A large, circular cutout in the background reveals a vibrant, busy city street at night. The street is filled with people, motorcycles, and cars, illuminated by colorful neon signs and streetlights. The scene captures the energy and activity of an urban environment.

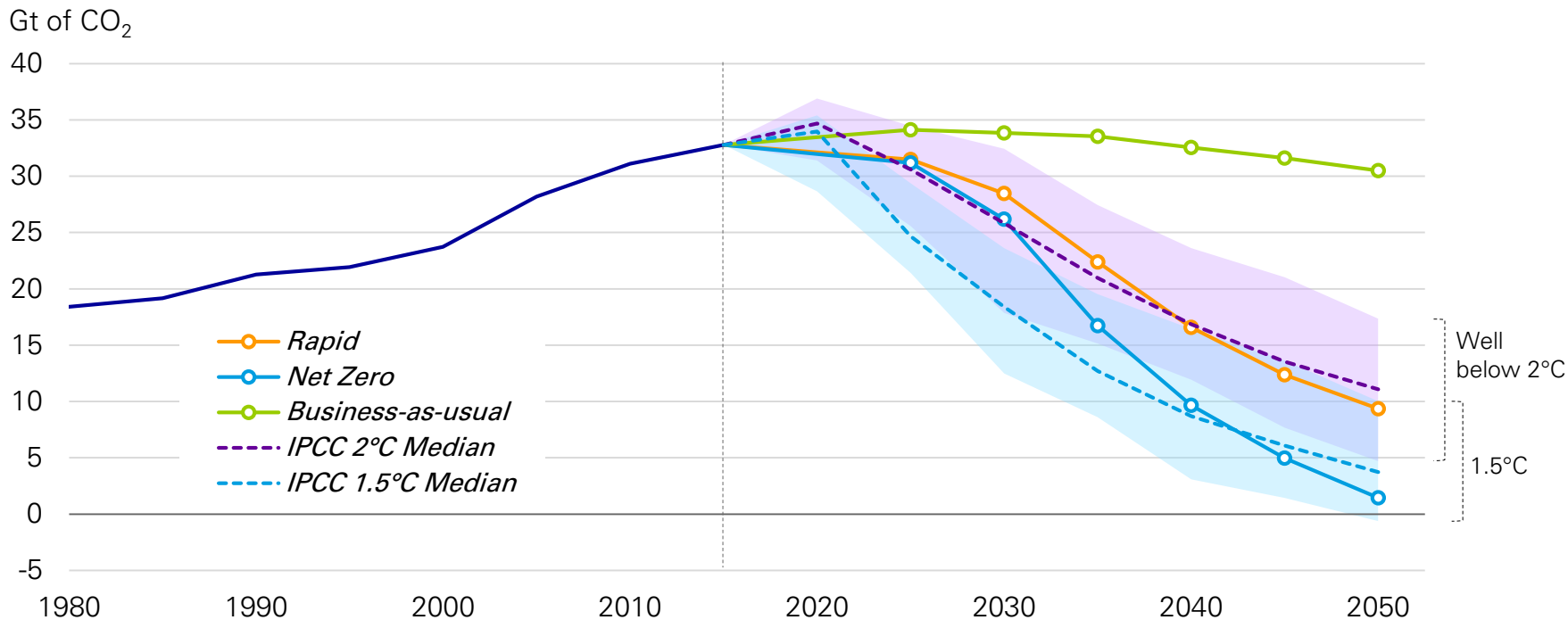
Energy Outlook
2020 edition

Spencer Dale
Group chief economist



Three scenarios to explore the energy transition

CO₂ emissions from energy use



Ranges show 10th and 90th percentiles of IPCC scenarios, see pp 150-151 of *Energy Outlook* for more details



Key questions

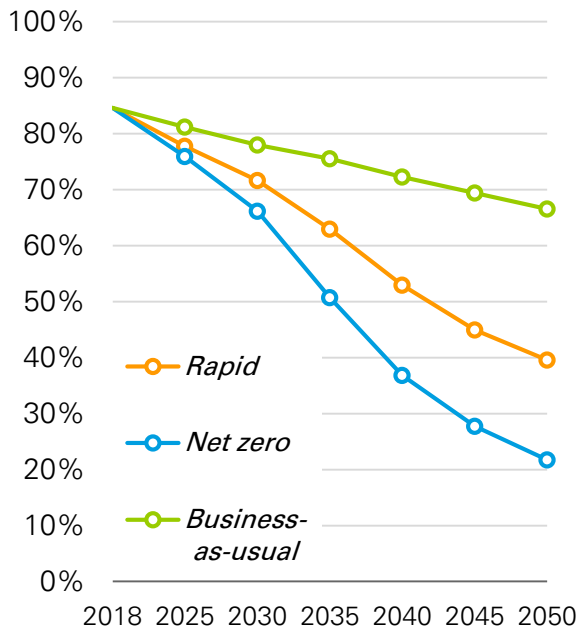
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Changing structure of global energy demand

