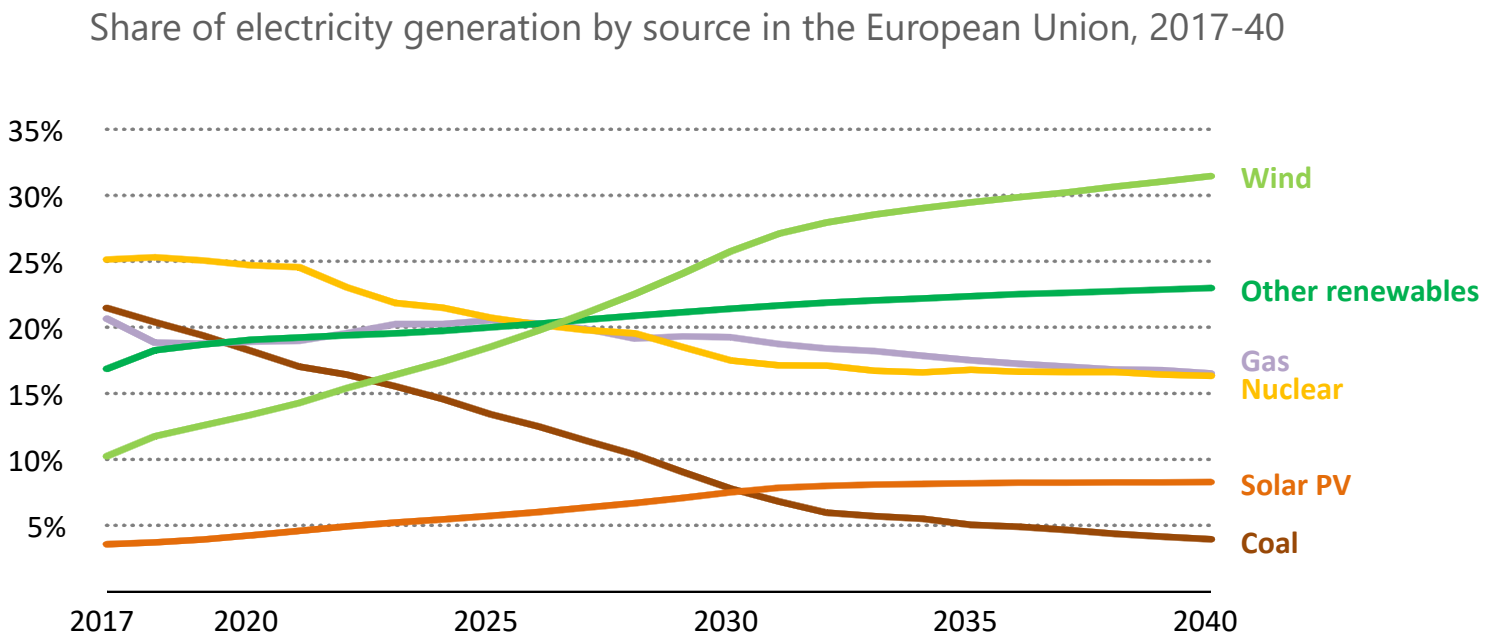
Installed power generation capacity by source in the New Policies Scenario



Renewables make up two-thirds of all capacity additions worldwide to 2040, capturing 70% of power plant investment

Wind to become the largest power source in the European Union



Wind electricity generation in the EU more than triples to 1 100 TWh by 2040; the rapid increase of variable forms of generation calls for new approaches to system integration

