



# The Sustainable Development Scenario

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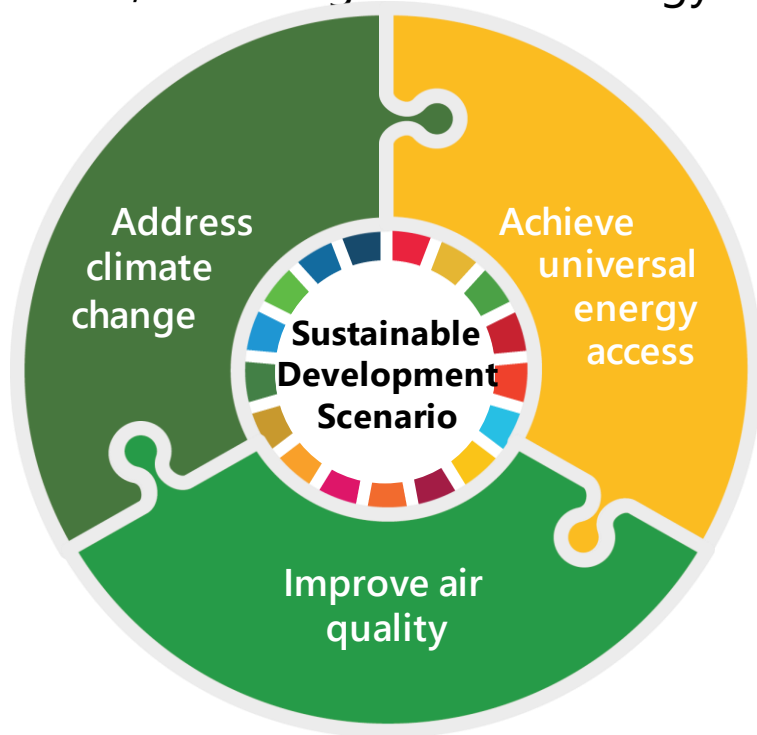
# Context

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- The energy world is marked by a series of deep disparities, between:
  - The promise of energy for all, while 850 million people remain without access to electricity
  - Better awareness of the impacts of air quality on public health, as pollution in cities continues to rise
  - The need for rapid cuts in greenhouse gas emissions, while these emissions reach historic highs
- Cost reductions & digitalisation are boosting new technologies, but they still need a helping hand from policy
- More than ever, energy decision makers need to take a hard, evidence-based look at the choices ahead
- The *World Energy Outlook* does not forecast what will happen; it explores different possible futures:
  - What if the world continues on its current path, with no additional changes?
  - What if we reflect today's policy intentions and targets? This is the Stated Policies Scenario (STEPS)
  - What if we meet sustainable energy goals in full? This is the Sustainable Development Scenario (SDS)

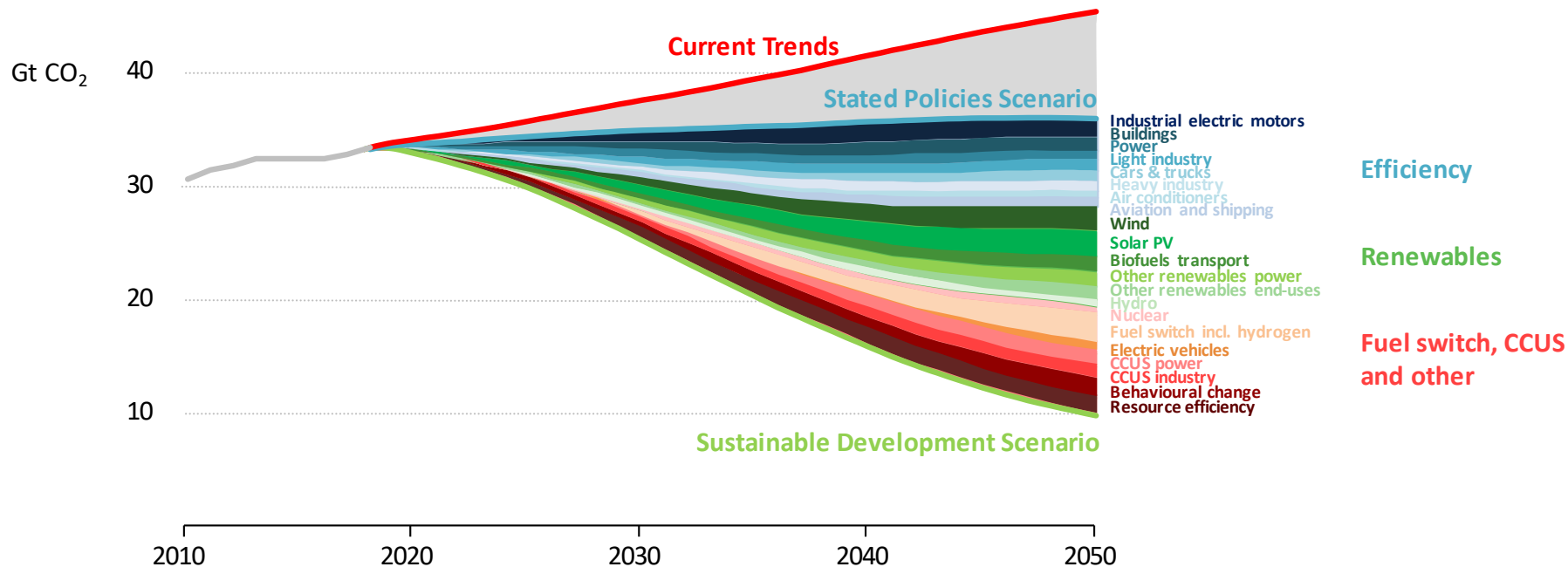
# An integrated strategy for energy & sustainable development