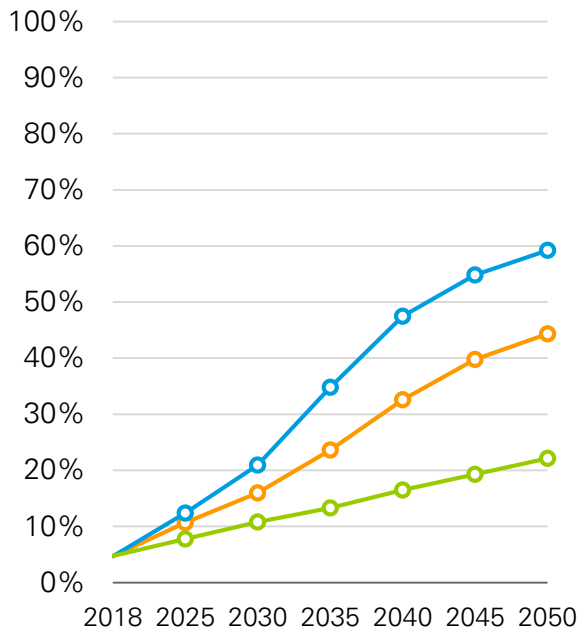
Fossil fuels

Shares of primary energy



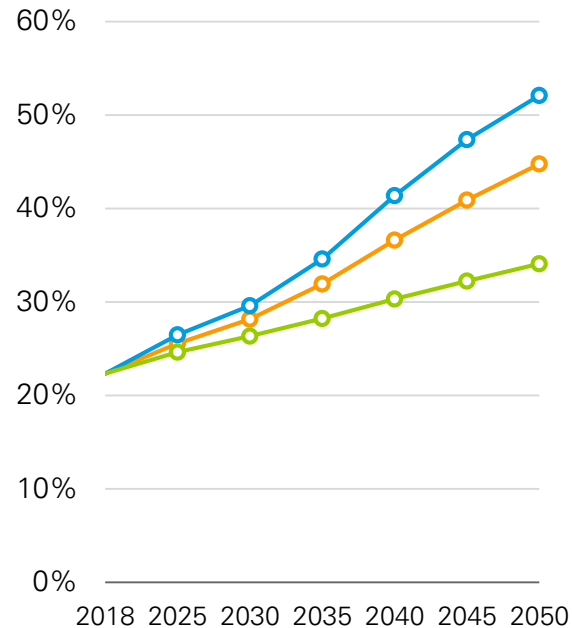
Renewables*

Shares of primary energy



Electricity

Share of total final consumption

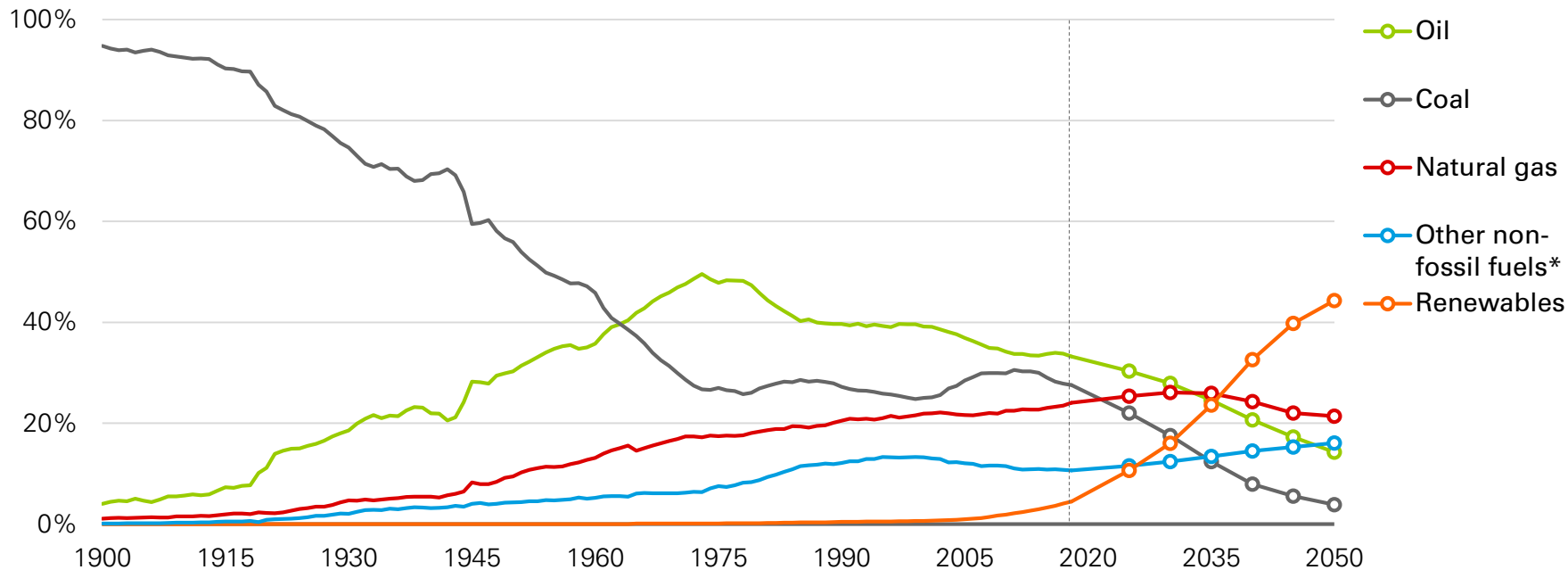


*Renewables includes wind, solar, geothermal, biomass, biomethane and biofuels and excludes large-scale hydro



Changing structure of global energy system

Shares of primary energy in *Rapid*



*Nuclear and hydroelectricity



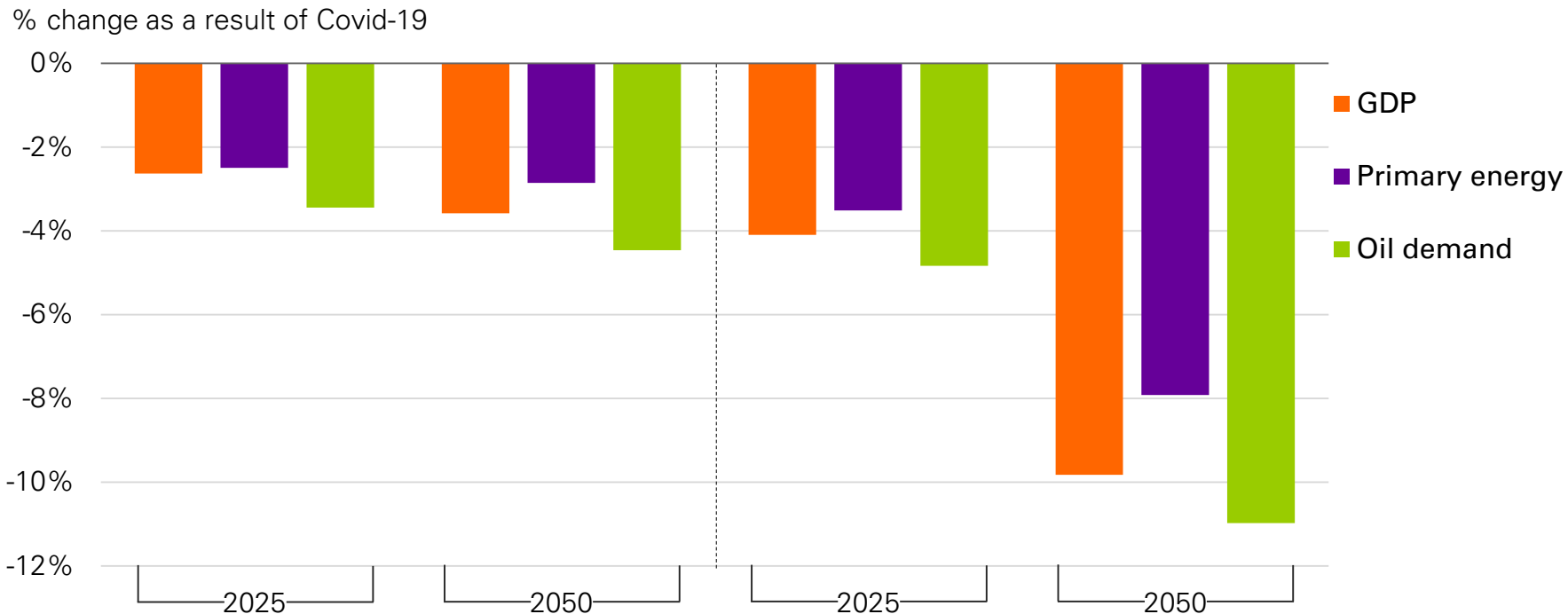
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Impact of Covid-19 in *Rapid*



Alt case*: Greater impact from Covid-19



*Alternative case showing the impact if Covid-19 leads to higher economic losses



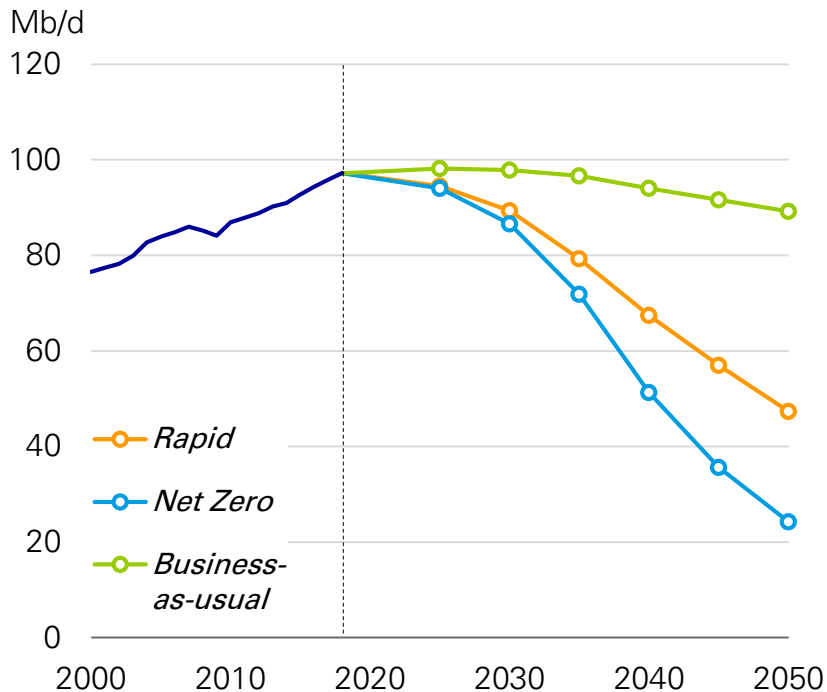
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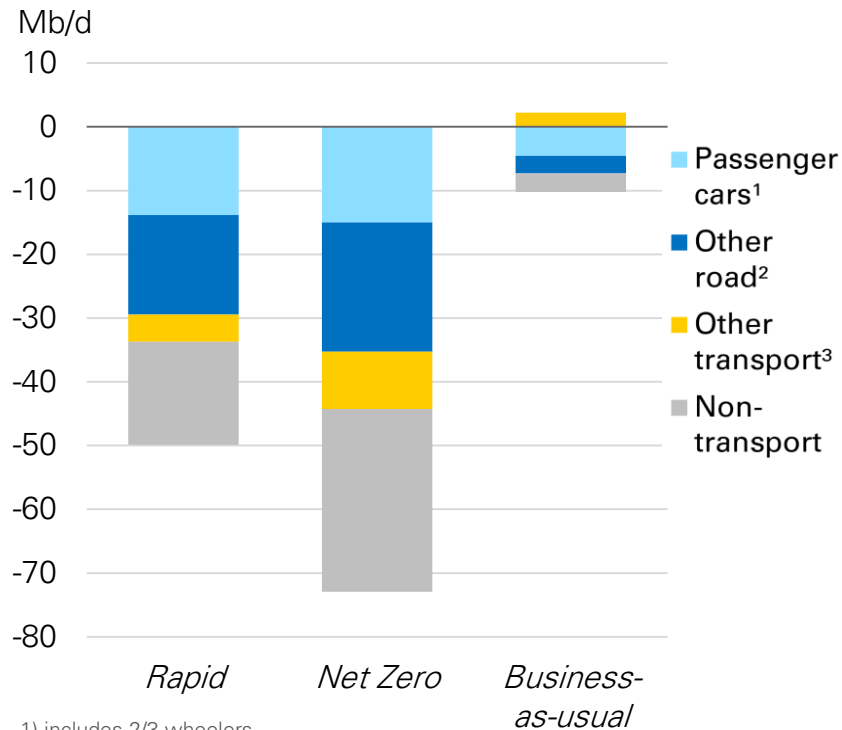


