



# Prospects for Global Energy Markets and Energy Sustainability

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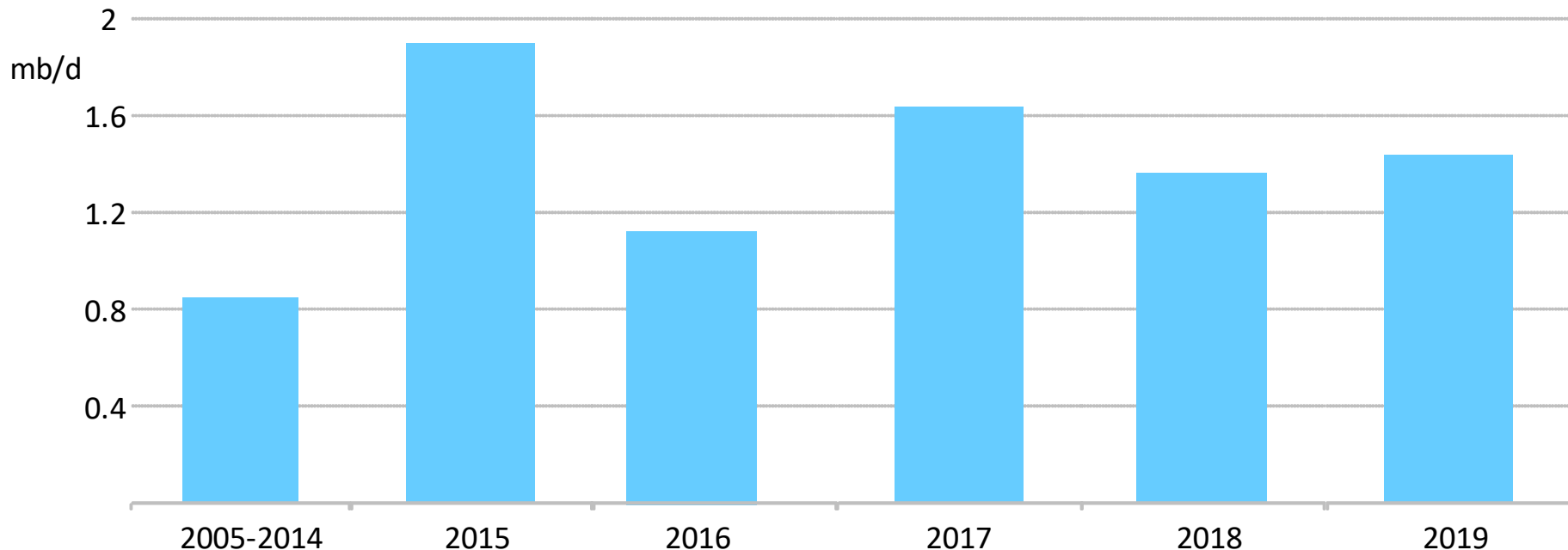
G20 Energy Ministerial – San Carlos de Bariloche, 15 June 2018



