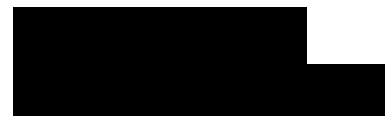


A large circular collage of various national flags, including the Australian flag, the flag of the United Kingdom, the flag of the United States, and the flag of the Republic of South Africa, among others. The flags are arranged in a circular pattern, with a large white circle in the center.

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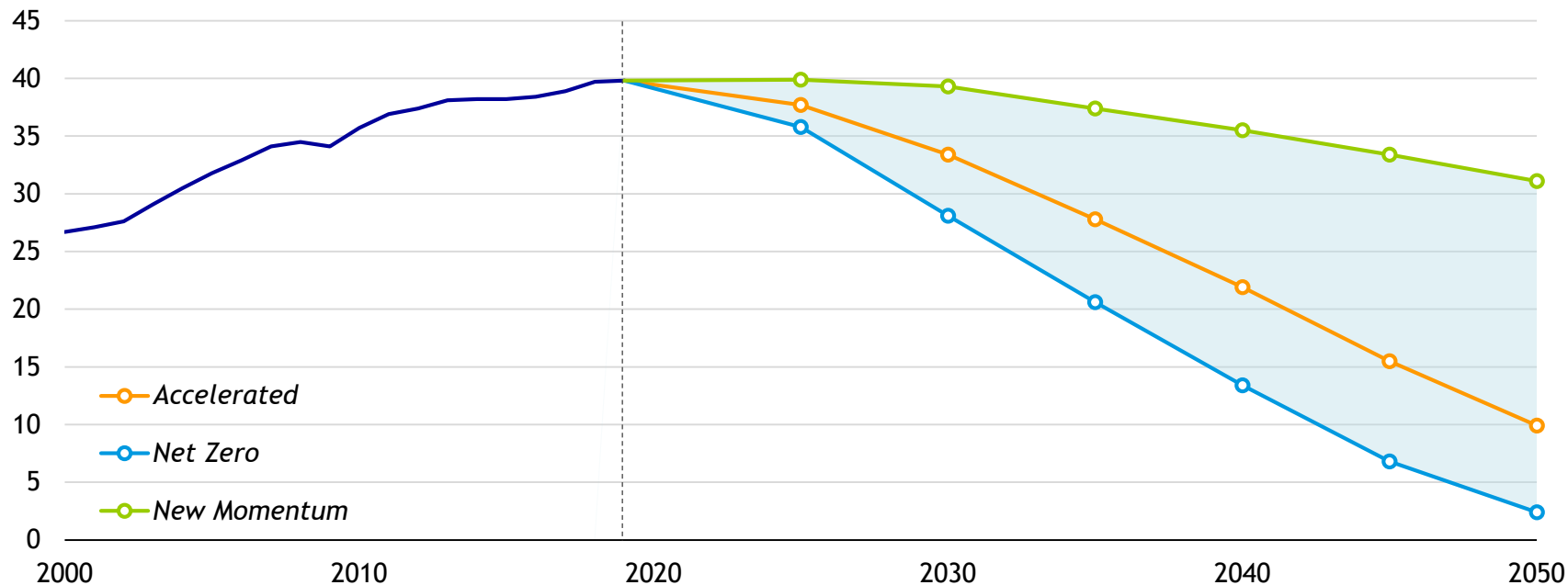
# Four issues

1. Three scenarios to explore the energy transition
2. Critical elements needed for a successful energy transition?
3. Insights on the current crisis
4. Wider issues raised by Ukraine war

