



# Global energy markets: today and tomorrow

---

Dr. Fatih Birol

Executive Director, International Energy Agency

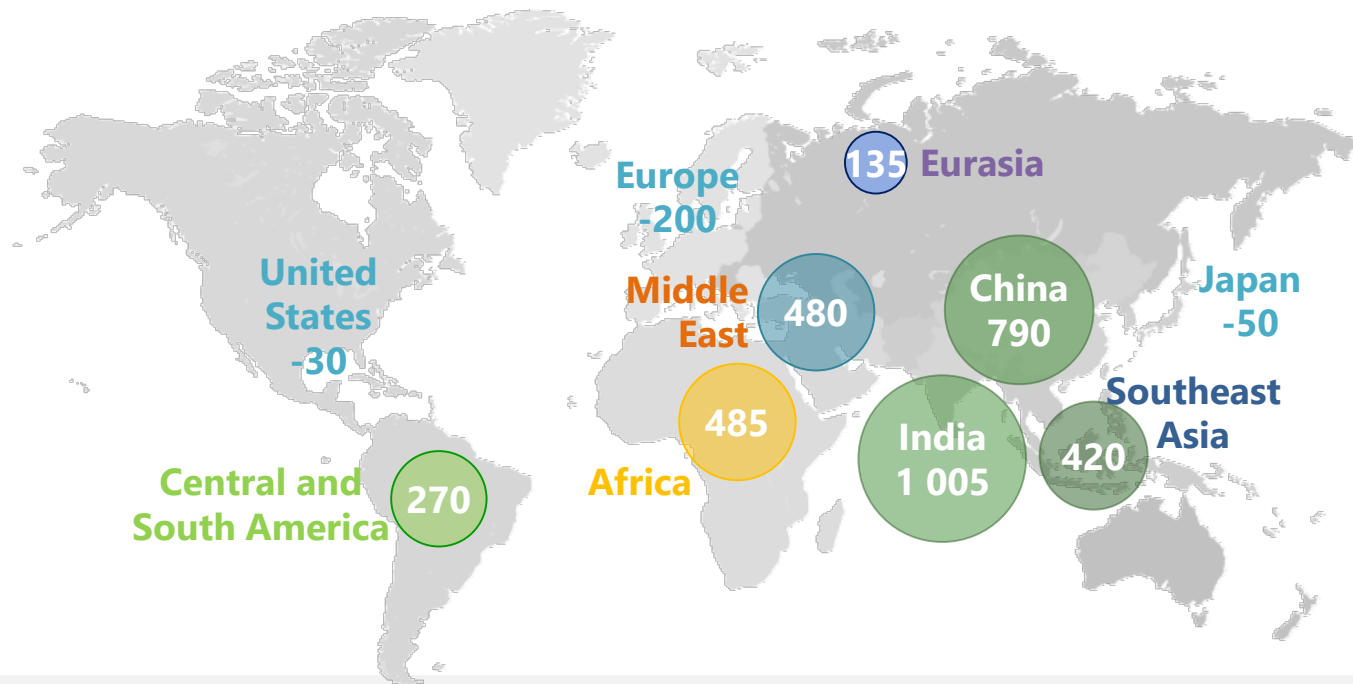
Universität Wien, 28 May 2018



- Four **large-scale upheavals** in global energy are underway:
  - The **United States** is turning into the undisputed global leader for oil & gas
  - **Solar PV** is on track to be the cheapest source of new electricity in many countries
  - **China's** new drive to “make the skies blue again” is recasting its role in energy
  - The future is **electrifying**, spurred by cooling, electric vehicles & digitalisation
- There are many possible pathways ahead & many potential pitfalls if governments or industry misread the signs of change

