IRENA
International Renewable Energy Agency

WORLD ENERGY TRANSITIONS OUTLOOK

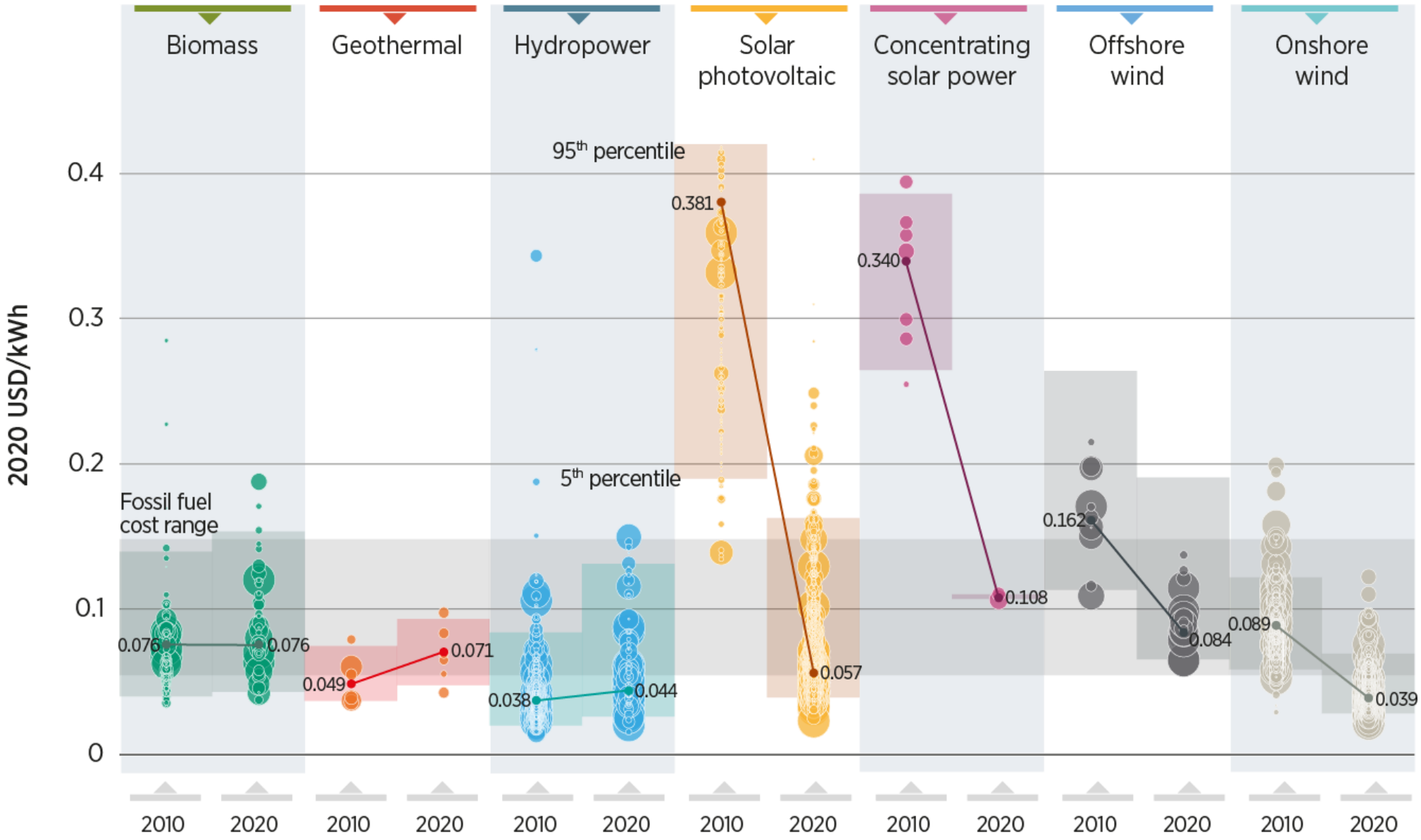
1.5°C Pathway

OVERVIEW

Yong Chen, IRENA Innovation and Technology Centre

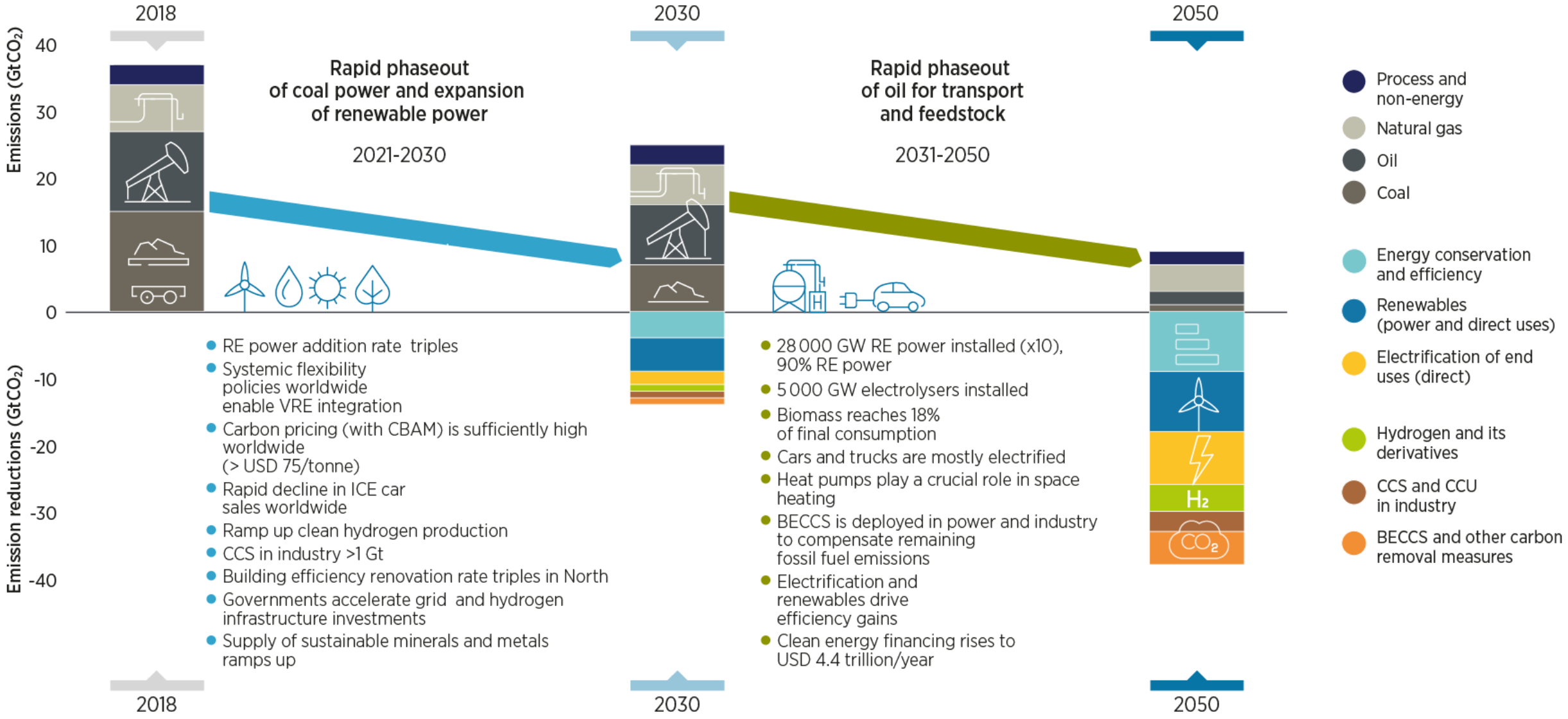
Green Finance for Sustainable Urban Energy| 9 December 2021