# Global oil demand remains robust

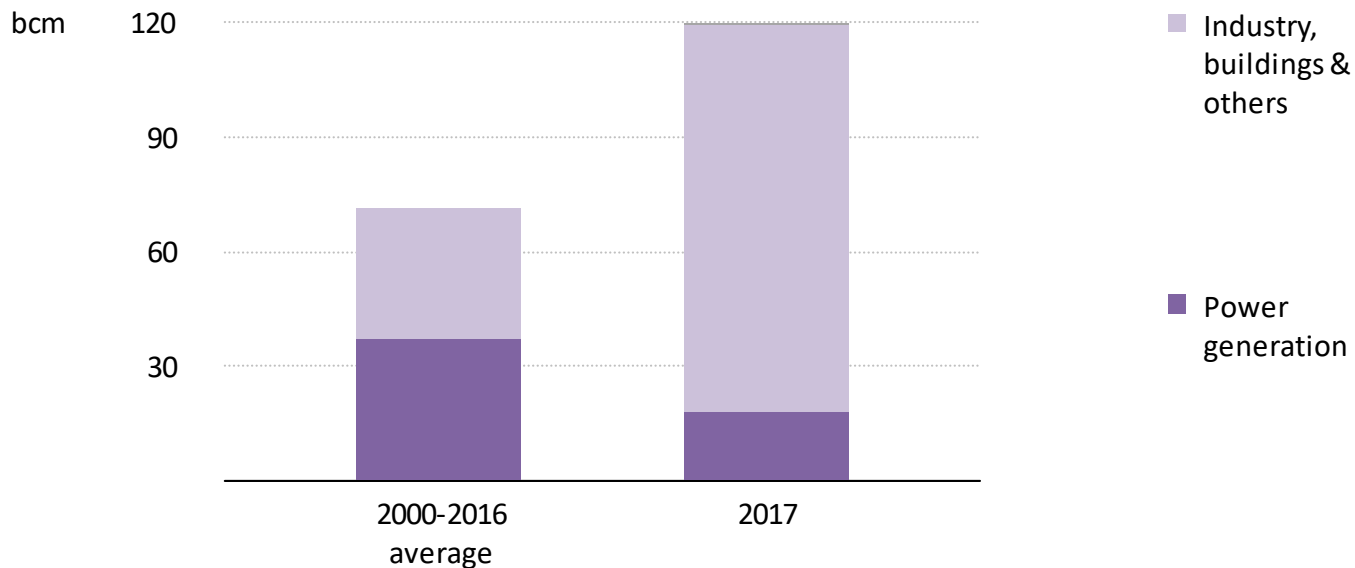


Growth in global oil demand



**Global oil demand is set to rise by 1.4 mb/d in 2019, with China and India accounting for almost half of the increase; petrochemical feedstocks are becoming increasingly important drivers of oil demand**

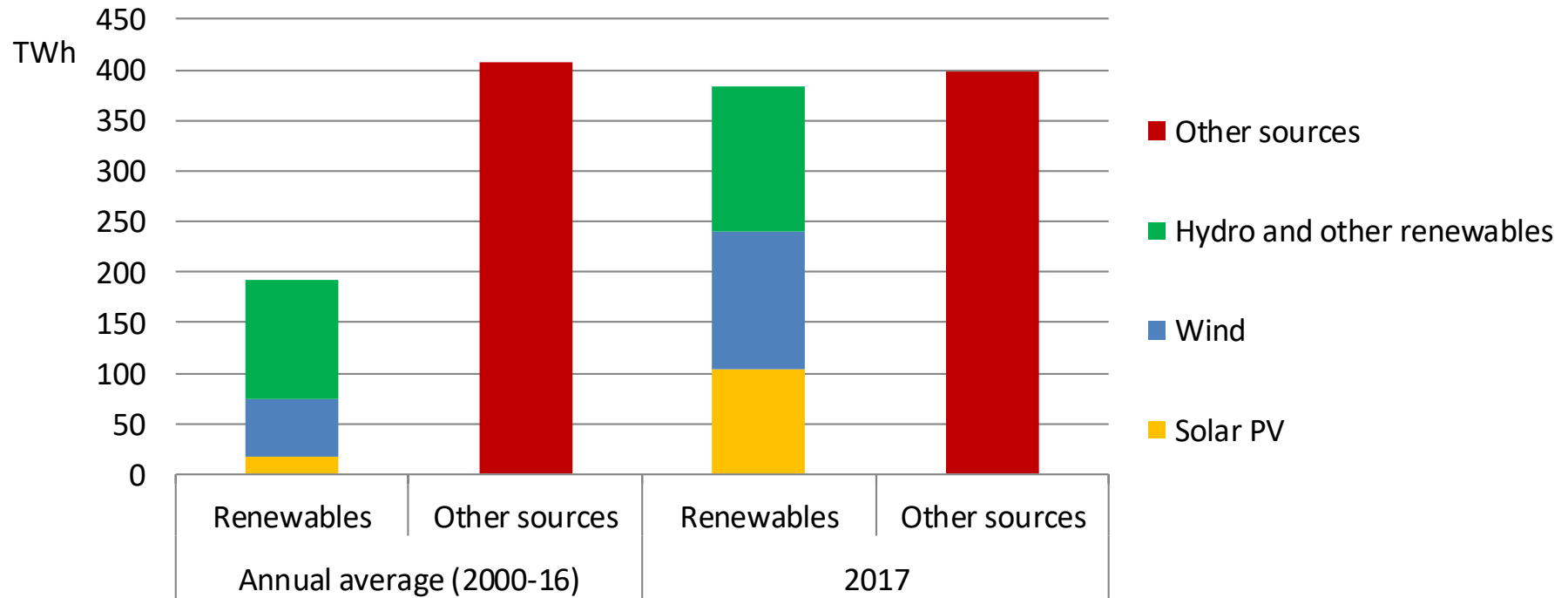
## Growth in global gas demand



**Industry & buildings have taken over from the power sector as the drivers of gas demand; China accounted for 30% of the increase in global gas demand in 2017**