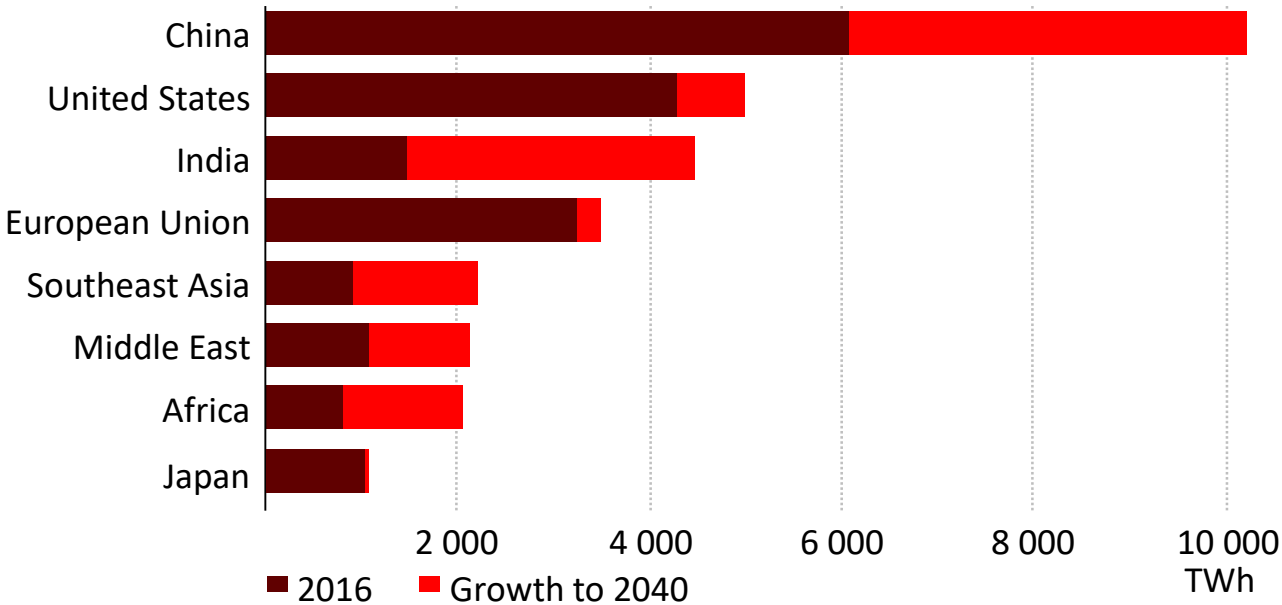
# India takes the lead, as China energy growth slows

Change in energy demand, 2016-40 (Mtoe)



Old ways of understanding the world of energy are losing value as countries change roles: the Middle East is fast becoming a major energy consumer & the United States a major exporter

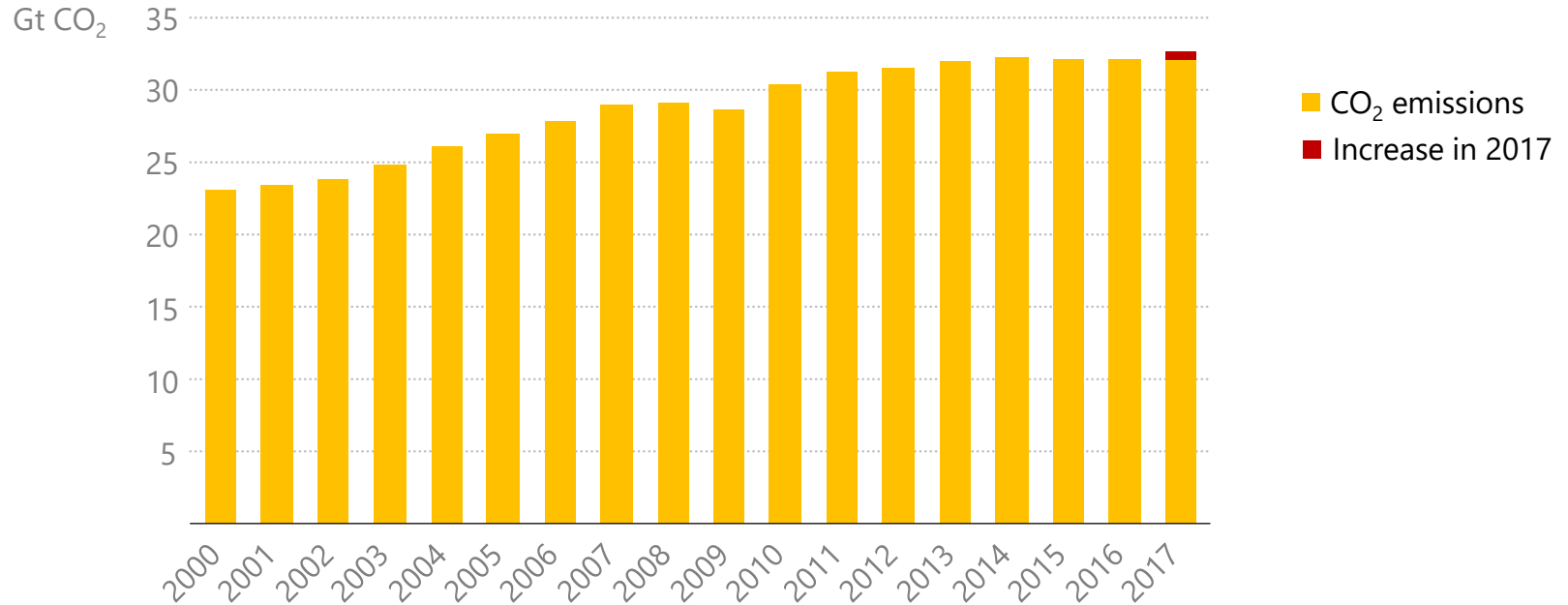
## Electricity generation by selected region



