

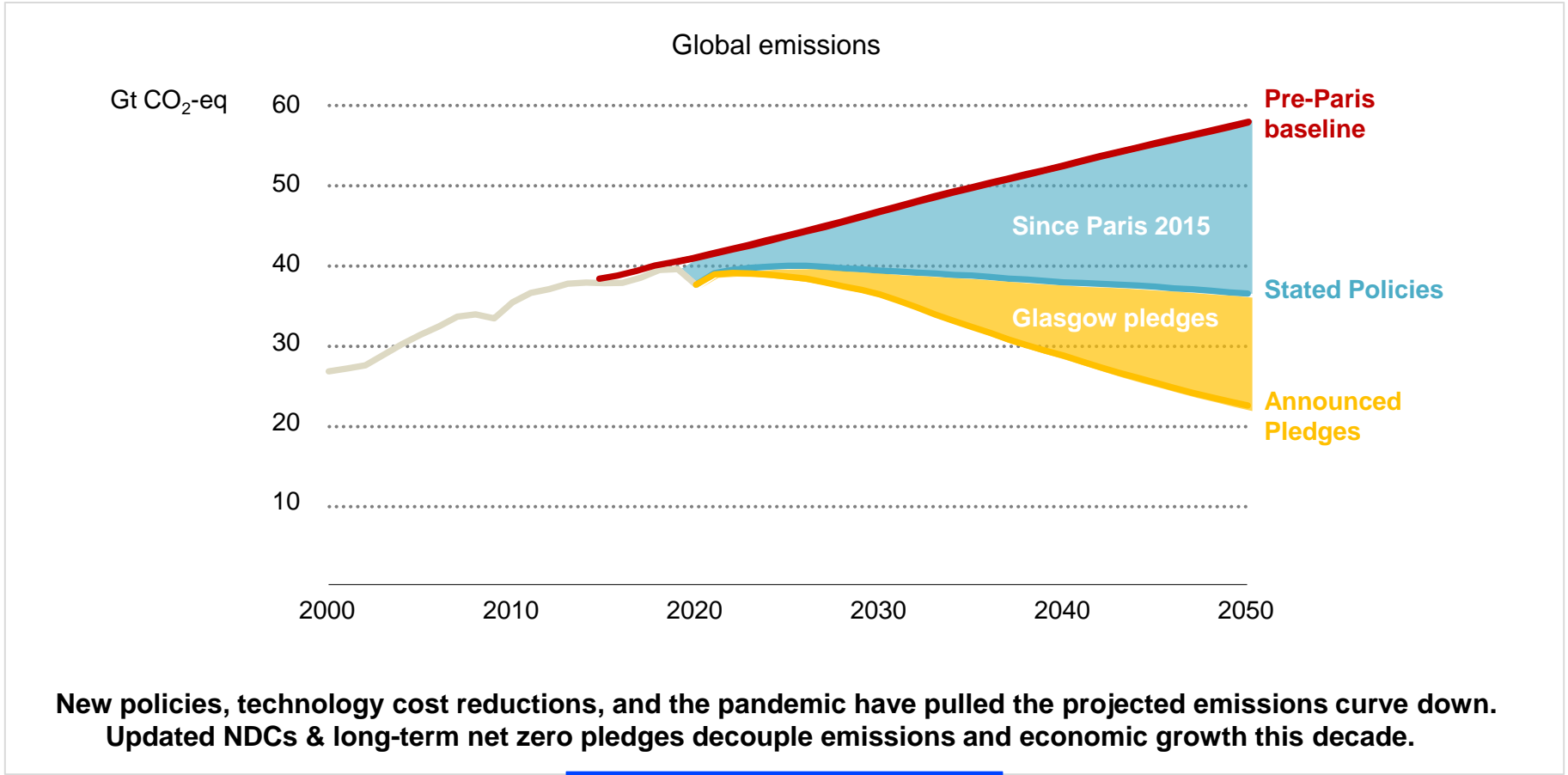


Tracking Clean Energy Progress 2021

Daniel Wetzel, Head of Tracking Sustainable Transitions

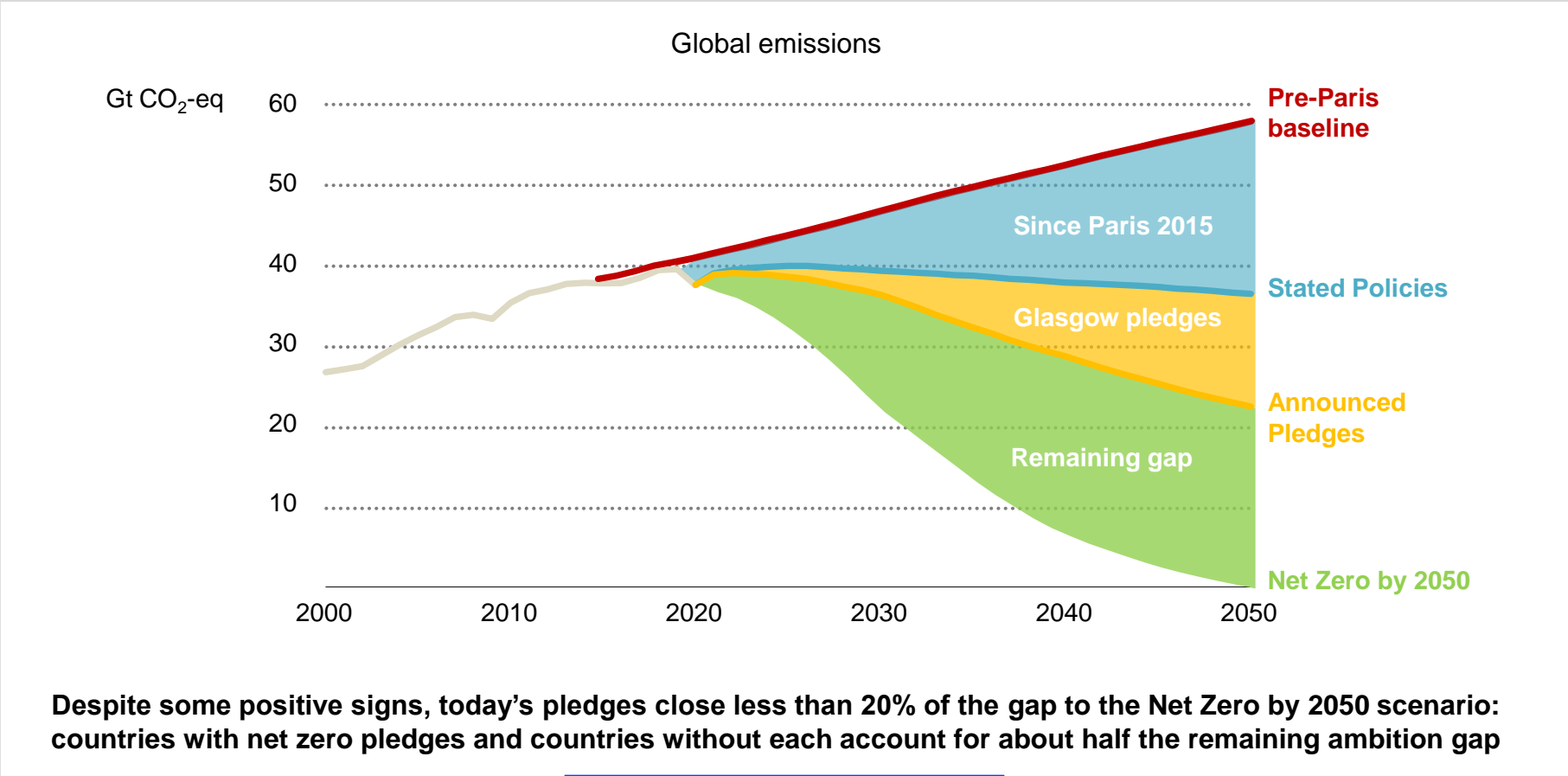
COP26 Nordic Pavilion, 8 November 2021

The world is starting to bend the emissions curve