# Renewables growing rapidly in the power sector

Annual electricity generation growth by technology



**Renewables accounted for almost half of the growth in electricity generation in 2017 and are set to meet a higher share of the growth going forward**

# Wind & solar making strong inroads, but new challenges may emerge

## Four phases of wind and solar integration

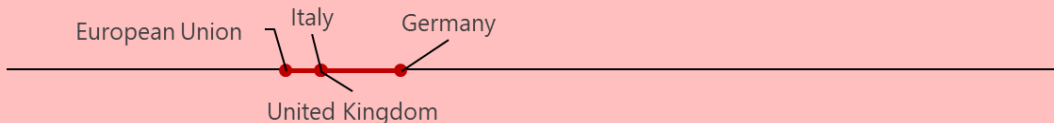
### Phase 4

Require advanced technologies to ensure grid reliability



### Phase 3

Flexibility investments: all power plants, demand side, storage, grids



### Phase 2

Draw on existing flexibility in thermal & hydro plants, grids



### Phase 1

System integration currently no relevant issue



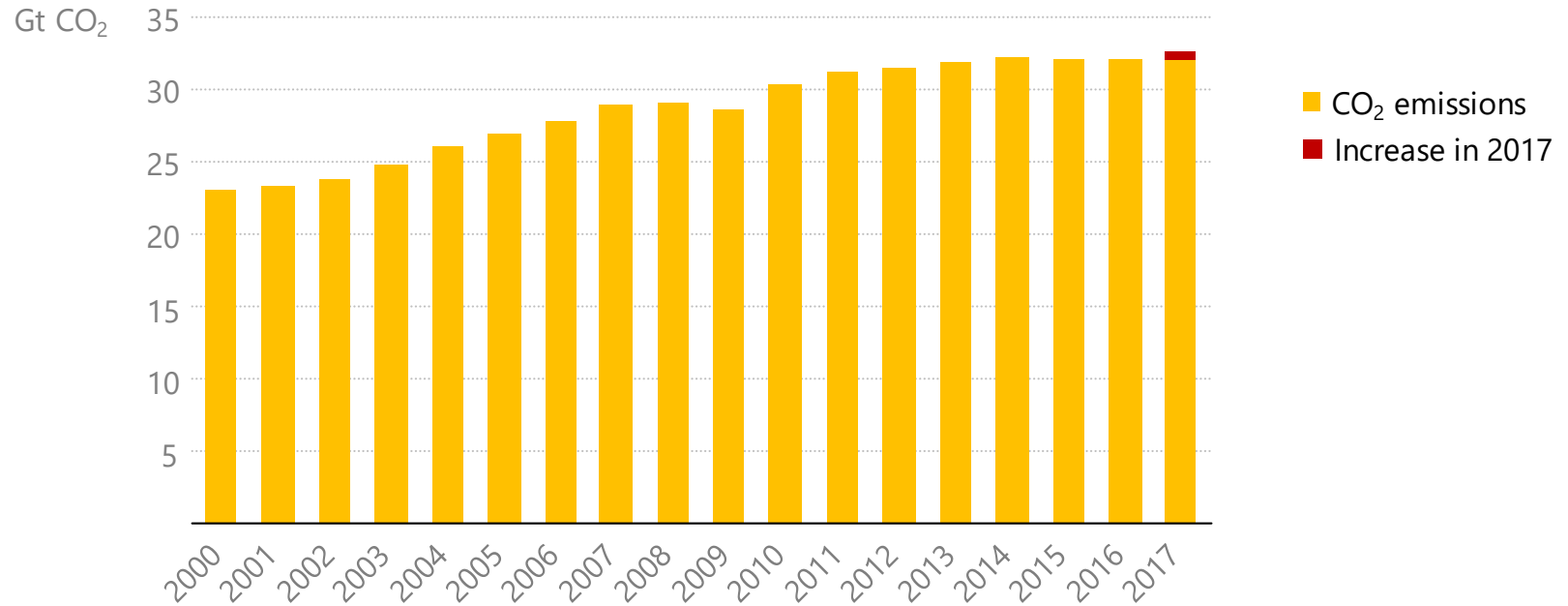
0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%