Renewables are increasingly the lowest-cost sources of electricity in many markets

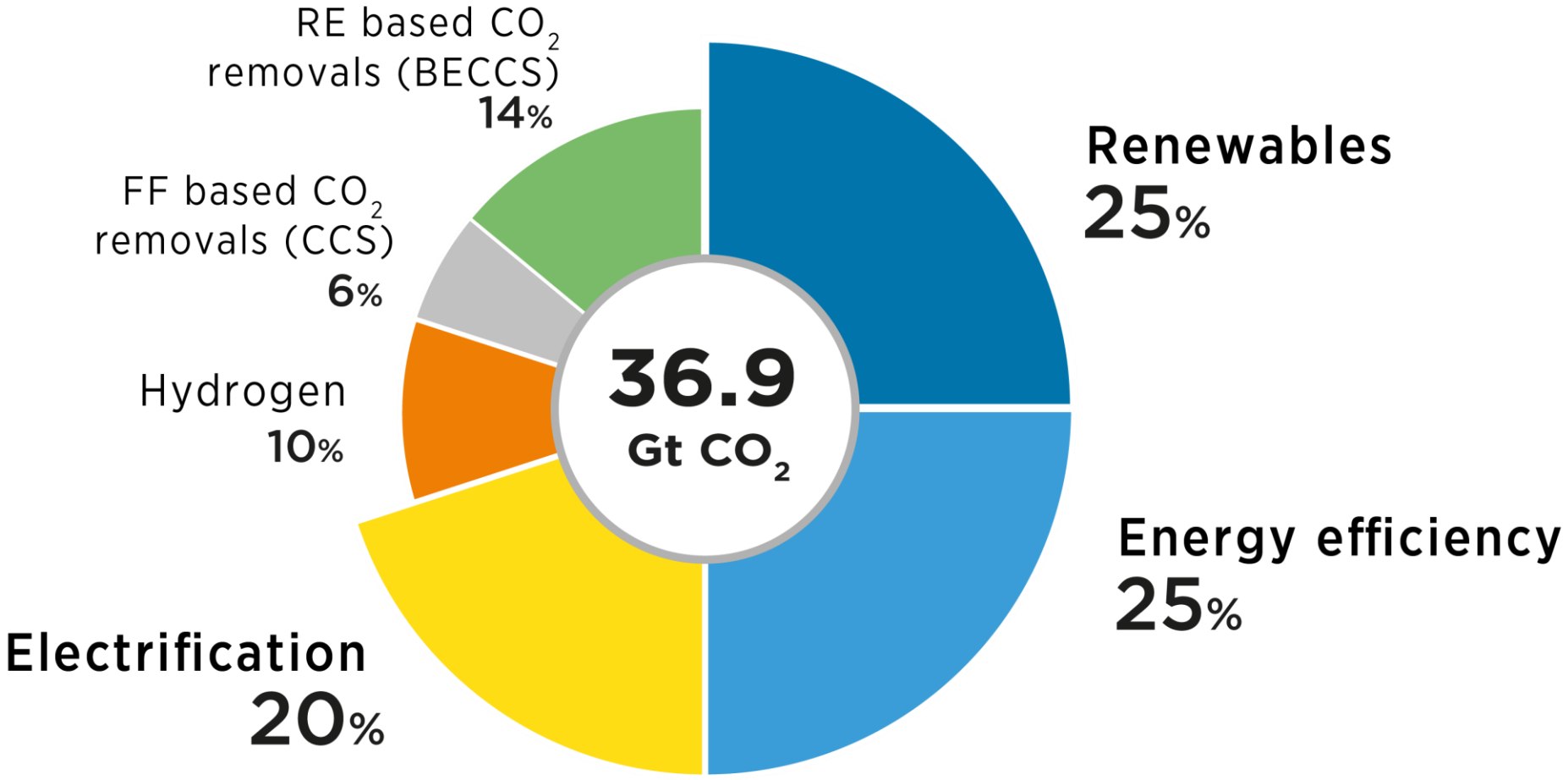


The costs of renewable energy have continued to decline. Solar PV and wind are increasingly the cheapest sources of electricity in many markets.