New policies, technology cost reductions, and the pandemic have pulled the projected emissions curve down. Updated NDCs & long-term net zero pledges decouple emissions and economic growth this decade.

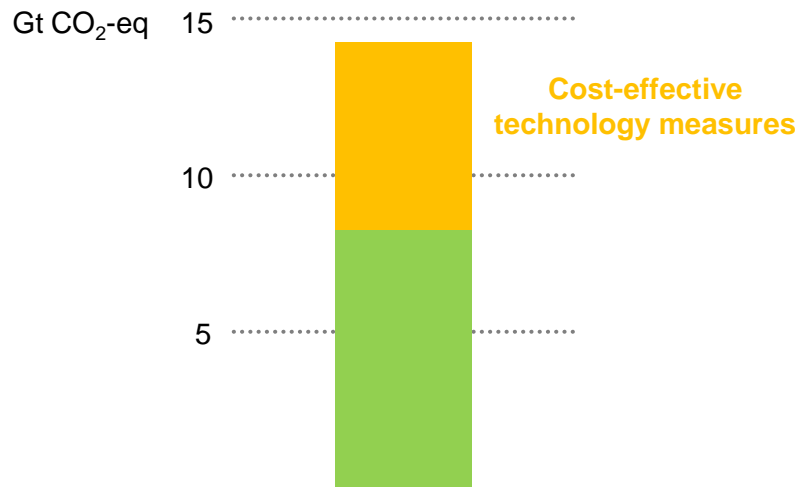
But a large ambition gap remains, especially to 2030