**India adds the equivalent of today's European Union to its electricity generation by 2040, while China adds the equivalent of today's United States**

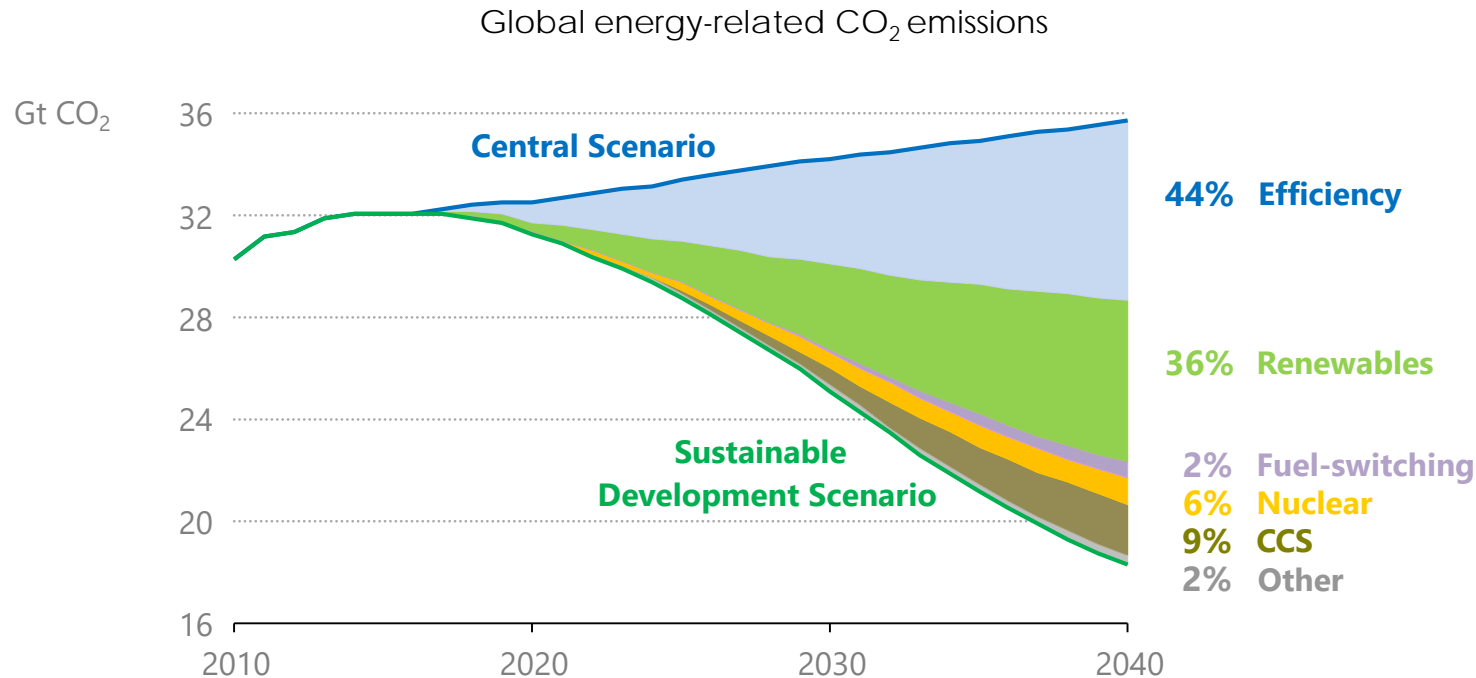
# After three years of plateau, global emissions increase again

