Tracking Clean Energy Progress (TCEP):
Where are we along the road of energy transitions?

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4 December 2018 – COP24 – EU Pavilion

IEA at COP24 – Key messages

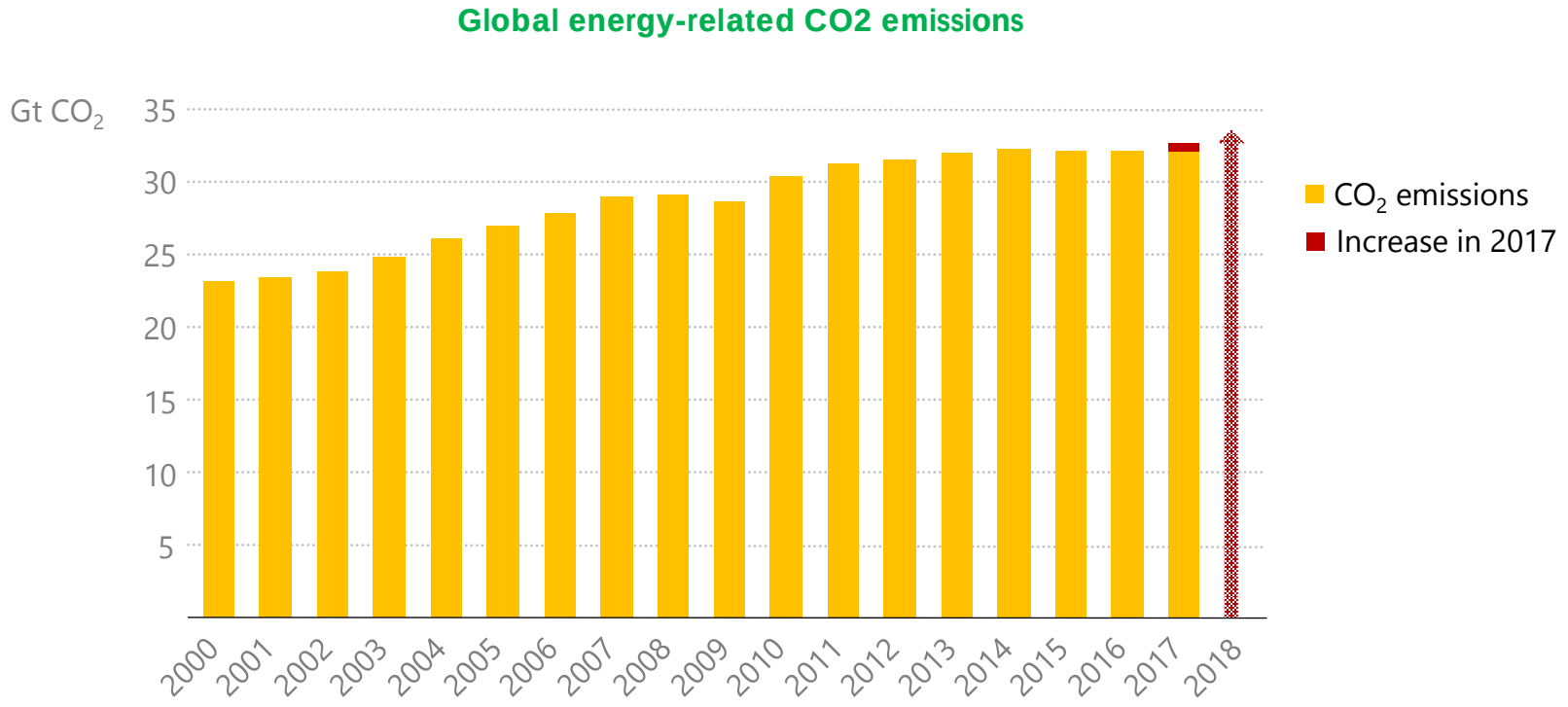
- **Paris Agreement goals are slipping out of reach**
  - *IEA estimates energy-related CO_2 emissions will reach an historic high in 2018*
  - *To meet Paris goals, CO_2 emissions need to peak around 2020 and enter a steep decline*

- **The IEA Family of countries now covers almost 75% of global energy demand, so is ideally placed to help countries meet their energy objectives**

- **The IEA offers data, analysis and solutions across "All Fuels and All Technologies"**

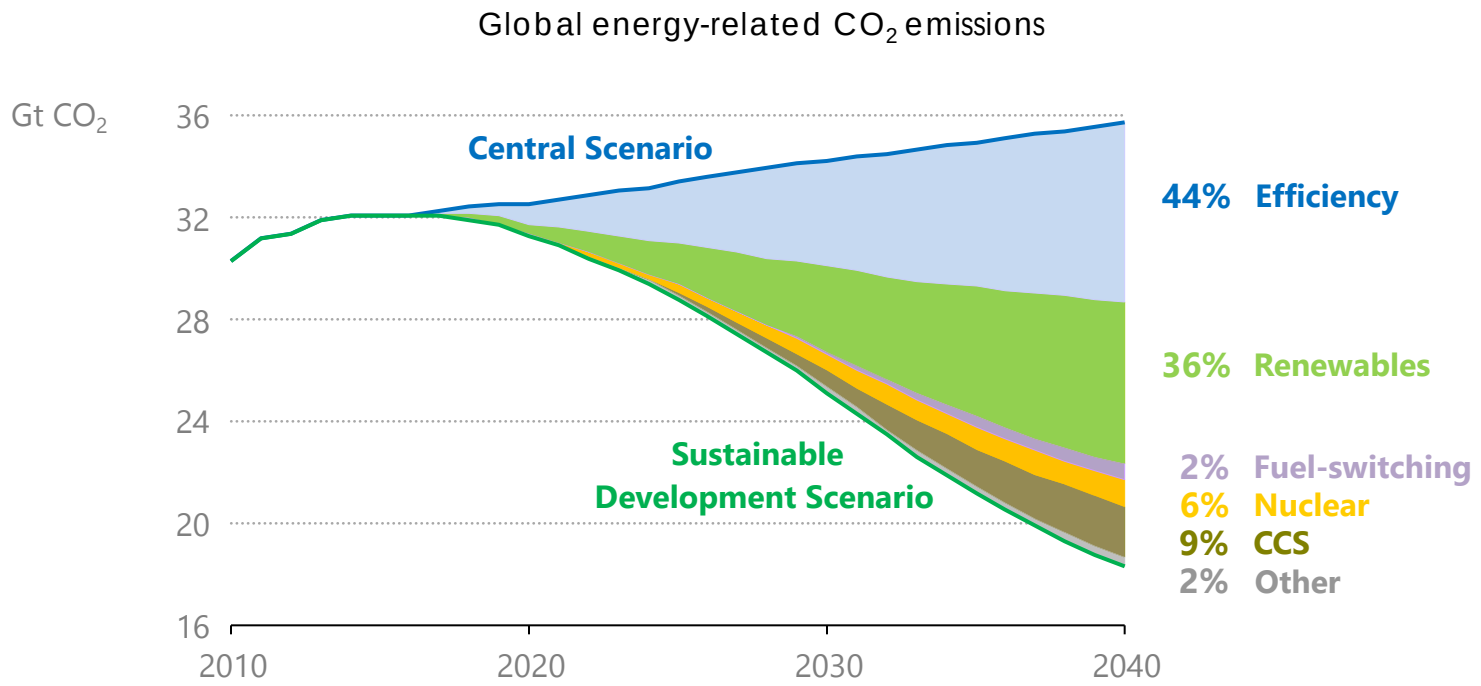
- **IEA analysis is key to tracking progress of global energy transitions**
  - *Assessing progress on energy transitions, under the Talanoa Dialogue and beyond*
  - *Helping to drive further NDC ambition*

