



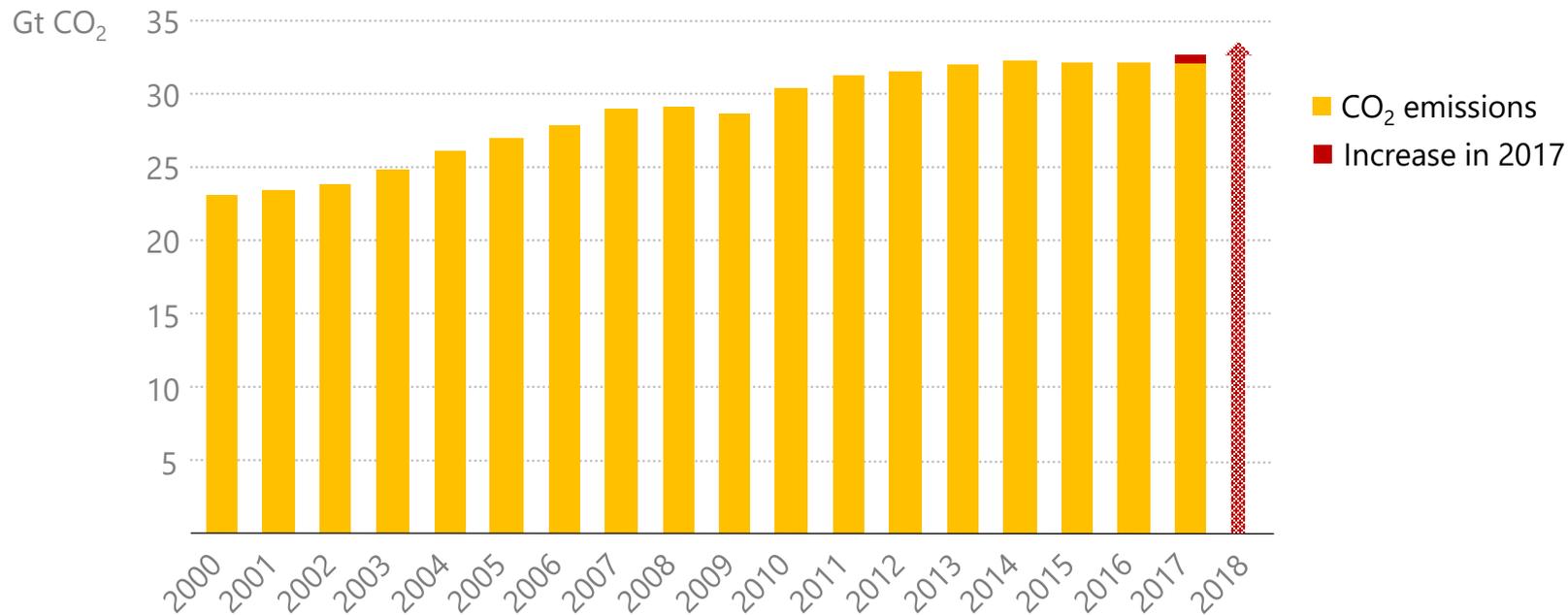
Role of renewable energy to address climate challenges