Phaseouts of coal and oil, 2021-2050

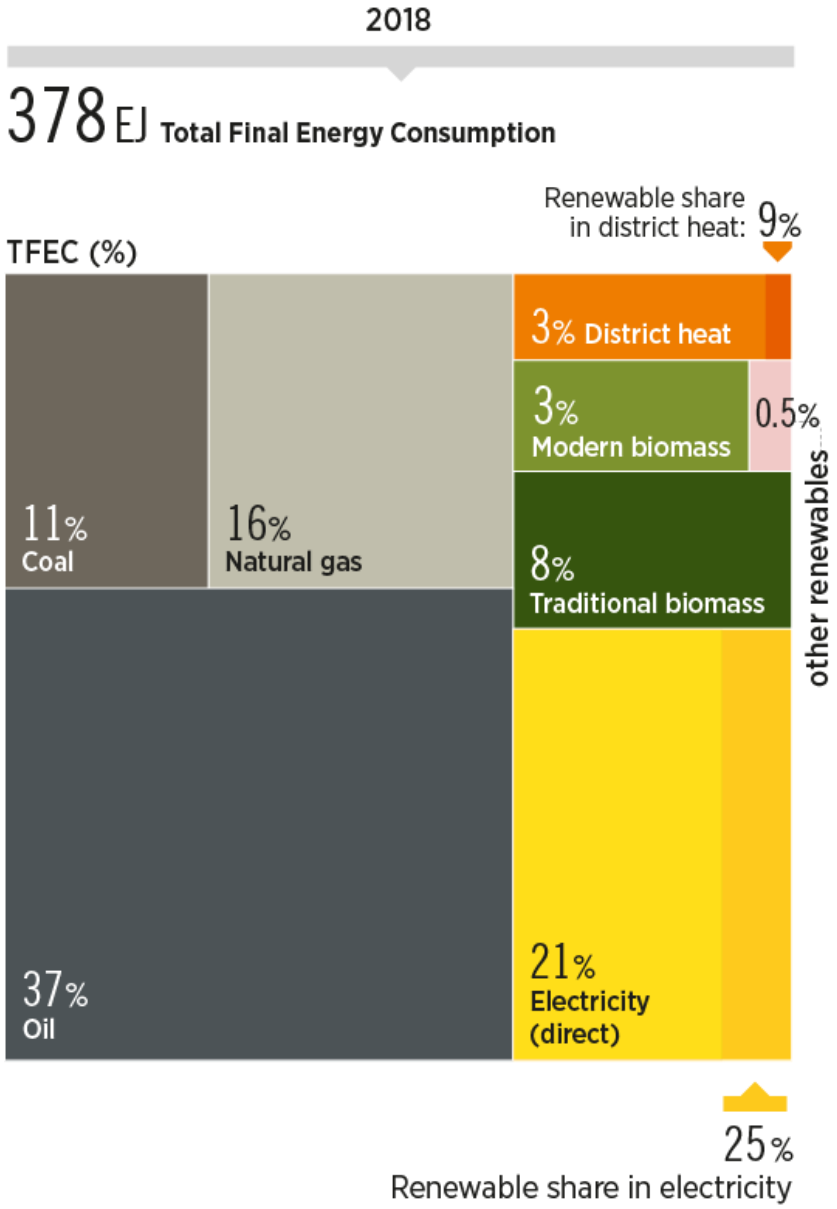


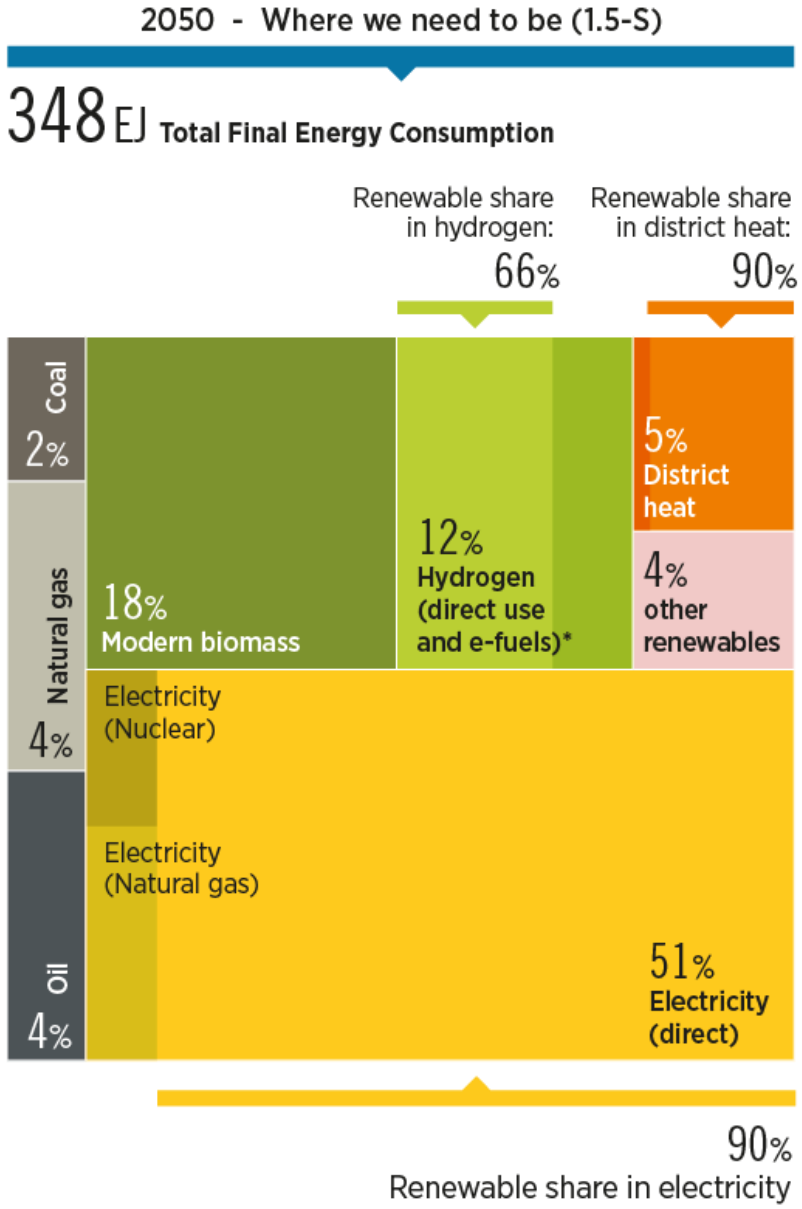
Renewables, efficiency and electrification dominate energy transition