- The Sustainable Development Scenario reduces CO<sub>2</sub> emissions while also tackling air pollution, achieving universal energy access



# No single or simple solutions to reach sustainable energy goals

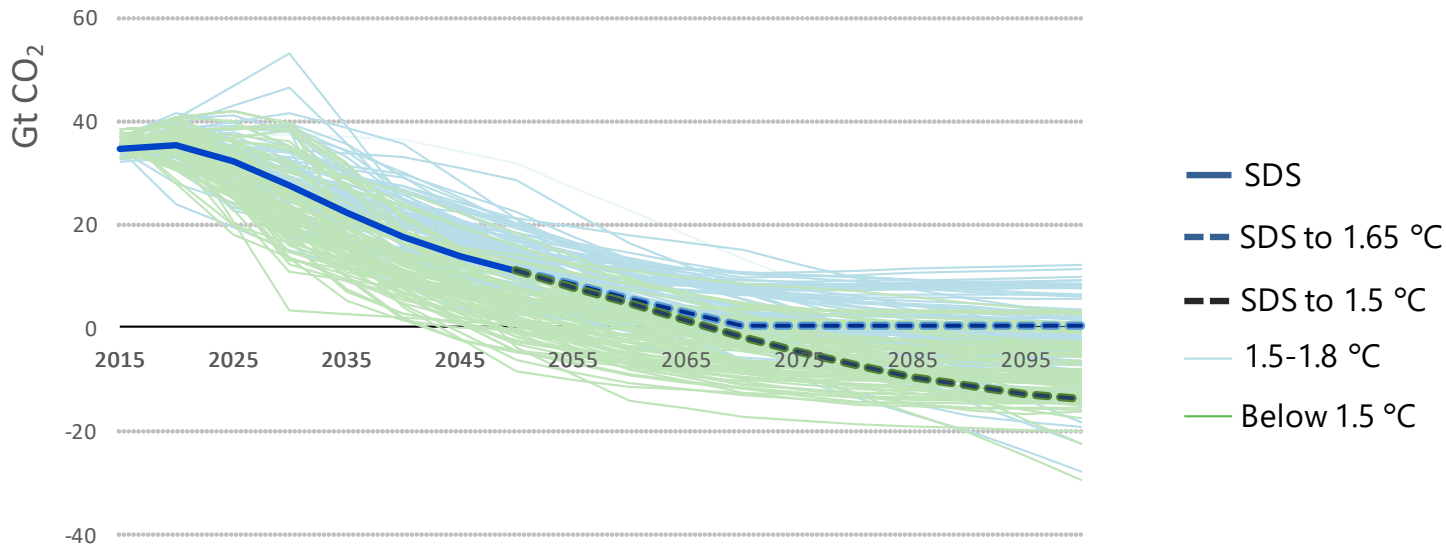
Energy-related CO<sub>2</sub> emissions and reductions in the Sustainable Development Scenario by source



A host of policies and technologies will be needed across every sector to keep climate targets within reach, and further technology innovation will be essential to aid the pursuit of a 1.5°C stabilisation

# How does the SDS compare to other climate scenarios?

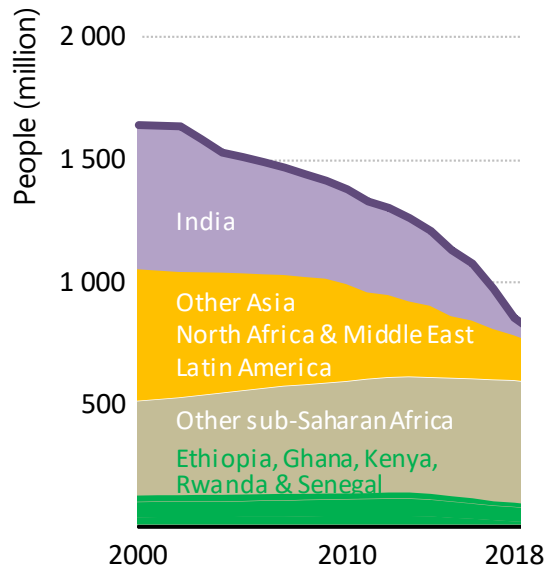
Energy sector CO<sub>2</sub> emissions in the Sustainable Development Scenario and other “well below 2 °C” scenarios