Tracking Clean Energy Progress 2018 (TCEP): Historical data basis



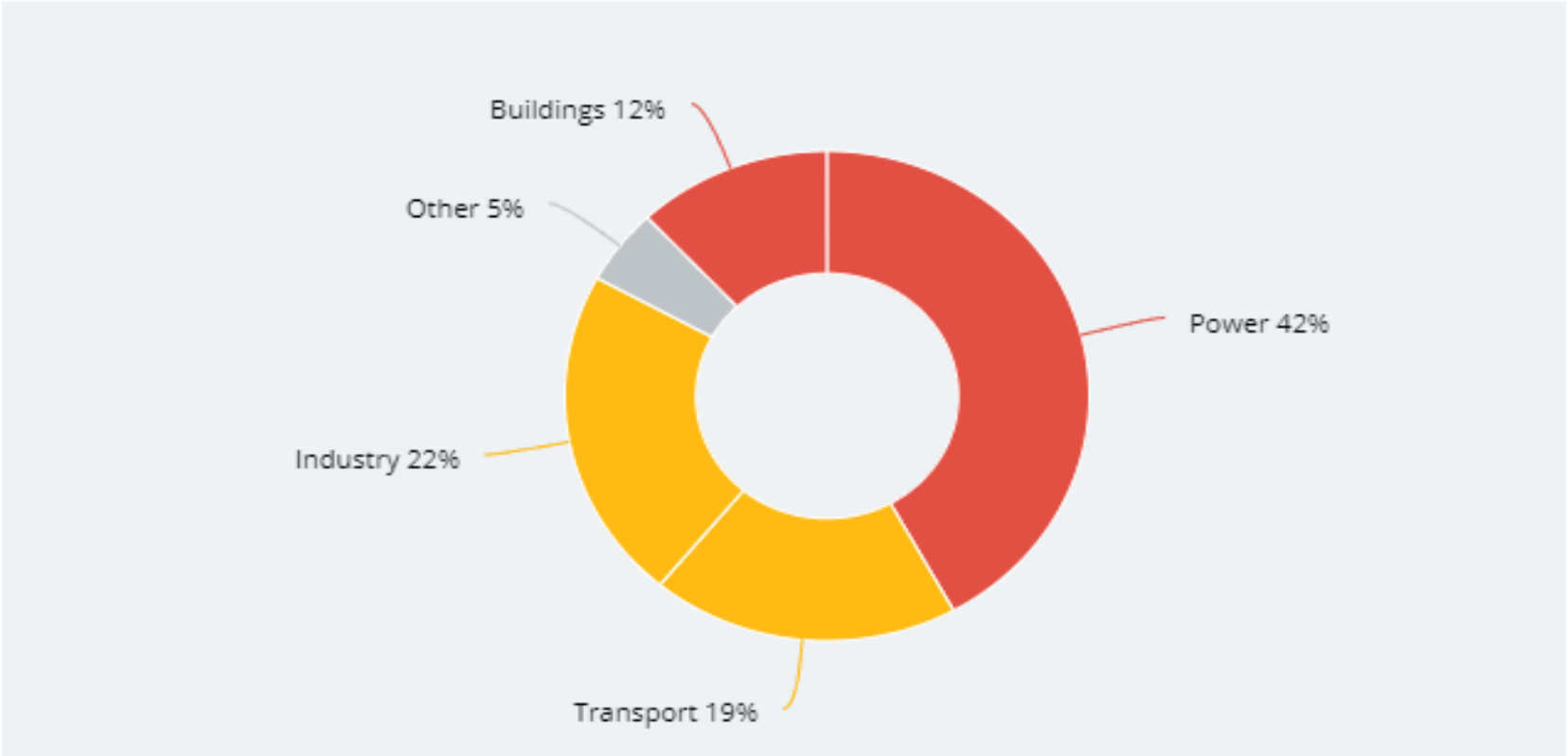
Global emissions are set to increase in 2018 - again
The world is not moving towards the Paris goals, but rather away from them

TCEP 2018: SDS as a benchmark on where do we want to go

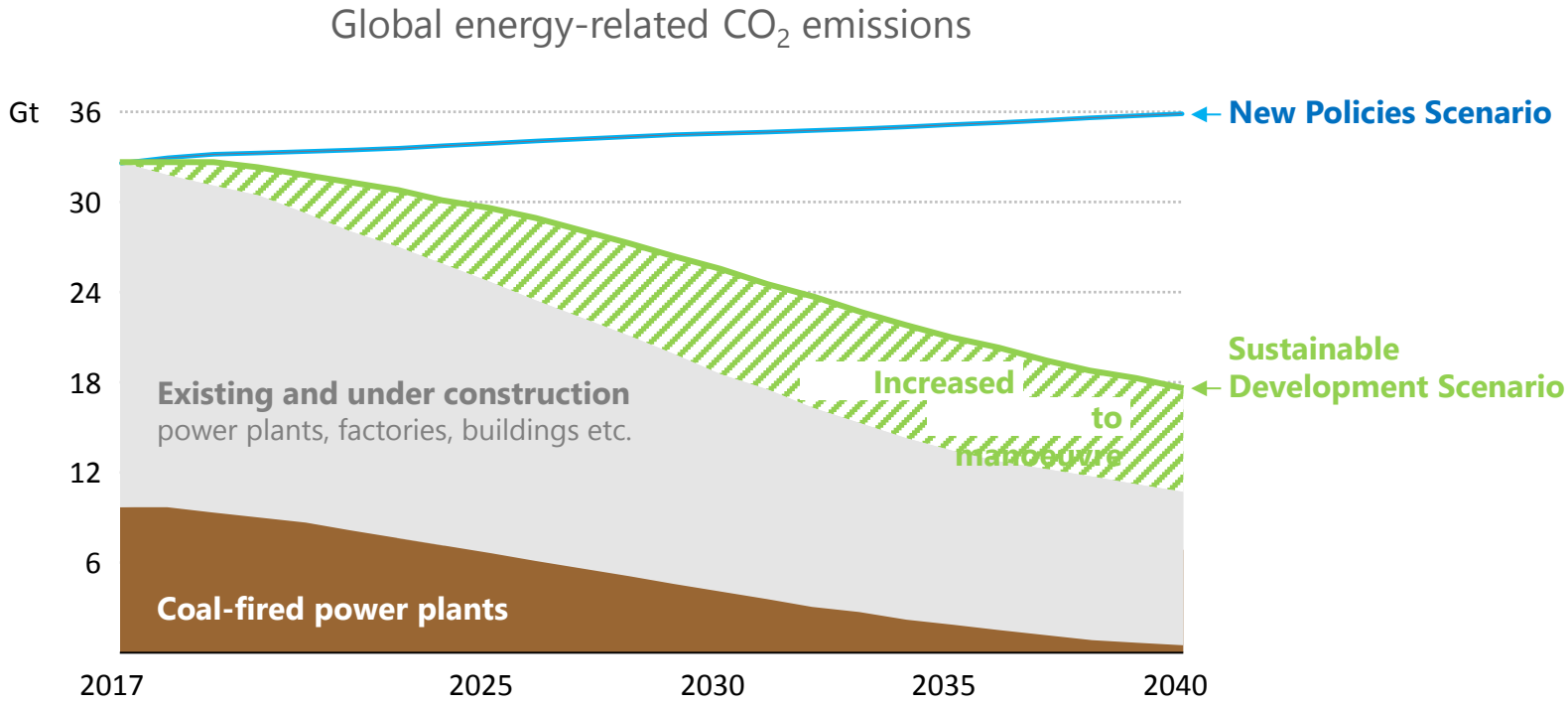


A wide variety of technologies are necessary to meet goals, with energy efficiency and renewables playing lead roles