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



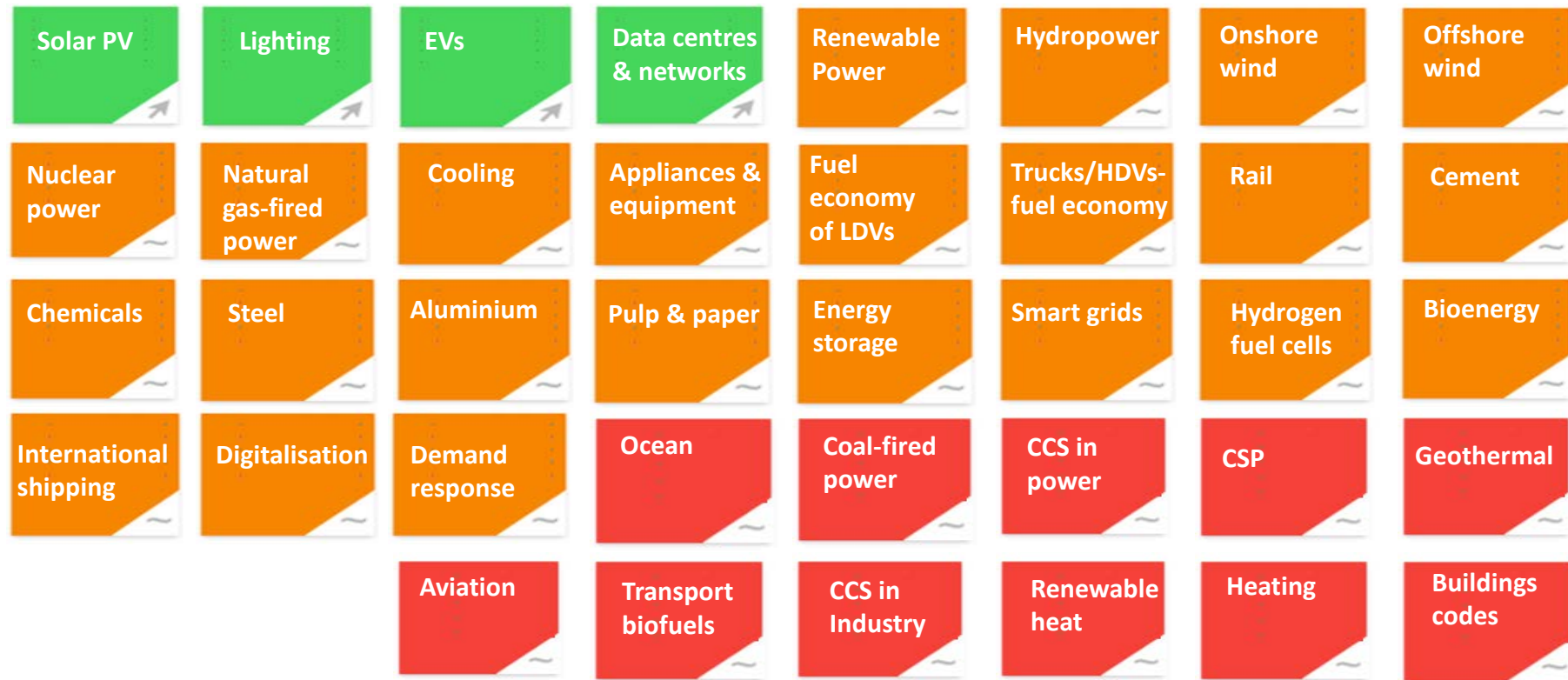
**After remaining flat for 3 years, global CO<sub>2</sub> emissions rose again in 2017, to an all-time high**

