

Energy Outlook  
2020 edition

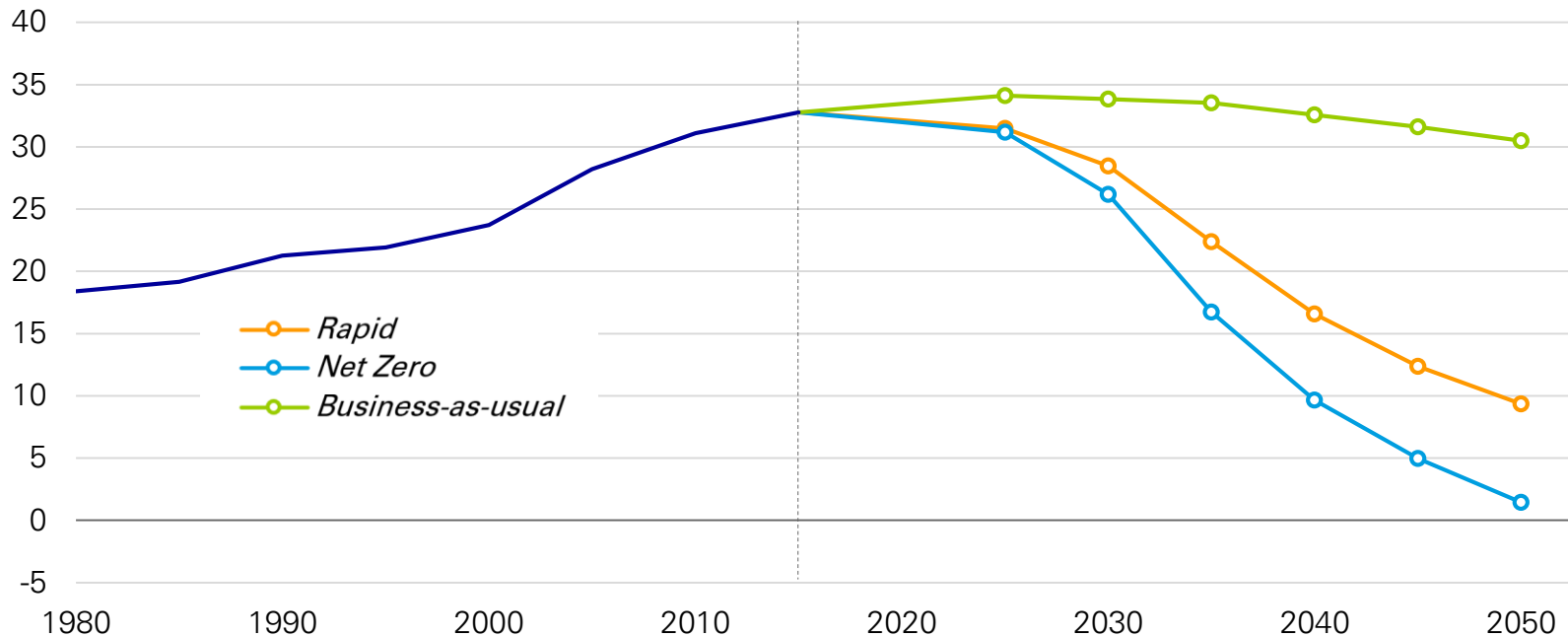
**Spencer Dale**  
Group chief economist



# Three scenarios to explore the energy transition

## CO<sub>2</sub> emissions from energy use

Gt of CO<sub>2</sub>

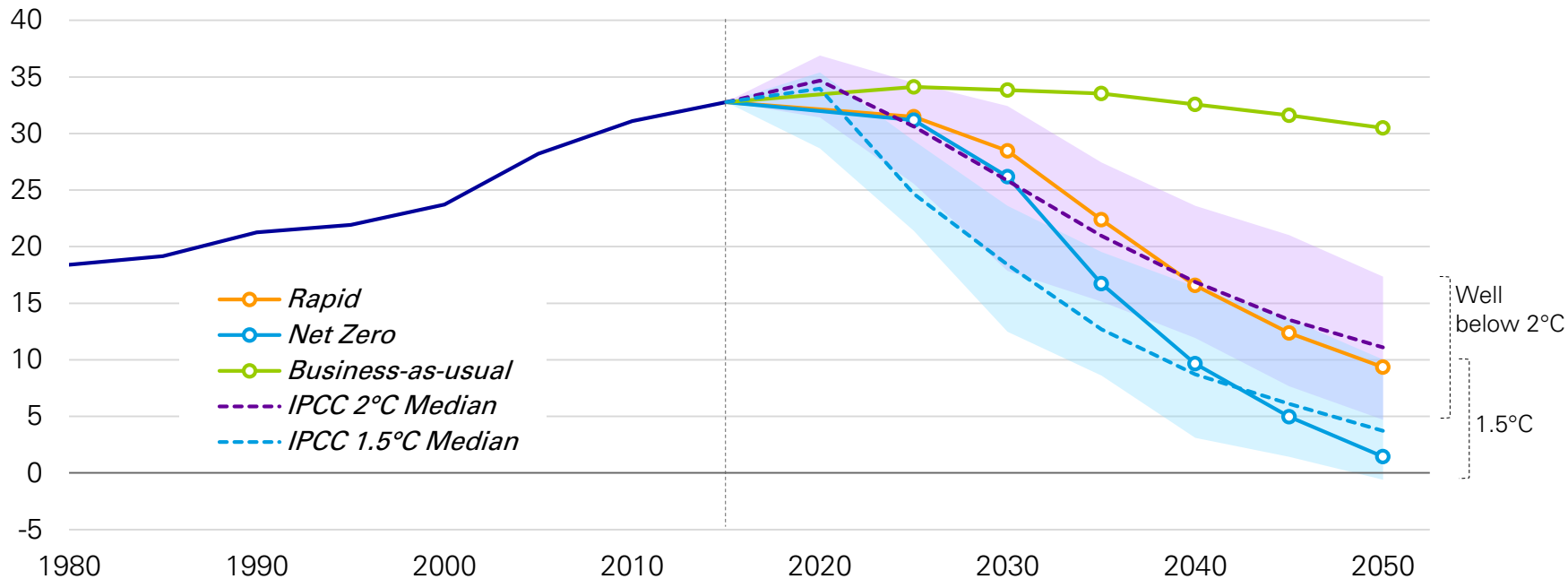




# Three scenarios to explore the energy transition

## CO<sub>2</sub> emissions from energy use

Gt of CO<sub>2</sub>

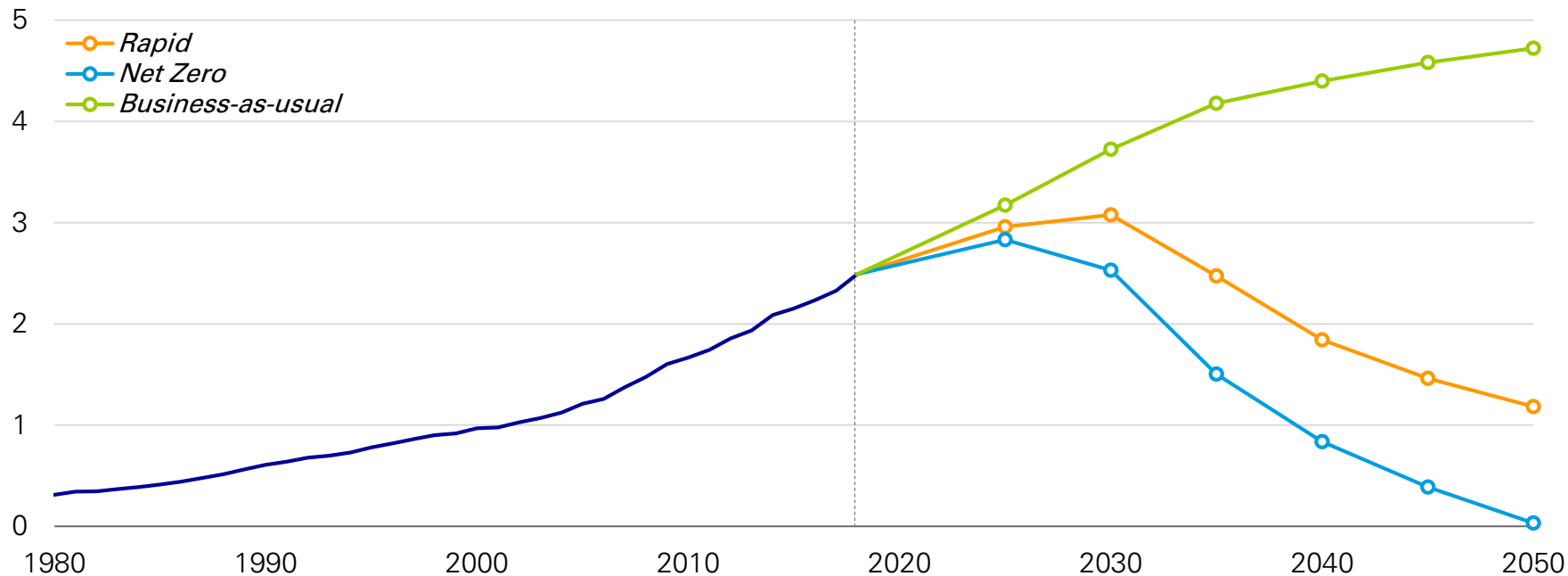


# Three scenarios to explore the energy transition (India)



## CO<sub>2</sub> emissions from energy use

Gt of CO<sub>2</sub>



# Key questions

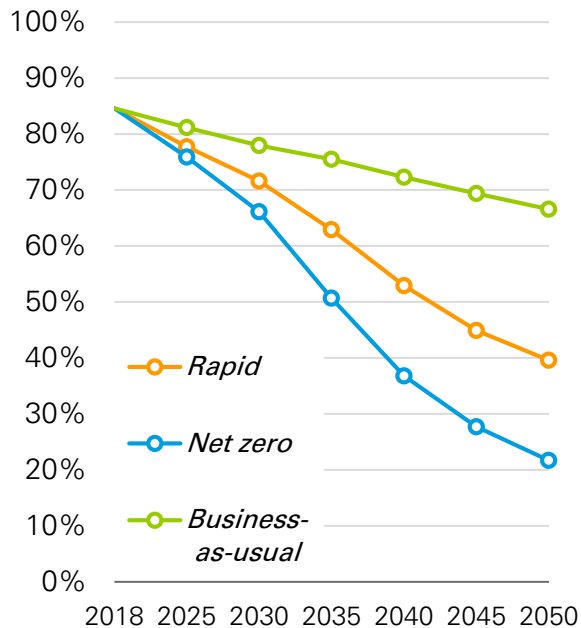
1. What DO we know?
2. Outlook for oil demand?
3. What role could natural gas play in the energy transition?
4. How quickly will renewable energy grow