International Energy Agency, Ms Sylvia Beyer, G20/G7 coordinator

G20 CSWG1, 15 February 2019, Tokyo

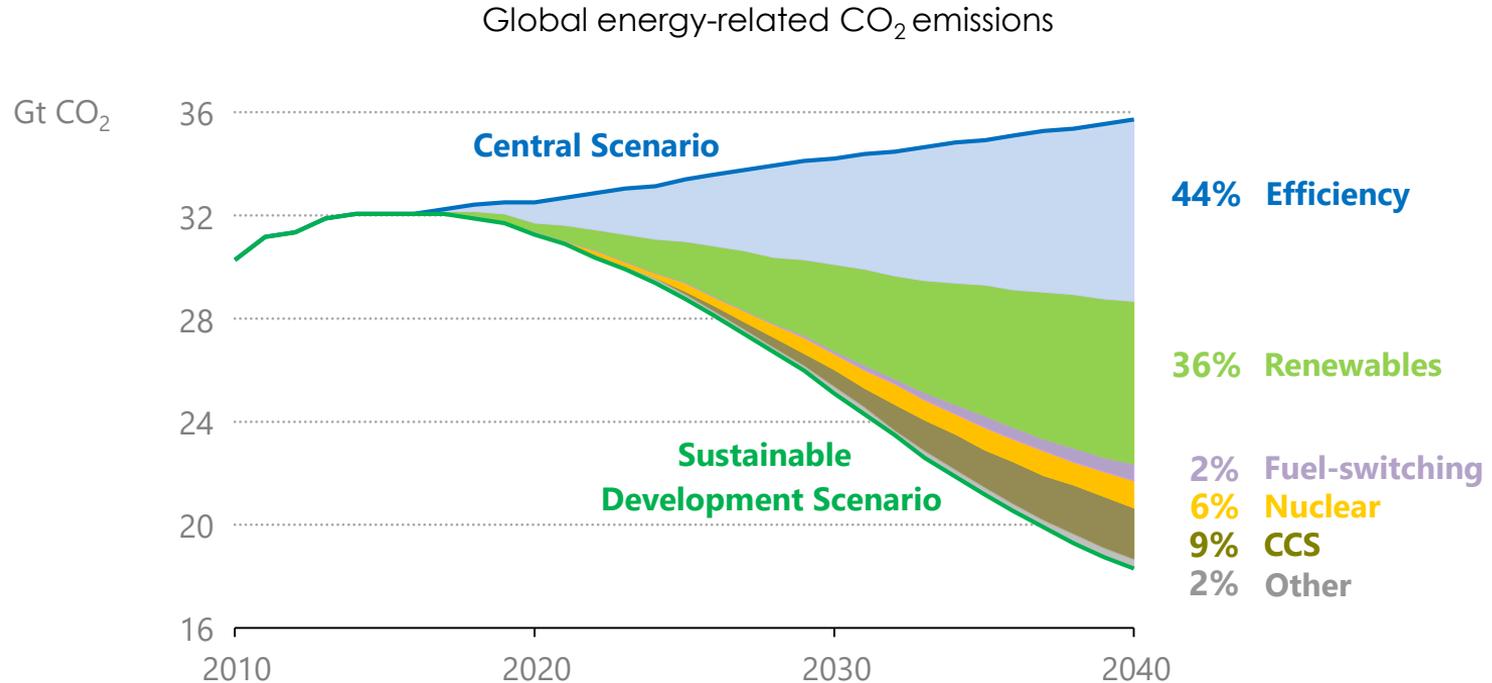
Paris Agreement Goals are slipping out of reach

Global energy-related CO₂ emissions



Global emissions increased in 2018 – again – towards a historic high. The G20 accounts for around 80%. Moving towards the Paris goals, rather away from them, will require action by the G20.

The IEA's Sustainable Development Scenario (SDS) : Early emissions peaking, followed by sharp decline



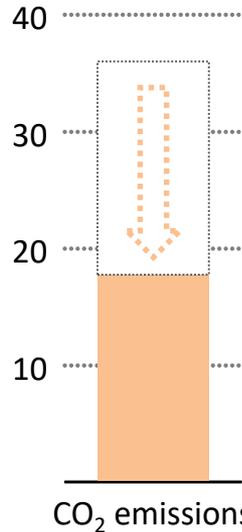
The IEA Paris Agreement scenario sets out an energy transition pathway for sustainable development. A wide variety of technologies are necessary to meet goals, with energy efficiency and renewables playing lead roles.



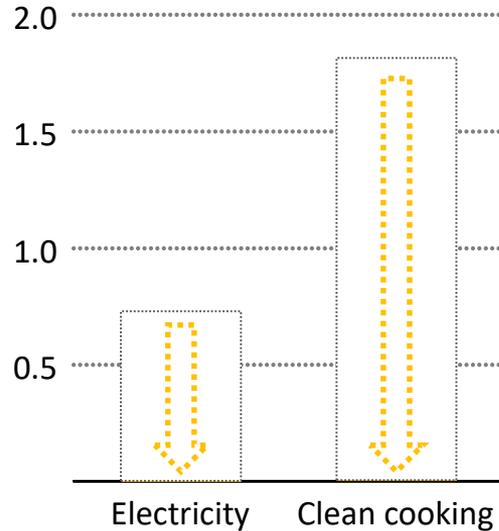
The IEA Sustainable Development Scenario reduces CO₂ emissions, while also tackling air pollution and achieving universal energy access thanks to higher renewables and energy efficiency.