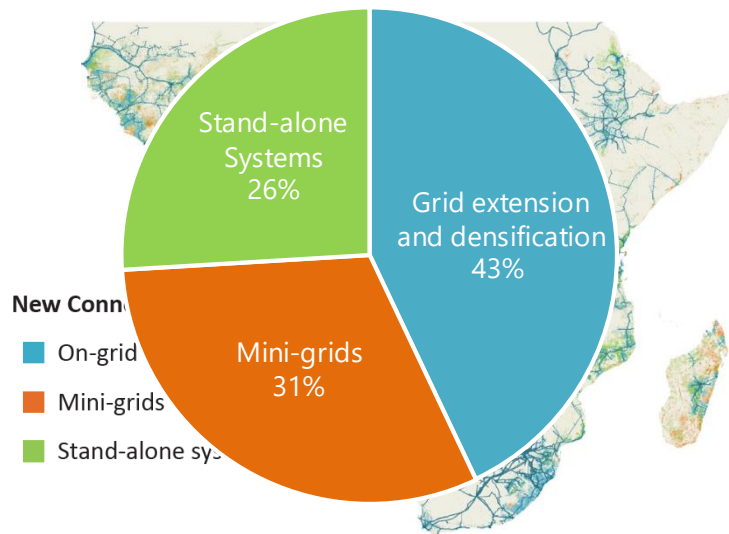
The CO<sub>2</sub> emissions trajectory to 2050 in the SDS is within the envelope of 1.5 °C scenarios used by the IPCC. Climate action beyond 2050 will determine the ultimate temperature outcome

# Accelerating action in power is key to achieve sustainable goals

Population without electricity access

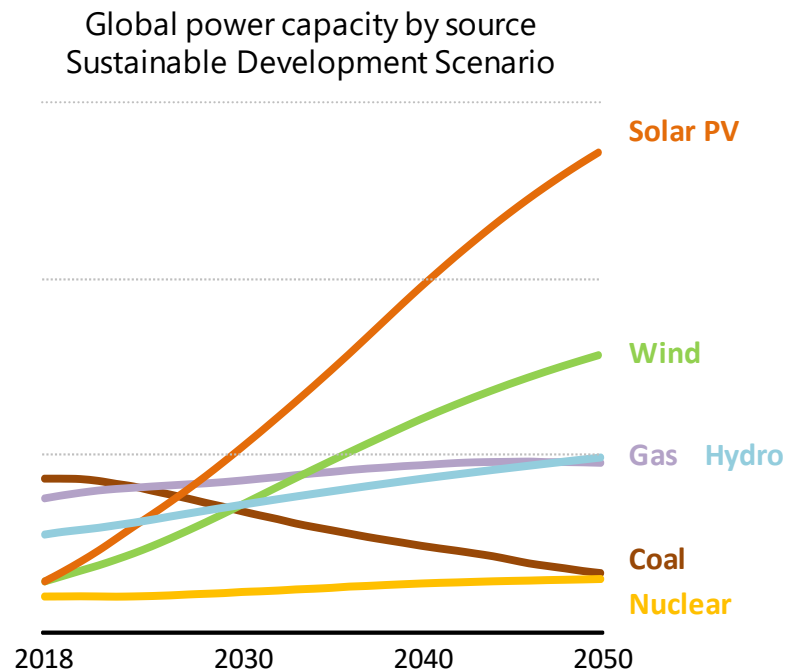
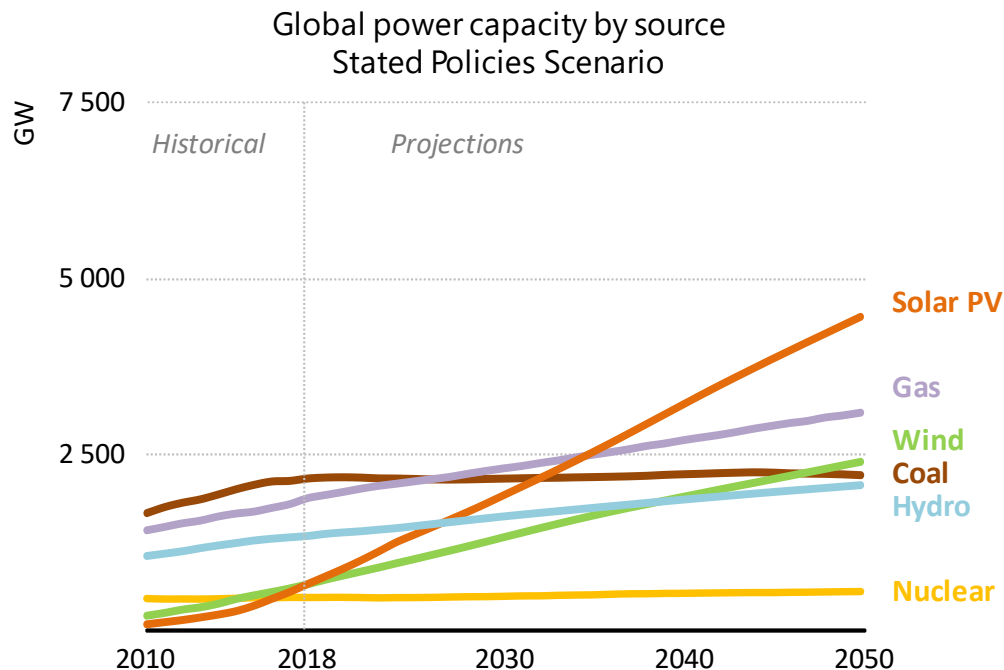