# Changing structure of global energy demand

## Fossil fuels

Shares of primary energy

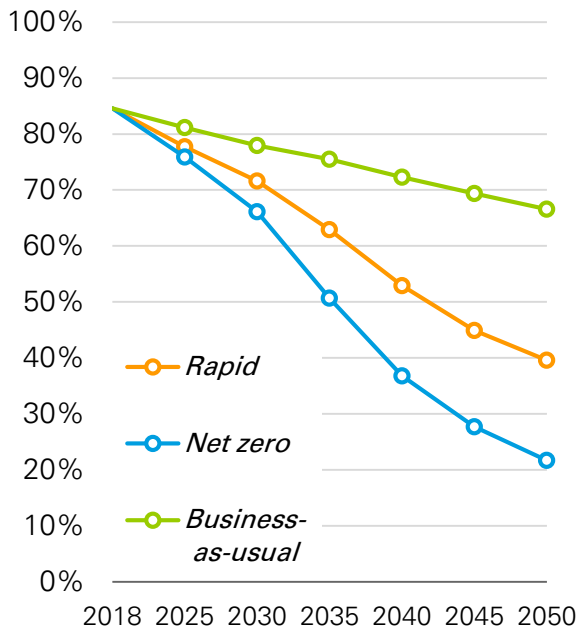




# Changing structure of global energy demand

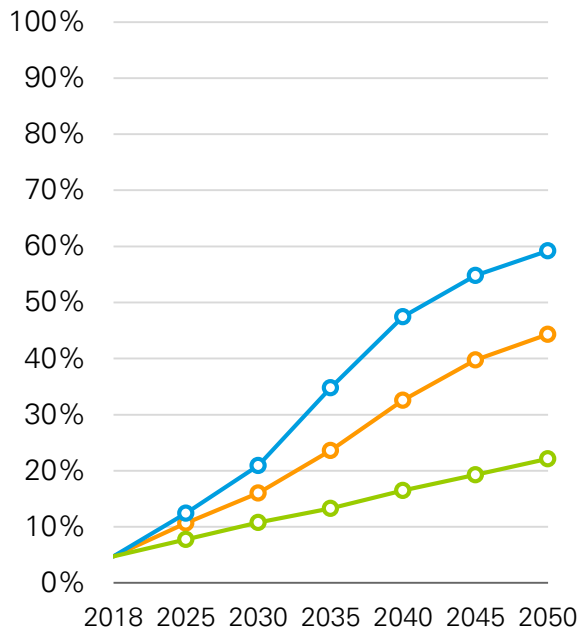
## Fossil fuels

Shares of primary energy



## Renewables

Shares of primary energy

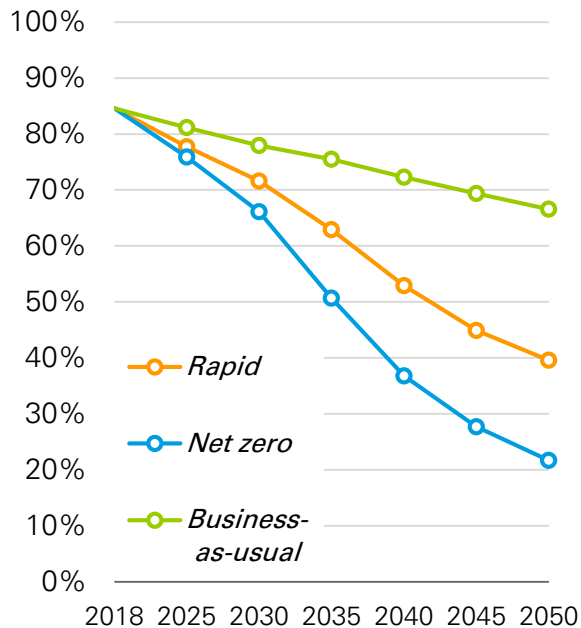




# Changing structure of global energy demand

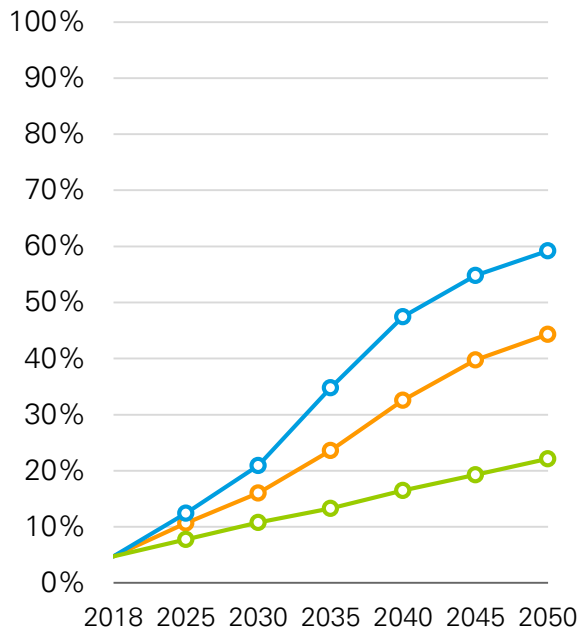
## Fossil fuels

Shares of primary energy



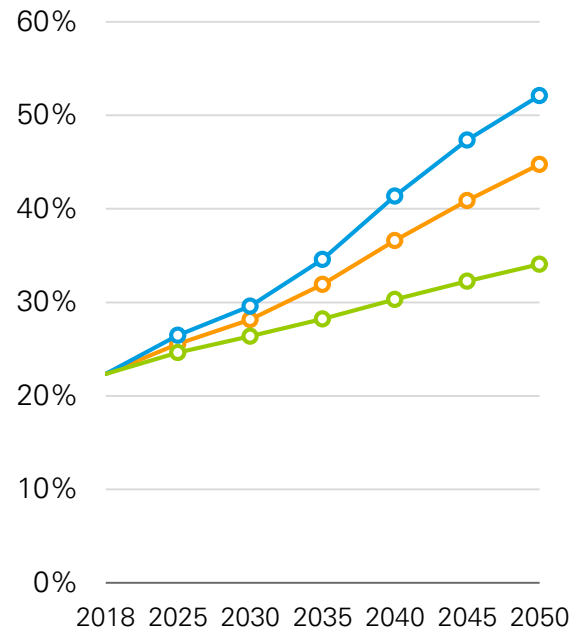
## Renewables

Shares of primary energy



## Electricity

Share of total final consumption



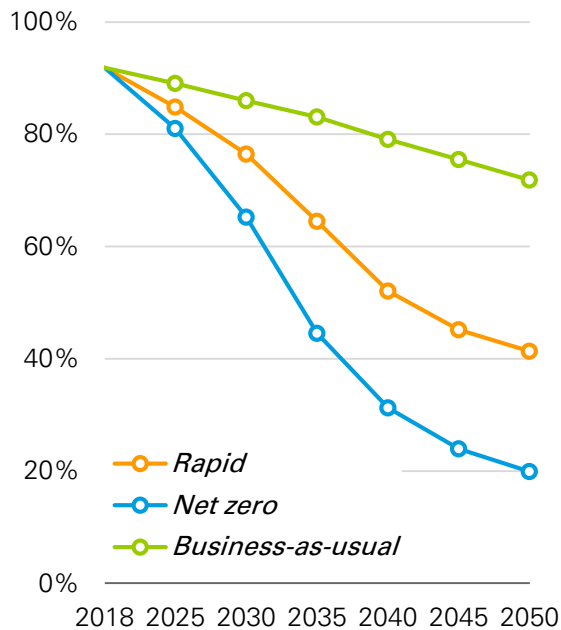




# Changing structure of Indian energy demand

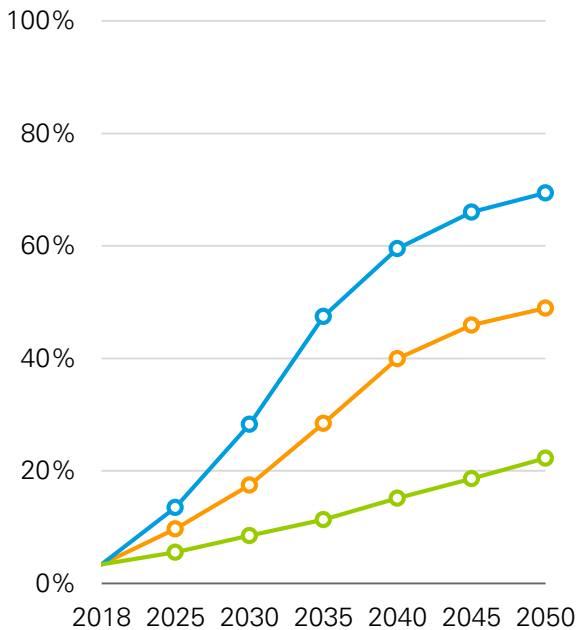
## Fossil fuels

Shares of primary energy



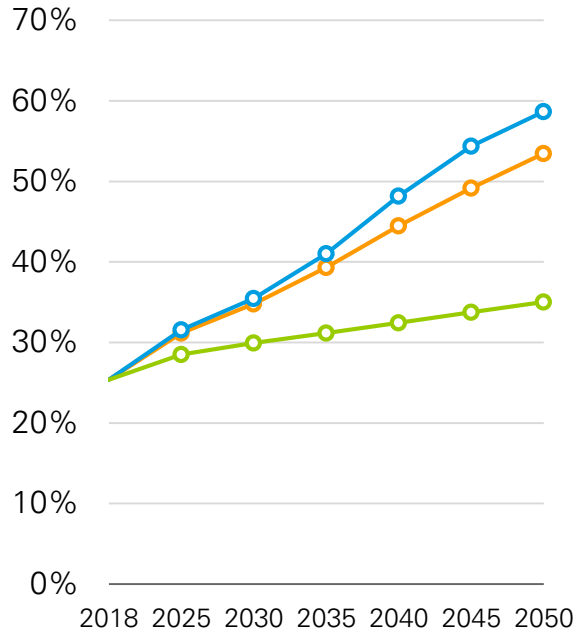
## Renewables

Shares of primary energy



## Electricity

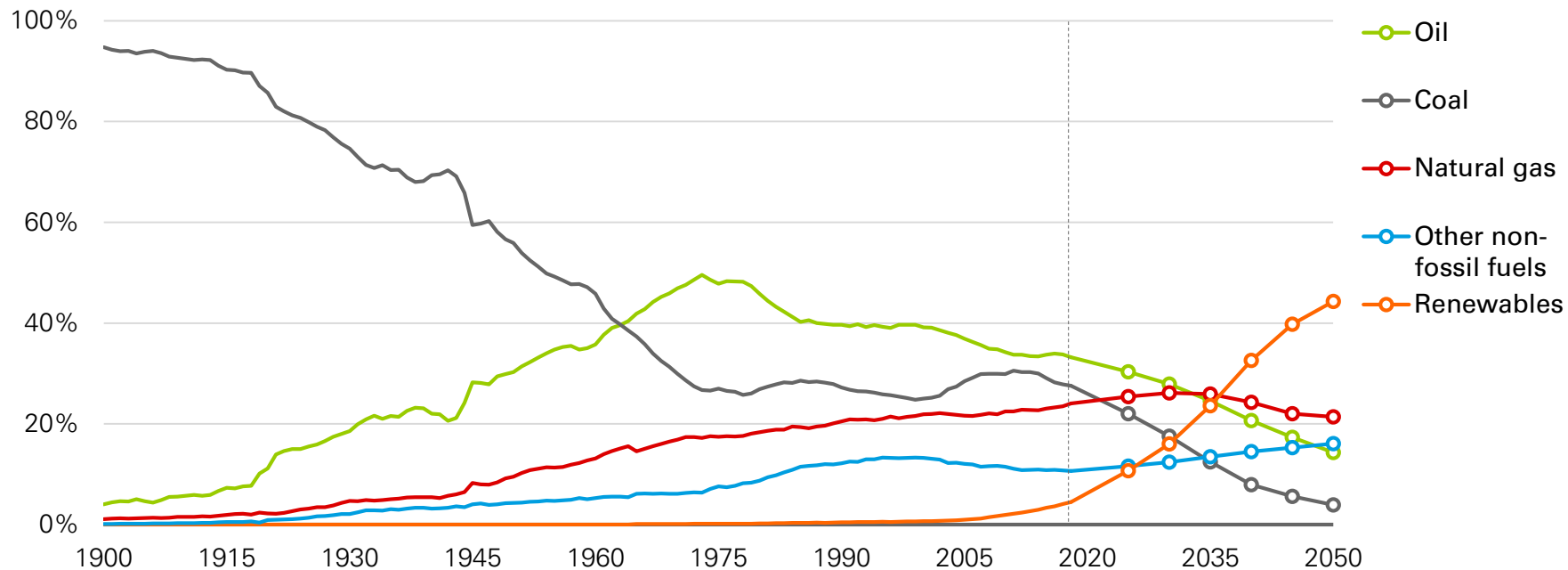
Share of total final consumption





# Changing structure of global energy system

Shares of primary energy in *Rapid*

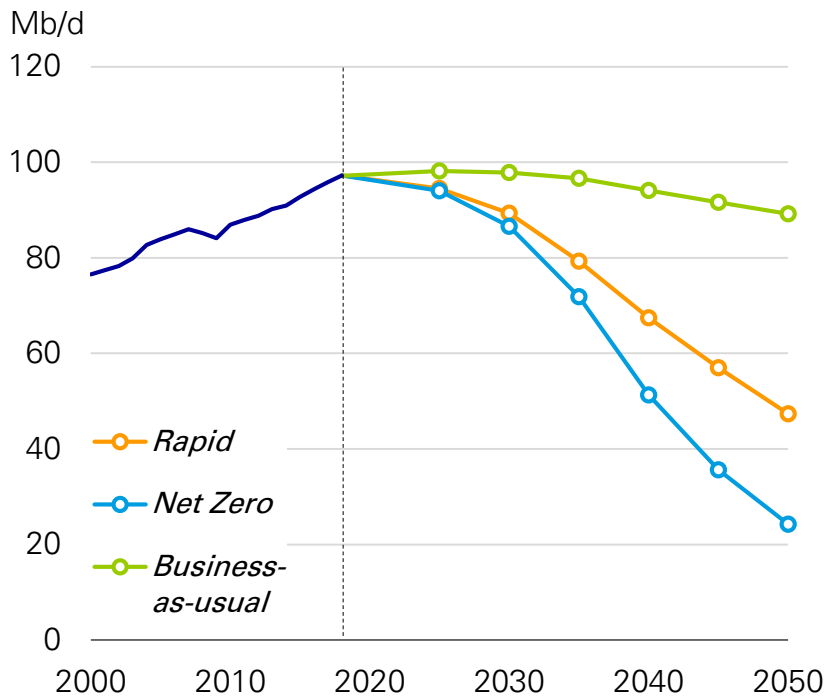


# Key questions

1. What DO we know?
2. Outlook for oil demand?
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# Outlook for oil demand