Outlook for oil demand

Oil consumption



Change in oil demand, 2018-2050

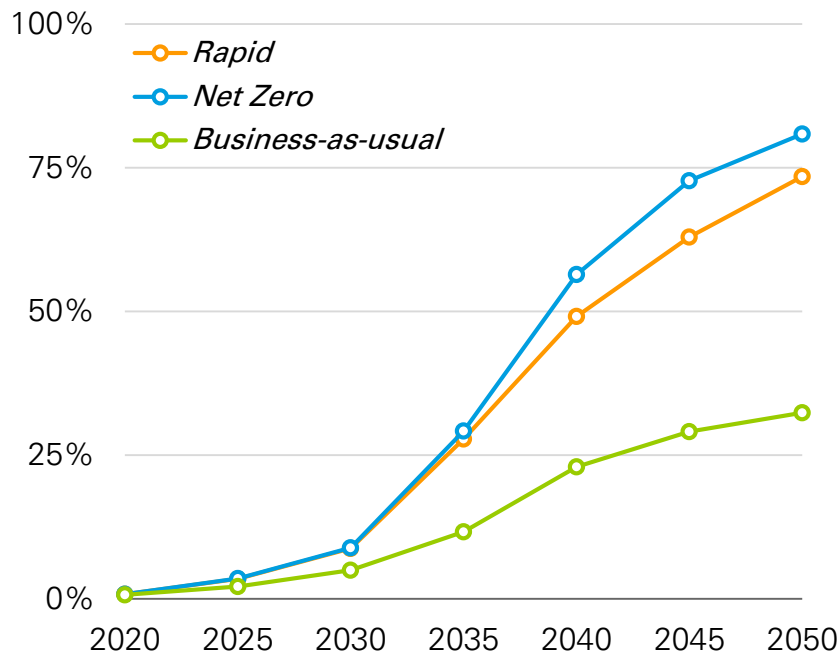


1) includes 2/3 wheelers
2) trucks and buses
3) aviation, marine and rail

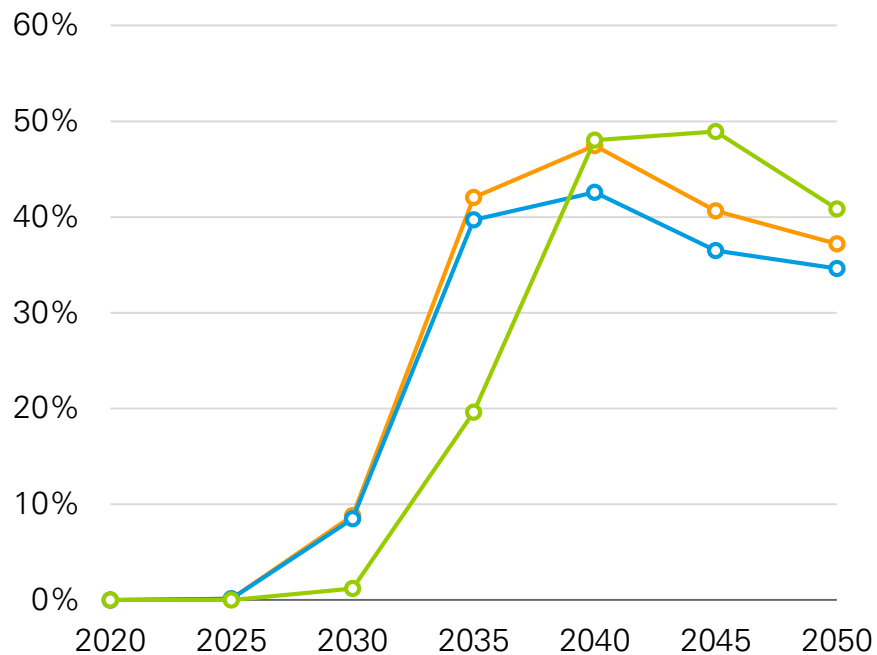
Mobility revolution: electrification, shared-mobility and autonomy



Share of car and truck VKM¹ electrified²



Robotaxi share of passenger car VKM¹ powered by electricity



1) vehicle kilometres

2) includes buses



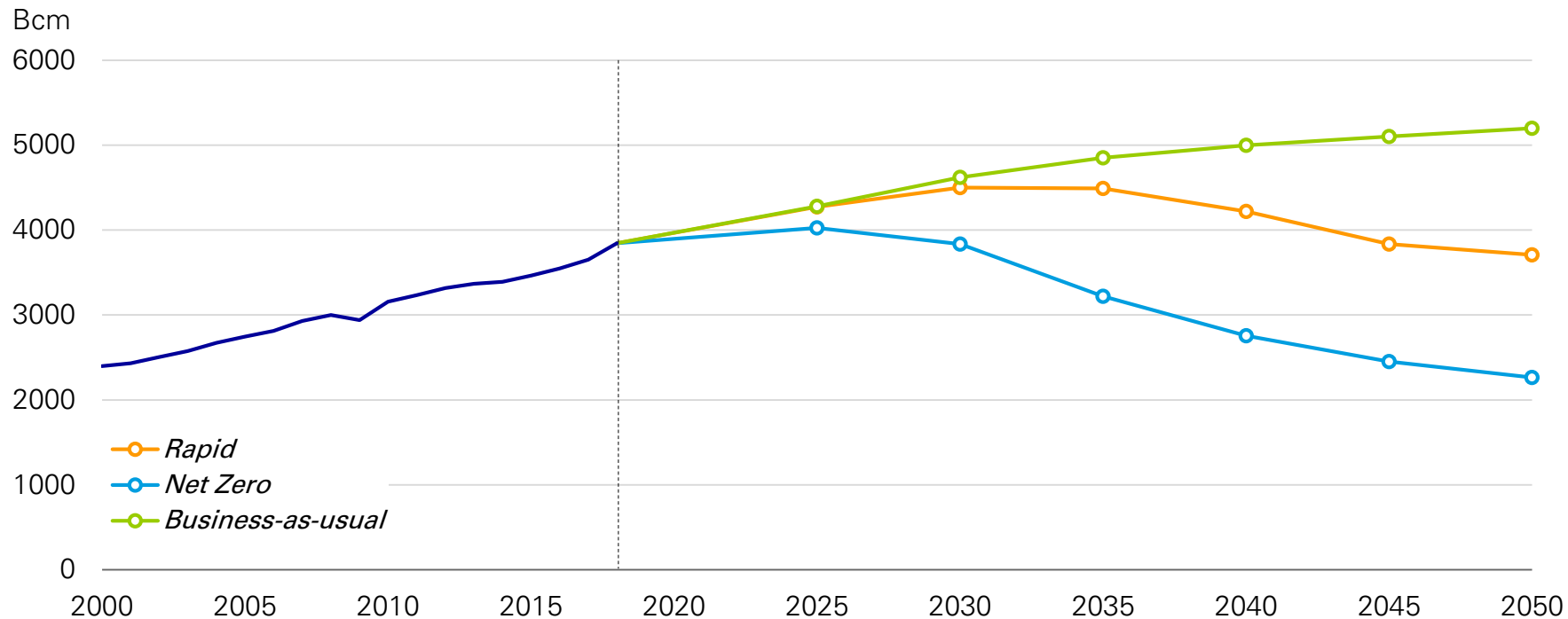
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Outlook for natural gas