90% of all decarbonisation in 2050 will involve renewable energy through direct supply of low-cost power, efficiency, electrification, bioenergy with CCS and green hydrogen.

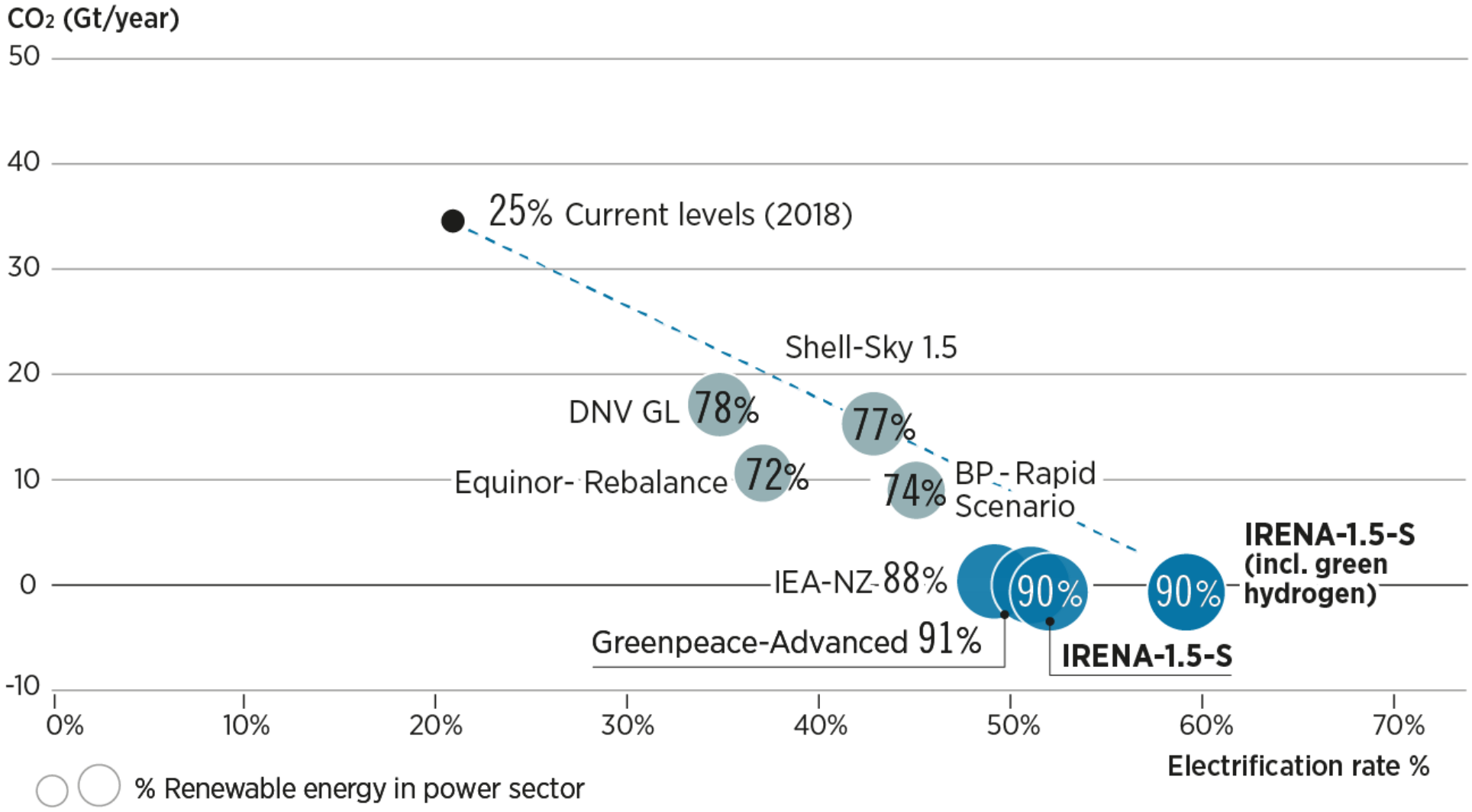
Electricity is the central energy carrier in future energy systems