share of wind, solar PV in power generation, 2016

# After plateauing for 3 years, global emissions are on the rise again



## Global energy-related CO<sub>2</sub> emissions



**After remaining flat for 3 years, global CO<sub>2</sub> emissions rose again in 2017, to an all-time high**

# How are clean energy technologies progressing?

## Power

- **Renewable power**
  - Solar PV
  - Onshore wind
  - Offshore wind
  - Hydropower
  - Bioenergy
- Geothermal
- Concentrating solar power
- Ocean

- Nuclear power
- Natural gas-fired power
- Coal-fired power
- CCS in power

## Industry

- Cement
- Chemicals
- Steel
- Aluminum
- Pulp and paper
- CCS in industry

## Transport

- Electric vehicles
- International shipping
- Fuel economy
- Trucks
- Transport biofuels
- Aviation
- Rail

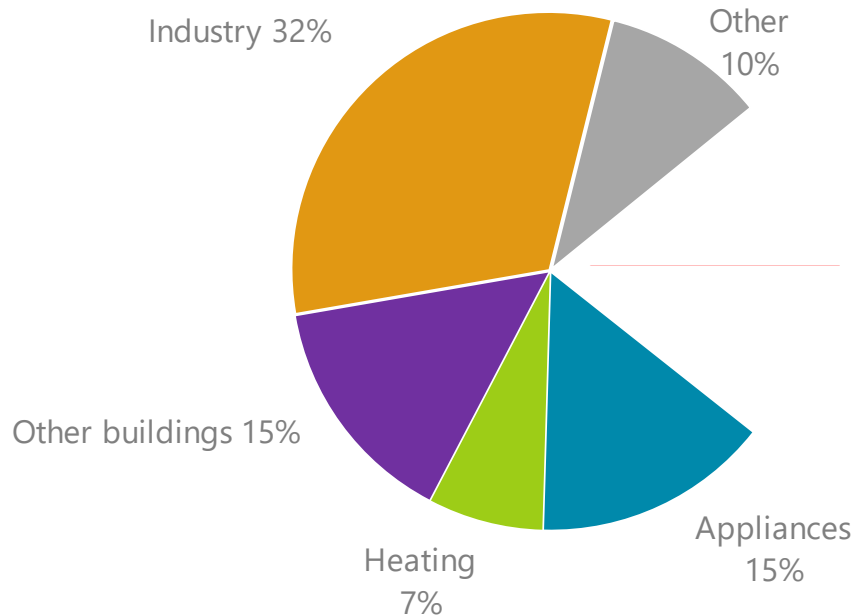
## Buildings

- Building codes
- Heating
- Cooling
- Lighting
- Appliances & equipment
- Data centres and networks

IEA's latest tracking of 38 clean-energy technologies reveals, **4 are on track**, **23 have to improve** & **11 are off track**