# Three scenarios to explore the energy transition?

## Carbon emissions

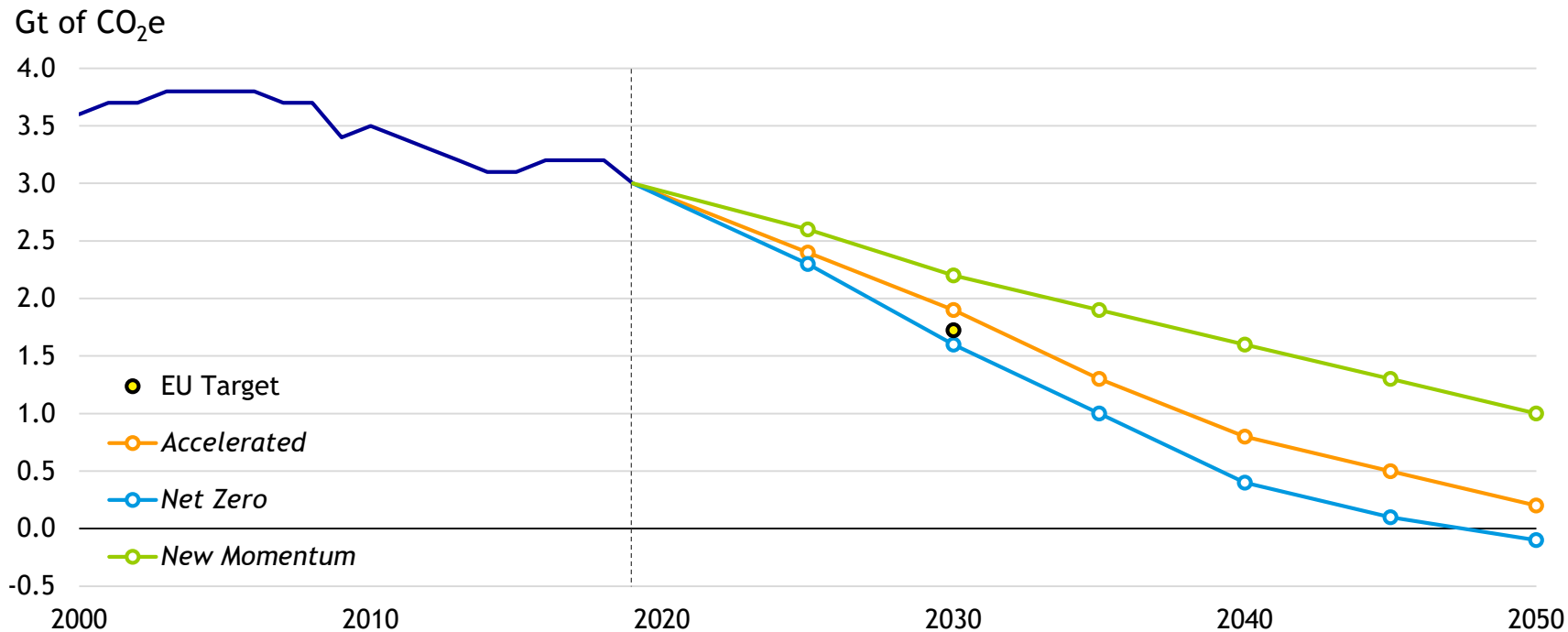
Gt of CO<sub>2</sub>e



Carbon emissions include CO<sub>2</sub> emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production

# Three scenarios to explore the energy transition in the EU

## EU Carbon emissions



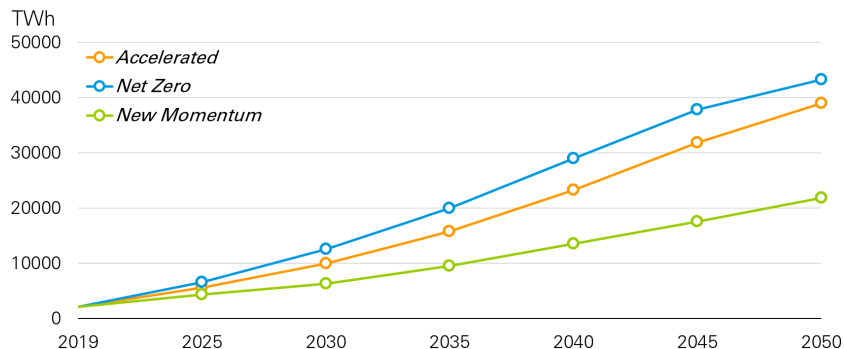
Carbon emissions include CO<sub>2</sub> emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production

# Four issues

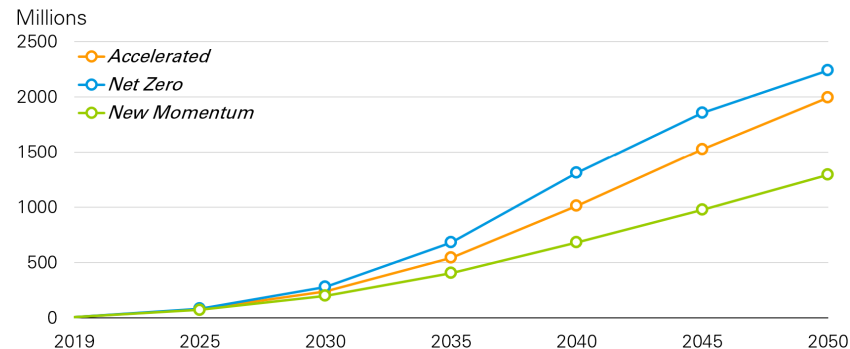
1. Three scenarios to explore the energy transition
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# What are the critical elements needed for a successful energy transition?