Natural gas consumption

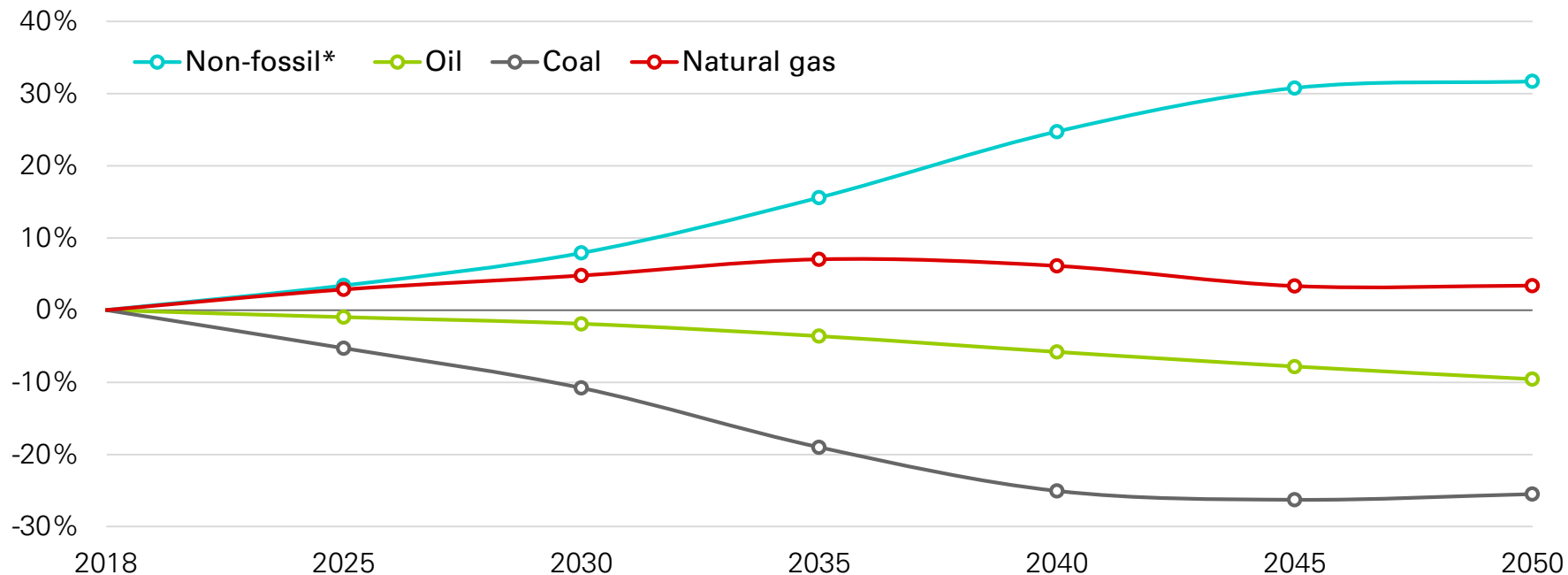


Supporting role of natural gas



Rapid vs. Business-as-usual: India and Other Asia

Differences in shares of primary energy

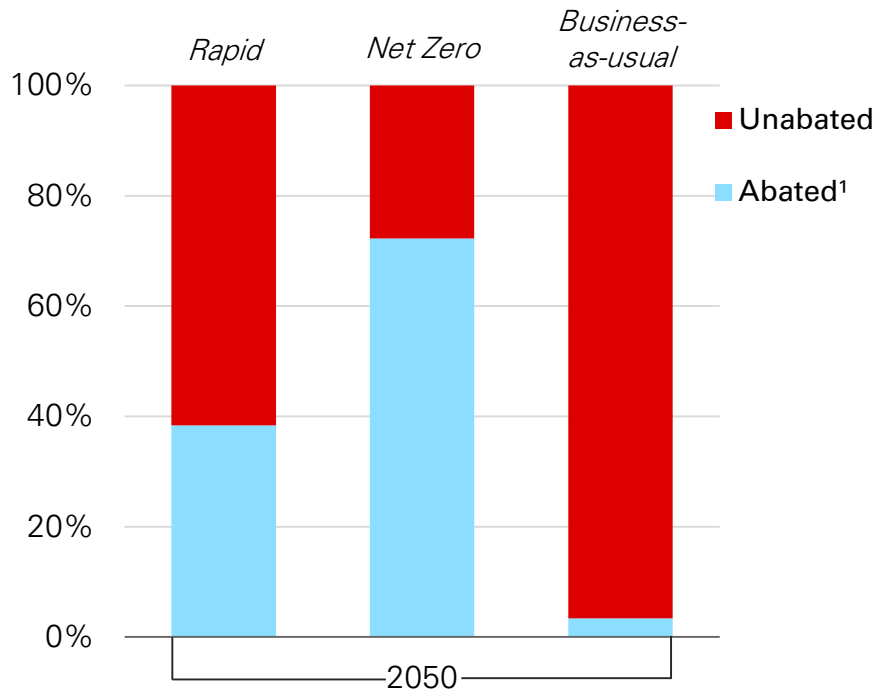


*Renewables, nuclear and hydroelectricity



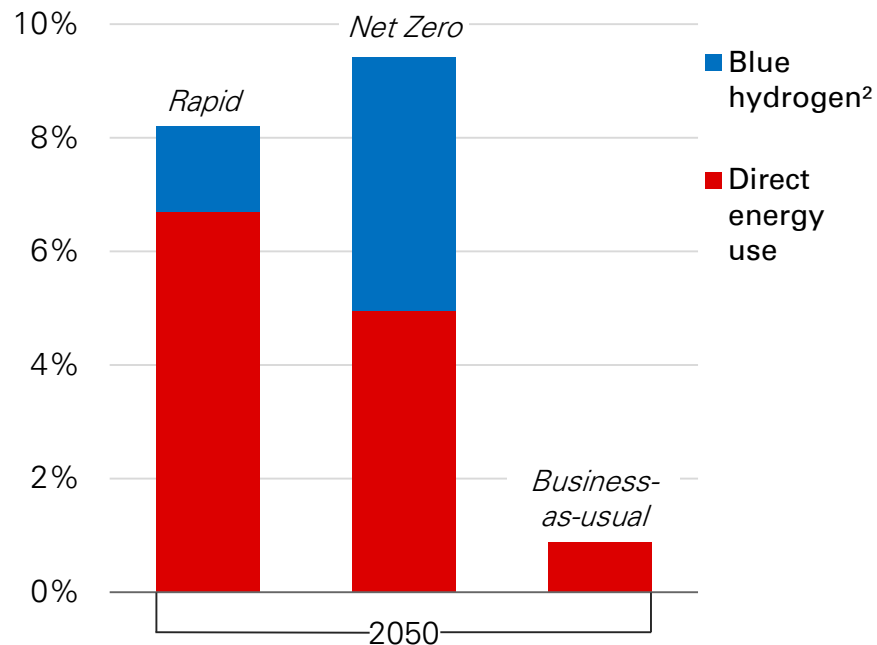
Natural gas as a source of near-zero carbon energy

Share of natural gas abated¹ and unabated



1) Direct use of natural gas with CCUS plus natural gas as input to blue hydrogen

Natural gas with CCUS as a share of primary energy



2) Blue hydrogen is extracted from natural gas (or coal), with the carbon dioxide by-product being captured via CCUS.