# What could the future look like?



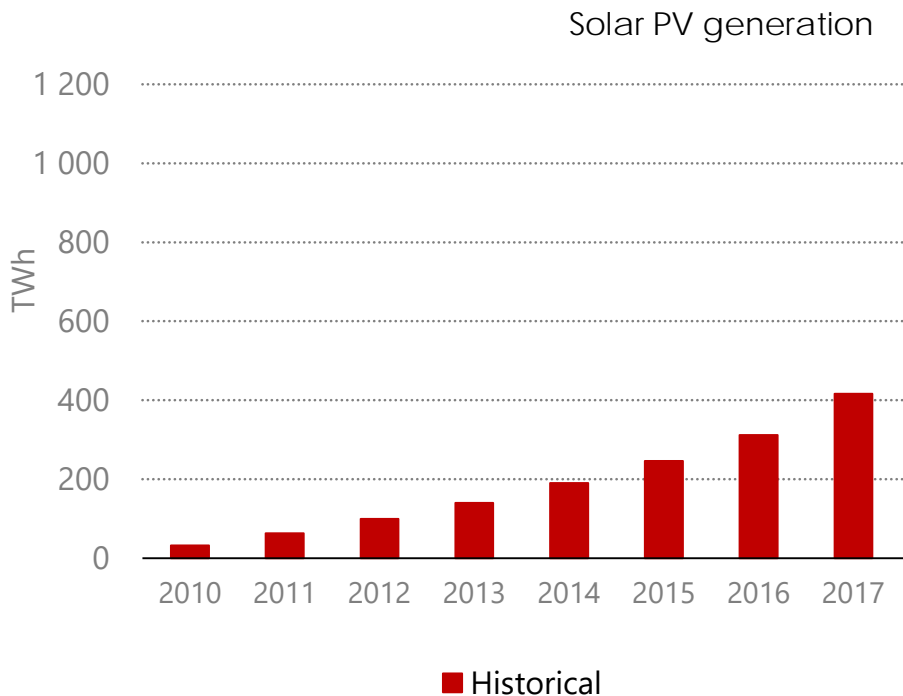
**A wide variety of technologies are necessary to meet sustainability goals, notably energy efficiency, renewables, CCUS and nuclear**

# How is clean energy technology progressing ?



Out of the 38 technologies included in *Tracking Clean Energy Progress (TCEP) 2018*, only 4 are on track, 23 need improvement

# Solar PV is the only renewable technology that is on track



**Following another record year in 2017, solar PV continues to lead the expansion in renewable power, driven by strong growth in China, the US and India**