Outcomes of the Sustainable Development Scenario vs. New Policies Scenario, 2040

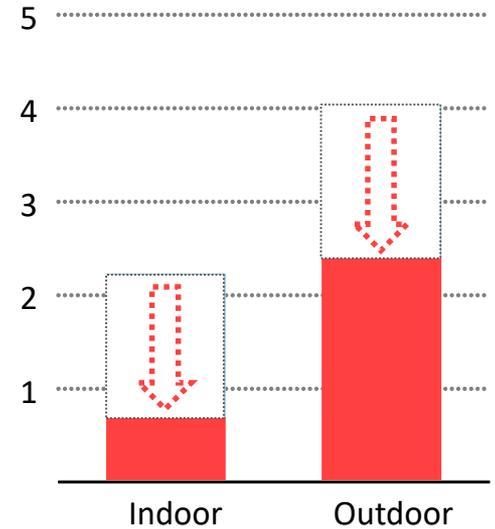
Carbon dioxide emissions
(Gt CO₂)



Population without access to modern energy (billion people)



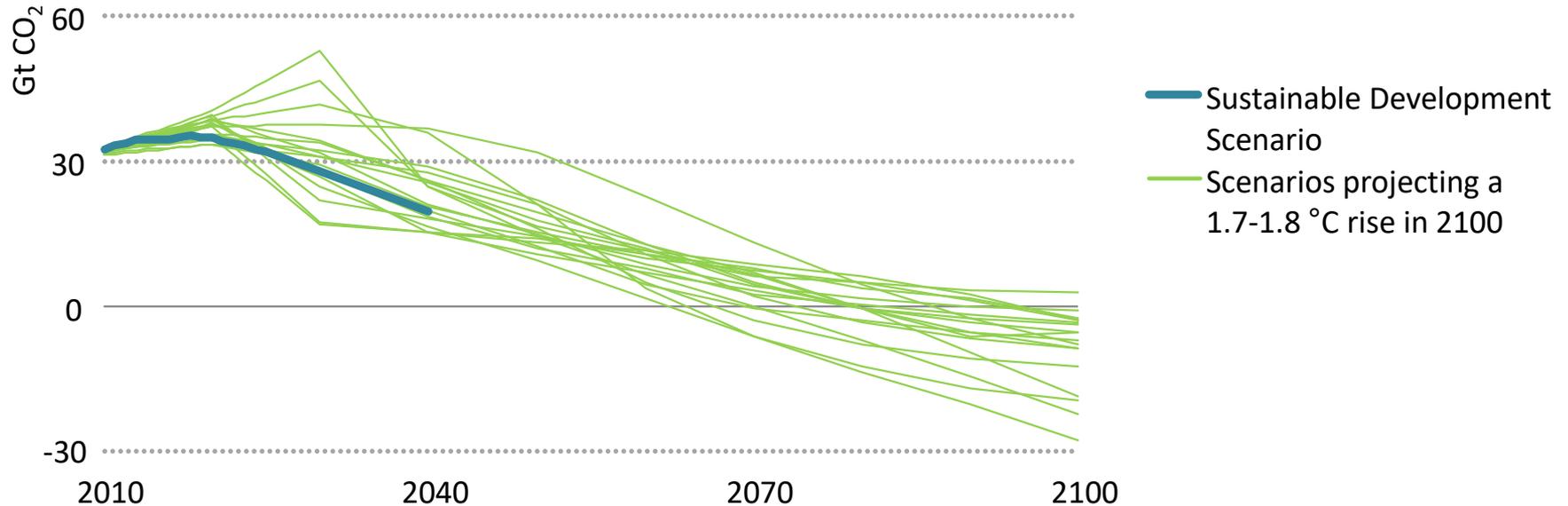
Premature deaths related to air pollution (billion)



In an integrated approach, universal energy access can be reached while also achieving climate goals and reducing air pollutant emissions, at little extra cost