Flexibility: the cornerstone of tomorrow's power systems

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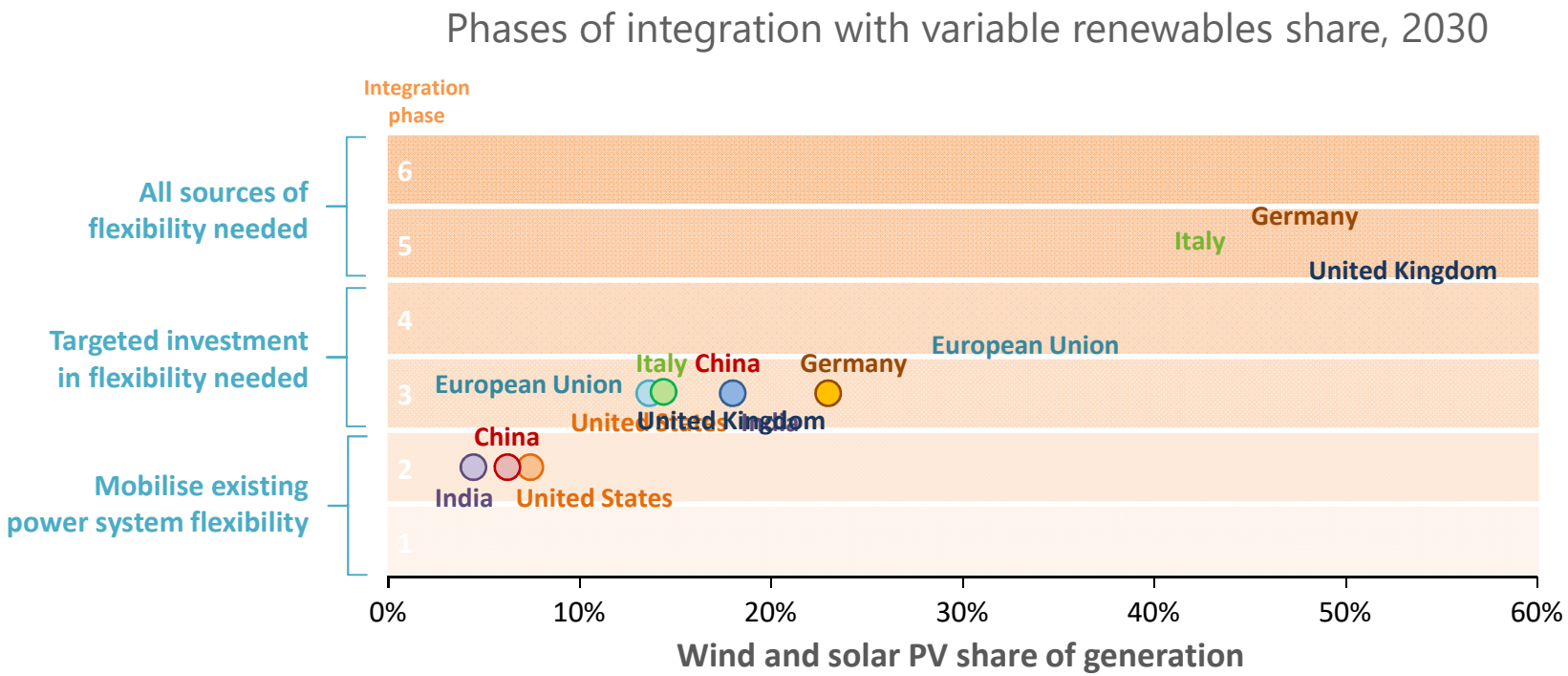
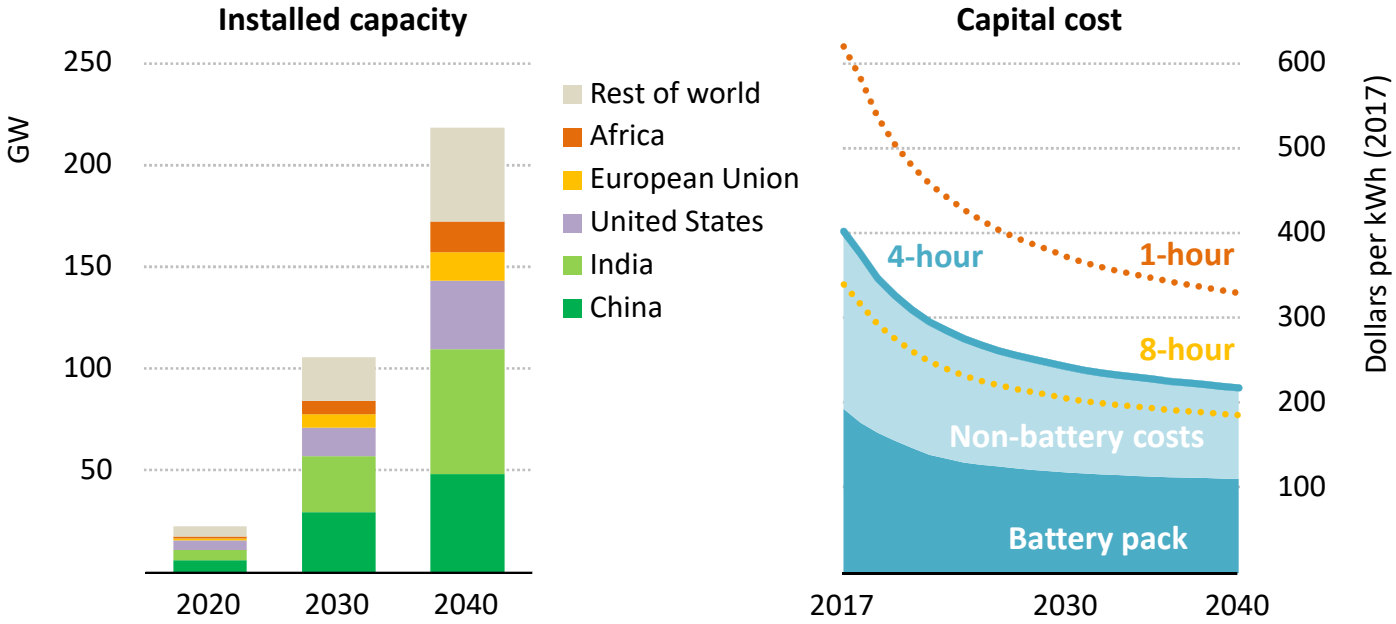


Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response

Battery storage is projected to grow strongly

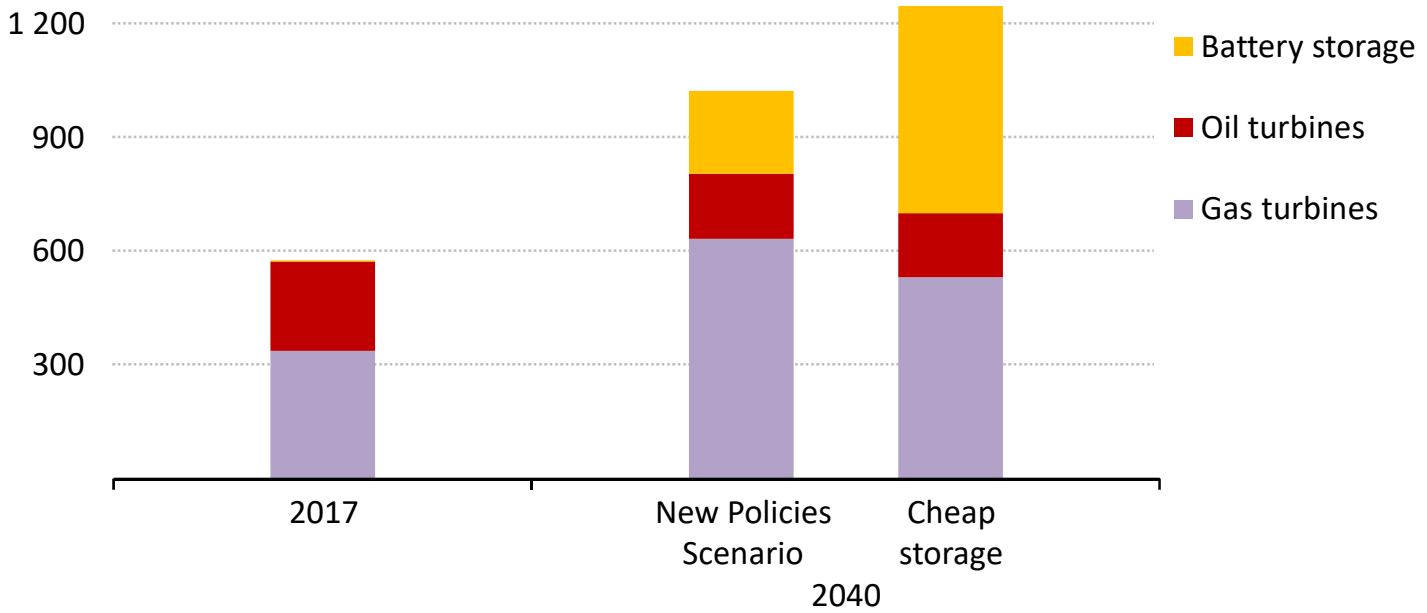
Deployment and costs of utility scale battery storage systems in the New Policies Scenario