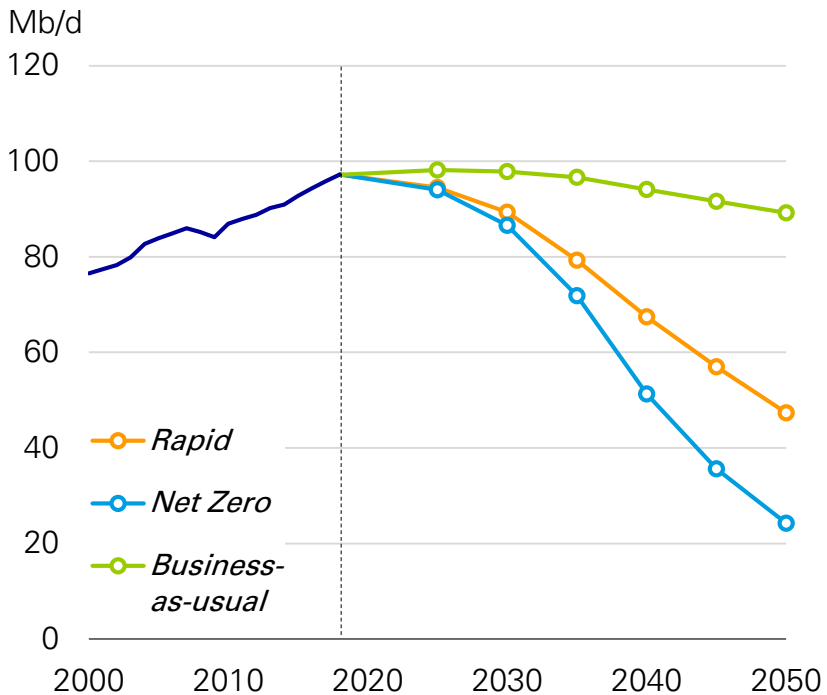
## Oil consumption



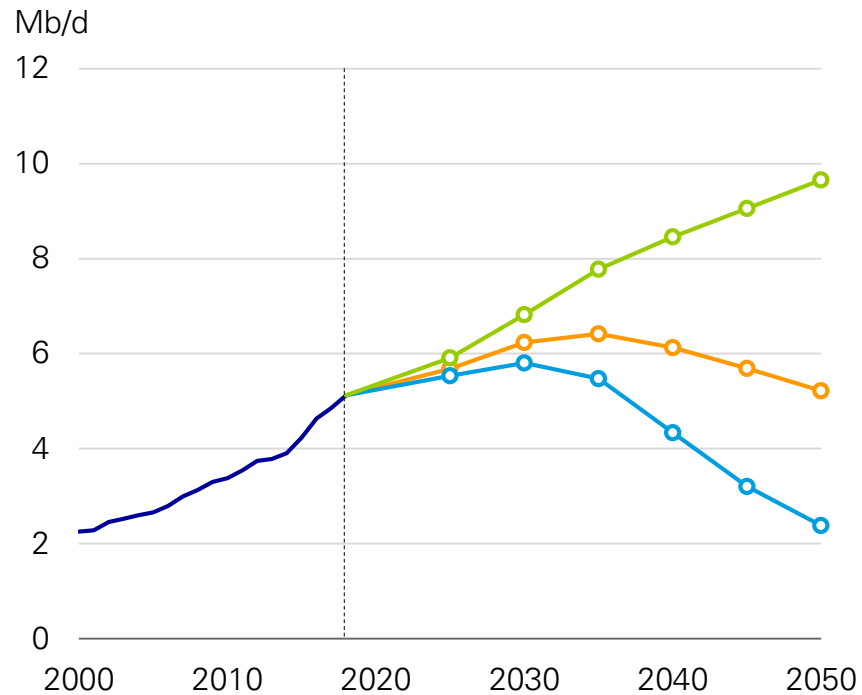
# Outlook for oil demand



## Oil consumption



## Indian oil consumption



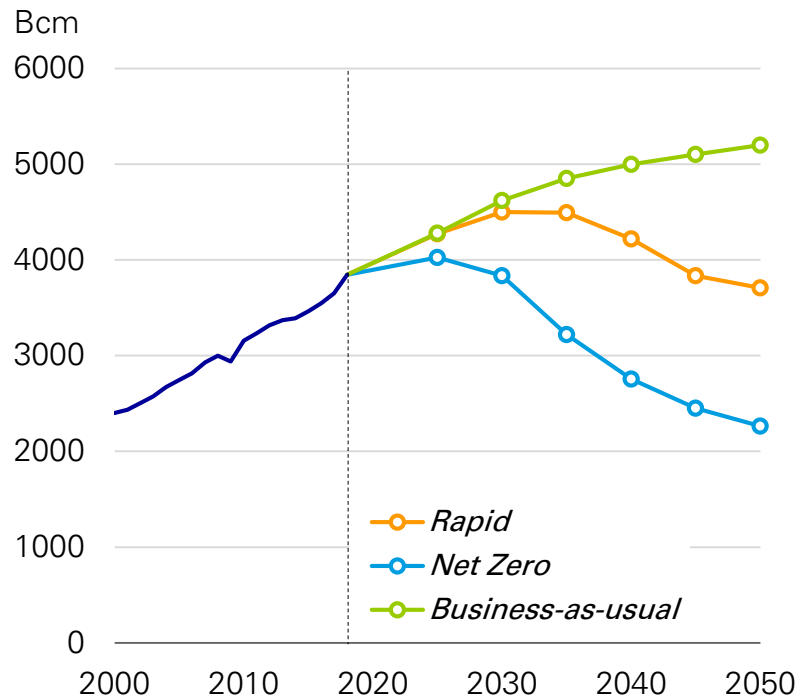


# Key questions

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# Outlook for natural gas

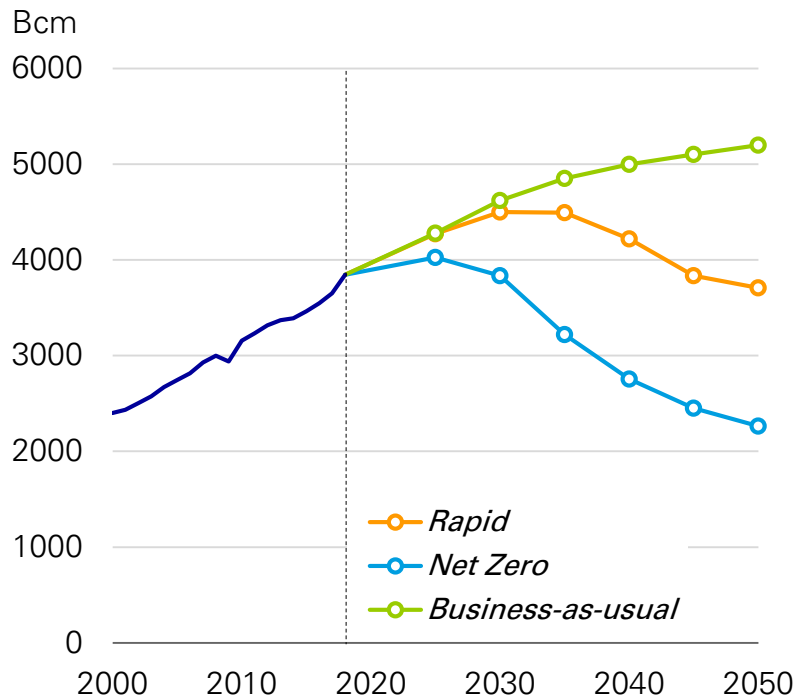
## Global natural gas consumption



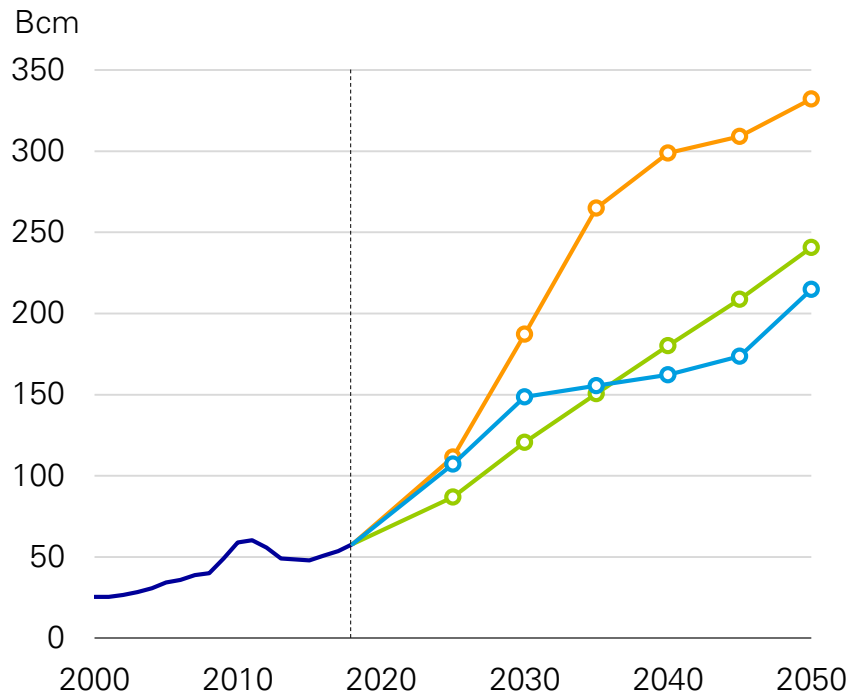