SDS: CO₂ emissions decline in line with Paris Agreement goals

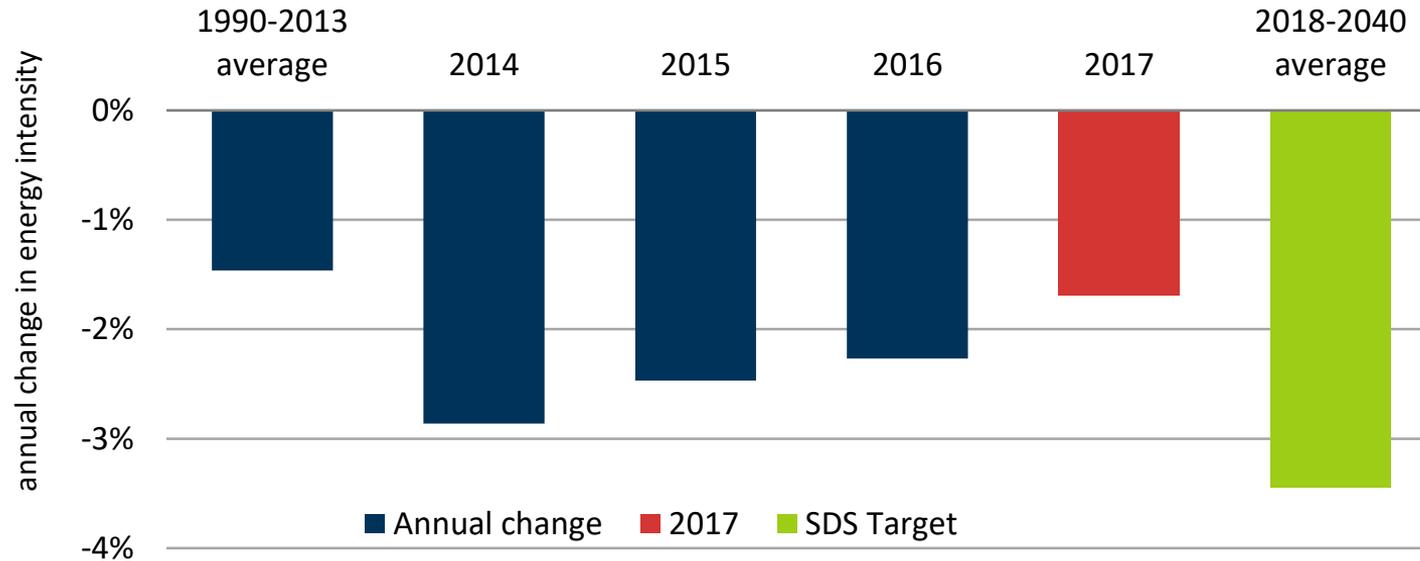
CO₂ emissions in the Sustainable Development Scenario and other “well below 2 °C” scenarios



The CO₂ emissions trajectory to 2040 in the SDS is at the lower end of a range of scenarios projecting a global temperature rise of 1.7-1.8 °C in 2100