Declining costs for batteries drive utility scale deployment to reach 220 GW by 2040, with battery storage paired with renewables making up two thirds of the total

What if battery storage systems become very cheap

Peaking capacity by technology in 2017 and 2040, New Policies Scenario and cheap storage Case



Second-use batteries together with further BOS cost reductions would greatly increase battery storage competitiveness, which becomes the biggest peaker technology by 2040

Looking beyond the levelised cost of electricity

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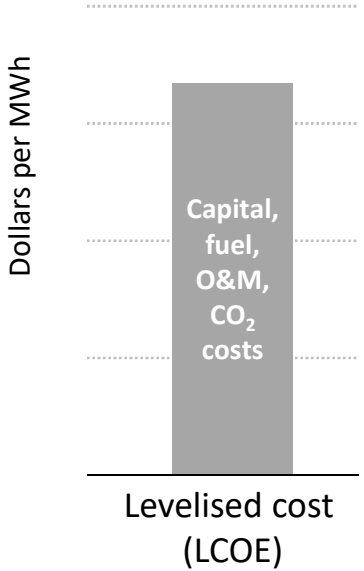
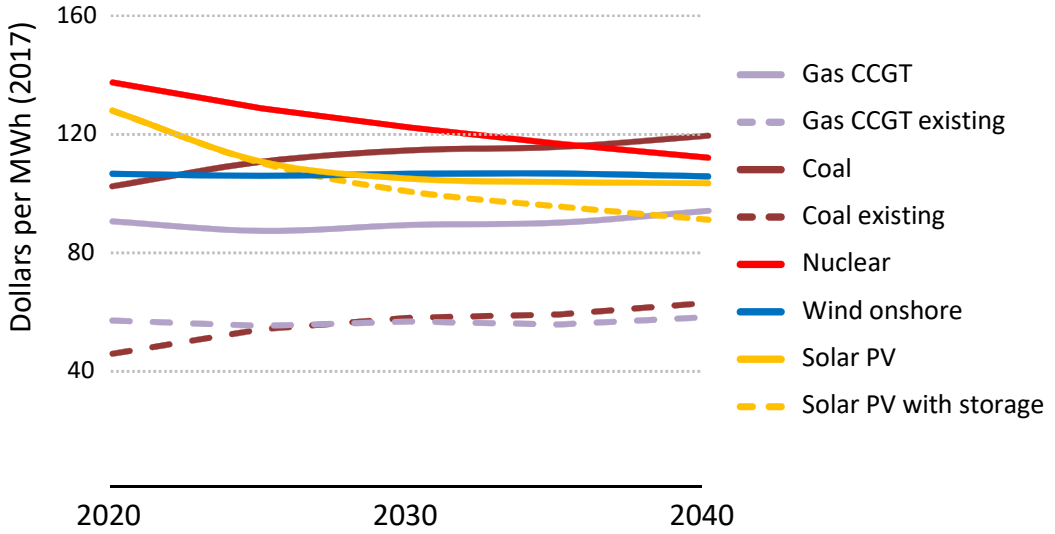
Technology costs and value



Value-adjusted LCOEs (VALCOEs) in the European Union



Costs remain an important indicator of competitiveness, but better metrics are needed to reflect the changing nature and needs of power systems

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Thank you!