# Cooling is driving electricity demand growth

Share of world electricity demand growth to 2050



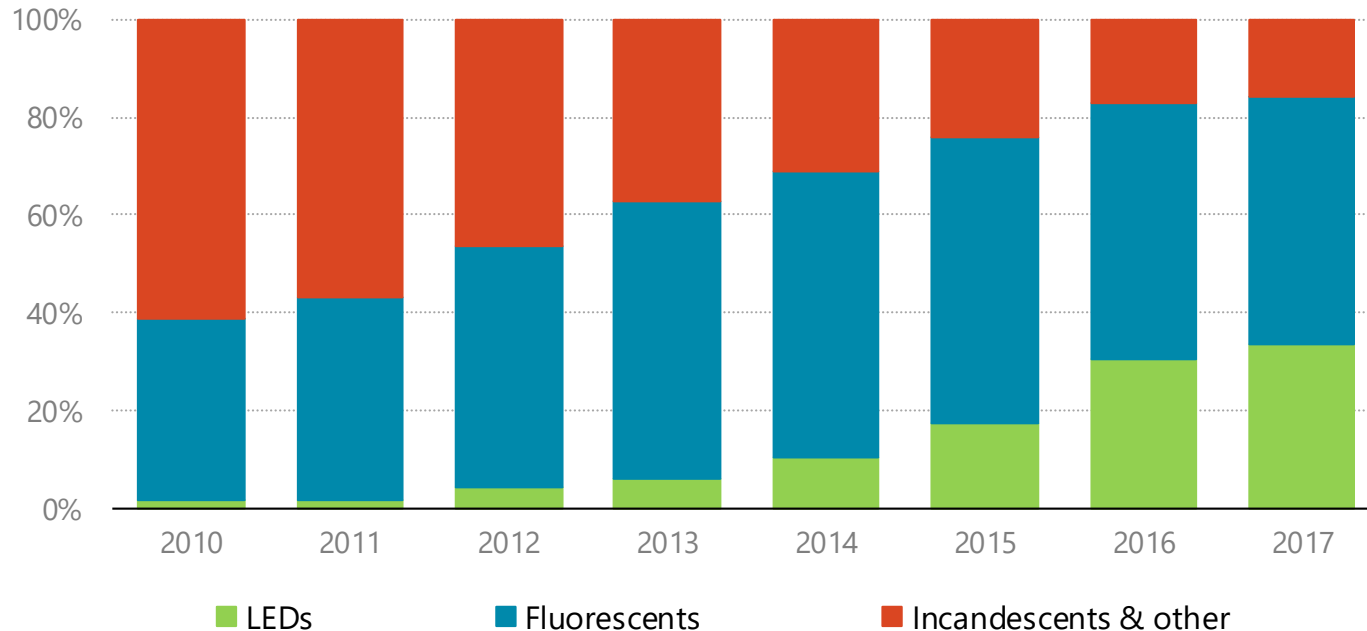
**Today, 90% of households in the US & Japan have air conditioners versus 32% in developing Asia; Electricity demand for air conditioning could more than triple by 2050**



# LED lighting is on track, thanks to government policy & innovation



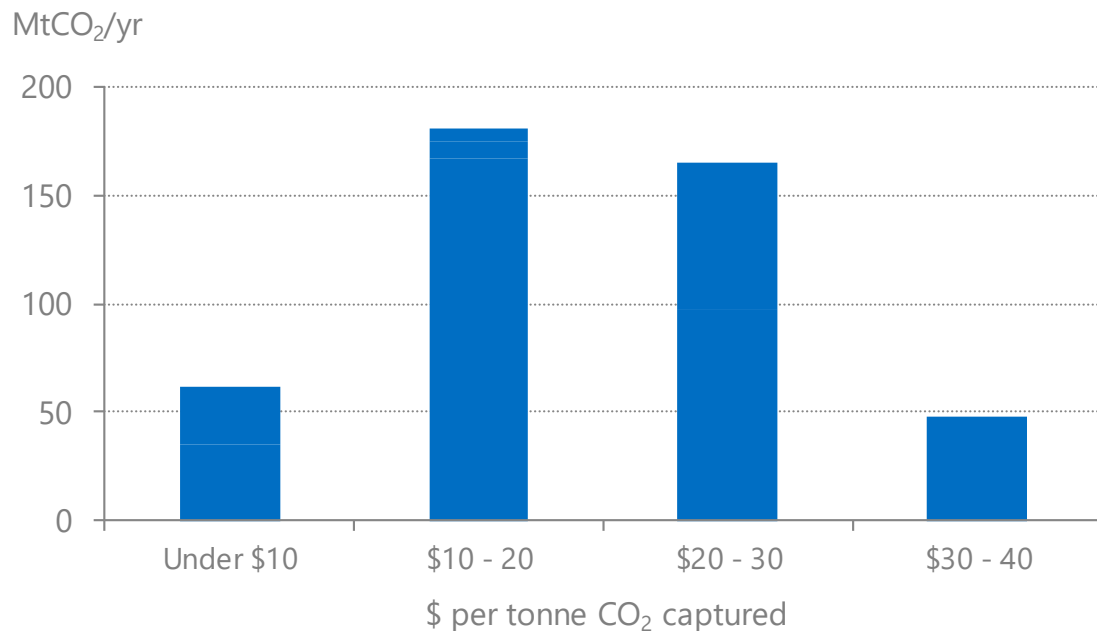
Global residential lighting sales by type