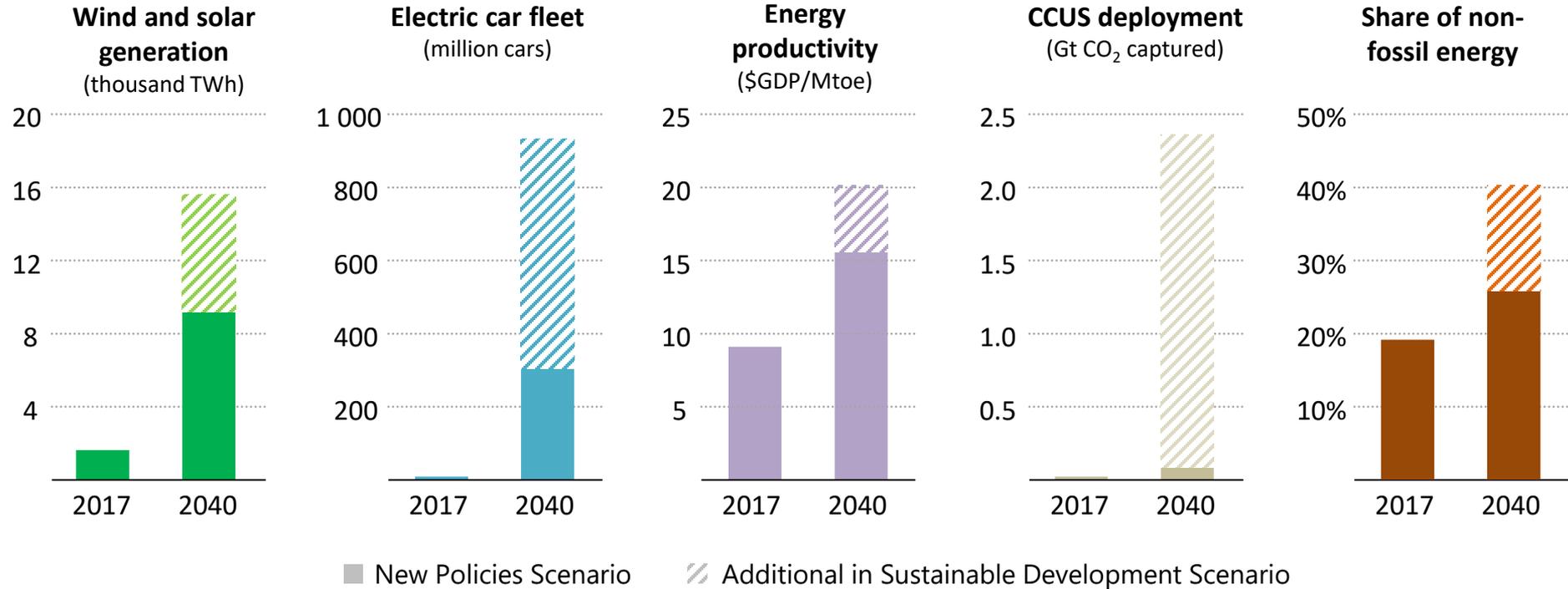
Energy efficiency needs improvement

Historical energy intensity improvement and SDS target



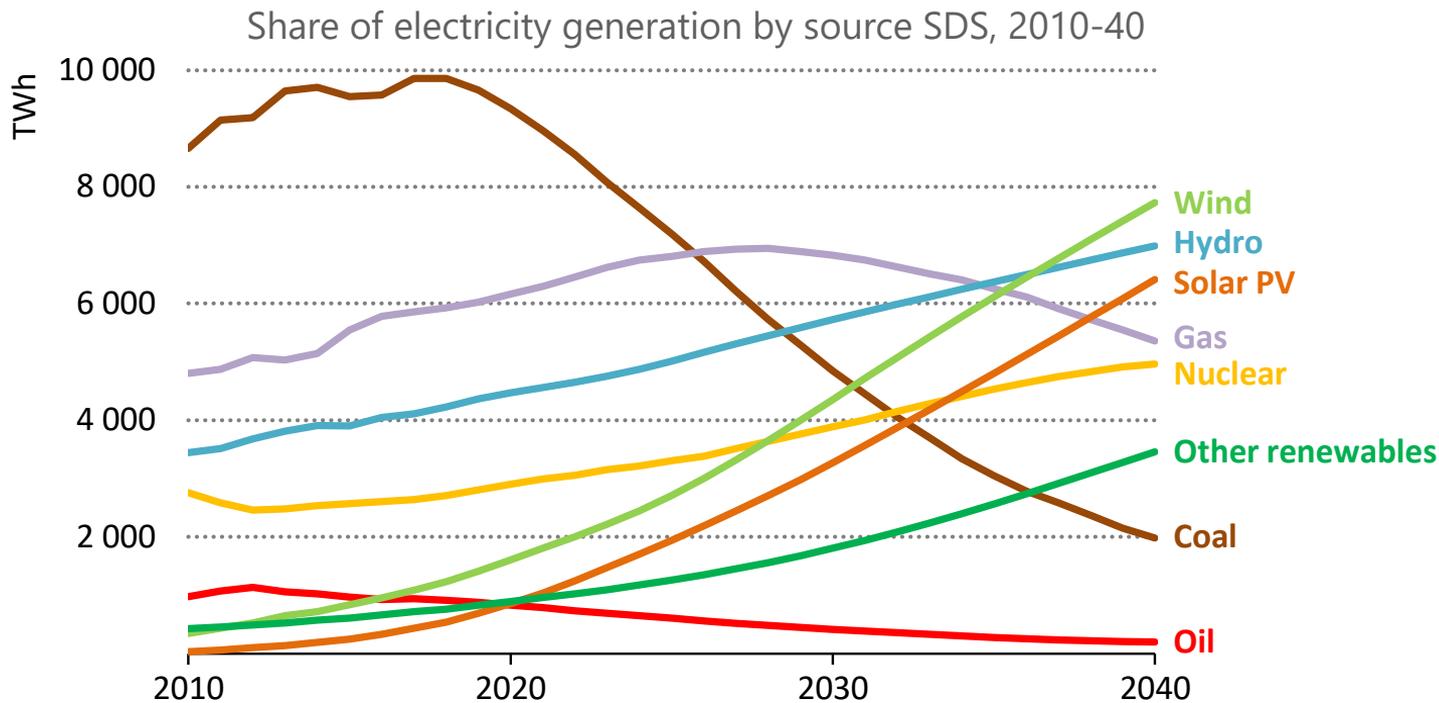
The world's energy supply in 2017 was as carbon intensive as in 2000, it needs to decline by 47% by 2040; Global energy intensity improved by only 1.7% in 2017, but needs to accelerate to 3.4% annually.