TCEP 2018: How energy sectors can contribute to the decarbonisation effort



Cumulative emissions reductions between 2017 and 2040 for each sector in the SDS compared to the NPS, including indirect emissions.



Coal plants make up one-third of CO_2 emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation

Tracking Clean Energy Progress 2018

How quickly are technologies and sectors becoming sustainable, and how can governments, companies and others speed up clean energy transitions? The IEA's enhanced *Tracking Clean Energy Progress* provides the most up-to-date and comprehensive assessment of more than 30 technologies and sectors. It plots where clean energy technologies are today and how they can get on track to with the IEA's **Sustainable Development Scenario**, a pathway to achieve the Paris Agreement's "well below 2°C" goal, deliver universal energy access and greatly lower air pollution.

IEA's most rigorous and timely innovation analysis ever indicates a 13% estimated increase for government low-carbon energy RD&D spending in 2017 and, while corporate clean energy R&D dropped slightly in 2017, the five-year trend shows 5% annual growth. Given the importance of innovation to achieve long-term energy transition goals, these increases are important but many innovation gaps remain. As part of our new "Innovation Tracking Framework," IEA experts have highlighted 100 innovation gaps across 38 clean energy technologies to help identify opportunities for both public and private investment.

Summary

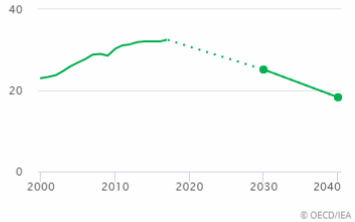
Tracking Clean Energy Progress 2018 – Key High Level Indicators

Is the energy system on track?

The IEA has prepared a set of key indicators that reflect the most important short-term actions that policymakers should focus on to drive the clean energy transition. Learn more about these high-level indicators.

Energy-related CO2 emissions

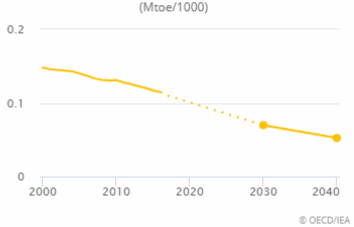
Total CO2 emissions from energy (Gt)



The overall trend of decoupling economic growth from energy-related CO_2 emissions continues despite a disappointing 1.4% increase in emissions in 2017. Read more

Energy Intensity

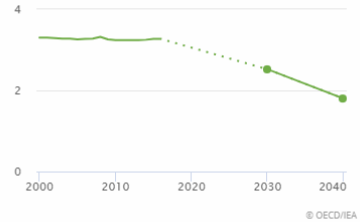
Primary energy demand per unit of GDP (Mtoe/1000)



The improvement in energy intensity slowed down in 2017 due to weaker efficiency policies and low energy prices. Read more

Energy system carbon intensity

CO2 emissions per unit of TFC (MtCO2/Mtoe)



There are signs that global energy supply has become cleaner over the past few years, but faster improvements are needed. Read more

Tracking Clean Energy Progress 2018 – Key High Level Indicators

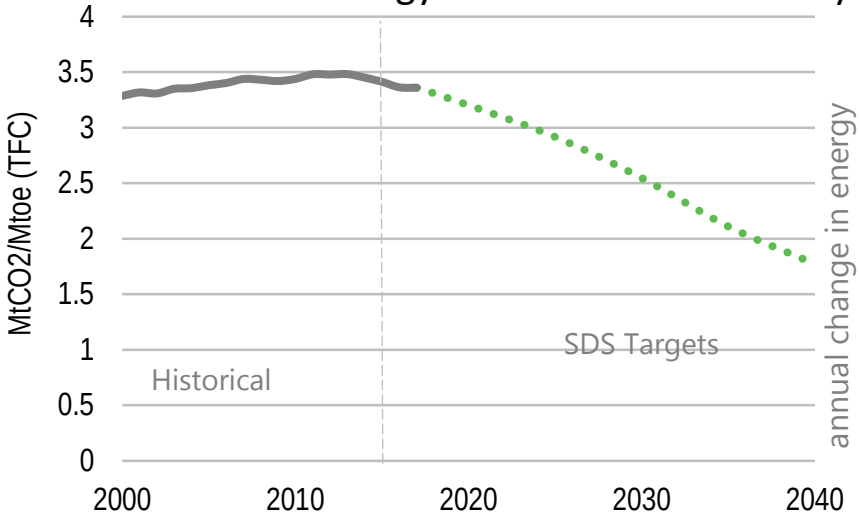
CO_2 Indicators

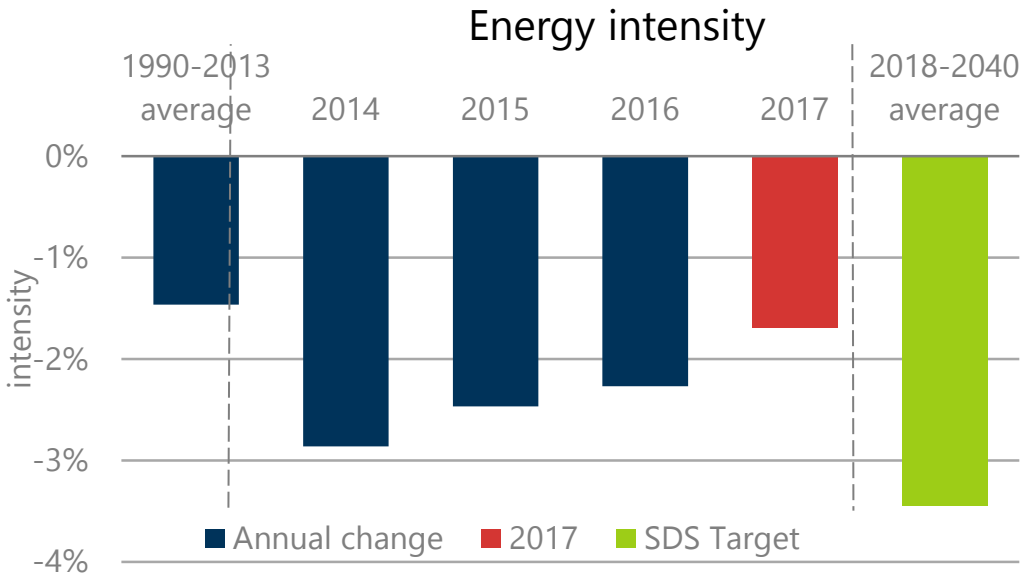
- Aggregate energy sector CO_2 emissions
- Sub- sectoral CO_2 emissions