# Outlook for natural gas



## Global natural gas consumption



## Indian natural gas consumption



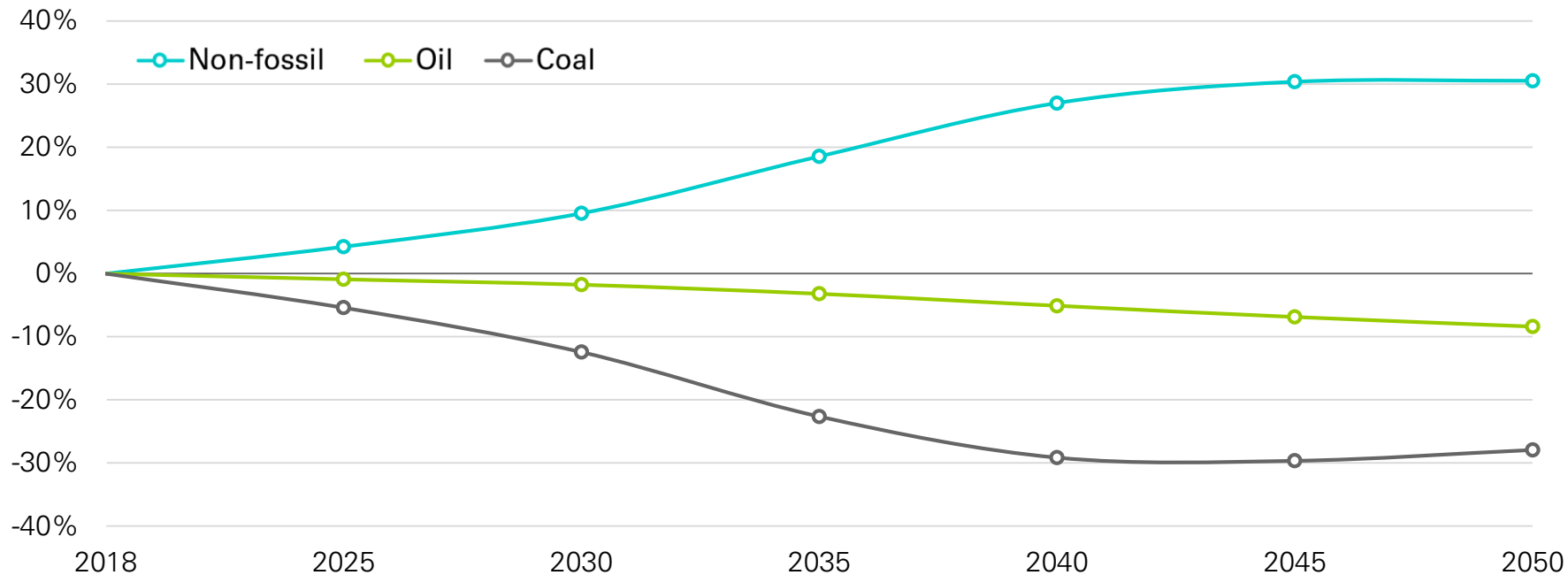


# Supporting role of natural gas



## *Rapid vs. Business-as-usual: India*

Differences in shares of primary energy

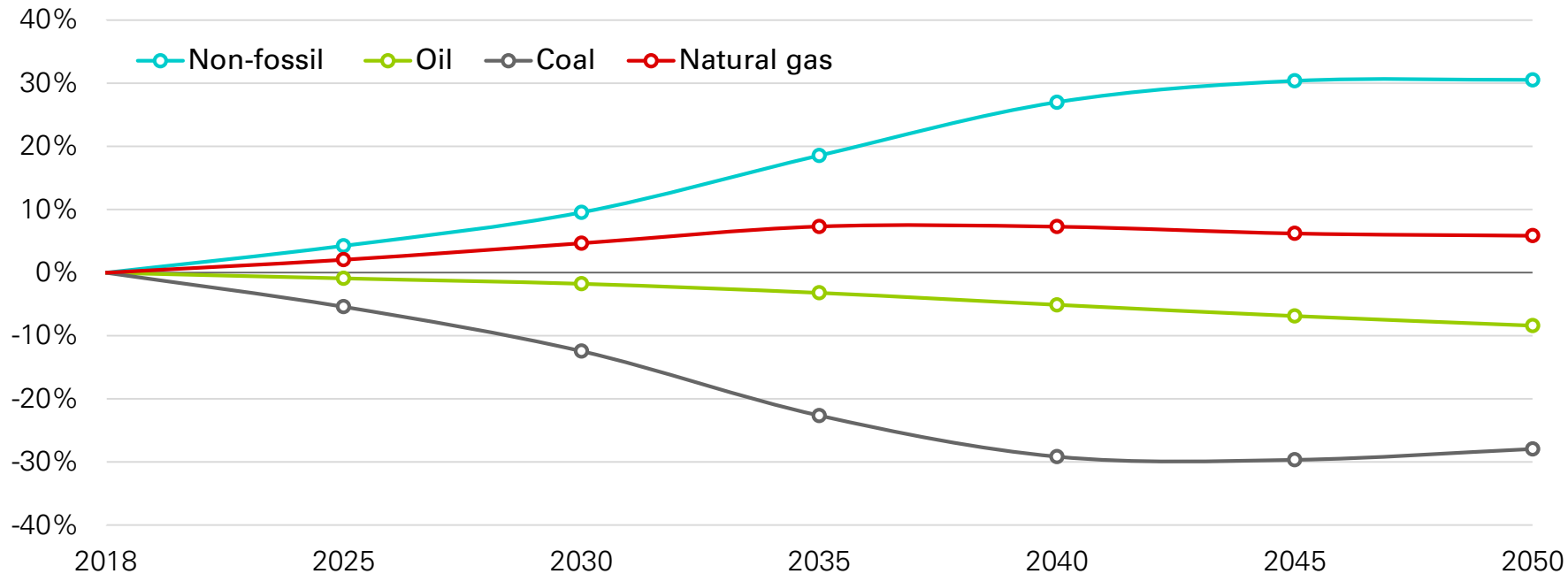


# Supporting role of natural gas



## *Rapid vs. Business-as-usual: India*

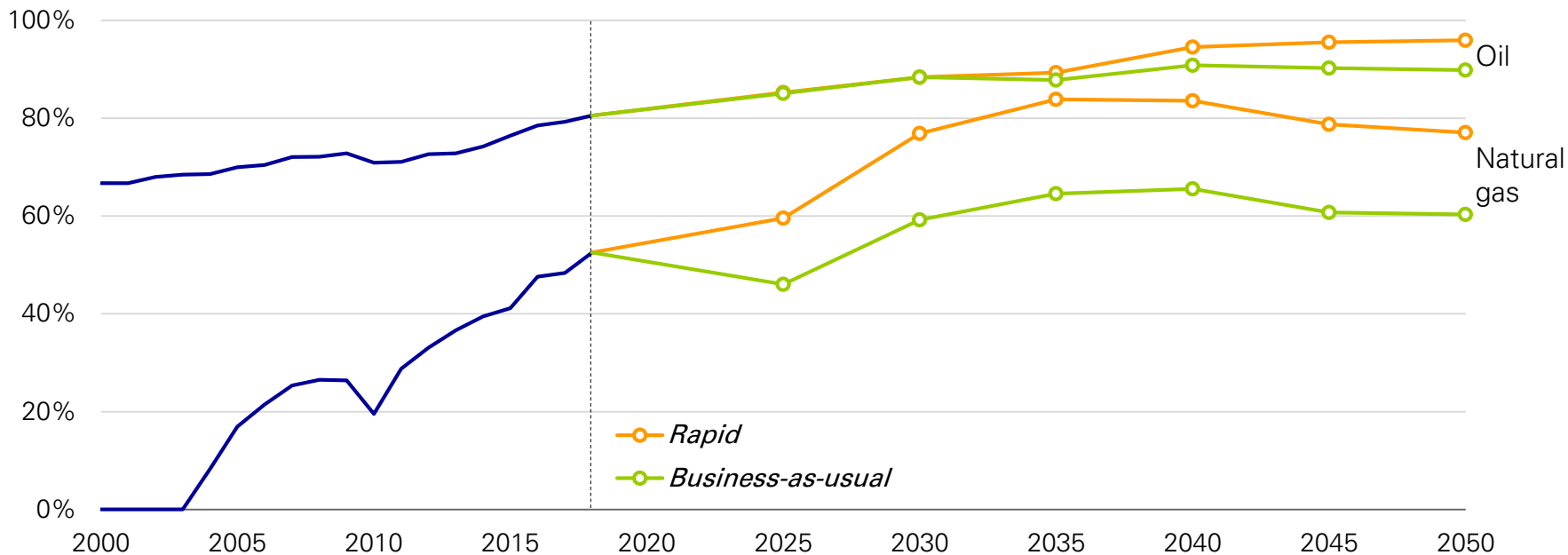
Differences in shares of primary energy





# Indian energy: supply and demand balance

Energy imports as a share of consumption