Solutions to provide full access by 2030 in Sub-Saharan Africa



Despite progress in several countries, access programs barely outpace sub-Saharan population growth; solar PV is essential to bridge the gap for universal access and deliver affordable electricity to millions

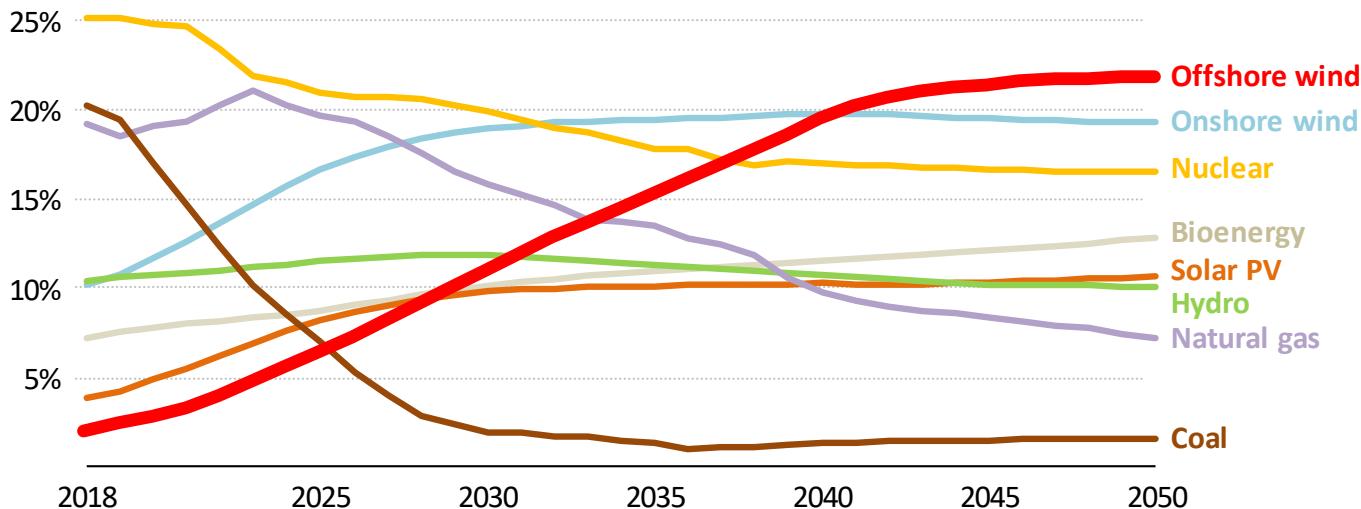
# Towards a low-carbon power sector



Renewables provide three-quarters of the growth in electricity supply to 2040 under stated policies much more is needed: a greater shift towards low-carbon generation and tackling the legacy issues

# A carbon neutral Europe puts offshore wind in front

Shares of electricity generation by technology in the European Union, Sustainable Development Scenario



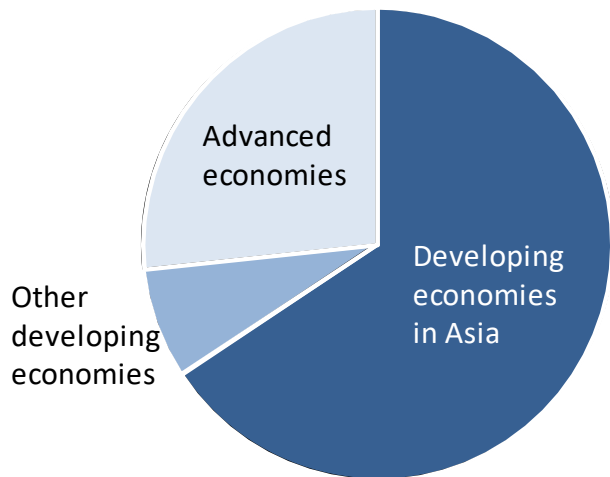
Offshore wind is set to become the largest source of electricity in the European Union by 2040, complementing other renewables towards a fully decarbonised power system



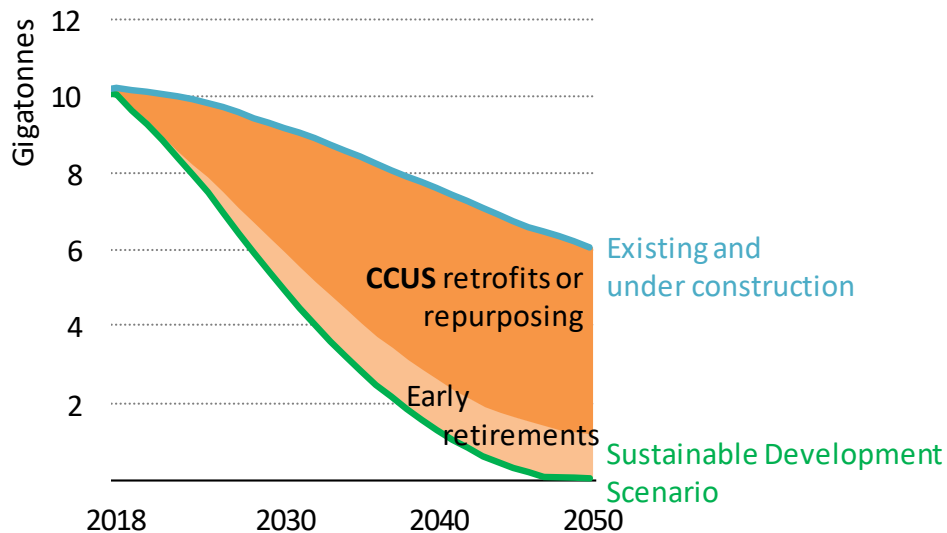
# Today's coal plants leave a legacy that technology can address