Clean Energy transitions indicators framework

- Aggregate indicators
  - *Energy sector carbon intensity*
  - *Electricity share of energy consumption*
  - *Primary energy intensity*
  - *Energy efficiency improvement rate*
  - *Investment share of low carbon energy*
  - *Public and private investment in clean energy RD&D*
- Sub- sectoral indicators
  - Power sector (example)
  - *Share of low-carbon power generation in overall power generation*
  - *Average CO_2 intensity of electricity generation*
  - *CO_2 intensity of power generation from new investments*
  - *Share of new low-carbon power generation investment in overall power generation investment*

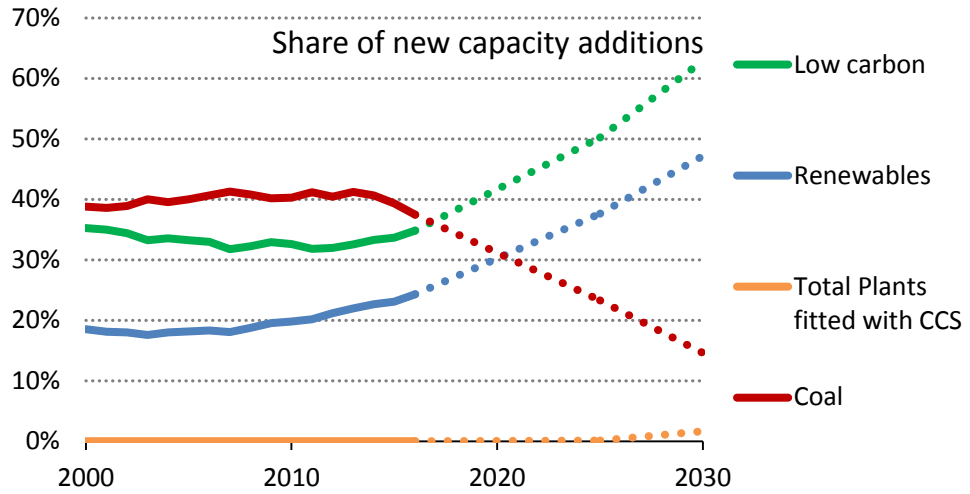
Aggregate Indicators for Clean Energy Transitions

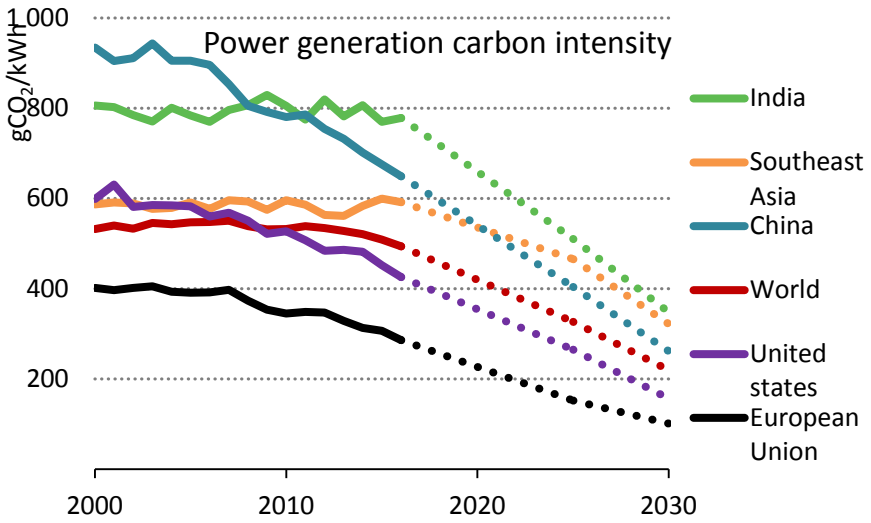




The world's energy supply in 2017 was as carbon intensive as in 2000, it needs to decline by 47% by 2040; Global energy intensity improved by only 1.7% in 2017, but needs to accelerate to 3.4% annually.

Power sector sub-sectoral indicators





Generation from low-carbon technologies needs to increase to nearly two-thirds by 2030; the carbon intensity of power generation needs to more than halve by 2030

Tracking Clean Energy Progress

Informing Energy Sector Transformations

The IEA's newly-enhanced Tracking Clean Energy Progress provides a comprehensive and rigorous assessment of a full range of energy technologies and sectors that are critical in a global clean-energy transition. It includes the most up-to-date information for where technologies are today and where they need to be according to the IEA's **Sustainable Development Scenario**, a pathway to reach the Paris Agreement well below 2°C climate goal, deliver universal energy access and significantly lower air pollution.

Are clean energy technologies on track?

Some technologies have made tremendous progress in 2017 – particularly solar PV, LEDs and EVs – but most are not on track. Energy efficiency improvements have slowed and progress on key technologies like carbon capture and storage remains stalled.

Click on a sector or technology for a detailed assessment of recent trends and progress.

● On track ● More efforts needed ● Not on track 🔎 One to watch

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
- CCUS in power

Buildings
- Building envelopes
- Heating
- Cooling 🔎
- Lighting
- Appliances & equipment
- Data centres & networks

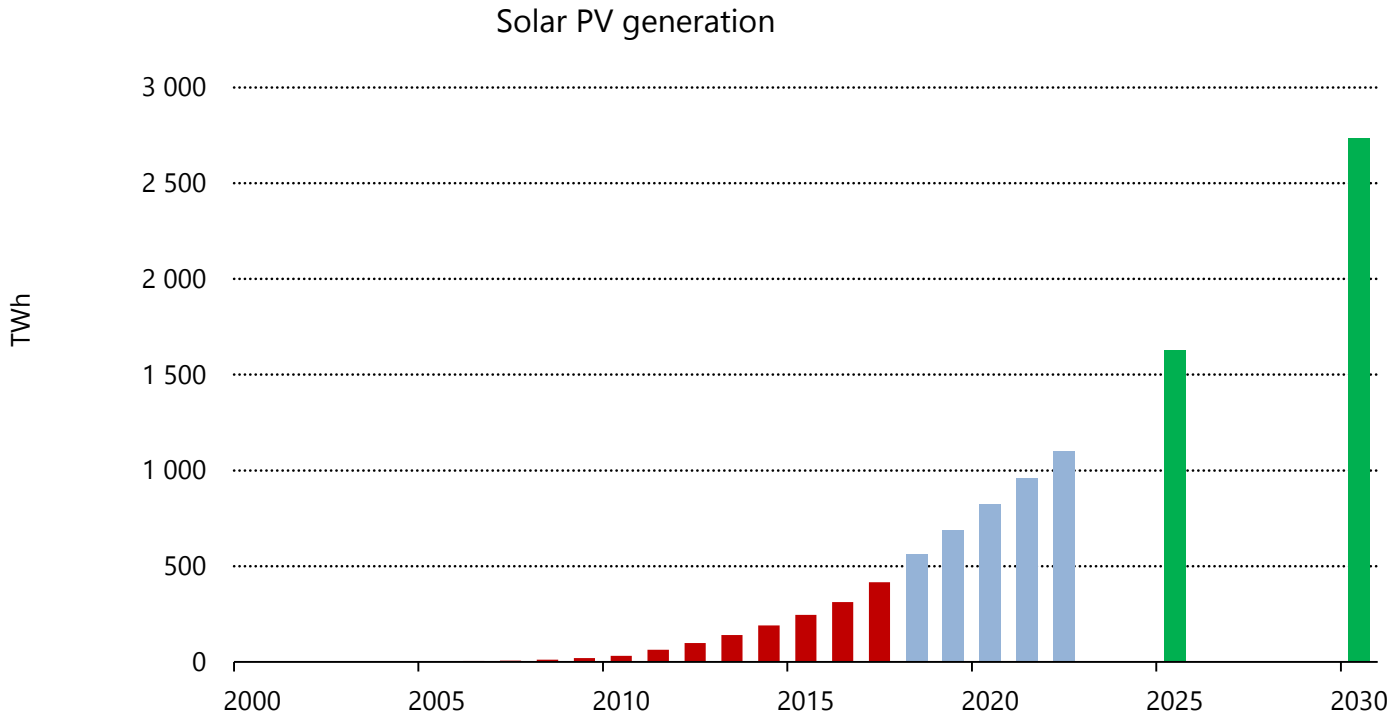
Transport
- Electric vehicles
- Fuel economy of cars & vans
- Trucks & buses
- Transport biofuels
- Aviation
- International shipping 🔎
- Rail