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Today's electricity context

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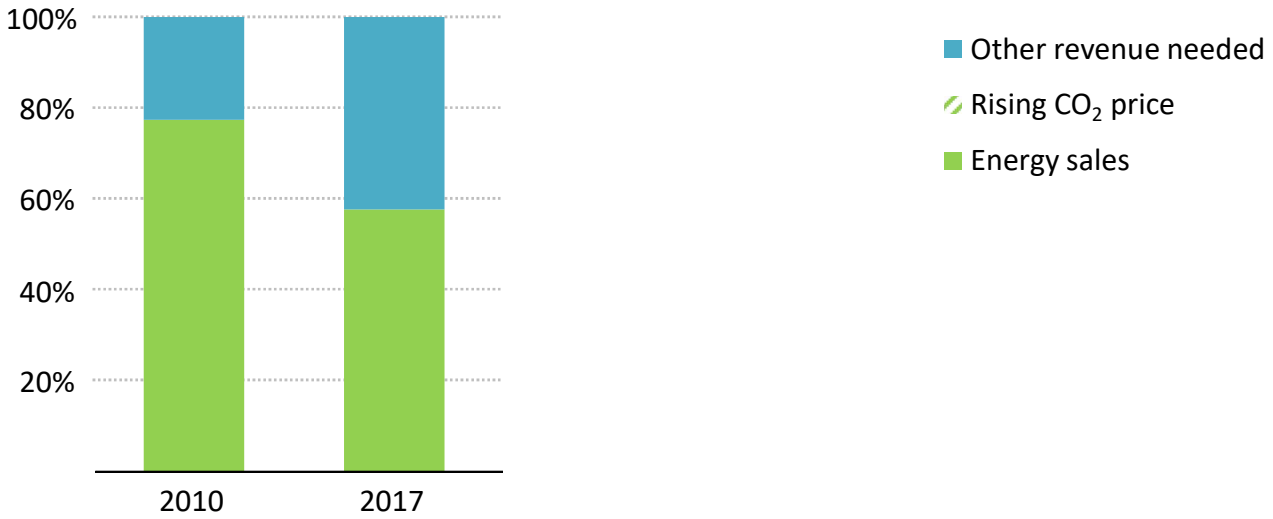
- Electricity is increasingly important in the modern world, to date:
  - Electricity demand has been growing twice as fast as total energy demand
  - Investment in the power sector is larger than that in the oil and gas sector
  - The rise of solar PV and wind power is transforming electricity supply
  - Overall energy-related CO_2 emissions are back on a rising trend in 2018
  - For the first time, the global population without access to electricity fell below 1 billion
- Policy makers need well-grounded insights about different possible futures & how they come about. The *WEO* provides two key scenarios:
  - New Policies Scenario
  - Sustainable Development Scenario
- The Future is Electric Scenario was introduced to explore the implications of more rapid electrification of end uses and the digitalization of the economy

Market designs will be under stress

Share of long-run generation costs covered by energy sales in the European Union



The widening gap between electricity sales and total generation costs in some markets raises questions about the ability of competitive markets to attract timely investment

Conclusions

- The links between energy & geopolitics are strengthening & becoming more complex, a major factor in the outlook for energy security
- The rapid growth of electricity brings huge opportunities; but market designs need to deliver both electricity *and* flexibility to keep the lights on
- A comprehensive strategy to electrify end uses and decarbonise the power sector is needed to achieve environmental goals
- There is no single solution to turn emissions around: renewables, efficiency & a host of innovative technologies, including storage, CCUS & hydrogen, are all required
- The future pathway for energy is open: governments will determine where our energy destiny lies