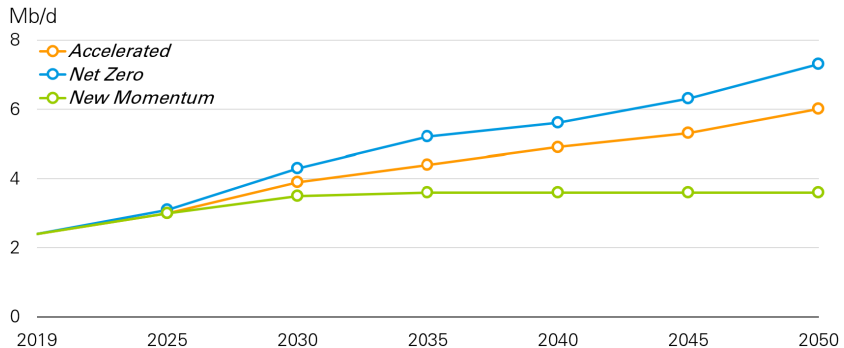
## Wind and solar power generation: global



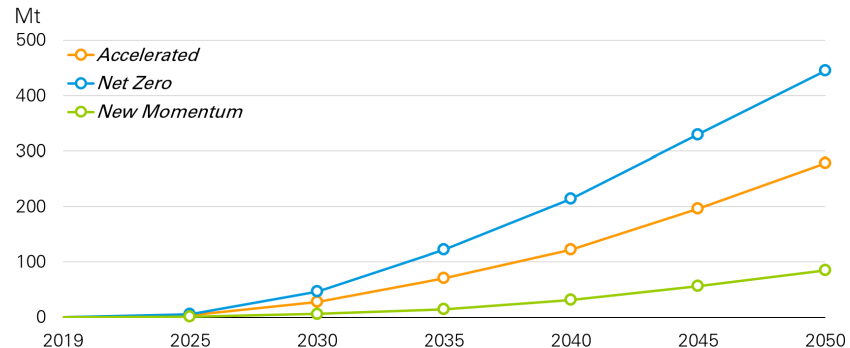
## Electric vehicles: global



## Biofuels: global

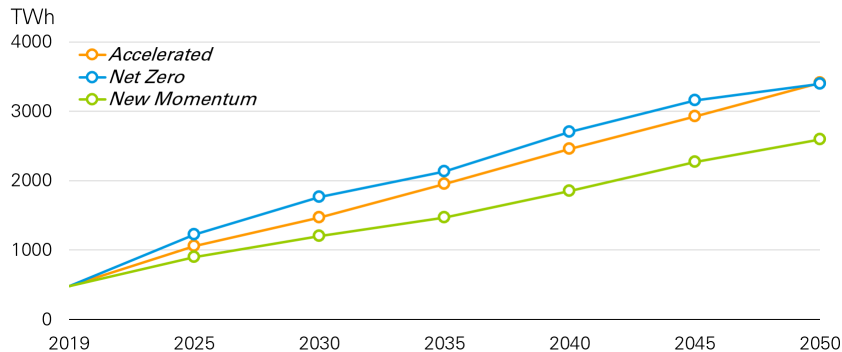


## Low-carbon hydrogen: global

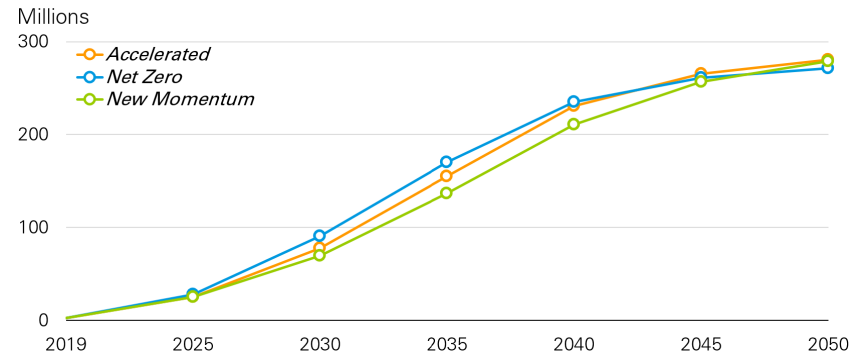