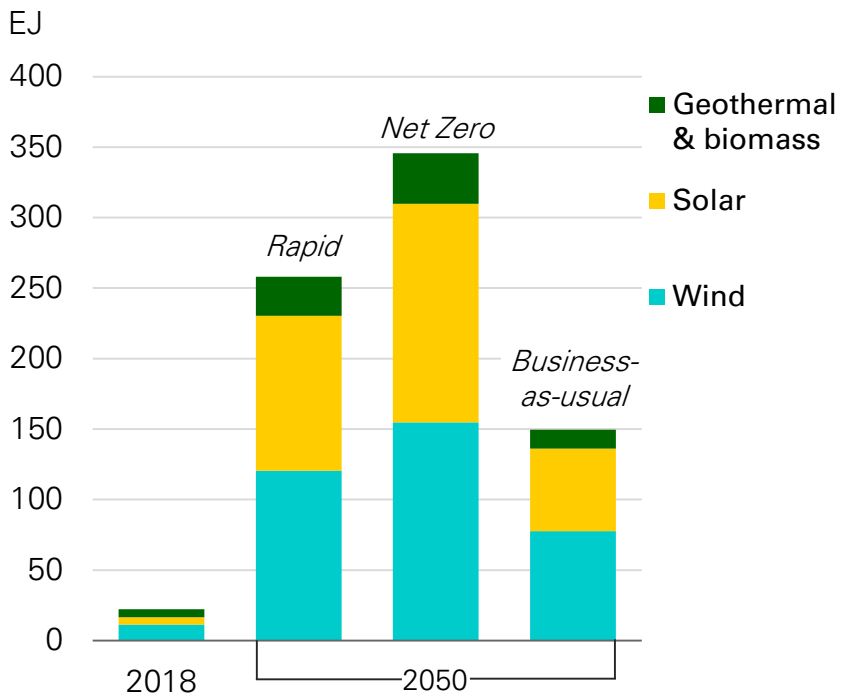


# Key questions

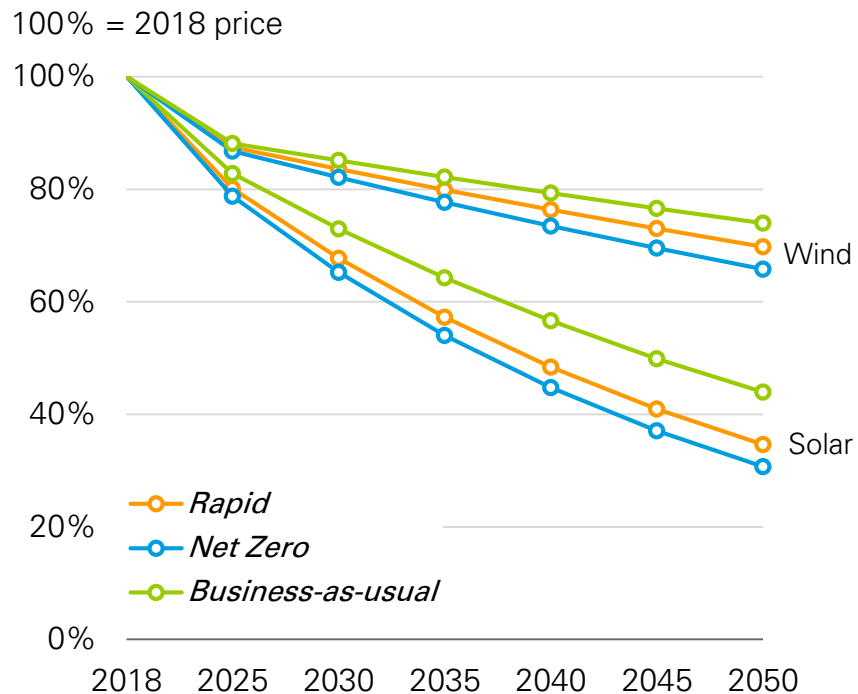
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# Renewable energy in power

## Renewable energy used in power sector

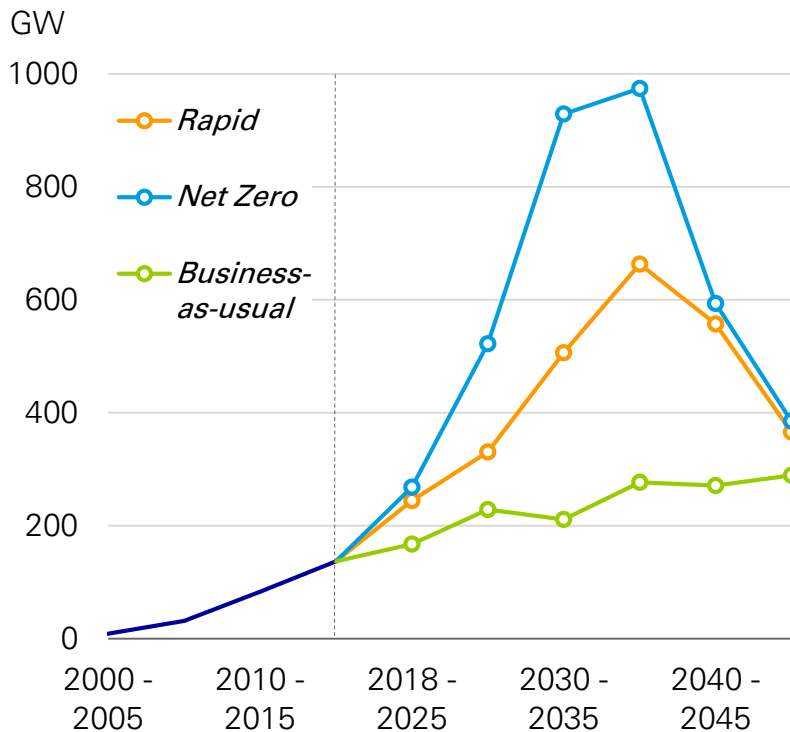


## Cost of wind and solar energy

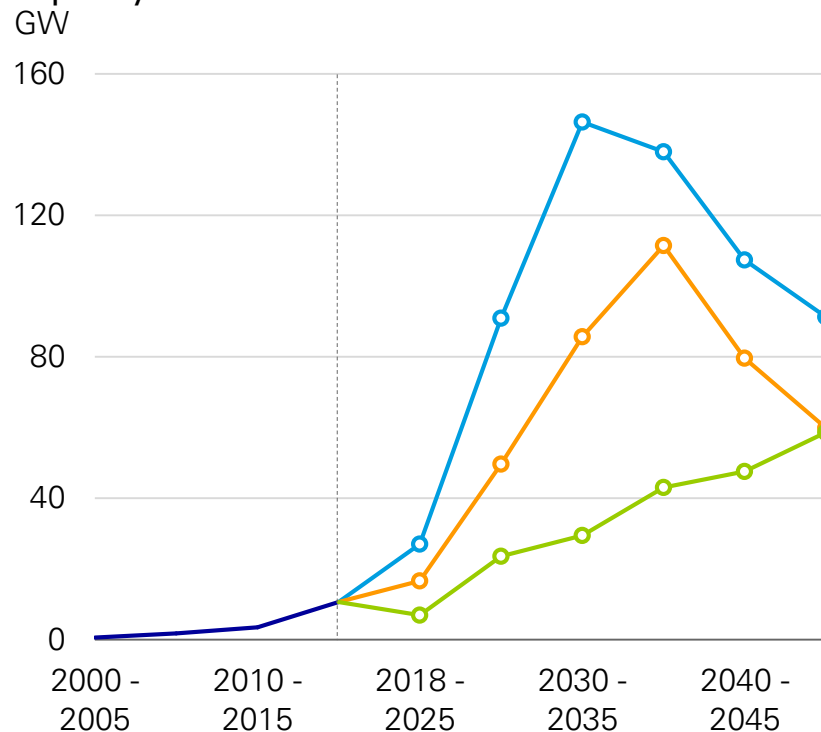


# Wind and solar capacity

Average annual increase in wind and solar capacity



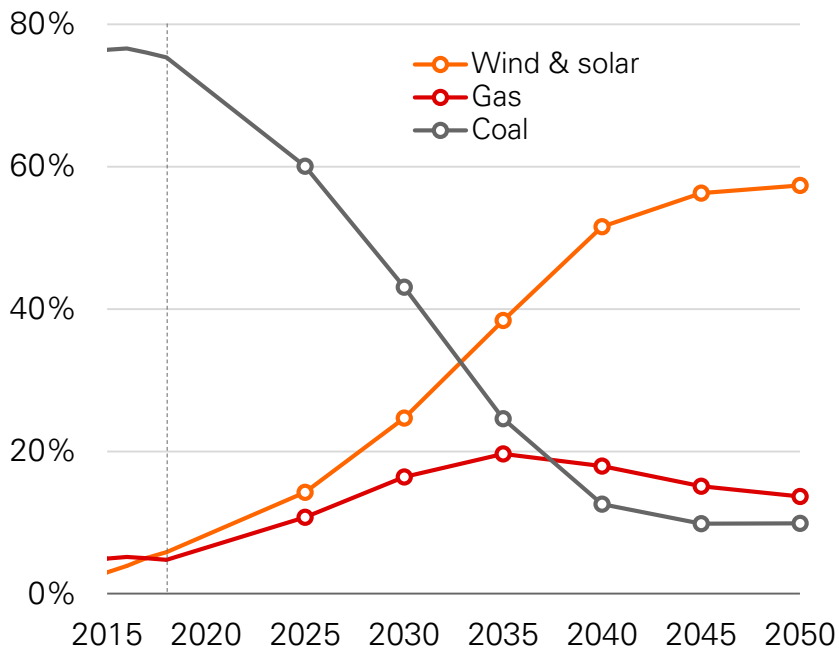
Average annual increase in wind and solar capacity India