**LEDs are on track to dominate residential lighting by around 2020;  
3.3 billion LEDs were installed in 2017, underpinned by falling costs & government policy**

# Carbon capture, utilisation & storage is crucial for industry

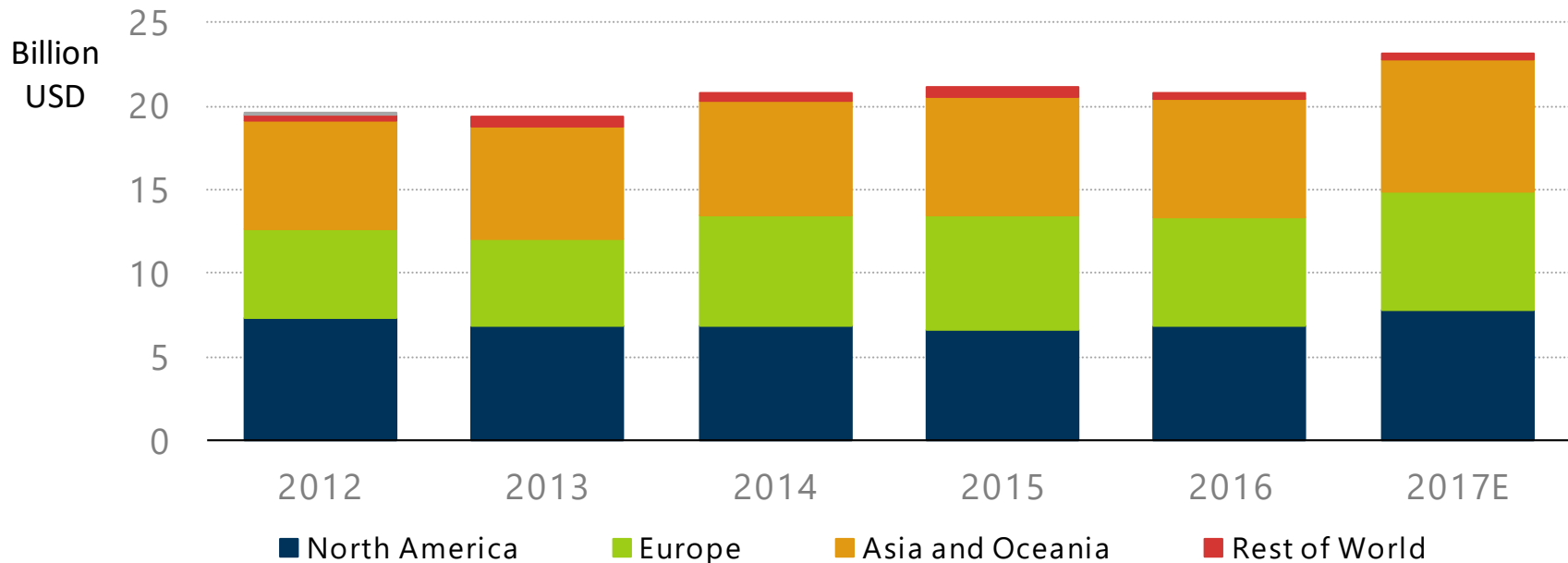
Cost for CO<sub>2</sub> capture and storage or utilisation in industry



**CCUS is one of few solutions to cut emissions in industry;  
450 Mt CO<sub>2</sub> can be abated per year for under \$40/t**