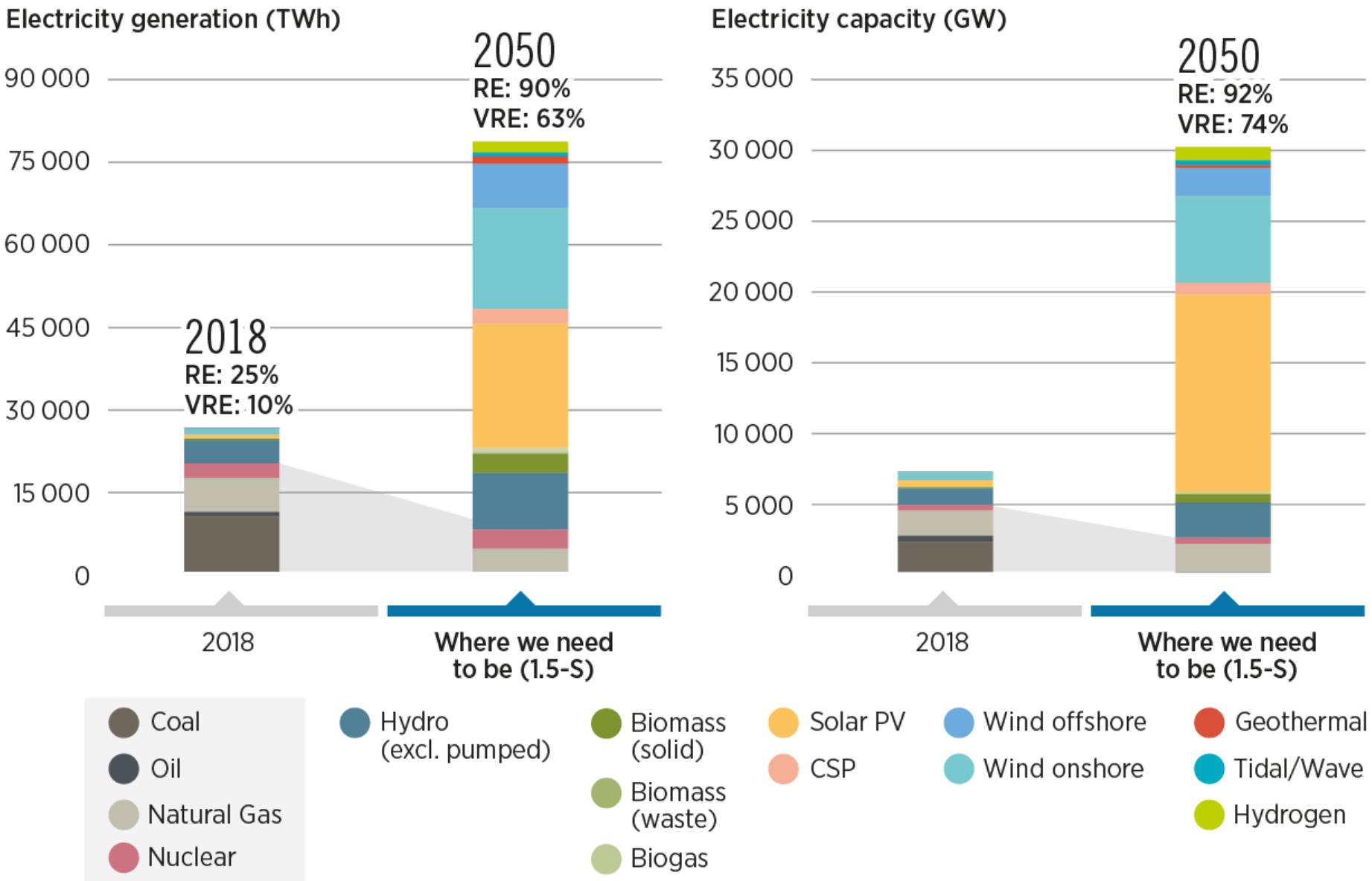
- By 2050, electricity would be the main energy carrier with more than a 50% direct share of total final energy consumption – up from 21% in 2018.
- By 2050, 90% of total electricity needs would be supplied by renewables followed by 6% from natural gas and the remainder from nuclear.
- Another 8% of final energy would come as indirect electricity in the form of e-fuels and hydrogen.