Coal-fired capacity, existing and under construction:

2 250 GW

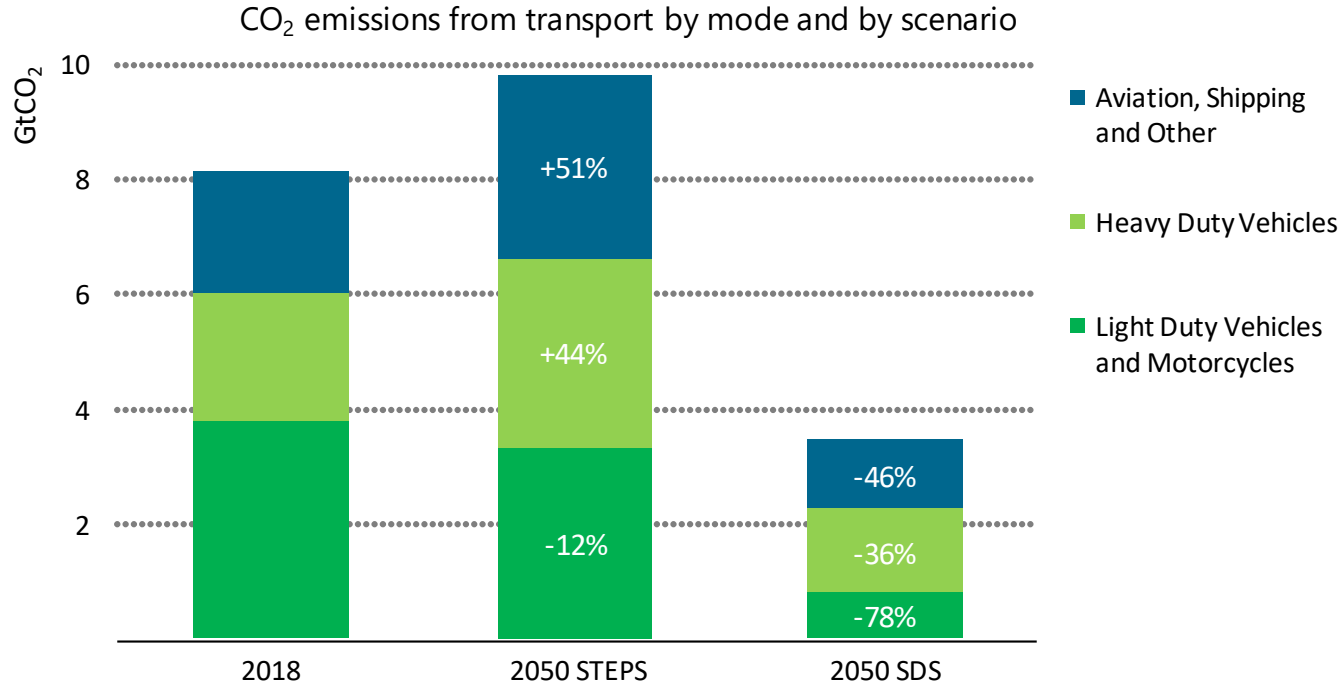


Annual CO<sub>2</sub> emissions from coal-fired power plants



Investment in CCUS will be critical to ensure that the young coal fleet is compatible with climate targets, while repurposing them to provide flexibility can reduce CO<sub>2</sub> and pollutant emissions, and help integrate renewables

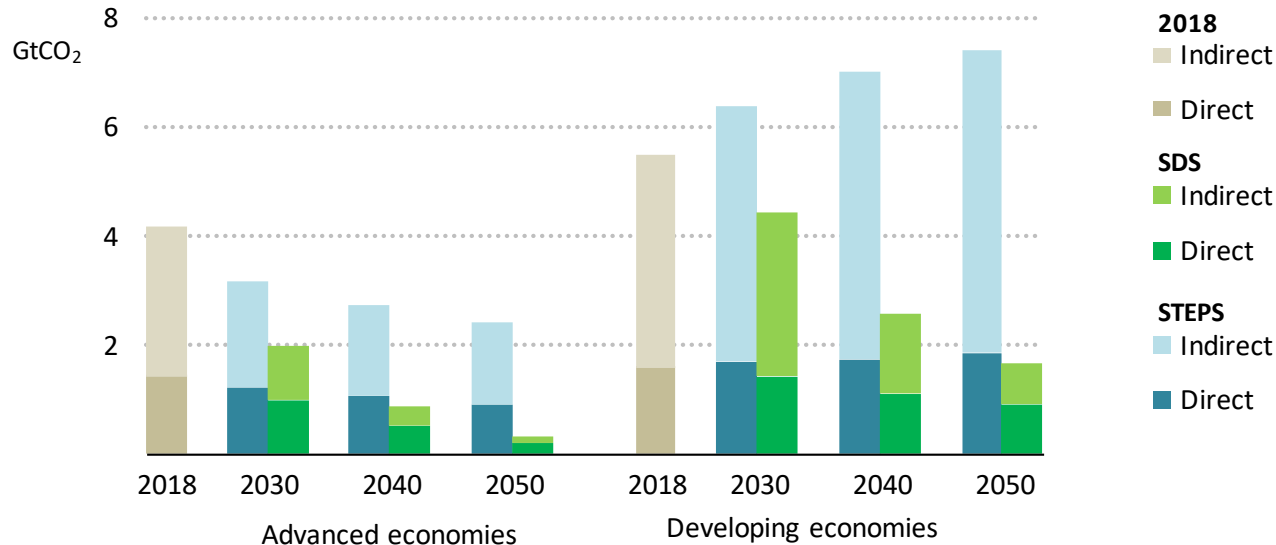
# Emissions from transport: easy wins and tough challenges