SDS: Renewables, electric vehicles; CCUS, energy productivity all ramp up



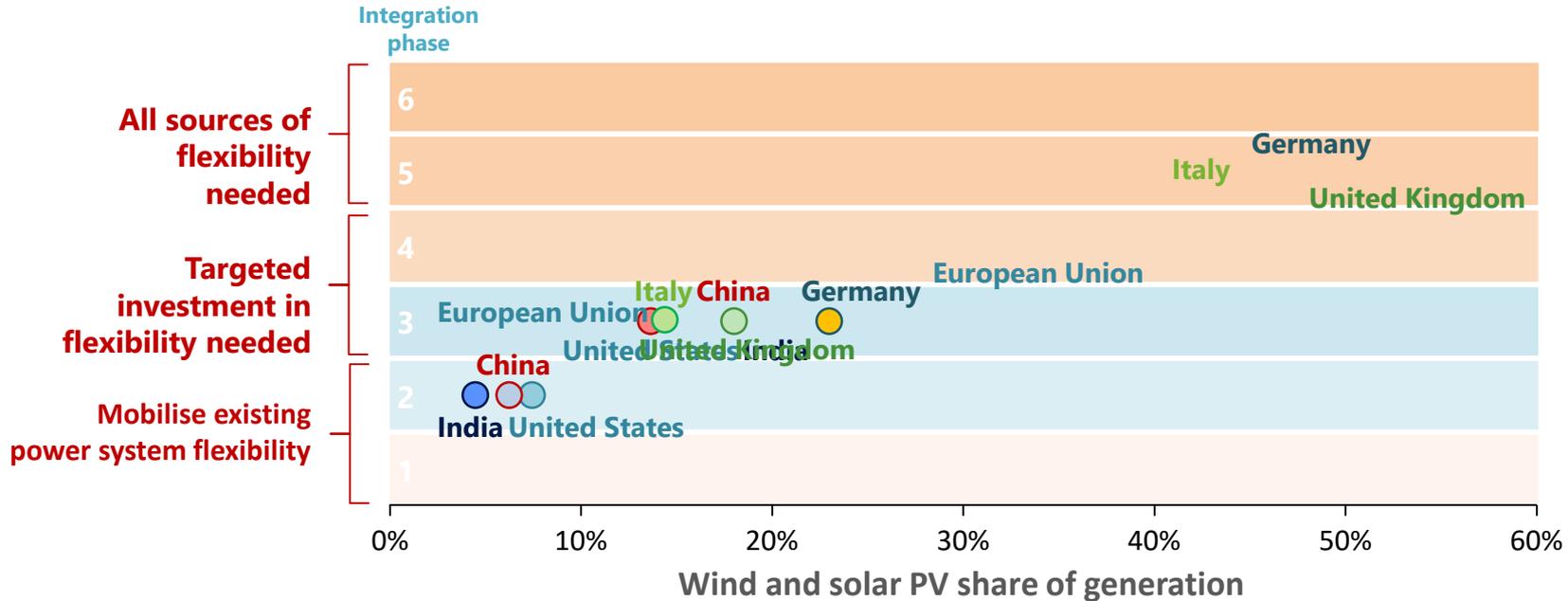
A rapid acceleration in energy transitions is required to simultaneously tackle climate change, achieve universal energy access and reduce the impacts of air pollution

SDS: Dramatic Renewables-led transformation of Power Systems



By 2040, the share of wind and solar reaches 38% globally, raising flexibility needs at unprecedented scale from dispatchable power plants, stronger grids, energy storage, and demand-side response

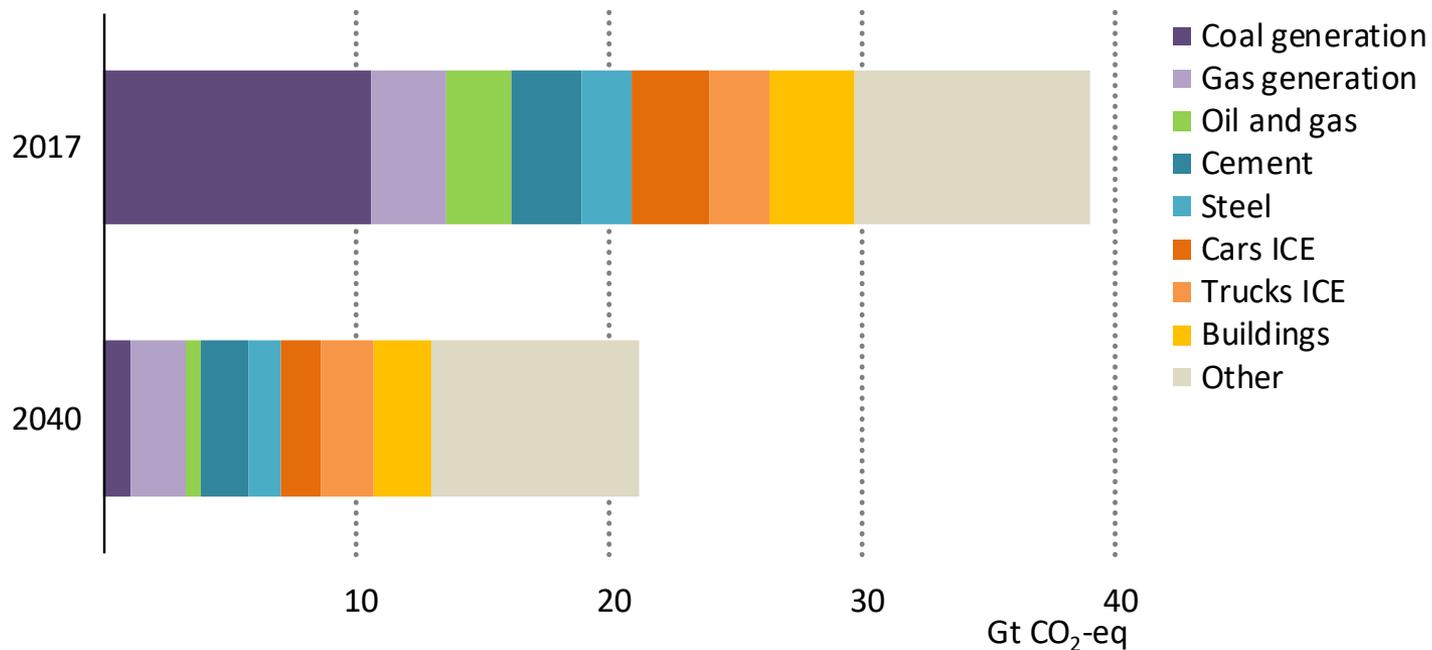
Phases of integration with variable renewables share, 2017, 2030