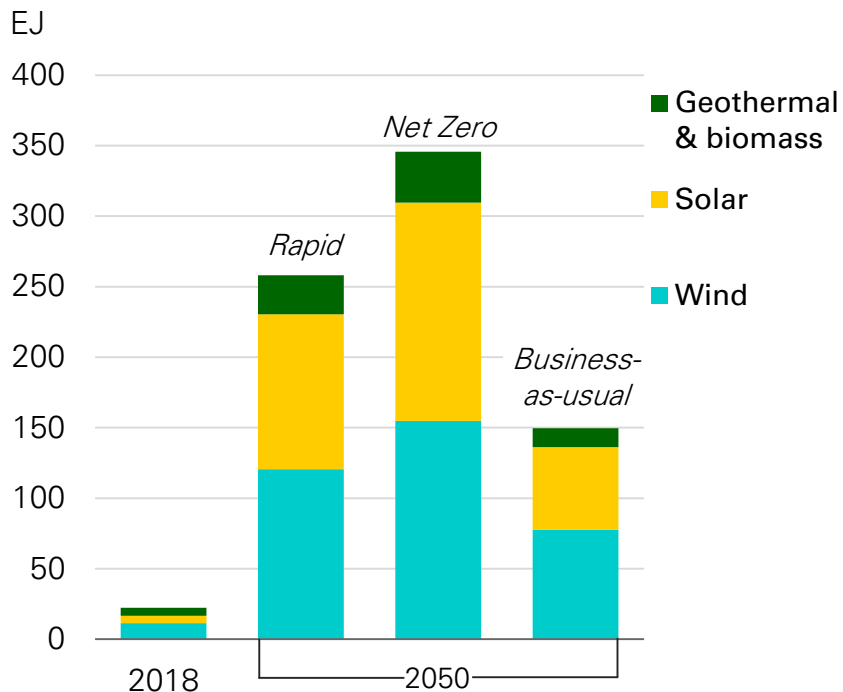


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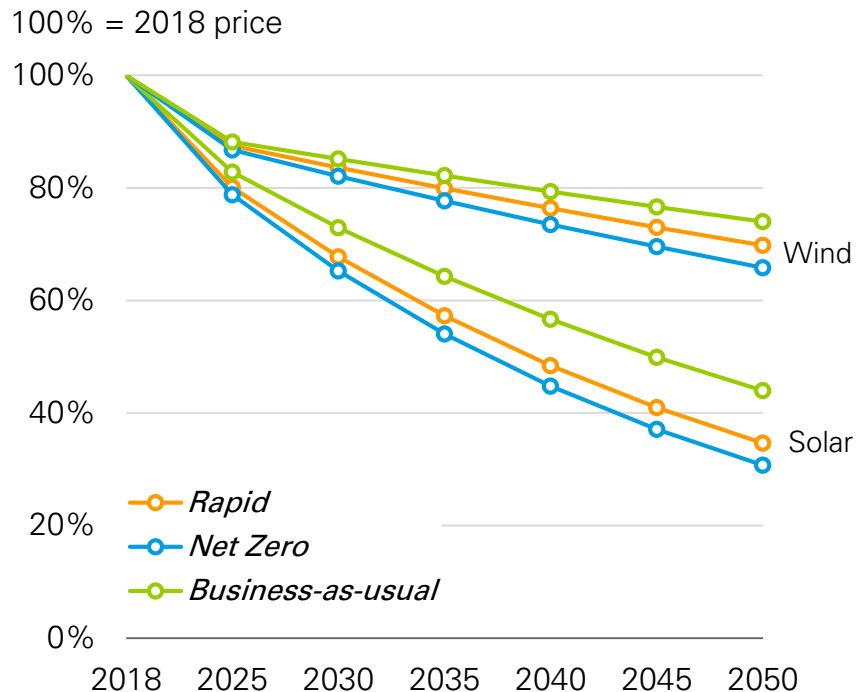
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Renewable energy in power

Renewable energy used in power sector*



Cost of wind and solar energy

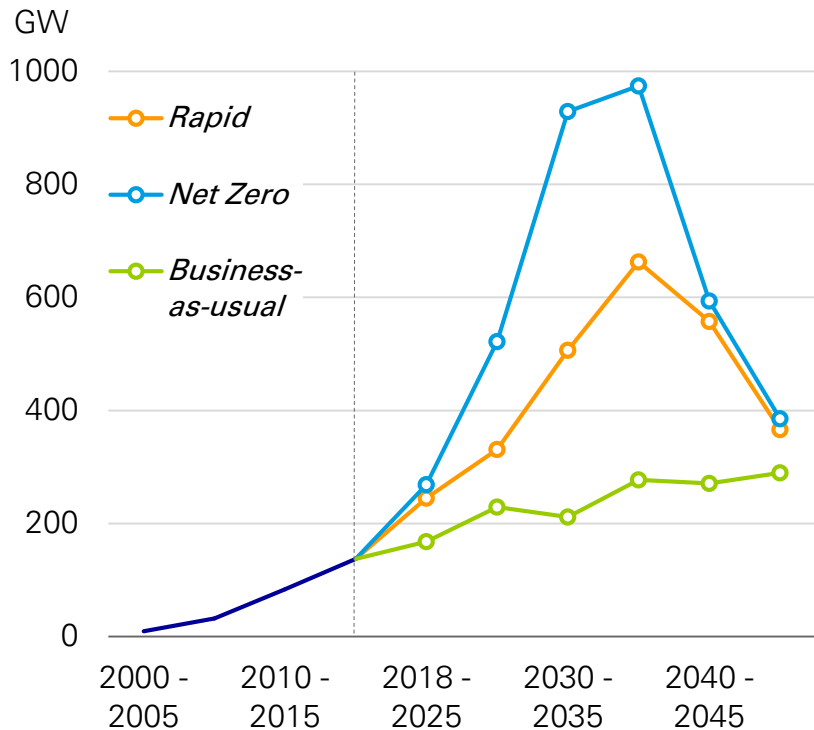


*On a primary energy basis (see *Energy Outlook* p154 for more details)