Efficiency improvements and EVs cut CO<sub>2</sub> emissions from cars in both scenarios. Trucks, aviation and shipping are harder to abate and will require low carbon fuels and new technologies in the long term.

# Buildings sector: different challenges around the world

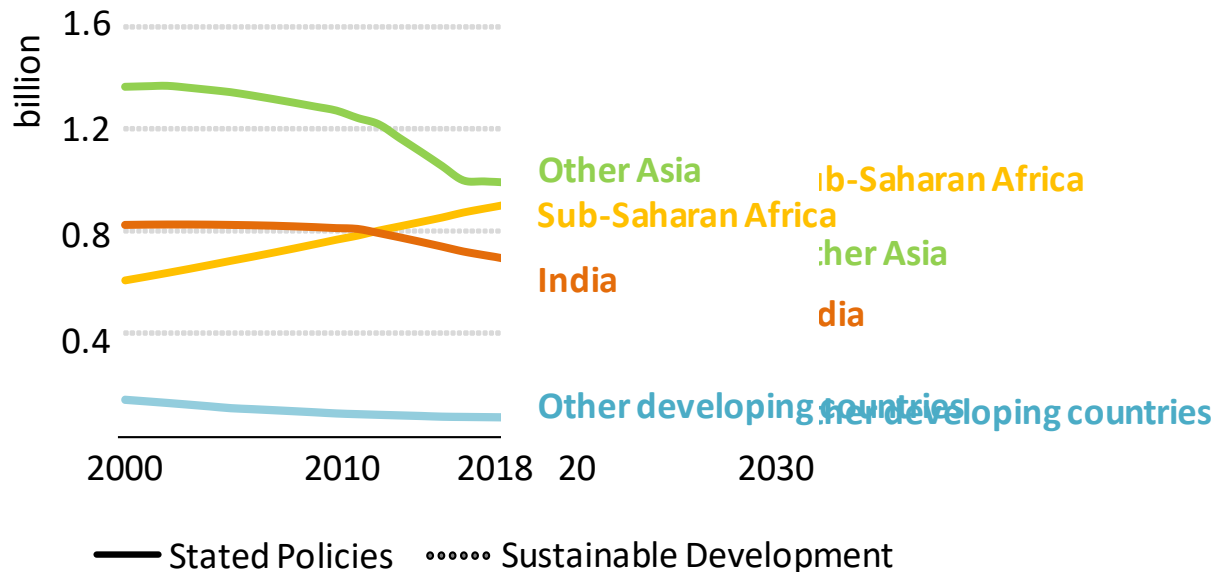
CO<sub>2</sub> emissions from buildings in advanced and developing economies by scenario



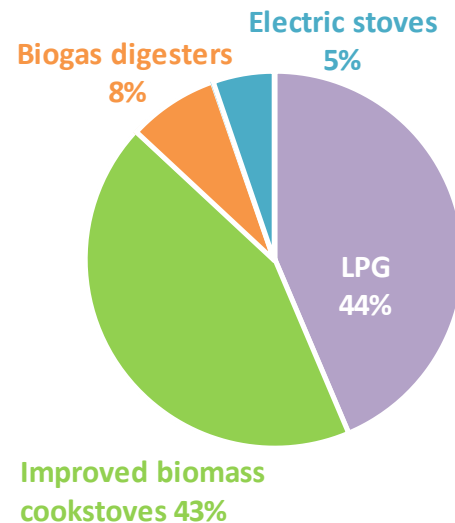
Tough regulations in advanced economies see deliver emissions reductions in STEPS; SDS only builds on this trend. For developing economies a sea change is required, supported by the rapid decarbonisation of power