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

## Phase 4

Require advanced technologies to ensure grid reliability

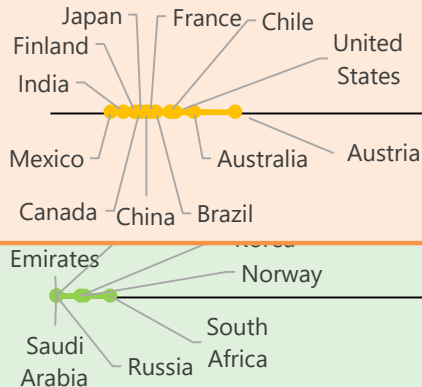
Denmark

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

## Phase 2

Draw on existing flexibility in thermal & hydro plants, grids

System integration currently no relevant issue



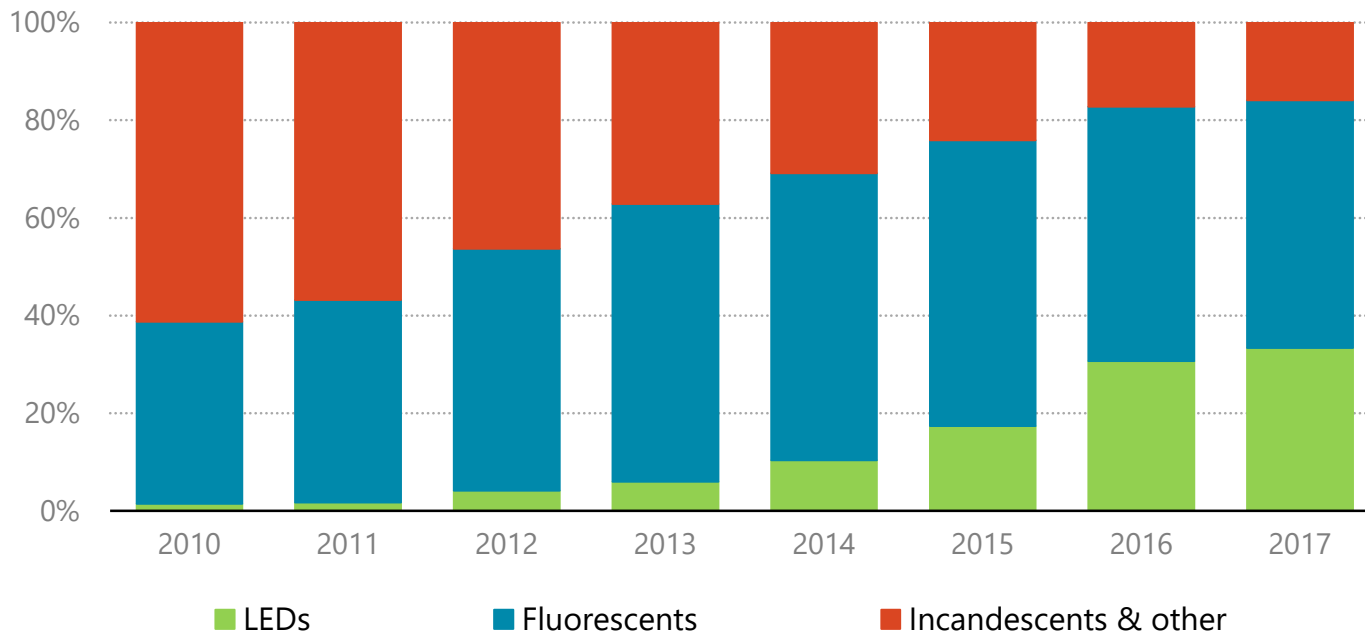
0% 10% 20% 30% 40% 50%

share of wind, solar PV in power generation, 2016

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



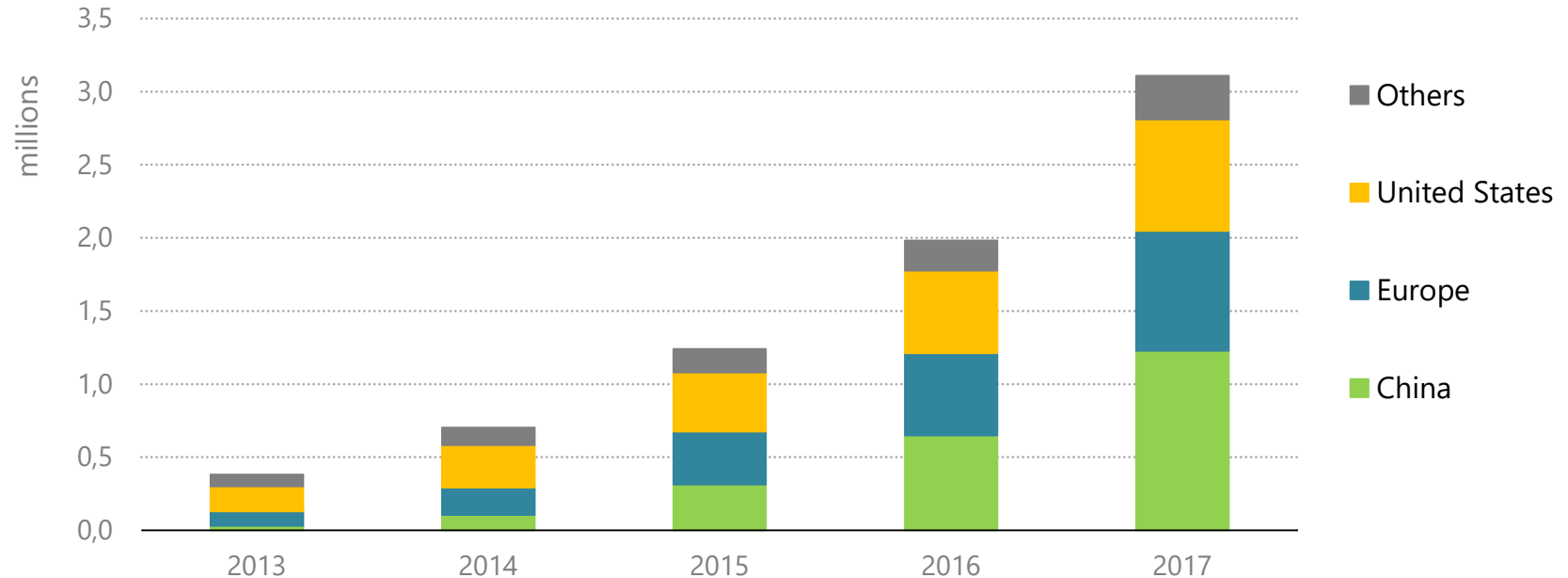
Global residential lighting sales by type



**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**

# Electric car sales continue to break records

Global electric car stock



**The number of passenger electric cars on the road passed 3 million in 2017, although they still represent just 1% of the global car sales**

- Faster technological innovation can spur economic growth, while also improving energy security & sustainability
- Of 38 clean-energy technologies **4 are on track**, **23 need improvement** & **11 are off track**
- Need to focus on all technologies; lack of progress on some puts even more pressure on others
- Government policy & market design will be instrumental in spurring innovation, deployment and private investment
- The IEA will continue to help all countries navigate clean energy transitions, with timely data, rigorous analysis, an all-of-technology approach and real-world solutions