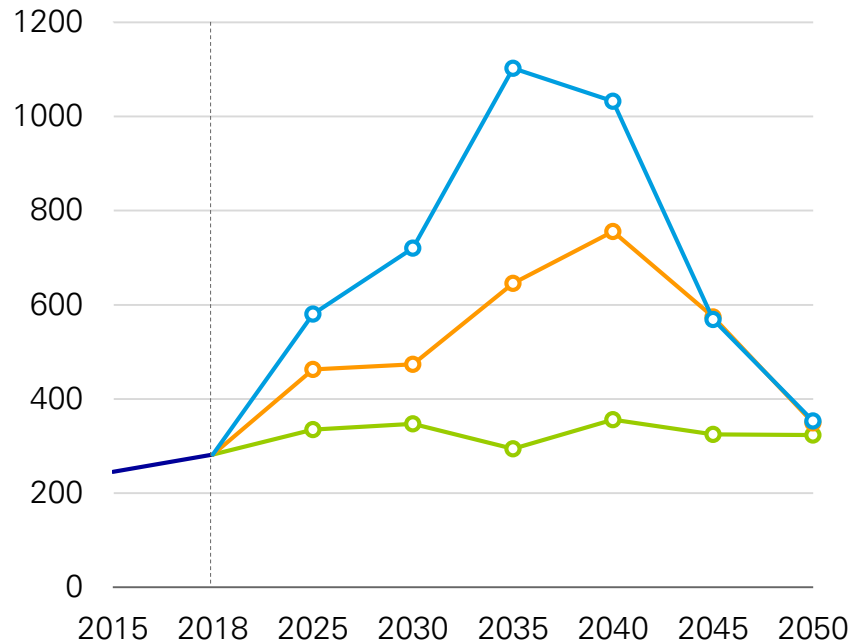
Wind and solar capacity

Average annual increase in wind and solar capacity



Average annual investment in wind and solar

Five-year rolling average, 2018 US\$ Billion





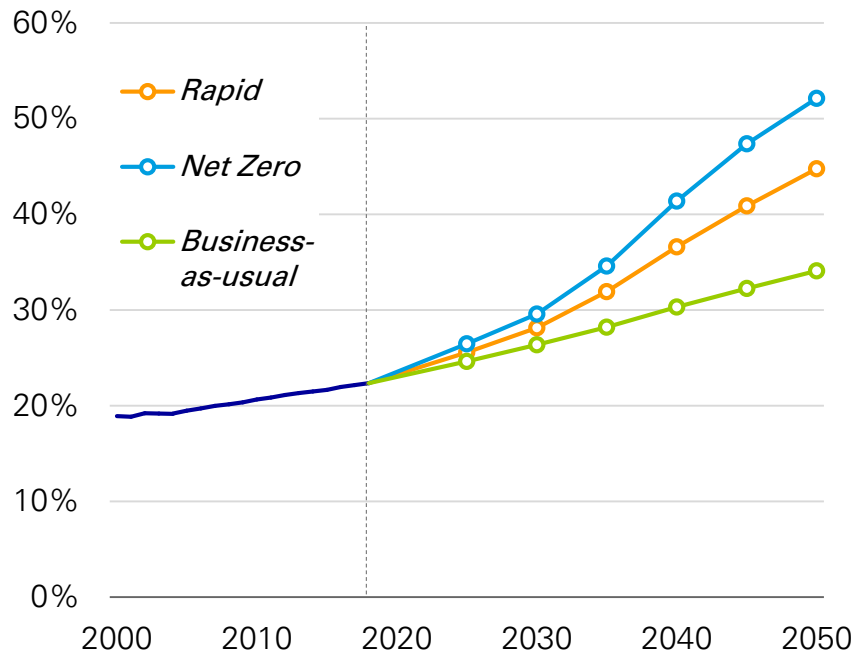
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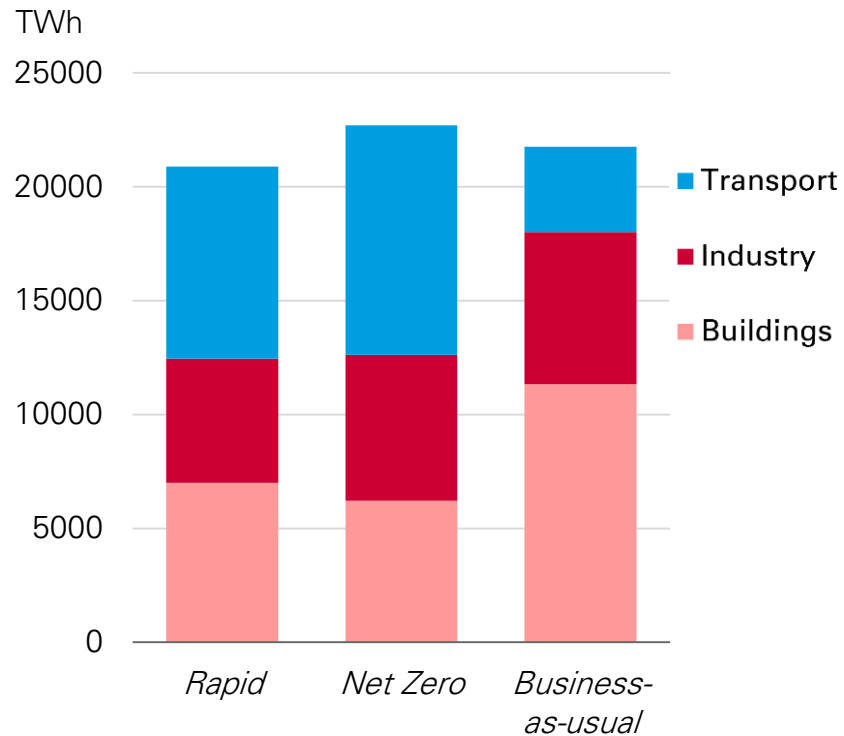


Electricity demand

Share of electricity in total final consumption



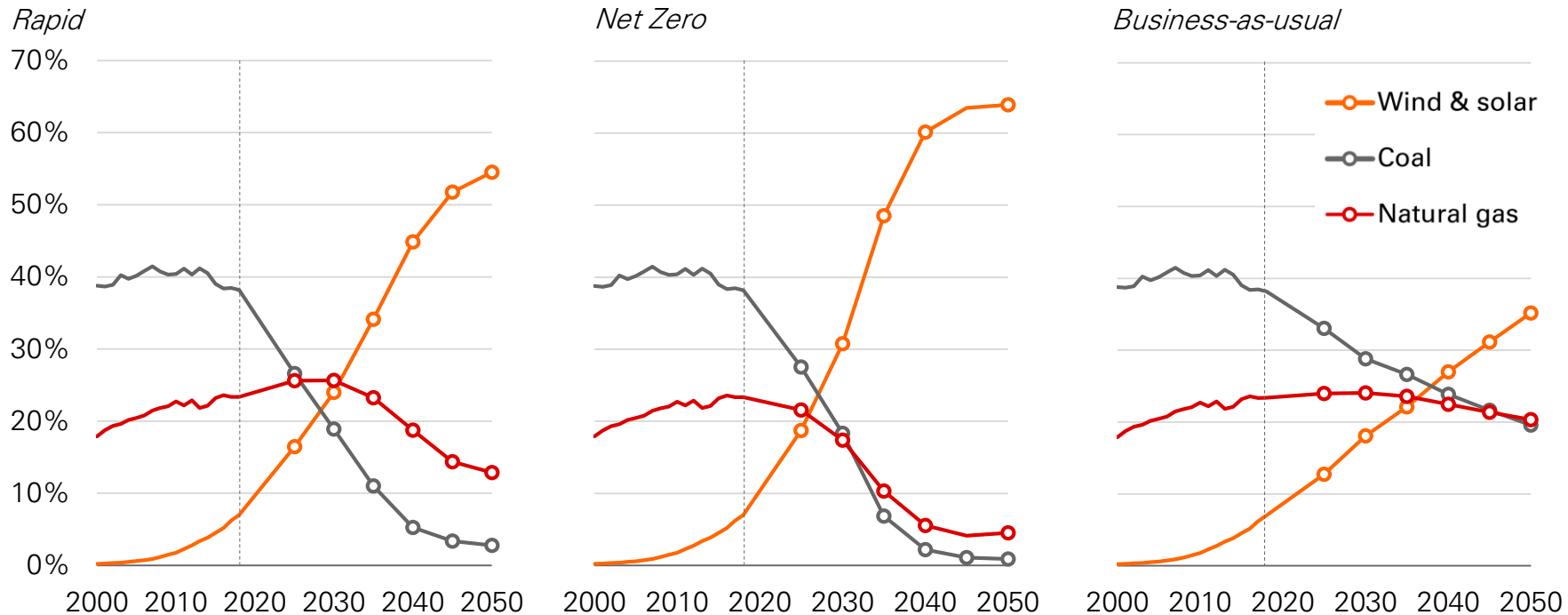
Change in electricity demand by sector, 2018-2050