# The challenge of decarbonizing the Indian power sector

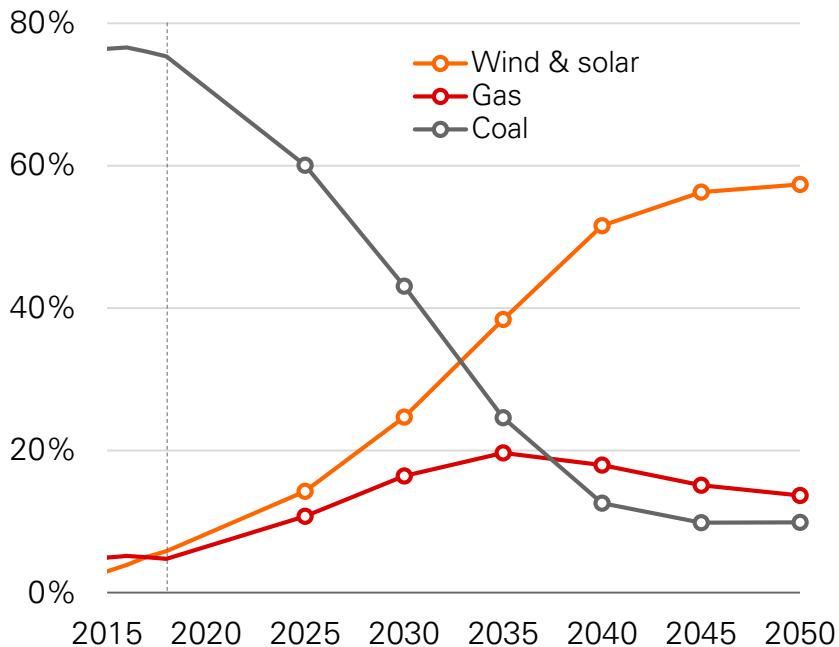


Share of Indian power generation by energy source in *Rapid*

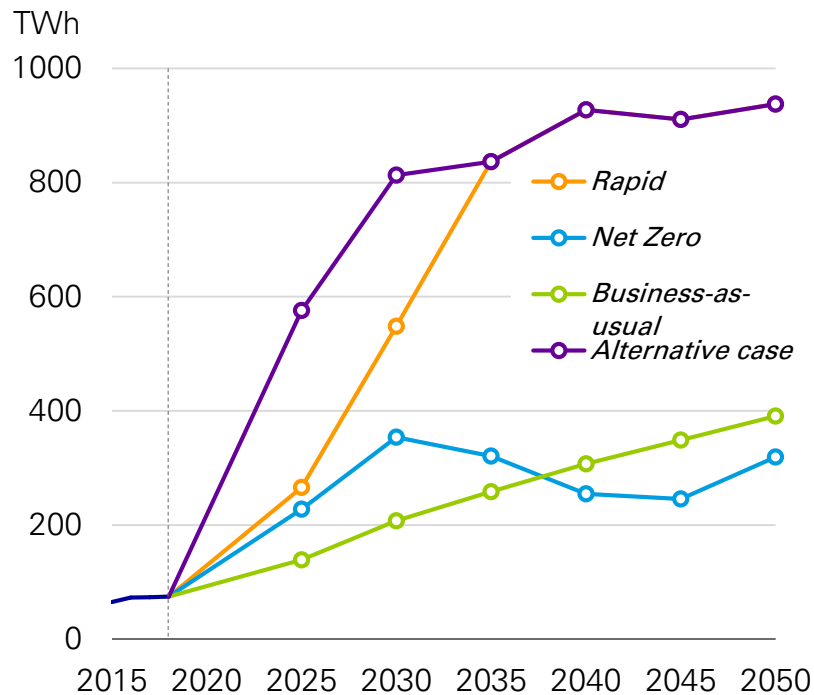


# The challenge of decarbonizing the Indian power sector

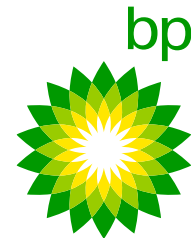
Share of Indian power generation by energy source in *Rapid*



Generation from gas in India





A large, circular cutout in the center of the page reveals a vibrant, busy street scene at night. The street is filled with people, motorcycles, and colorful lights from shops and street vendors. The scene is illuminated by a mix of warm yellow and cool blue lights, creating a lively atmosphere. The cutout is set against a white background that features a large, white, semi-circular shape on the left side, which partially overlaps the street scene.

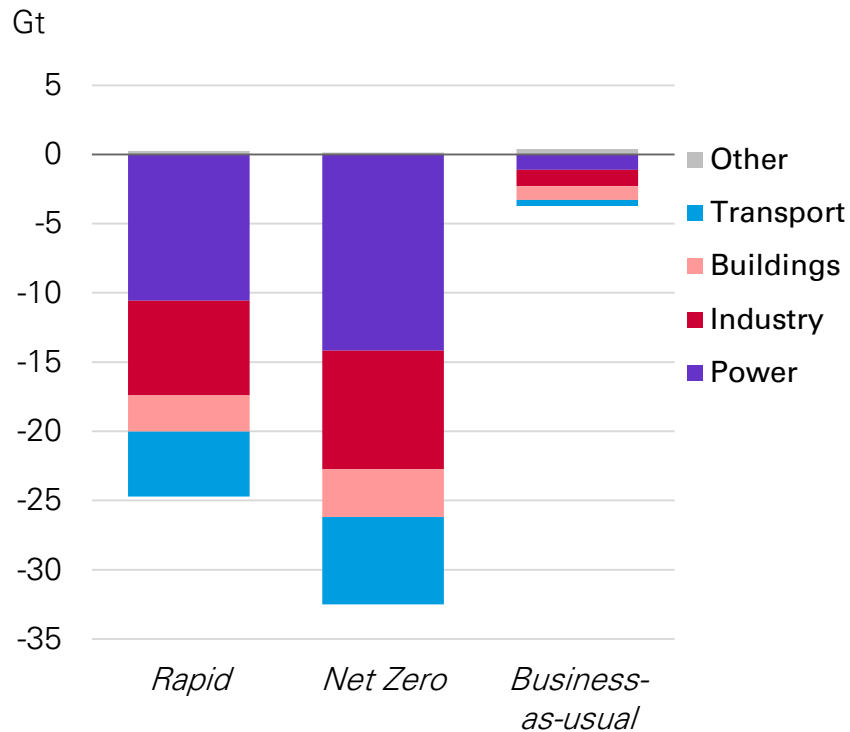
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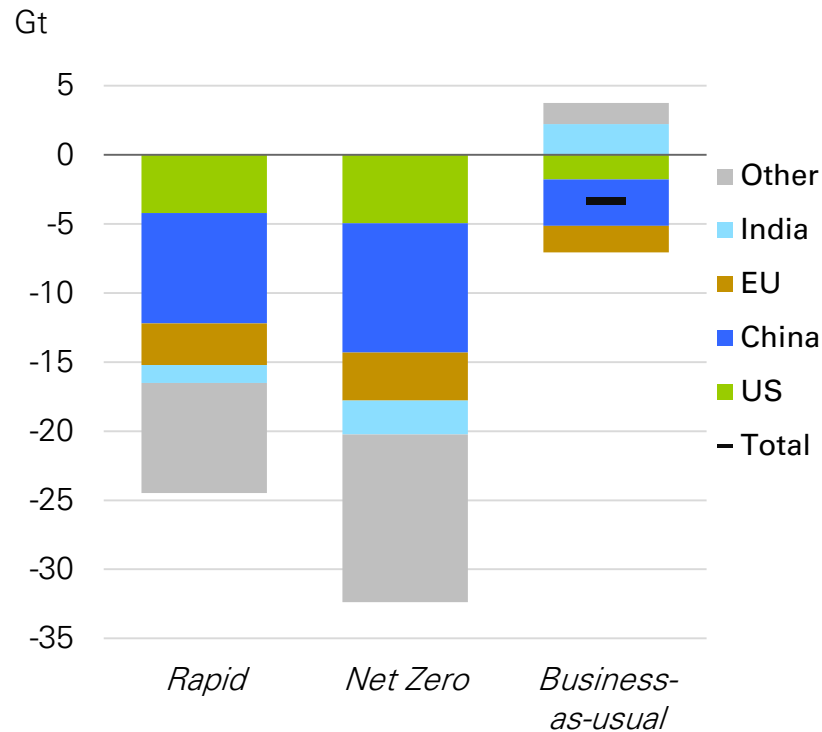