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

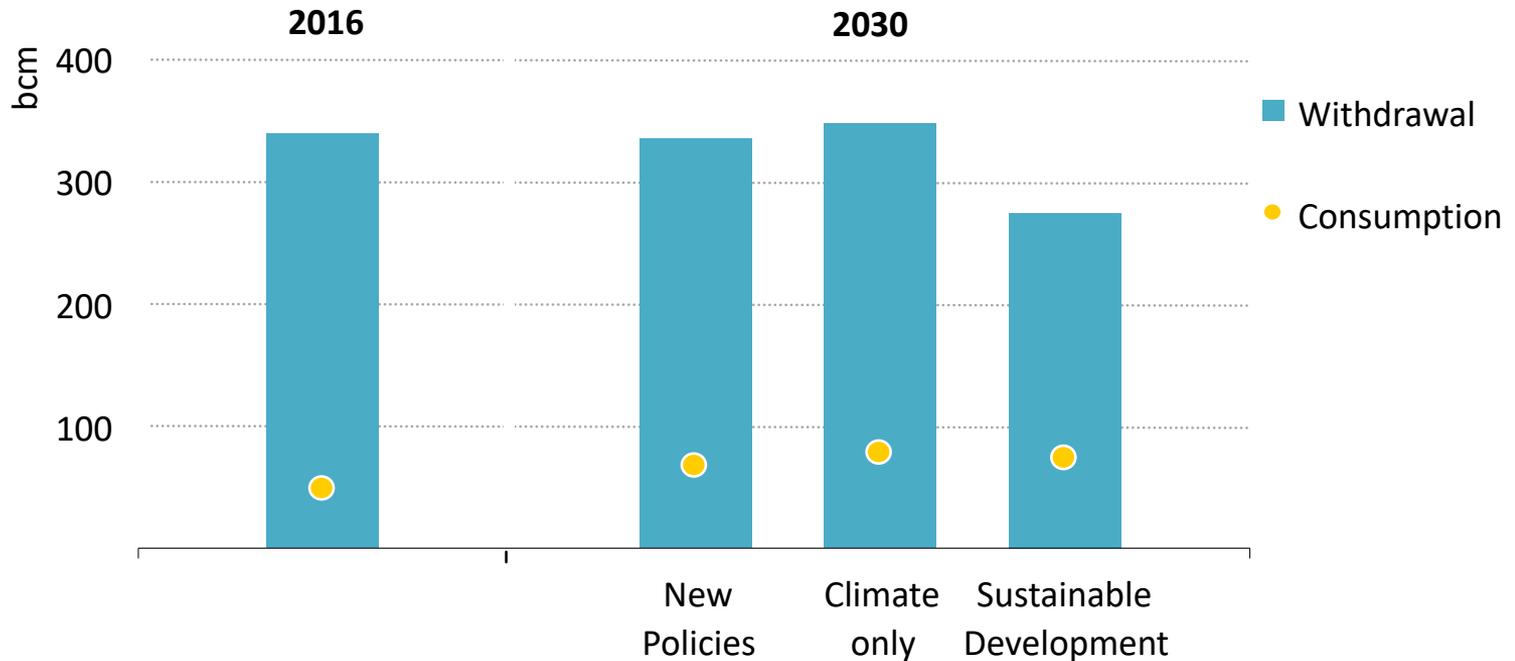
Efforts needed beyond the power sector

GHG emissions from selected sectors, 2017, and in the Sustainable Development Scenario, 2040