Emerging consensus on the role of renewables and electrification



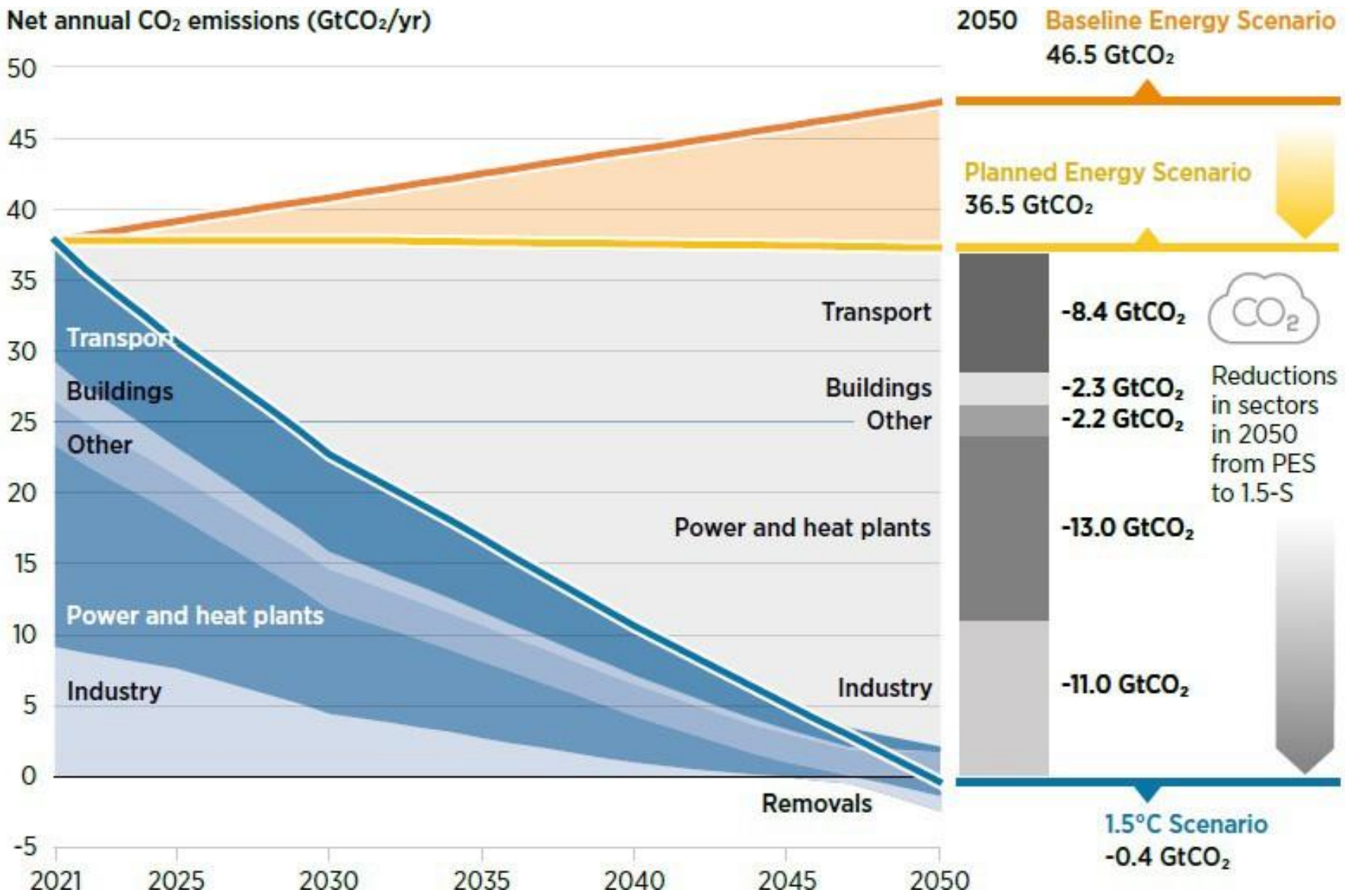
Despite the differences among the energy scenarios, there is a clear consensus on the important role that electrification powered by renewable energy sources has in the decarbonisation of the energy system.

Renewables will dominate the power generation mix



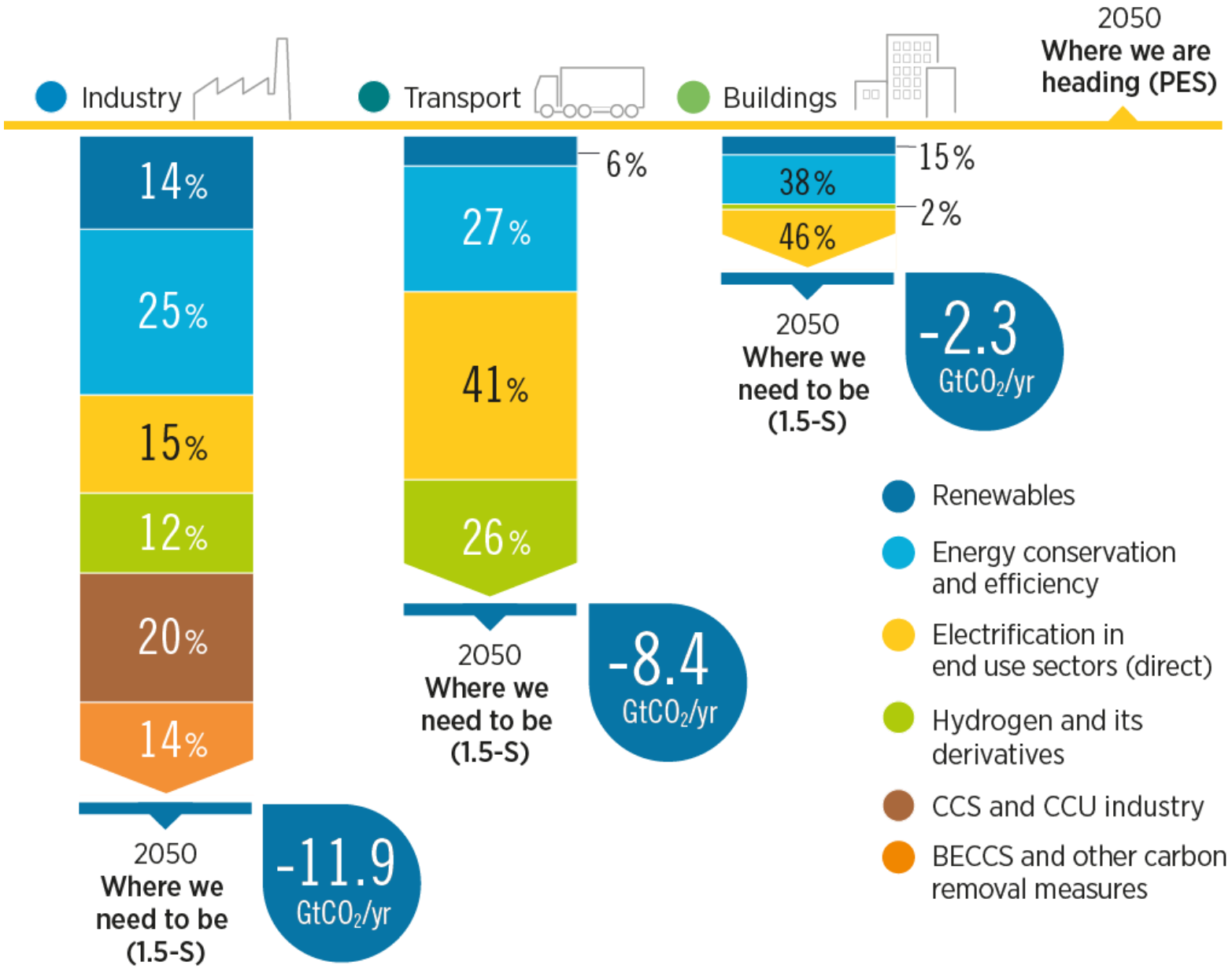
- By 2050, power generation triples compared to today's level, and renewables supply 90% of total electricity up from 25% in 2018.
- Limited role for nuclear as it is not least-cost zero carbon electricity.
- Fossil fuels in power will be greatly diminished, but natural gas will still exist.