# Emissions slide, 2018-2050

## Change in CO<sub>2</sub> emissions by sector



## Change in CO<sub>2</sub> emissions by country

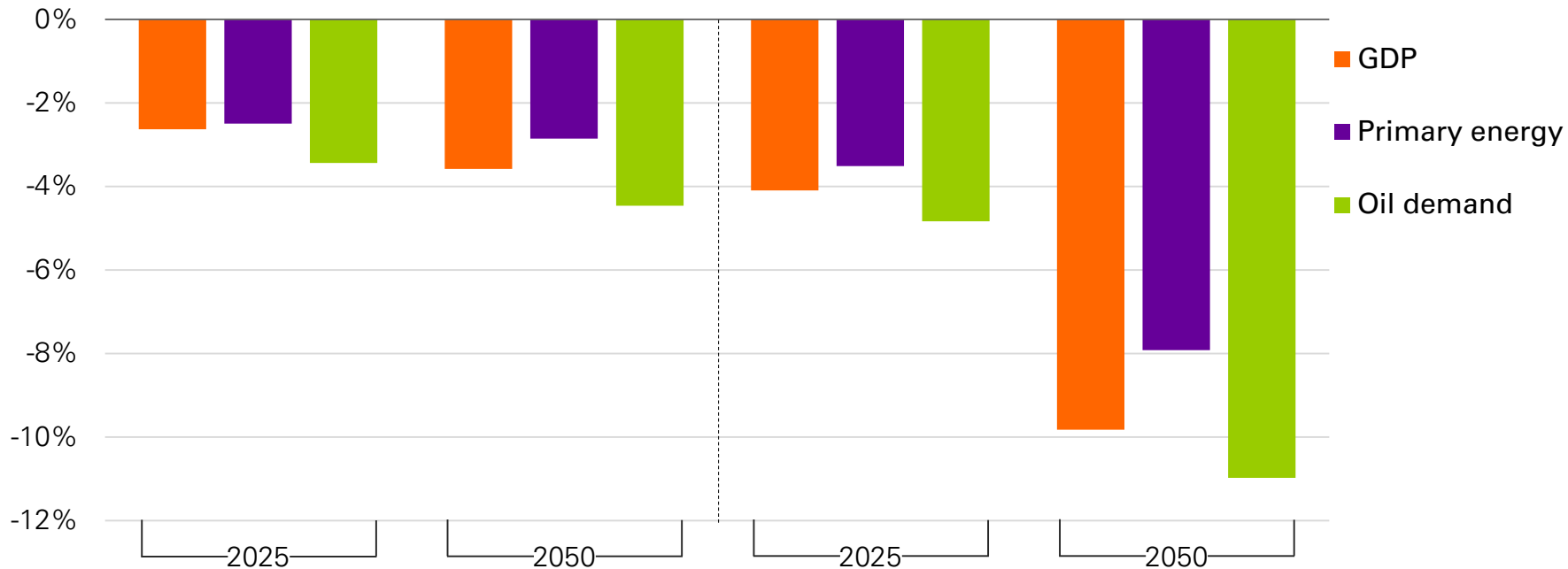


# Impact of Covid-19 in *Rapid*



Alt case: Greater impact from Covid-19

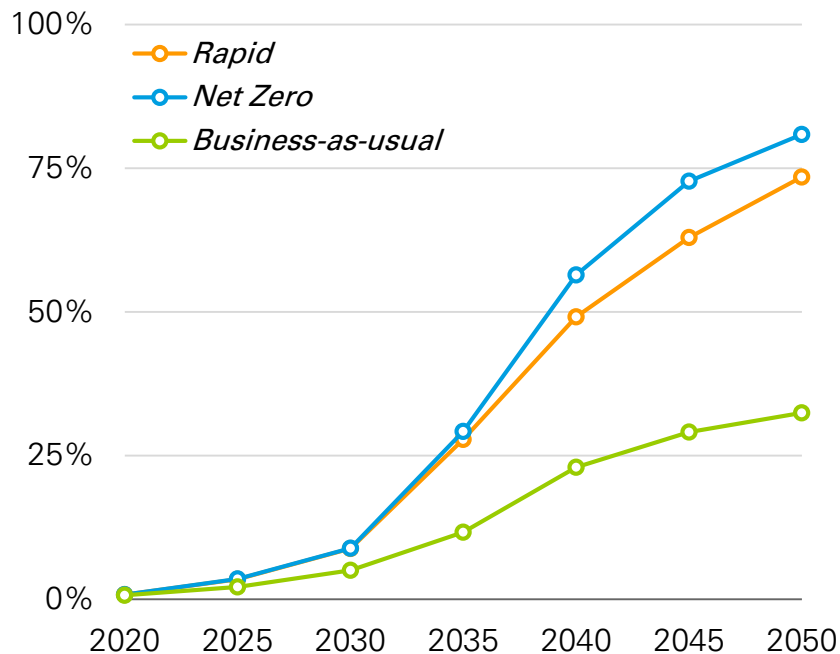
% change as a result of Covid-19



# Mobility revolution: electrification, shared-mobility and autonomy

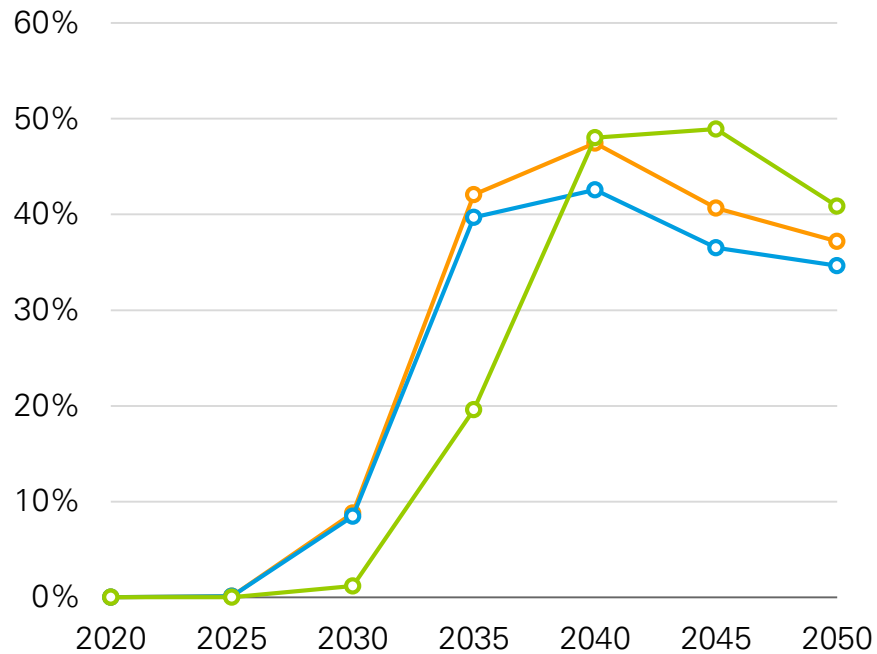


## Share of car and truck VKM electrified\*



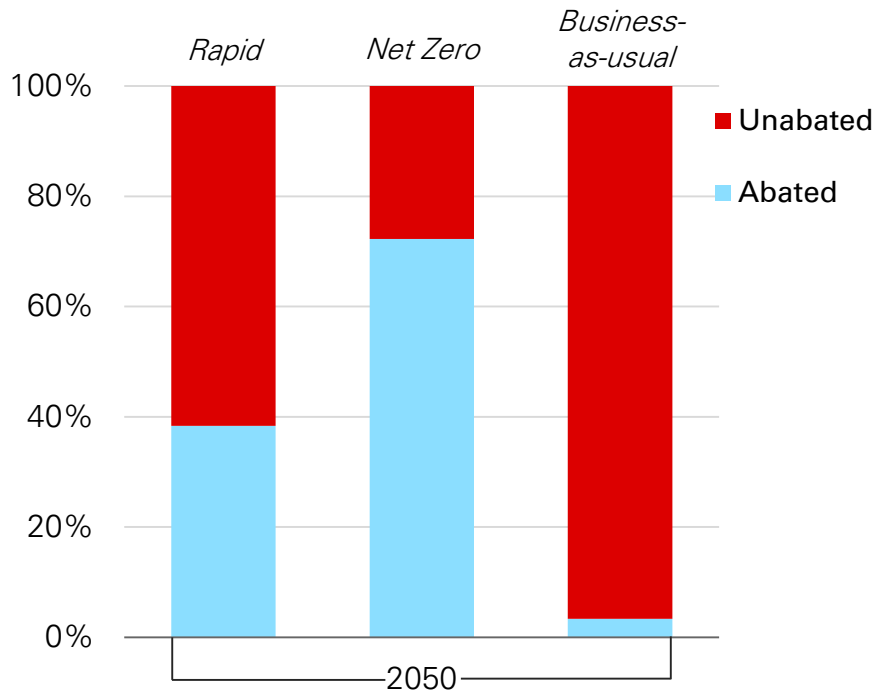
\*includes buses

## Robotaxi share of passenger car VKM powered by electricity

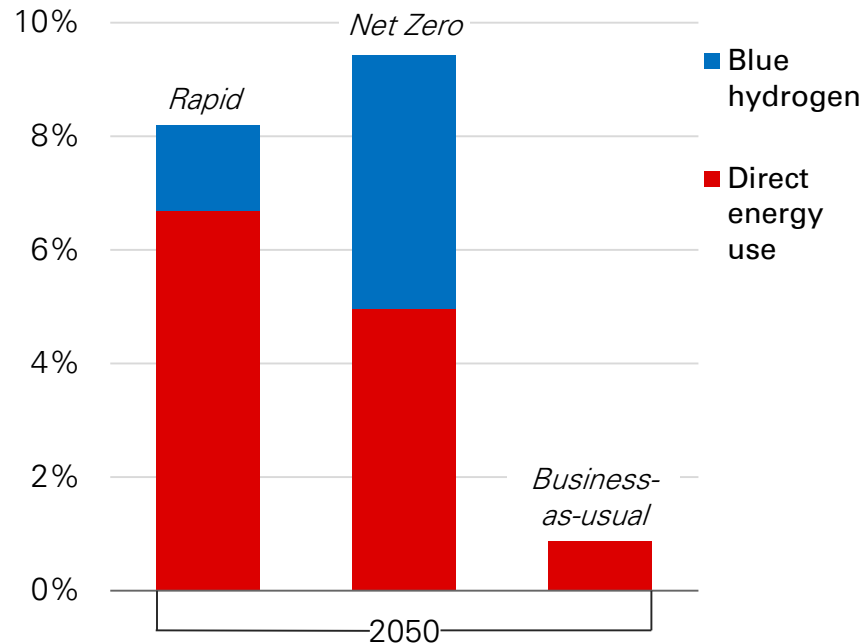


# Natural gas as a source of near-zero carbon energy

Share of natural gas abated and unabated

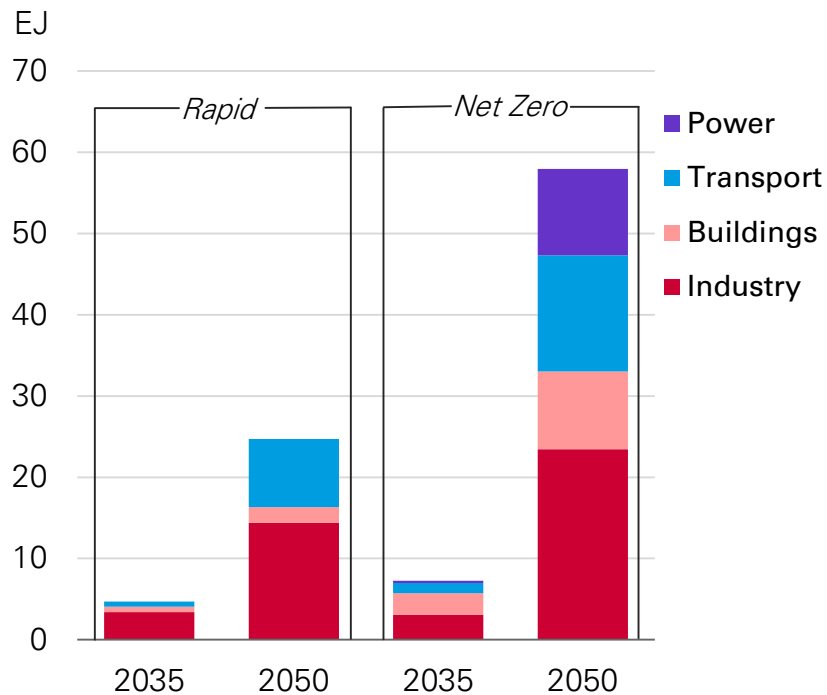