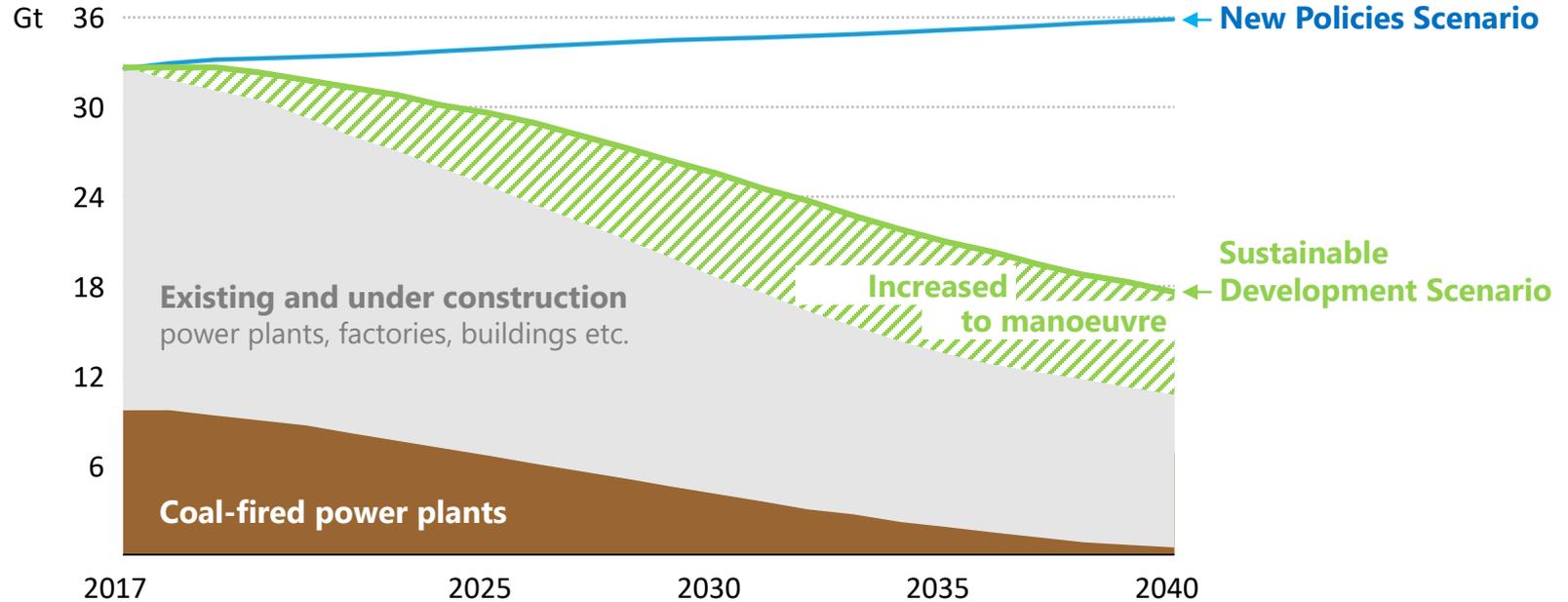
Eight source categories account for three-quarters of today's energy-related GHG emissions; power sector emissions drop by 76% by 2040 in the SDS

Global water use by the energy sector by scenario



A focus on an integrated approach with stronger contribution of wind and solar and energy efficiency results in the lowest level of water withdrawals in 2030 than high nuclear, CCS or bioenergy.

Global energy-related CO₂ emissions



Coal plants make up one-third of CO₂ emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation

- Paris Agreement and COP24 Paris rule book will require significant efforts on energy efficiency and renewable energy
- There is no single solution to turn emissions around: renewables, efficiency & a host of innovative technologies, including storage, CCUS & hydrogen, are all required
- The rapid growth of electricity brings huge opportunities; but market designs need to deliver both electricity *and* flexibility to keep the lights on
- Greater use of bioenergy, solar, wind, & other renewables – is needed beyond the electricity sector
 - Better alignment of energy efficiency and renewable energy policies
 - Enhanced direct renewable heat uses
 - Stronger renewables penetration in industry, including through hydrogen-based fuels & feedstocks
 - Renewables require less water than thermal power and innovations drive down water usage



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