Net zero emissions by mid-century



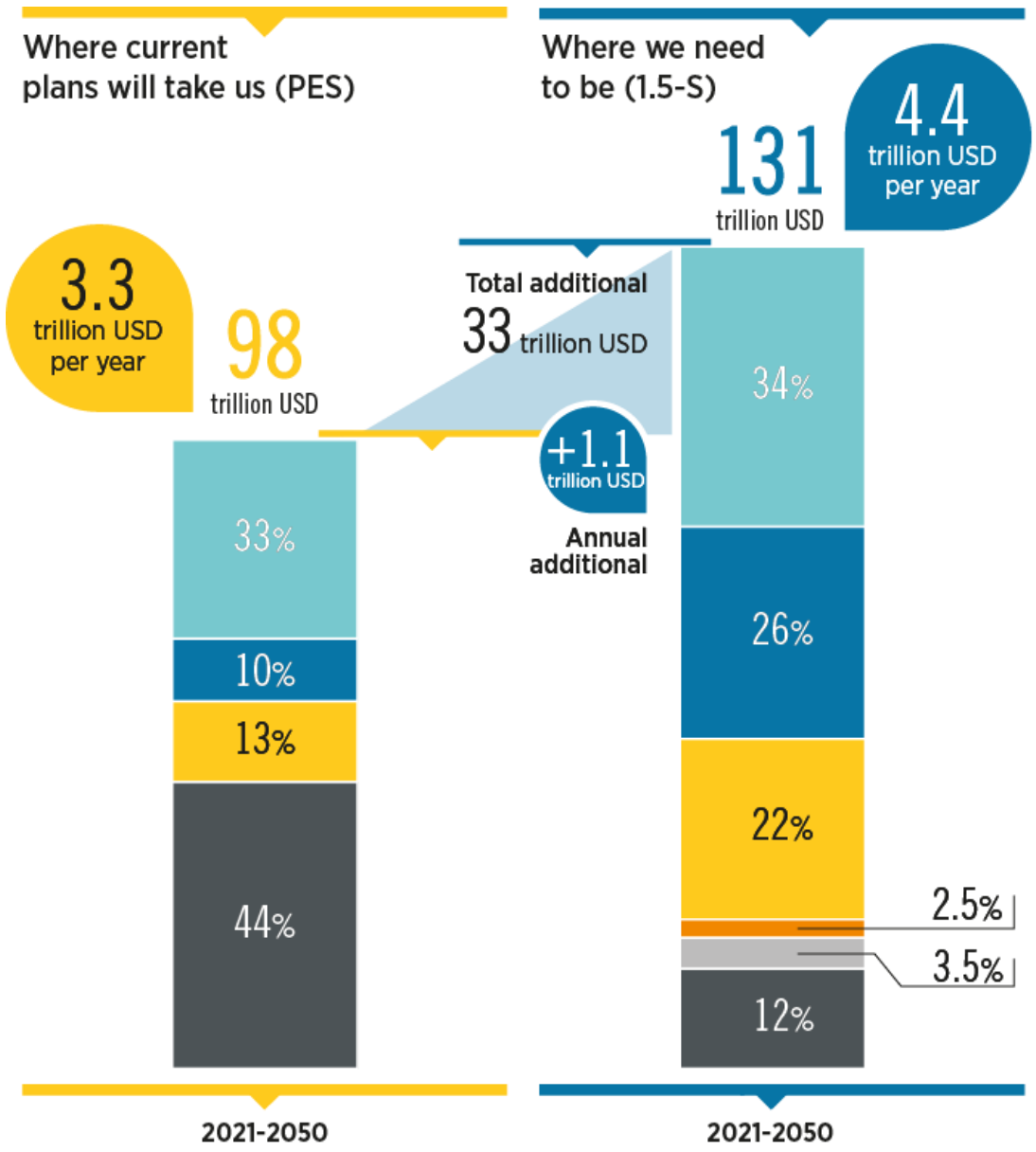
- Baseline emissions continue to rise, while the policies of governments (Planned Energy Scenario) result in flatlining of emissions
- For the 1.5˚C climate target, global CO2 emissions need to drop to net zero by 2050
- Steepest decline necessary over the next 10 years – 2020 must be the decade of action