# Clean cooking for all: planned effort lags behind

Population without access to clean cooking  
by scenario



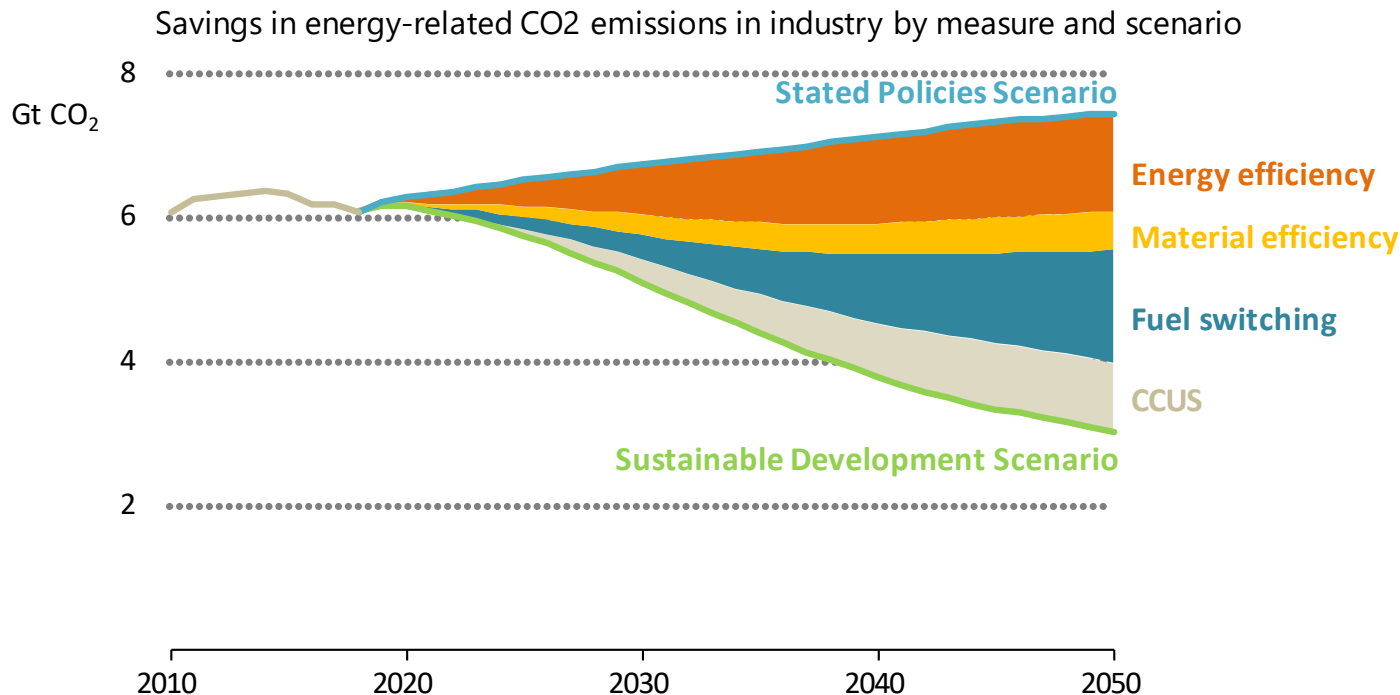
Population gaining access by 2030  
Sustainable Development Scenario,



Despite progress in several countries, acceleration is needed in Africa and Asia

LPG and improved cookstoves could significantly lower premature deaths due to household air pollution

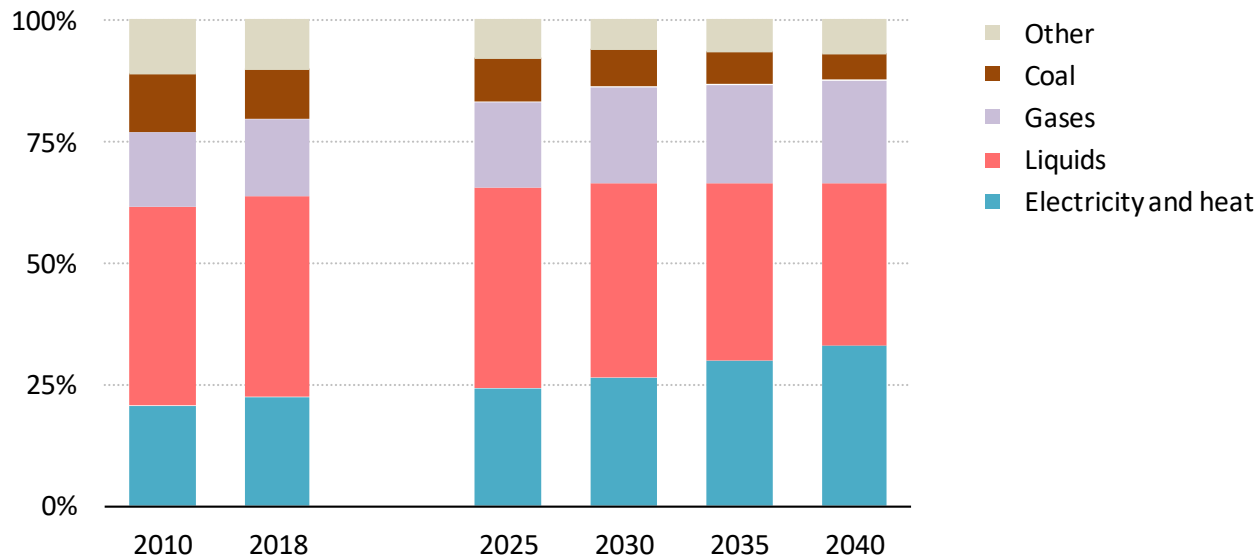
# Industry requires multiple emissions reduction strategies



Energy efficiency makes up the largest portion of industry emissions reductions in the SDS, followed by fuel switching, carbon capture and storage and material efficiency.