Global power generation

Share of global power generation by energy source





Technologies to help balance the power sector

	Seconds	Minutes	Hours	Days	Weeks	Seasons
Batteries	Most advantaged	Most advantaged	Most advantaged	Not applicable / expensive	Not applicable / expensive	Not applicable / expensive
Pumped Hydro	Less advantaged	Most advantaged	Most advantaged	Not applicable / expensive	Not applicable / expensive	Not applicable / expensive
Demand response and rescheduling	Less advantaged	Most advantaged	Most advantaged	Less advantaged	Not applicable / expensive	Not applicable / expensive
Hydro with high-capacity reservoirs	Less advantaged	Most advantaged	Most advantaged	Most advantaged	Most advantaged	Most advantaged
Hydrogen	Less advantaged	Less advantaged	Less advantaged	Most advantaged	Most advantaged	Most advantaged
Gas (or coal) with CCUS	Not applicable / expensive	Less advantaged	Less advantaged	Most advantaged	Most advantaged	Most advantaged
Bioenergy with or without CCUS	Not applicable / expensive	Less advantaged	Less advantaged	Most advantaged	Most advantaged	Most advantaged

Not applicable / expensive

Less advantaged

Most advantaged

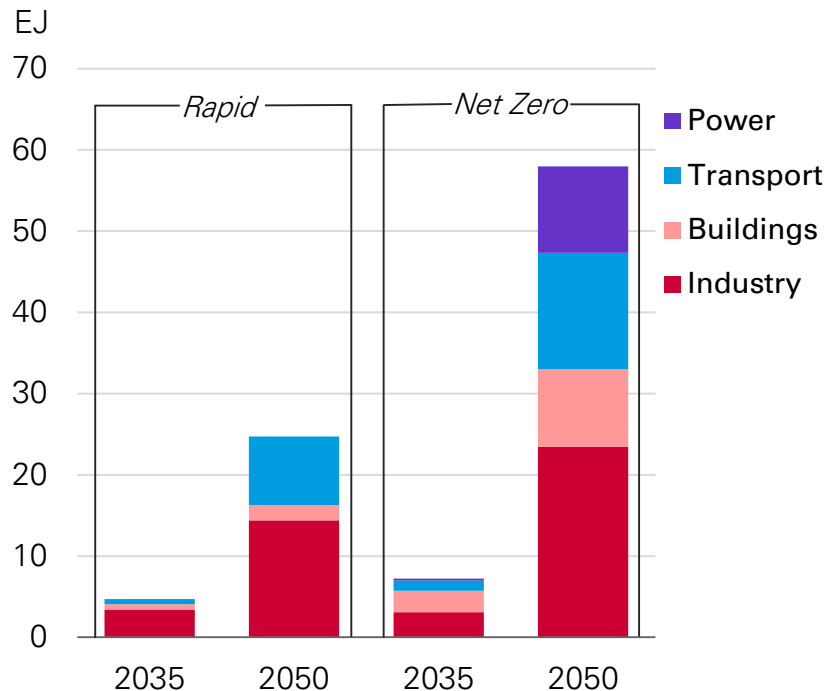


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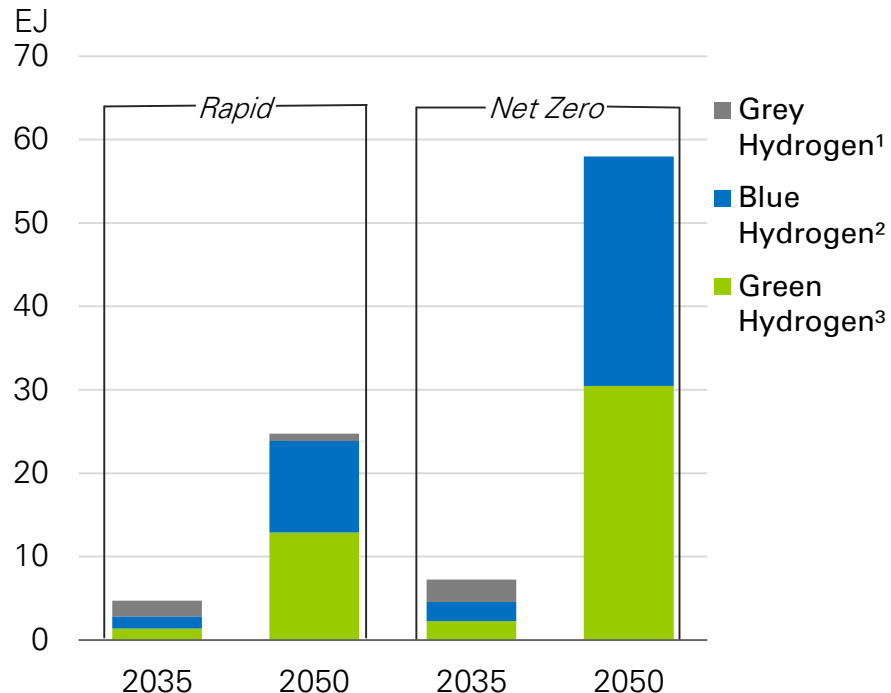
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Consumption and production of hydrogen

Hydrogen use by sector



Hydrogen production by type



1) produced from natural gas (or coal), without CCUS.

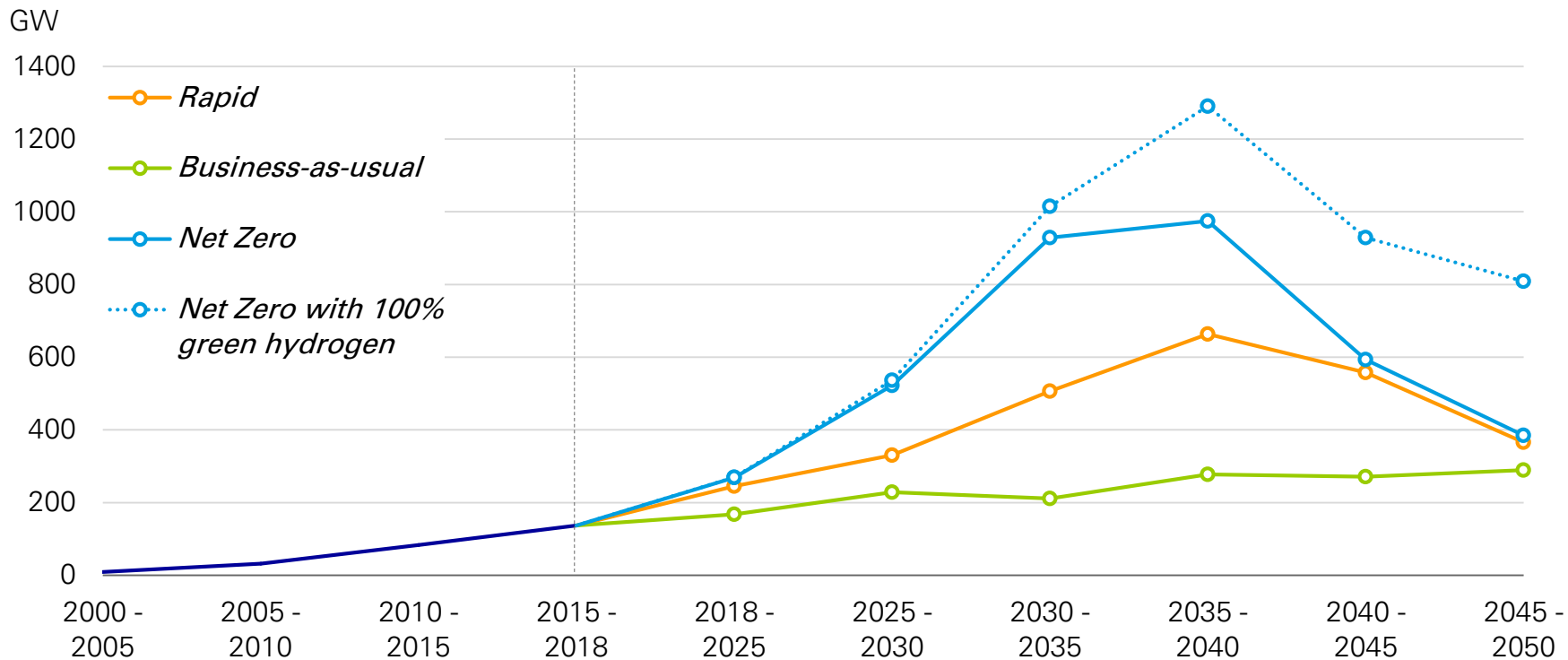
2) produced from natural gas (or coal) with CCUS