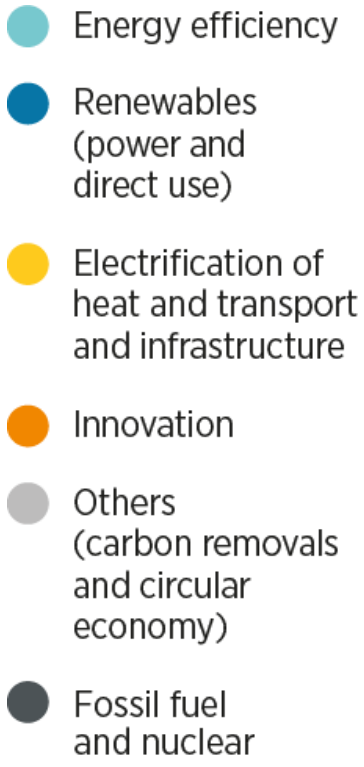
All options are important in the mitigation effort



- In transport, 67% of emission reductions come from direct electrification and hydrogen.
- In industry, hydrogen and electrification combined contribute 27% of mitigation needs.
- In buildings, the key solutions are electrification, contributing close to half of the reduction needed, followed by energy efficiency.

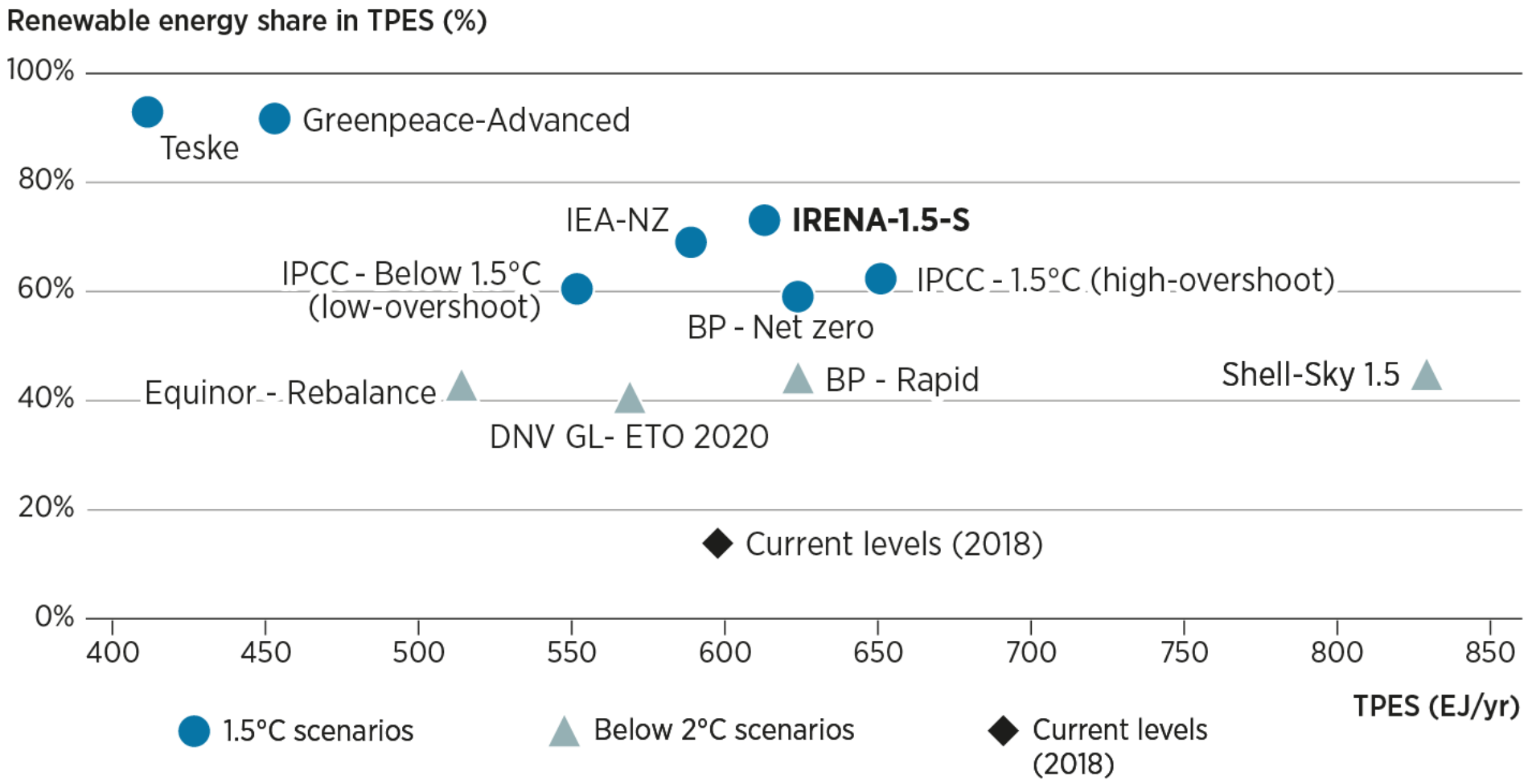
New investment priorities: renewables, efficiency and electrification





- A climate-safe future calls for the scale-up and redirection of investments towards energy transition technologies, away from fossil fuels.
- Accelerating the pace of the energy transition and scaling up investments in energy transition technologies in all sectors hinges on what the world does between 2021 and 2030. Setting the right investment priorities is key.

Several other scenarios explore pathways for the energy transition



Several other scenarios have been published to explore pathways for the energy transition in the coming decades. Their variation reflects the complexity and uncertainties of the energy transition and different approaches and assumptions regarding the development of key components.

IRENA

International Renewable Energy Agency

WORLD ENERGY TRANSITIONS OUTLOOK

1.5°C Pathway

Thank you!