# Liquids and gases remain the cornerstone of energy consumption

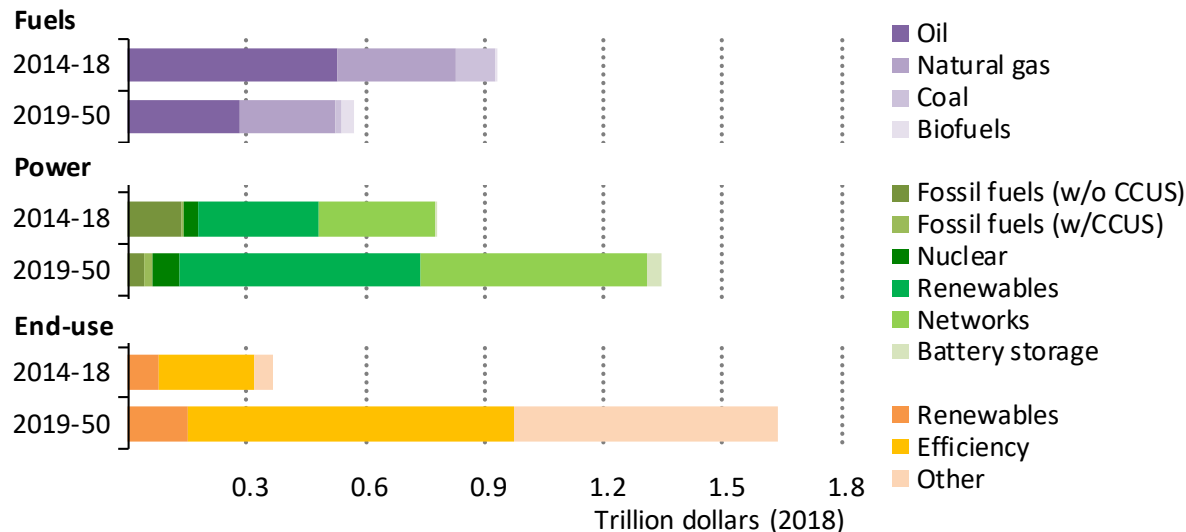
Share of fuels in total final energy consumption in the Sustainable Development Scenario



Electricity comprises an increasing share of energy consumption but liquids and gases remain central to energy use. Limiting the emissions from these is a key element of energy transitions.

# Energy-sector investment in the Sustainable Development Scenario

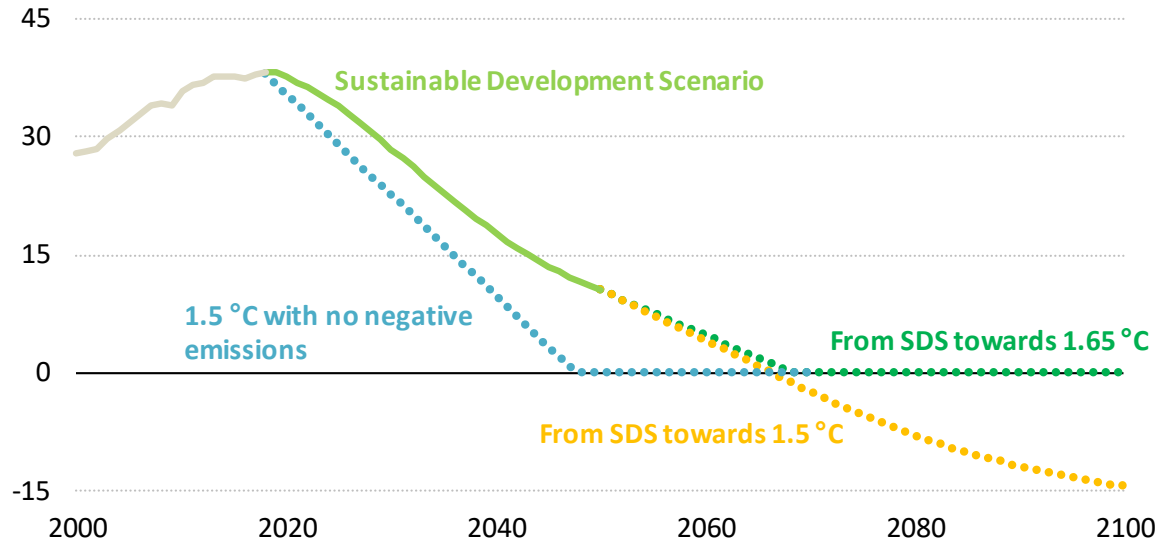
Average annual energy investment in the Sustainable Development Scenario, 2014-2018 and 2019-2050



Investment in fuels and power is marked by a major reallocation of capital towards renewables and electricity networks; demand-side investment increases substantially

# The Sustainable Development Scenario and 1.5 °C

Emissions trajectories for total CO<sub>2</sub> emissions in the Sustainable Development Scenario and to limit warming to 1.5 °C



If emissions turn net negative after 2070, the Sustainable Development Scenario could lead to a 50% chance of limiting the temperature rise to below 1.5 °C



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