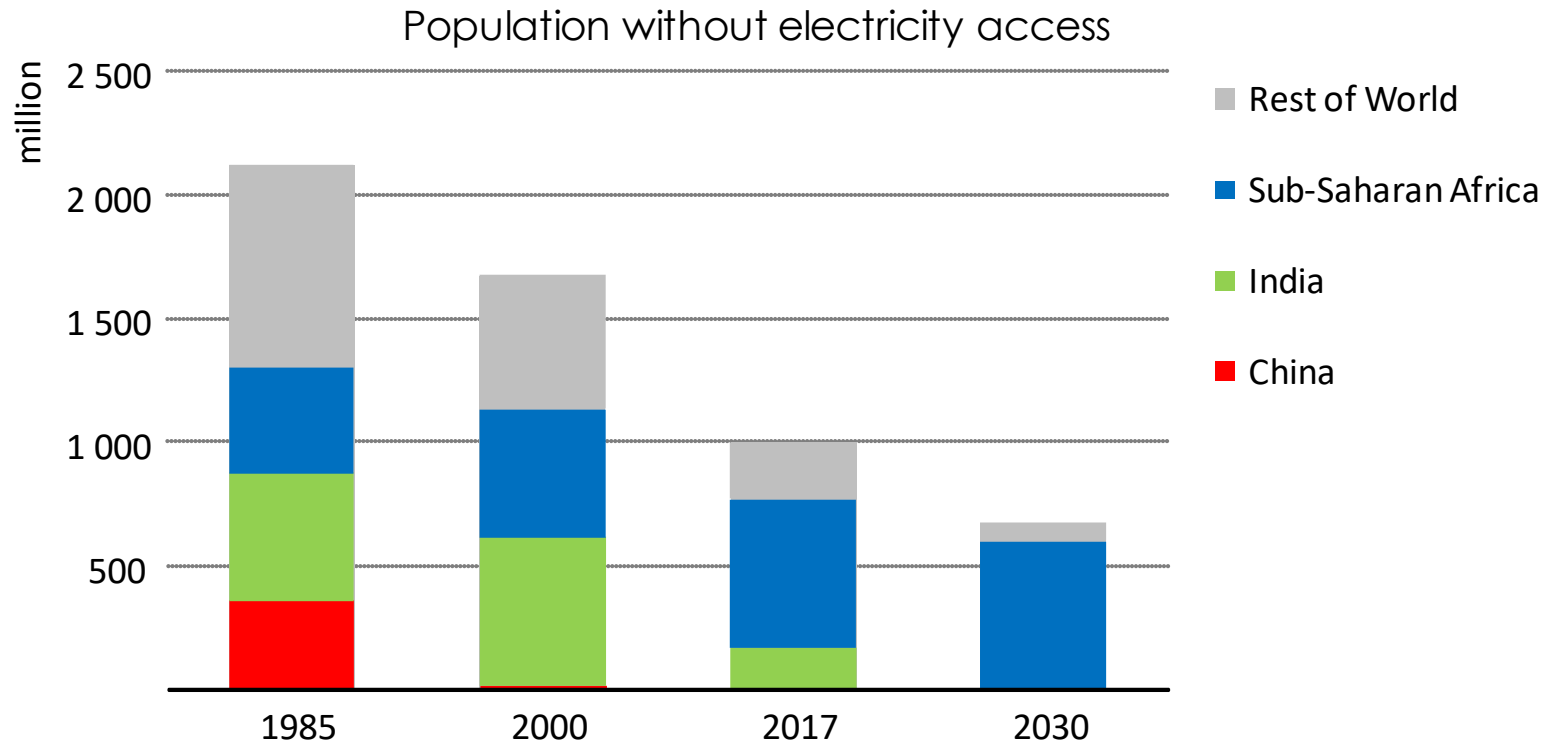
# Clean energy R&D investment is finally on the rise...

Total public spending on clean energy technology RD&D



**Investment in clean energy R&D rose in 2017, but more is needed**

# Electrification success stories, but need to focus on sub-Saharan Africa



**China was a remarkable success story for electrification, bringing access to hundreds of millions in record time; India achieved electricity access for all its villages in 2018; today the challenge is concentrated in sub-Saharan Africa**

- Global energy markets are undergoing fundamental changes, with major implications for trade flows, investment, energy security & geopolitics
- Faster energy-technology innovation can overcome sustainability challenges, while spurring economic growth & improving energy security
- Achieving universal access to electricity and clean cooking is imperative for global economic growth, stability, health and gender equality
- The IEA can help the G20 make well-founded energy decisions, by providing timely data, rigorous analysis, an all-of-technology approach & real-world solutions