Industry
- Chemicals 🔎
- Iron & Steel
- Cement
- Pulp & paper
- Aluminium
- CCUS in industry & transformation

Energy integration
- Energy storage 🔎
- Smart grids
- Demand response
- Digitalization
- Hydrogen
- Renewable heat

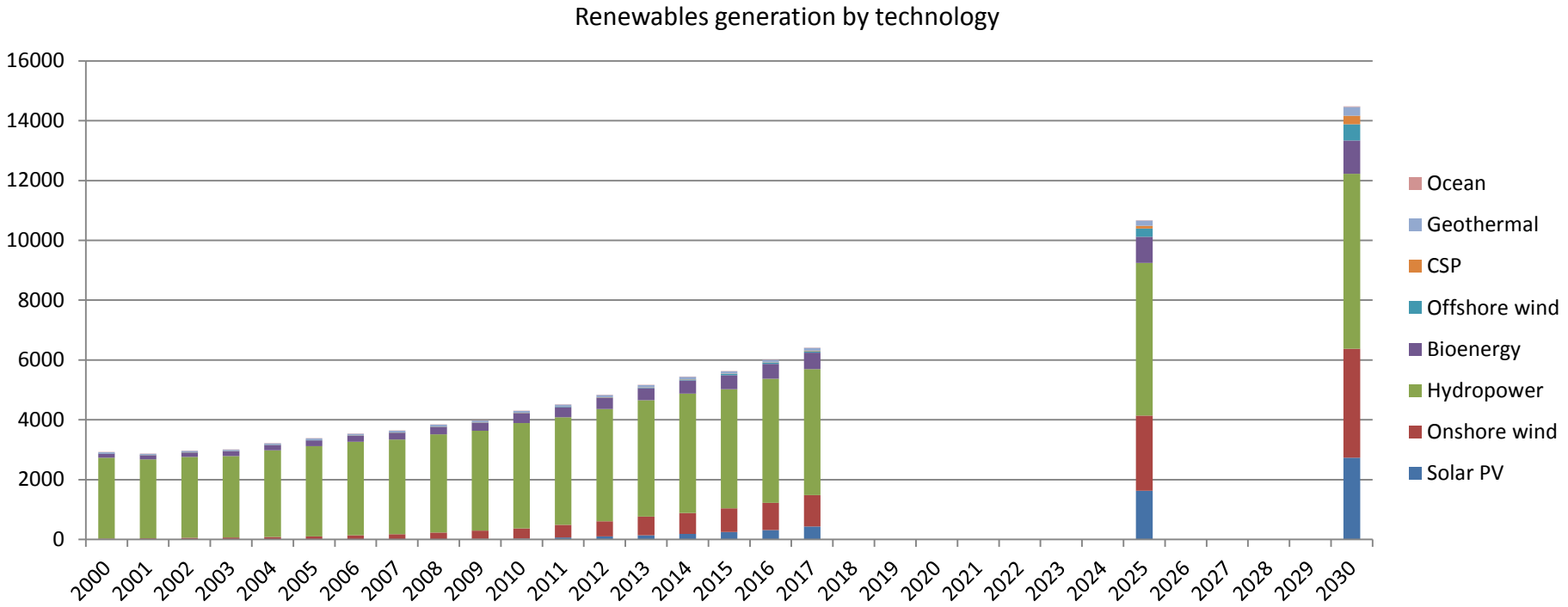
About the TCEP methodology

Solar PV is the only renewable technology on track



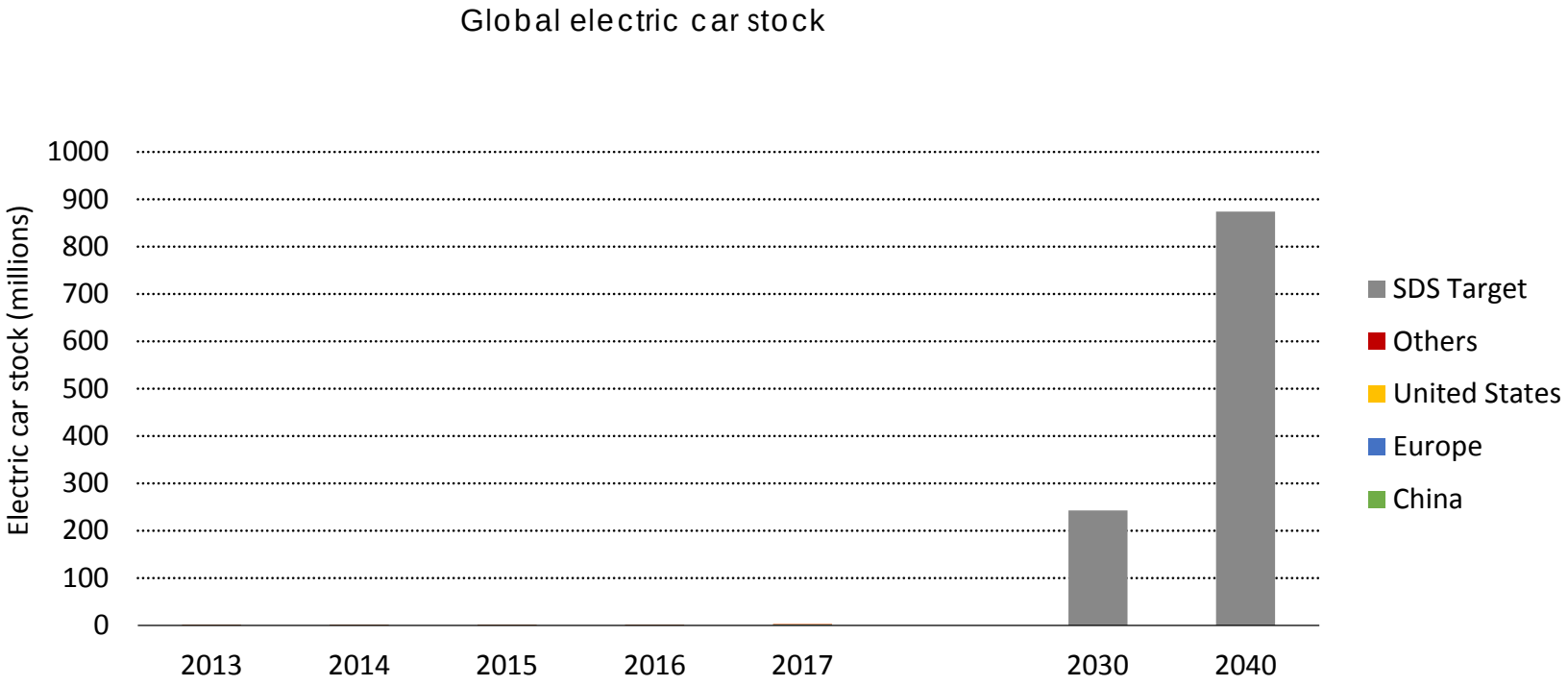
Following another record year in 2017, solar PV continues to lead the expansion in renewable power, driven by unprecedented growth in China and strong deployment in the US and India