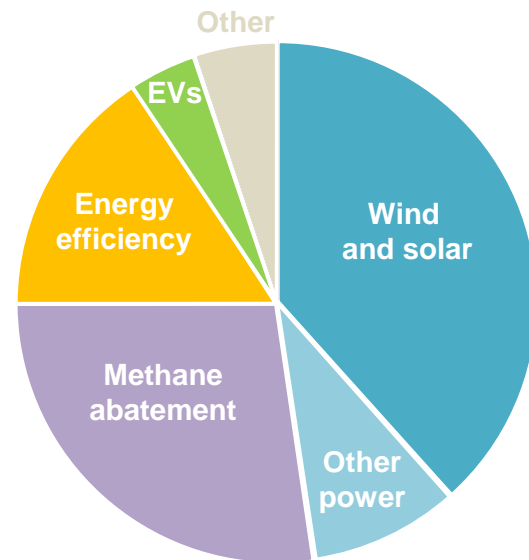
Despite some positive signs, today's pledges close less than 20% of the gap to the Net Zero by 2050 scenario: countries with net zero pledges and countries without each account for about half the remaining ambition gap

We have cost-effective ways to close the gap

Ambition gap in 2030



Cost-effective reductions
6.1 Gt CO₂-eq



Technologies and policies are available to close the emissions gap to 2030. More than 40% of the actions required are cost-effective – bringing more low-cost renewables into power, reducing methane leaks, and improving efficiency

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - CSP
 - Ocean
- Nuclear power
 - Gas-fired power
 - Coal-fired power
 - CCUS in power

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
 - Heat pumps
 - District heating
- Cooling
 - Lighting
- Appliances & equipment
- Data centres & networks

● Fuel supply

- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Smart grids
- Direct air capture
- Hydrogen
- Demand response

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - CSP
 - Ocean
- Nuclear power
- Gas-fired power
- Coal-fired power
- CCUS in power

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- **Electric vehicles**
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
- Heat pumps
- District heating
- Cooling
- **Lighting**
- Appliances & equipment
- Data centres & networks

● Fuel supply

- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Smart grids
- Direct air capture
- Hydrogen
- Demand response

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - CSP
 - Ocean
- Nuclear power
- Gas-fired power
- Coal-fired power
- CCUS in power

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
- Heat pumps
- District heating
- Cooling
- Lighting
- Appliances & equipment
- Data centres & networks

● Fuel supply

- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Hydrogen
- Smart grids
- Demand response
- Direct air capture

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
- Nuclear power
 - Gas-fired power
 - Coal-fired power
 - CCUS in power
- Geothermal
- CSP
- Ocean

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
- Heat pumps
- District heating
- Cooling
- Lighting
- Appliances & equipment
- Data centres & networks

● Fuel supply

- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Smart grids
- Direct air capture
- Hydrogen
- Demand response

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - CSP
 - Ocean
- Nuclear power
 - Gas-fired power
 - Coal-fired power
 - CCUS in power

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
- Heat pumps
- District heating
- Cooling
- Lighting
- Appliances & equipment
- Data centres & networks

● Fuel supply

- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Smart grids
- Direct air capture
- Hydrogen
- Demand response

● Power

- Renewable power
 - Solar PV
 - Wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - CSP
 - Ocean
- Nuclear power
- Gas-fired power
- Coal-fired power
- CCUS in power

● Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

● Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

● Buildings

- Building envelopes
- Heating
- Heat pumps
- District heating
- Cooling
- Lighting
- Appliances & equipment
- Data centres & networks