3) made by electrolysis, using renewable power



Wind and solar capacity

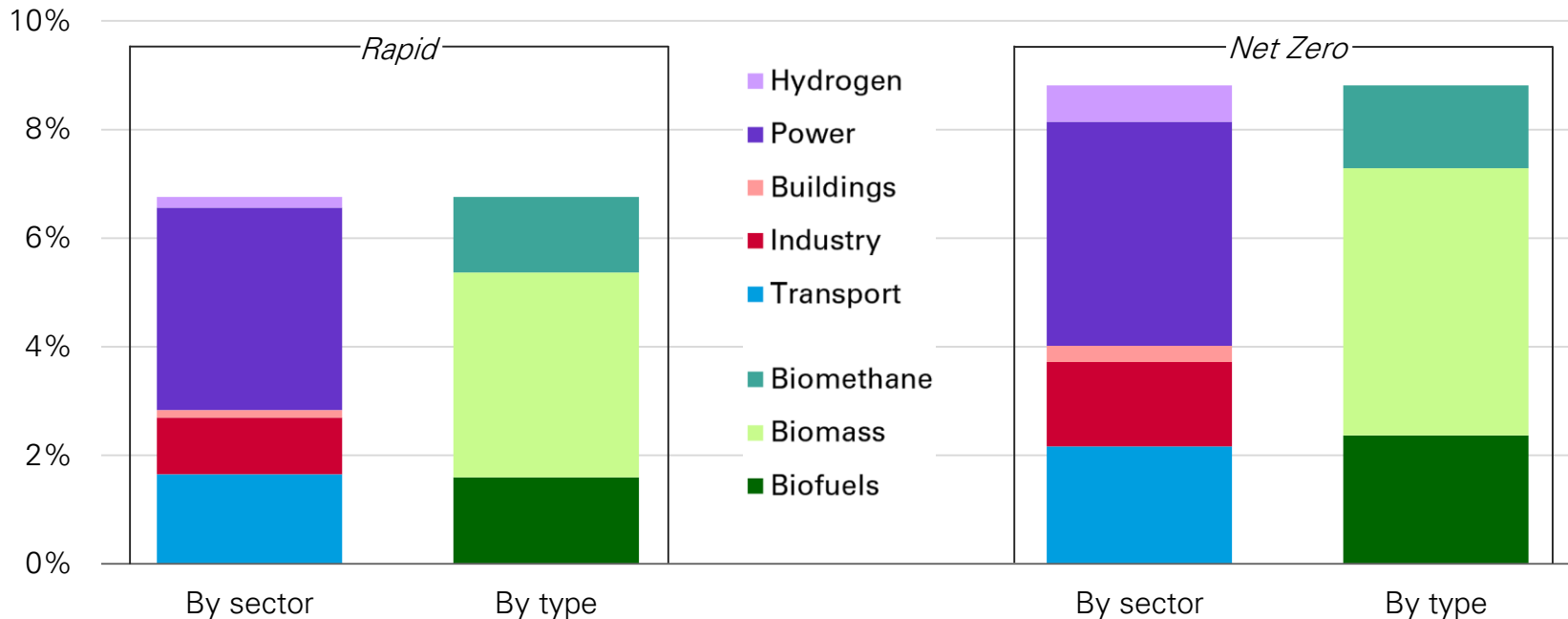
Annual average increase in wind and solar capacity



Bioenergy in *Rapid* and *Net Zero*



Shares of primary energy



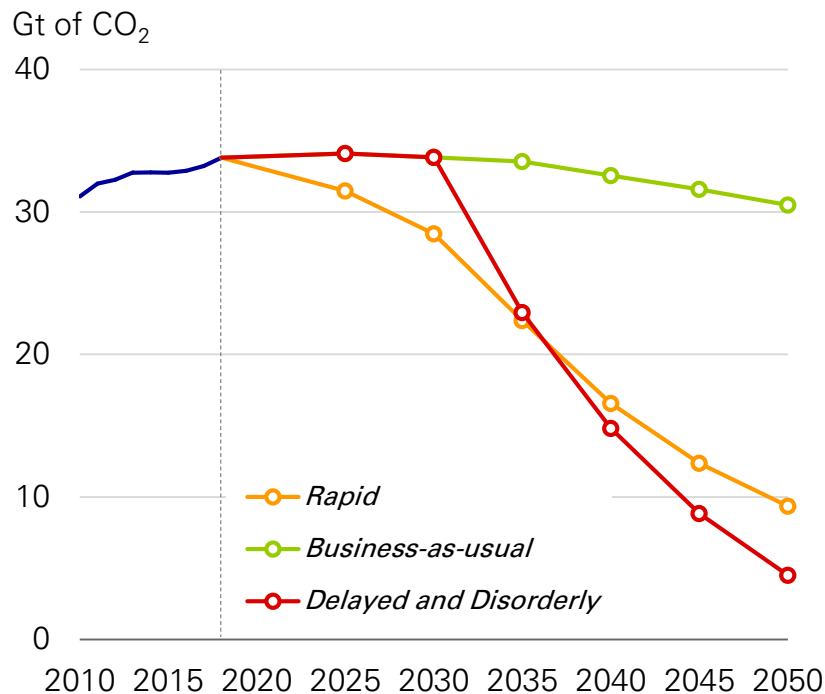


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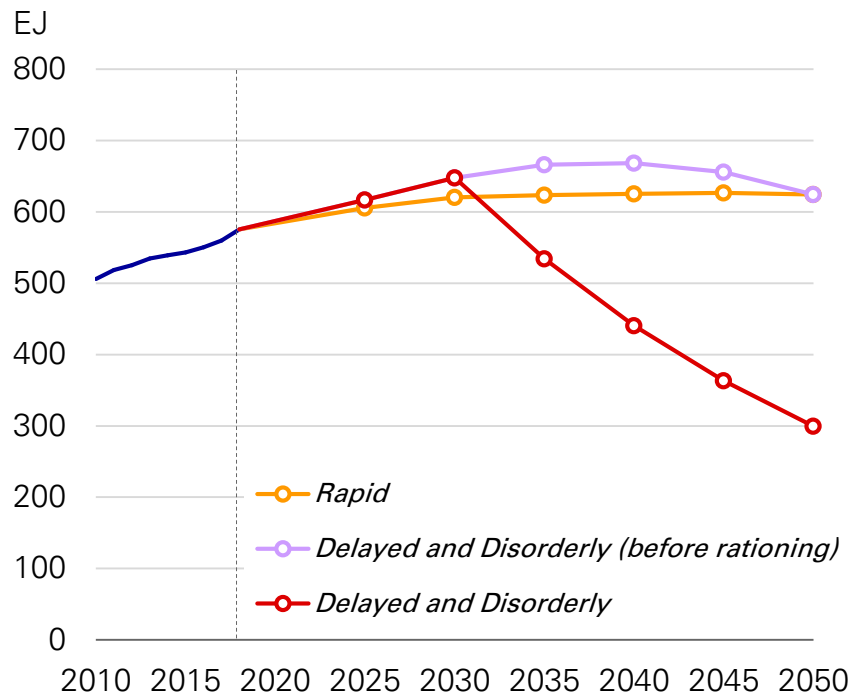
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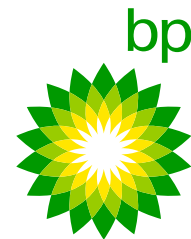
Delayed and Disorderly scenario

Carbon emissions



Primary energy consumption



A large, circular cutout in the background reveals a vibrant, busy street scene at night. The street is filled with people, motorcycles, and cars, illuminated by colorful streetlights and building lights. The scene is framed by a white circular shape that also contains the text.

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