Renewables growth is not fully on track for what is needed



Renewables saw highest rate of generation growth among all energy sources in 2017, but deployment must further speed up to meet 2030 targets and beyond

EV growth has grown rapidly; strong momentum needs to continue



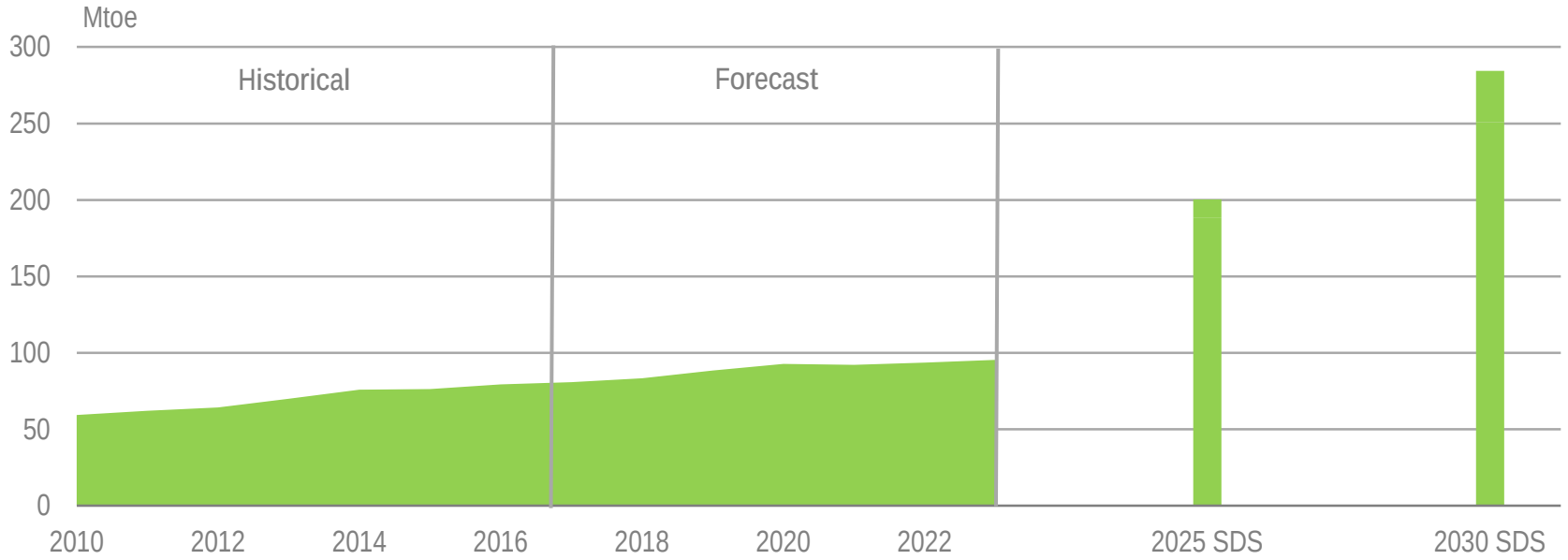
The number of passenger electric cars on the road passed 3 million in 2017, but it needs to grow to 240 million by 2030 in the SDS

Beyond electric cars: the future of e-mobility

The future of e-mobility extends to 2/3-wheelers, low speed vehicles, buses, trucks, and autonomous/connected/shared vehicles

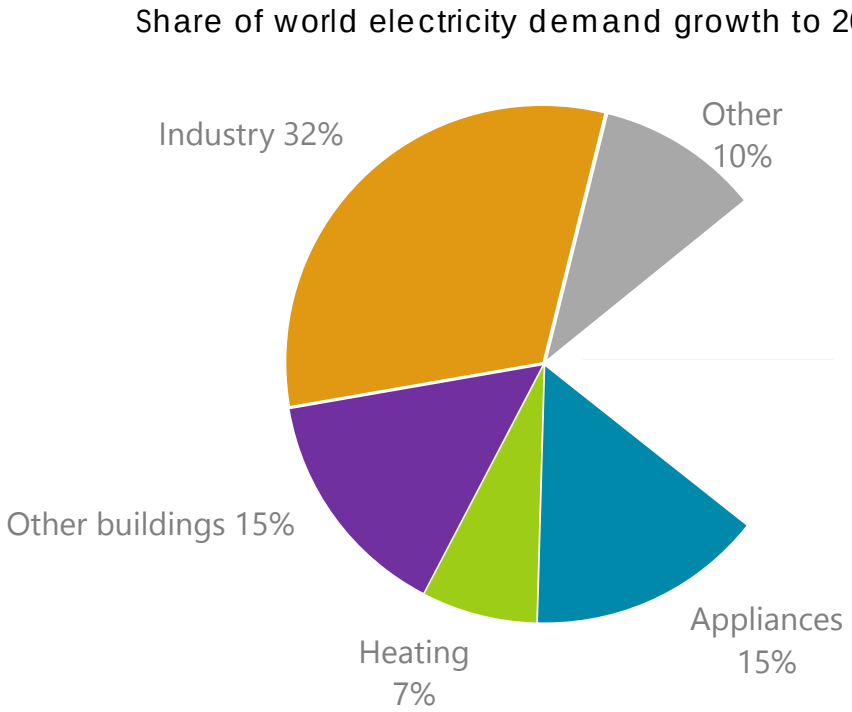
Transport biofuels are far from reaching their potential