● Fuel supply

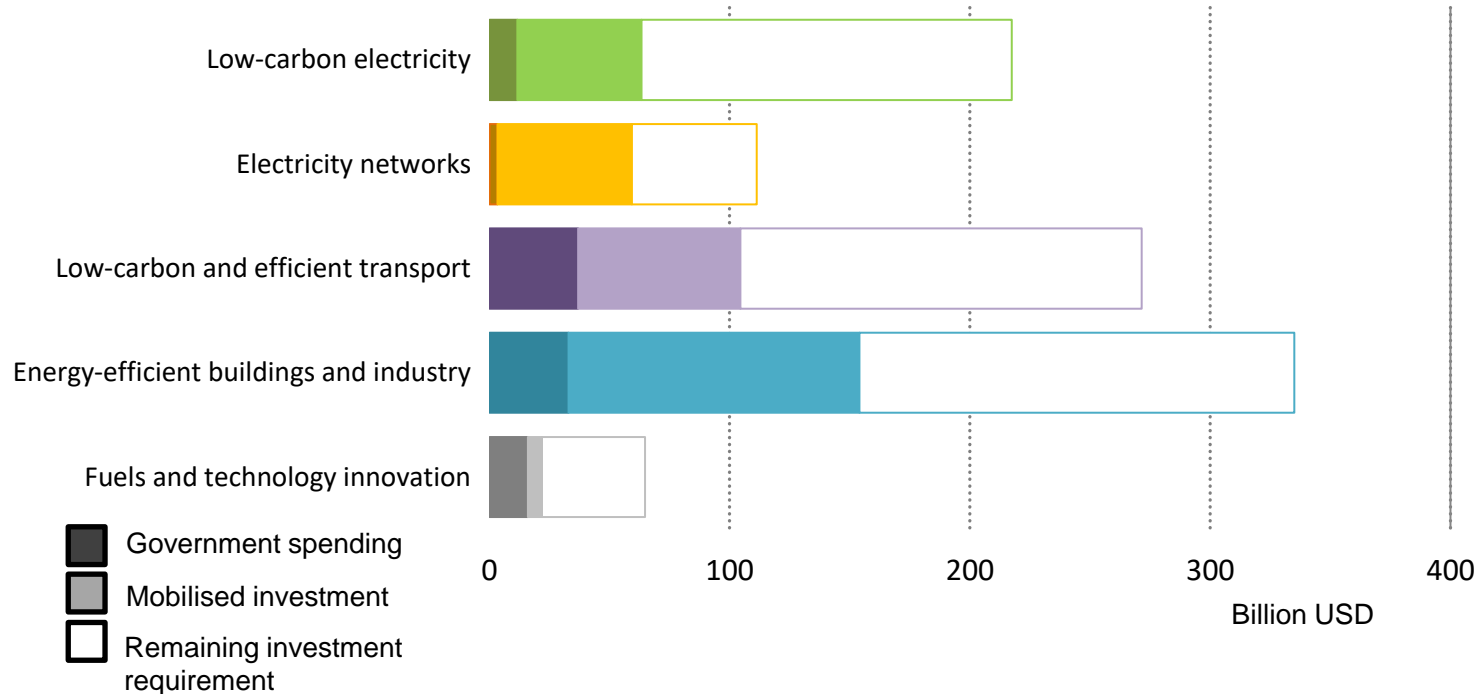
- Methane emissions from oil and gas
- Flaring emissions