# What are the critical elements needed for a successful energy transition?

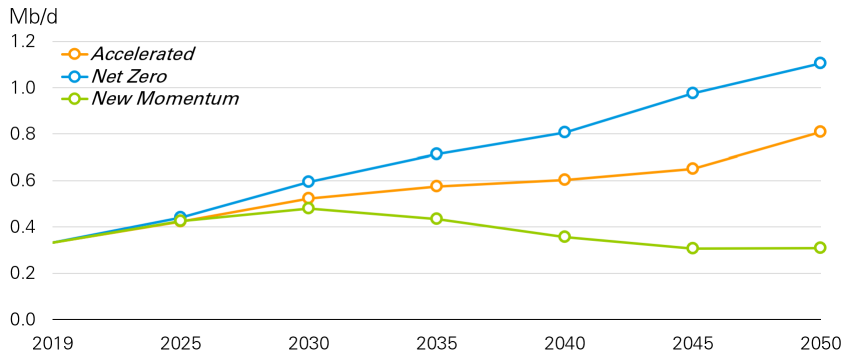
## Wind and solar power generation: EU



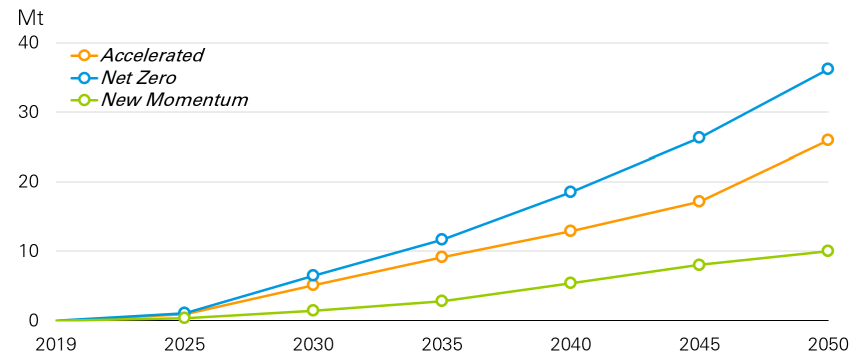
## Electric vehicles: EU



## Biofuels: EU



## Low-carbon hydrogen: EU



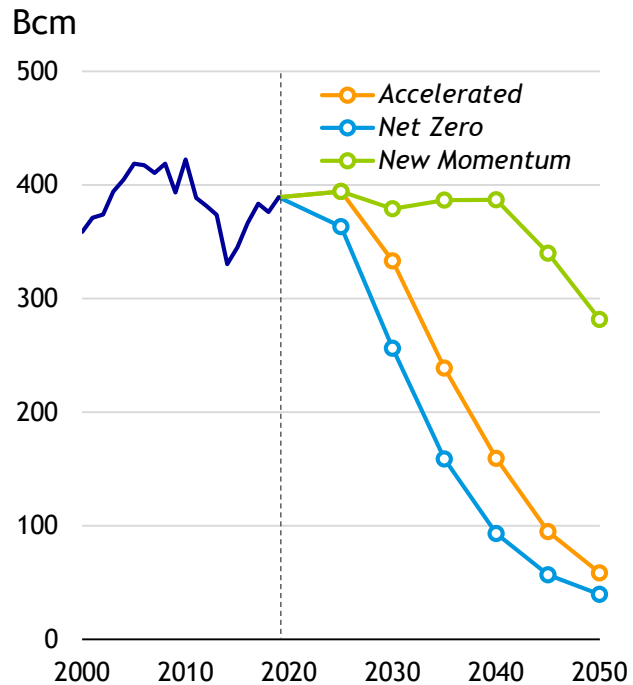