Natural gas with CCUS as a share of primary energy

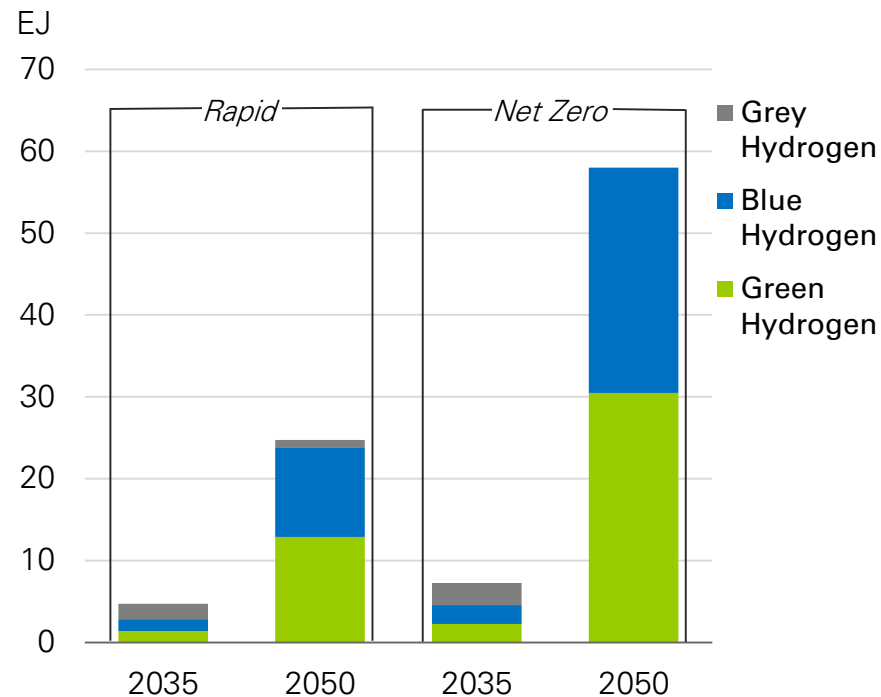


# Consumption and production of hydrogen

## Hydrogen use by sector



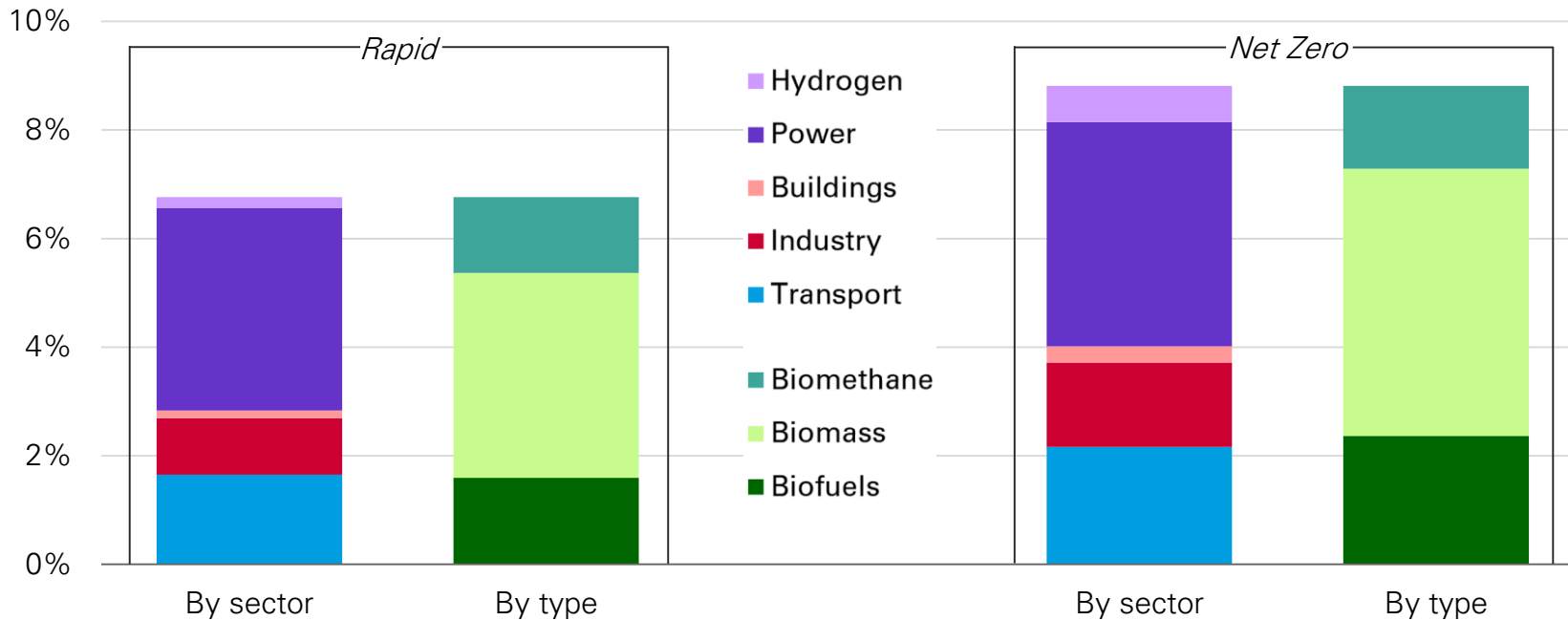
## Hydrogen production by type



# Bioenergy in *Rapid* and *Net Zero*



Shares of primary energy





# 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

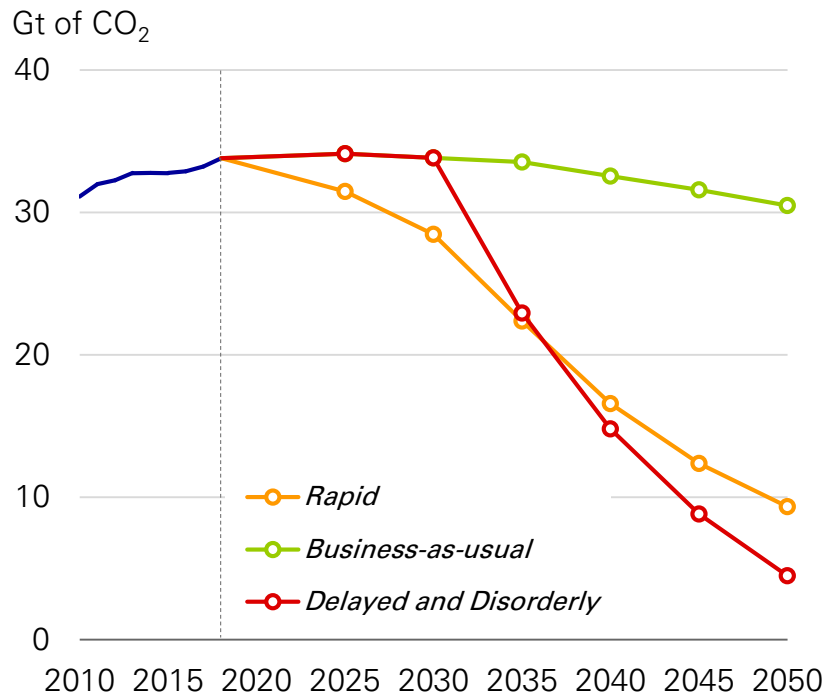
Less advantaged

Most advantaged

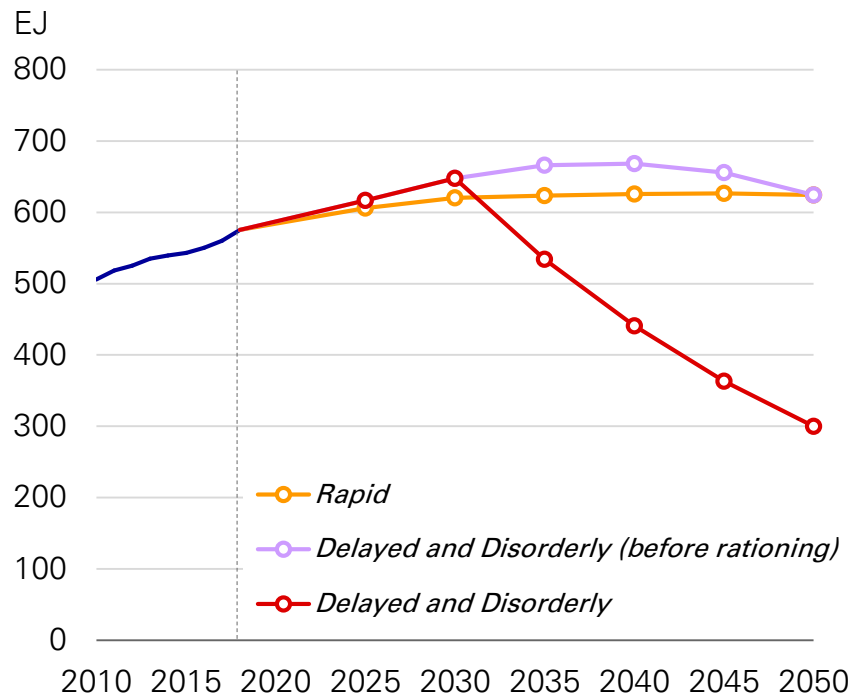


# Delayed and Disorderly scenario

## Carbon emissions



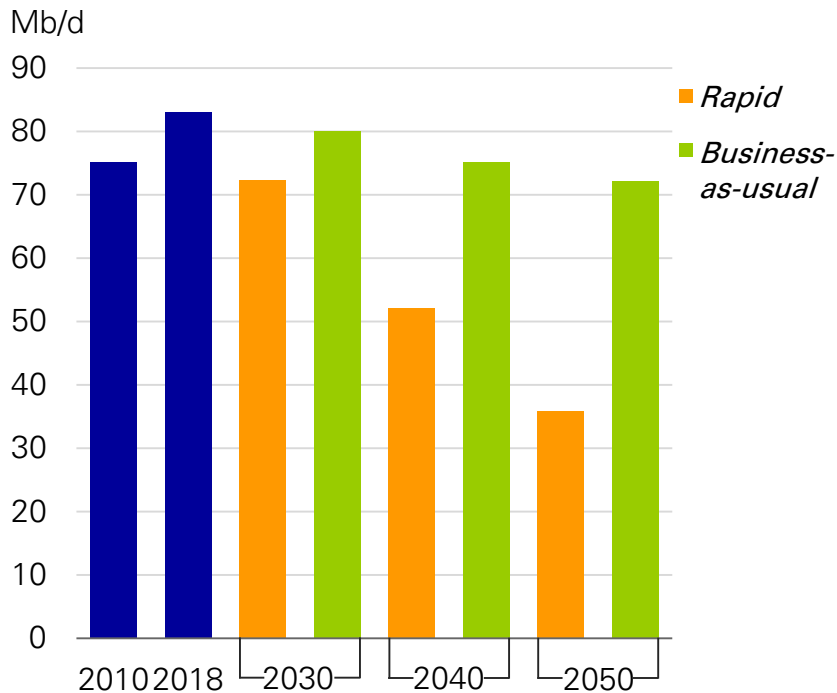
## Primary energy consumption



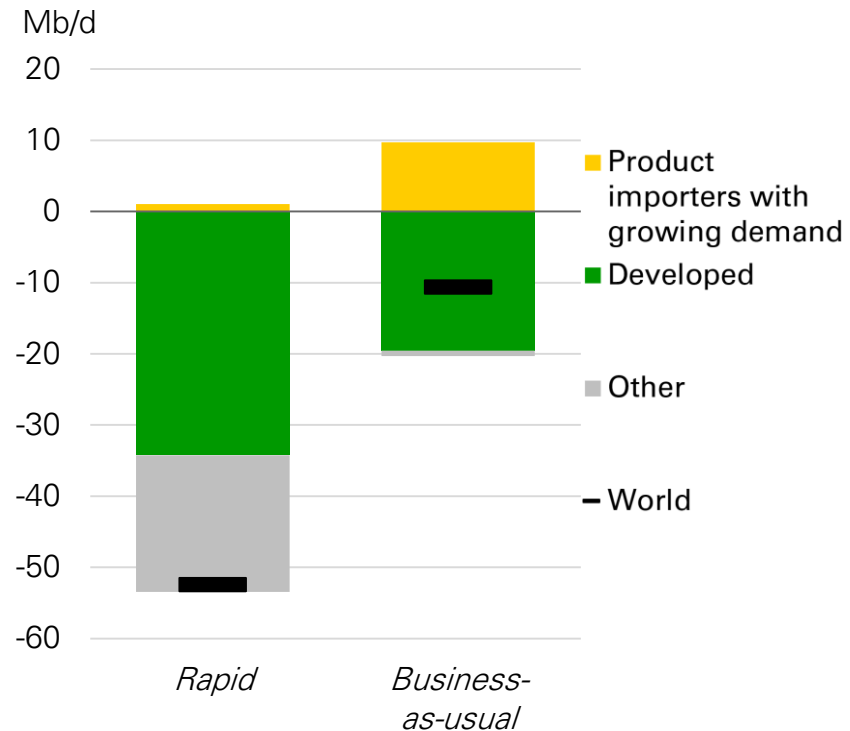


# Refining outlook

## Refinery throughput



## Refining capacity changes, 2018-2050





# Oil feedstock for plastic and fibres

## Oil feedstock for plastics and fibres