● Energy integration

- Energy storage
- Smart grids
- Direct air capture
- Hydrogen
- Demand response

Governments are starting to increase support

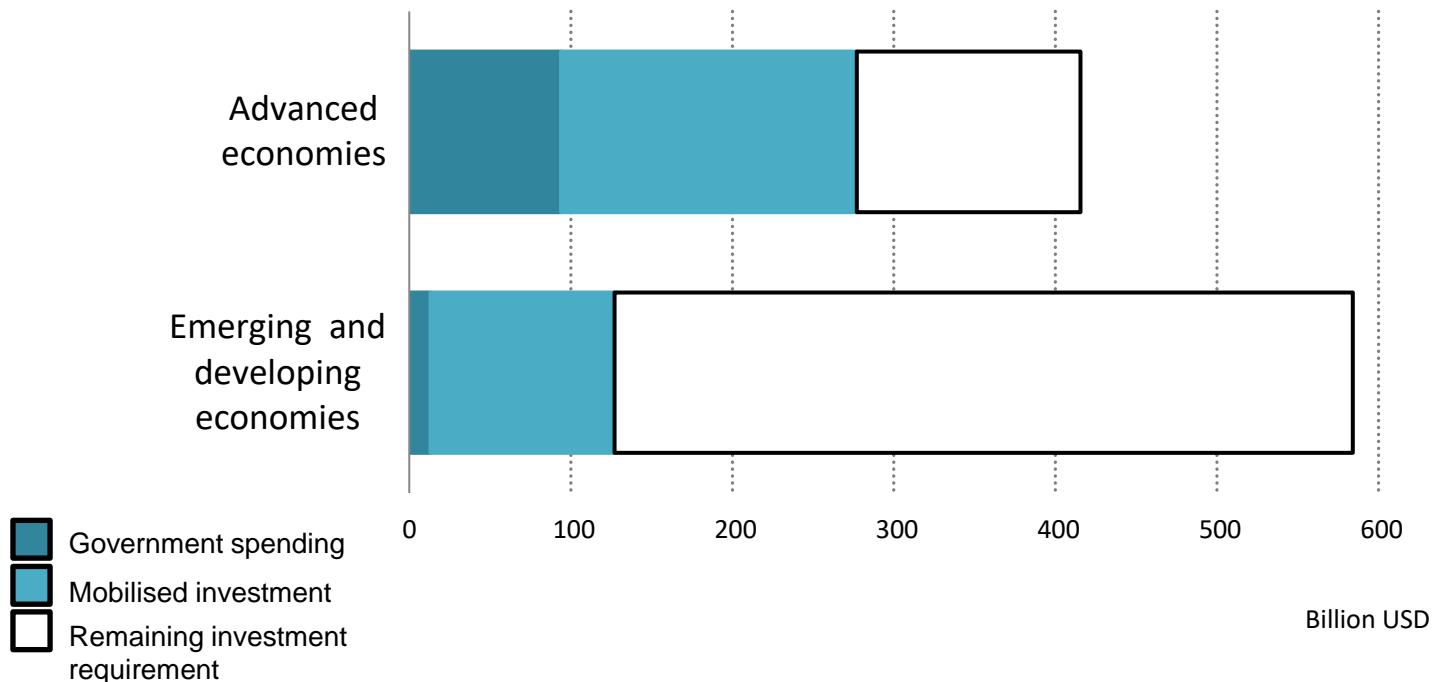
Additional investment by category compared to levels in the Sustainable Recovery Plan (annual average from 2021-2023)



Categories with established policy mechanisms or large public sector prevalence were able to mobilise government spending quickly and attract more total spending. New programmes must reach beyond low-hanging fruit.

Advanced economies are making a pivot, but EMDEs lag behind

Annual clean energy investment mobilised by recovery measures (2021-2023)



Advanced economies are dedicating 70% of what would be needed under a Sustainable Recovery Plan, but in emerging economies the share is only 20%, where many countries have limited fiscal leeway.


Tracking Clean Energy Progress

Assessing critical energy technologies for global clean energy transitions

Tracking Power

● Not on track

Decarbonising the power sector is a fundamental step to reduce emissions, especially in an increasingly electrified world.

[Tracking Power 2021 report](#) 

● [Renewable Power](#)

● [Nuclear Power](#)

● [Natural Gas-Fired Power](#)


● [Coal-Fired Power](#)

● [CCUS in Power](#)

Tracking Transport

● Not on track

The transport sector will need to undergo a major transformation, including vastly improving efficiency and shifts from oil to electricity and other low-carbon fuels.

[Tracking Transport 2021 report](#) 

● [Electric Vehicles](#)

● [Rail](#)

● [Fuel Consumption of Cars and Vans](#)

● [Trucks and Buses](#)

● [Transport Biofuels](#)


● [Aviation](#)

● [International Shipping](#)

Tracking Fuel Supply

● Not on track

A rapid step-change in policy and industry action is needed to cut flaring and methane emissions in the oil and gas sector.

[Tracking Fuel Supply 2021 report](#) 


● [Methane Emissions from Oil and Gas](#)

● [Flaring Emissions](#)

Tracking Buildings

● Not on track

Unprecedented efficiency improvements are required in buildings, addressing growing demand from cooling, heating and powered devices.

[Tracking Buildings 2021 report](#) 

● [Building Envelopes](#)

● [Heating](#)

● [Cooling](#)

● [Lighting](#)

● [Appliances and Equipment](#)

● [Heat Pumps](#)

● [District Heating](#)

● [Data Centres and Data Transmission Networks](#)

Tracking Industry

● Not on track

Industry processes that can't be easily electrified must cut emissions through efficiency, aggressive innovation and carbon capture.

[Tracking Industry 2021 report](#) 

● [Chemicals](#)

● [Iron and Steel](#)

● [Cement](#)

● [Pulp and Paper](#)


● [Aluminium](#)

● [CCUS in Industry and Transformation](#)

Tracking Energy Integration

● More efforts needed

Energy integration technologies will become increasingly important, especially as shares of variable renewables rise.

[Tracking Energy Integration 2021 report](#) 

● [Energy Storage](#)

● [Hydrogen](#)

● [Smart Grids](#)

● [Demand Response](#)

● [Direct Air Capture](#)

Explore *Tracking Clean Energy Progress* at: www.iea.org/tcep

iea