Transport biofuels production



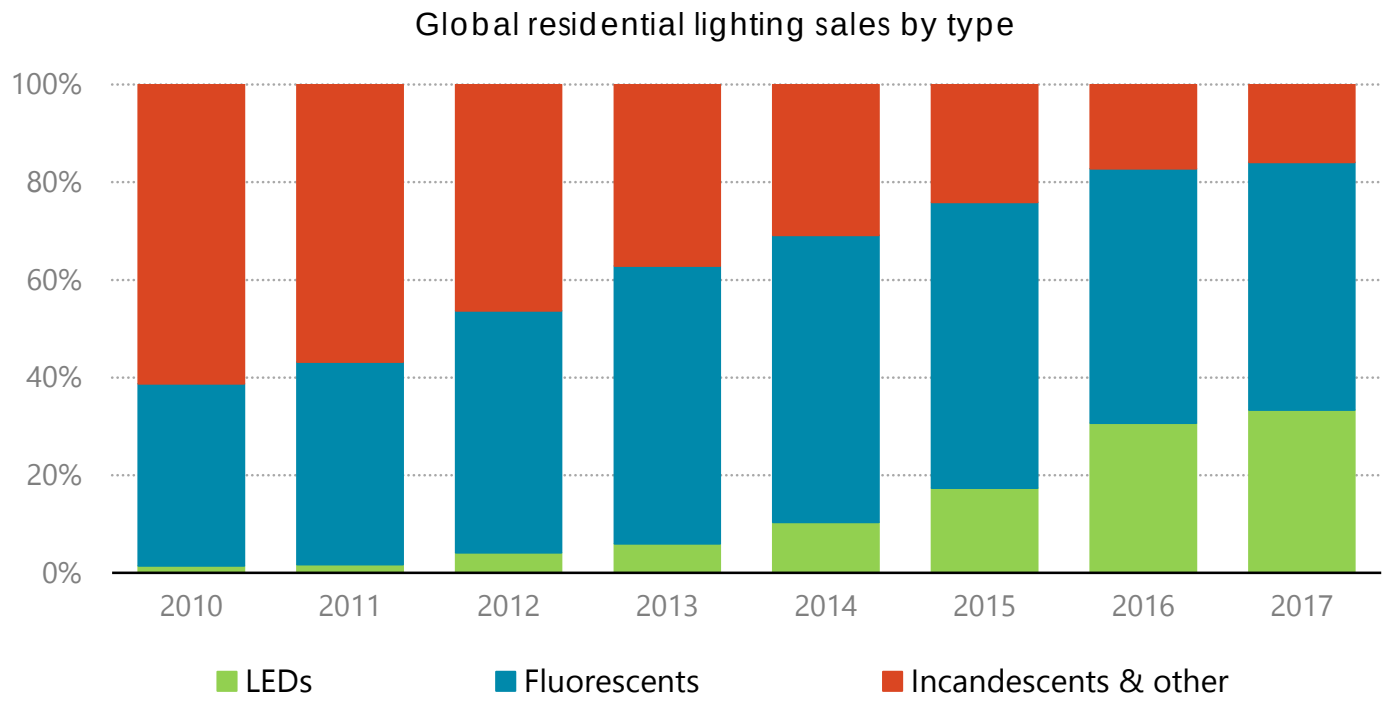
Production of transport biofuels grew by 2% in 2017, but transport biofuels need to triple by 2030 to meet SDS

Cooling is driving electricity demand growth



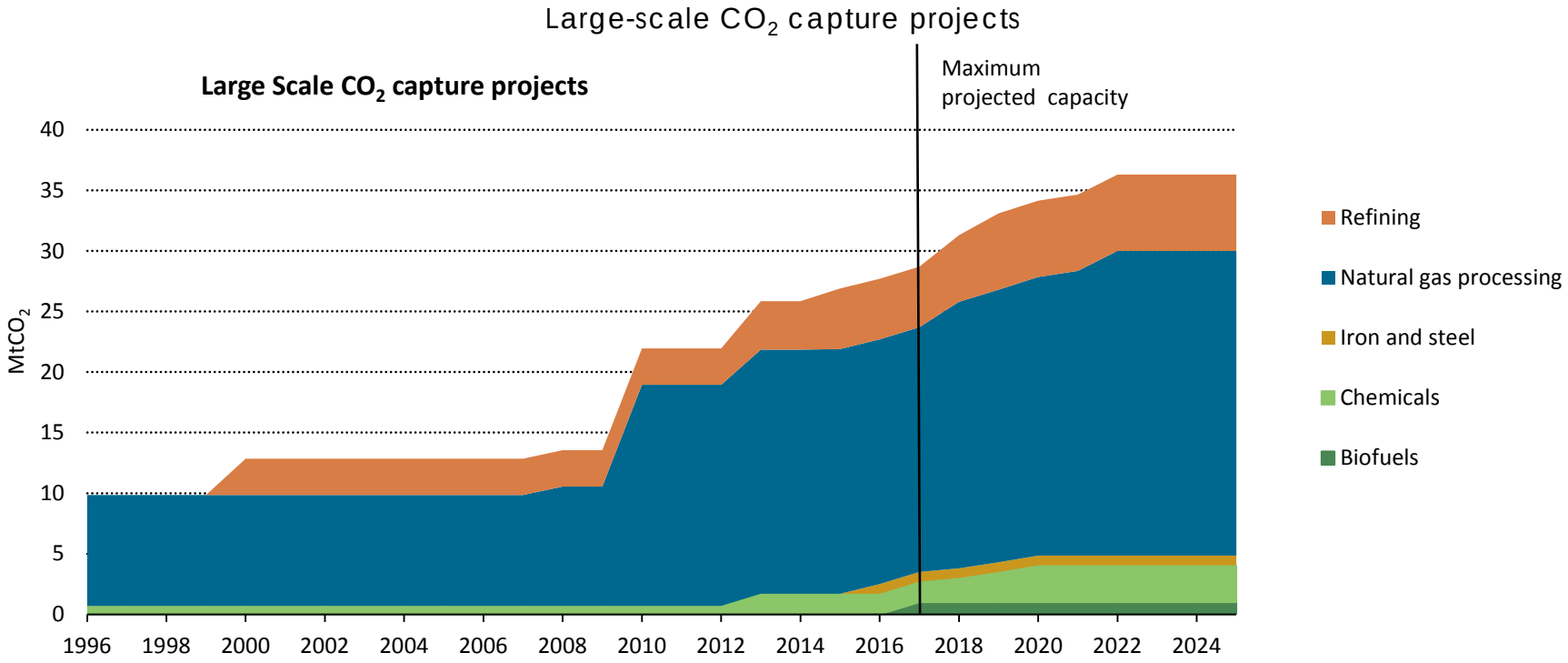
Electricity demand for air conditioning could more than triple by 2050 – requiring as much new electricity capacity as all of the United States, EU and Japan today – but better policies could cut it in half

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



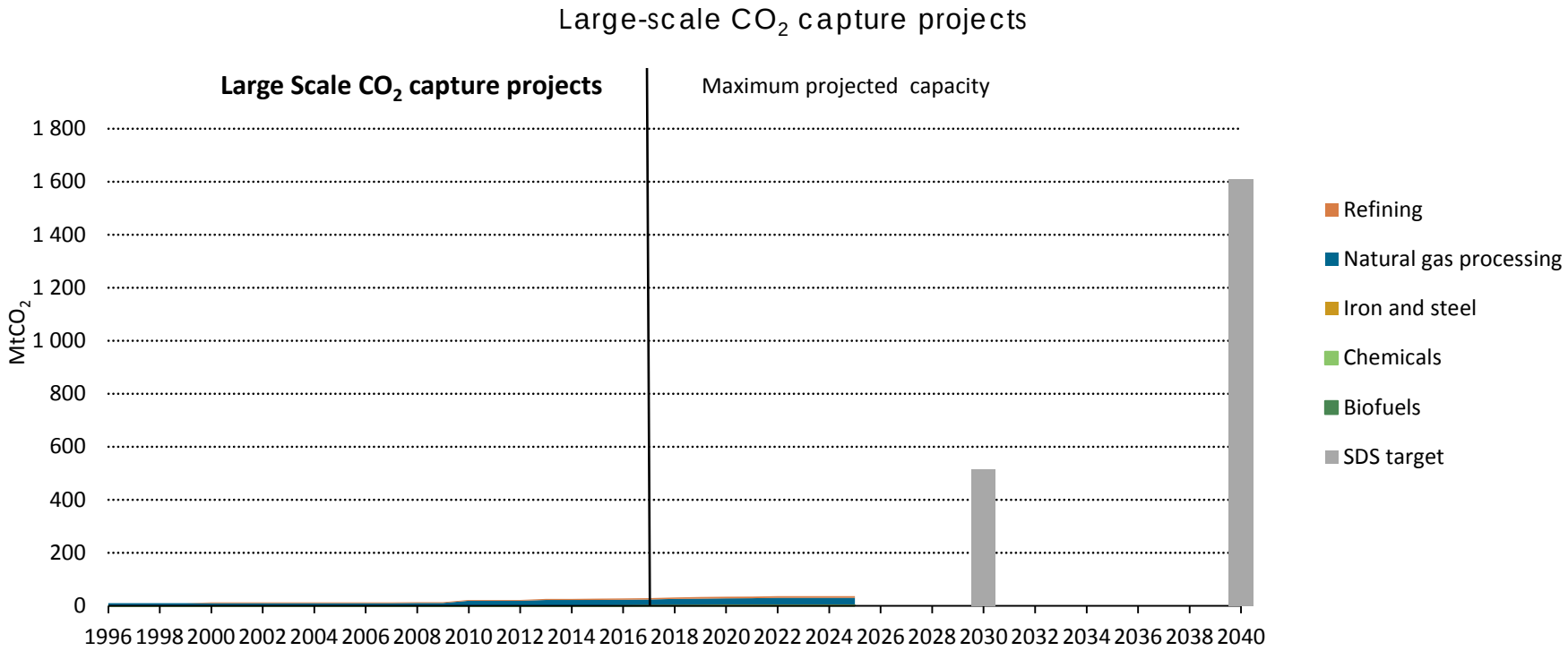
LEDs are on track to dominate residential lighting by around 2020;
3.3 billion LEDs were installed in 2017, underpinned by falling costs & government policy

Industry CCUS pipeline is growing...



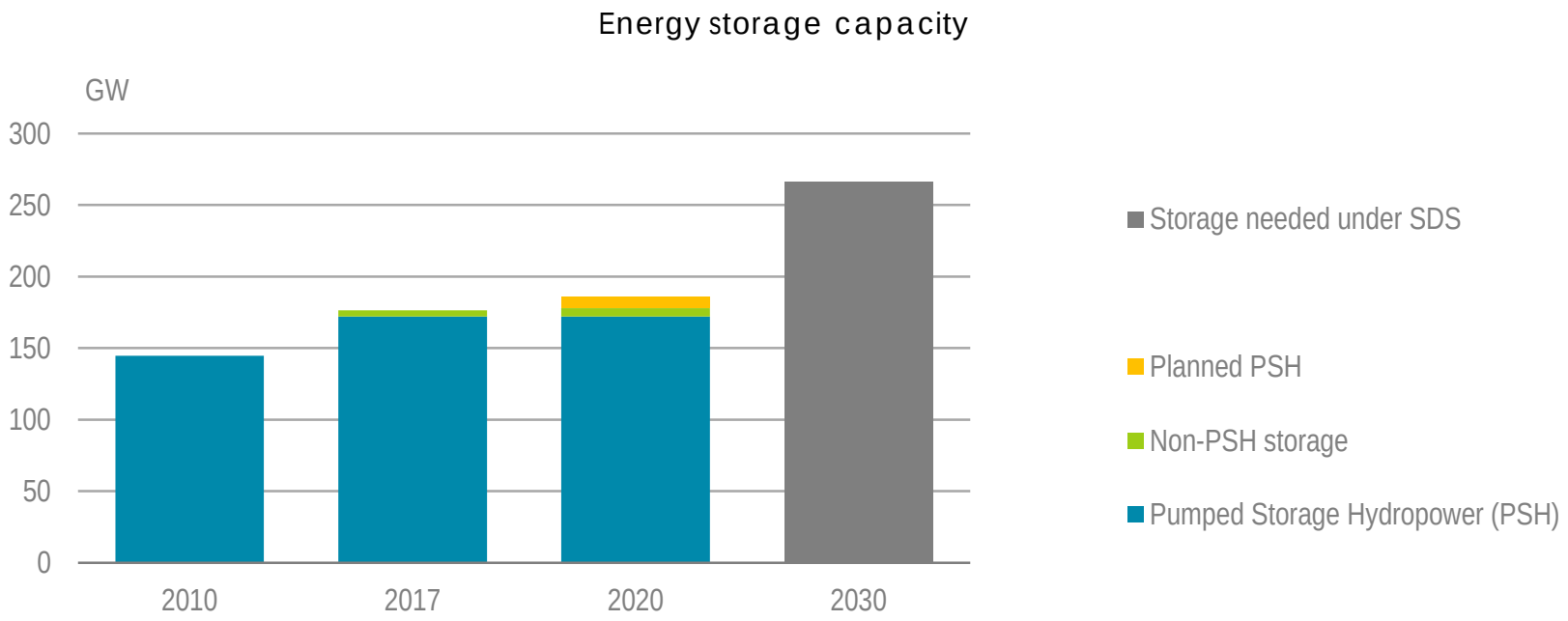
The global portfolio of large-scale CCUS projects continued to expand in 2017, with one additional industrial project linked to bioenergy coming into operation (in the U.S.)

...but industry and fuel transformation remains way off track....



CCUS is one of the few existing mitigation technology options for industry, but remains woefully off track to achieve the 2030 target.

Energy storage lost its on track status and needs improvement



Additional utility-scale deployments for all storage technologies (excluding pumped hydro) remained flat in 2017 (620 MWh). This is insufficient to meet the SDS, which requires 80 GW of capacity additions by 2030.

Tracking clean energy innovation progress

Last updated **Thursday, 9 August 2018**

What's changed?

IEA's most rigorous and timely innovation analysis ever indicates a 13% estimated increase for government low-carbon energy RD&D spending in 2017 and, while corporate clean energy R&D dropped slightly in 2017, the five-year trend shows 5% annual growth. Given the importance of innovation to achieve long-term energy transition goals, these increases are important but many innovation gaps remain. As part of our new "Innovation Tracking Framework," IEA experts have highlighted 100 innovation gaps across 38 clean energy technologies to help identify opportunities for both public and private investment.

Summary

Public spending on energy RD&D

Government RD&D spending on low-carbon energy technologies grew by 13% in 2017 – a very welcome increase after years of decreases and stagnation. Learn more

The IEA works around the world to support accelerated clean energy transitions that are

enabled by real-world SOLUTIONS

supported by ANALYSIS

and built on DATA

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