# Four issues

1. Three scenarios to explore the energy transition
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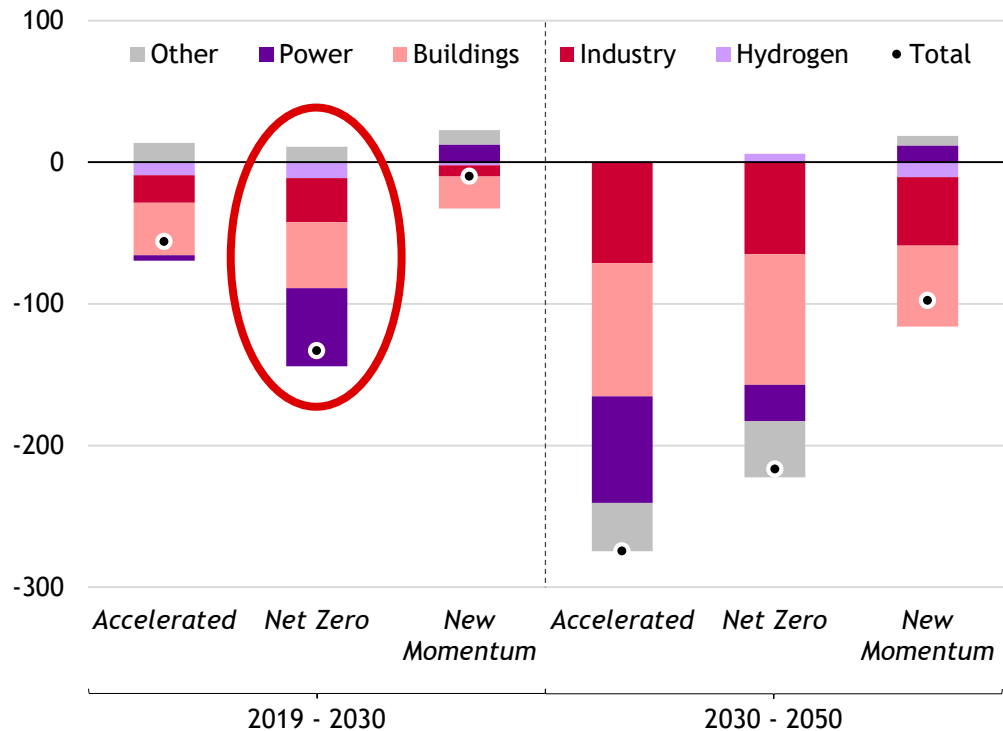
# EU natural gas demand

## Natural gas demand



## Natural gas demand by sector

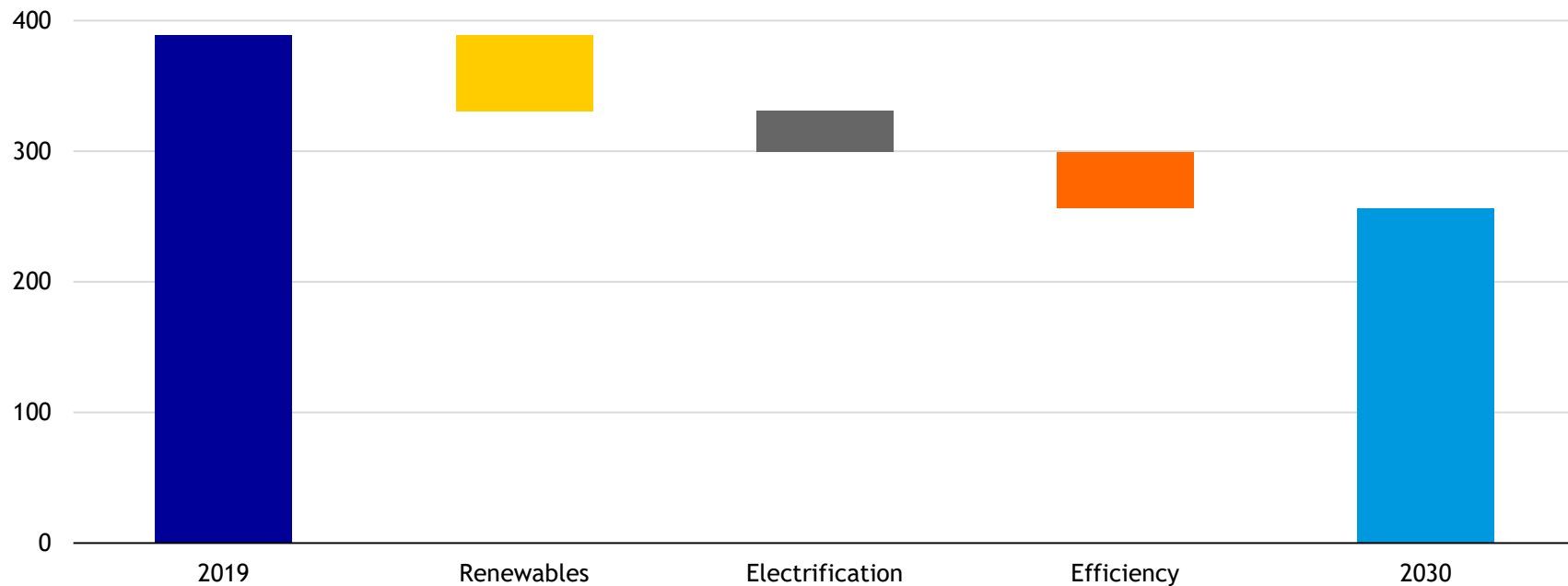
### Change, Bcm



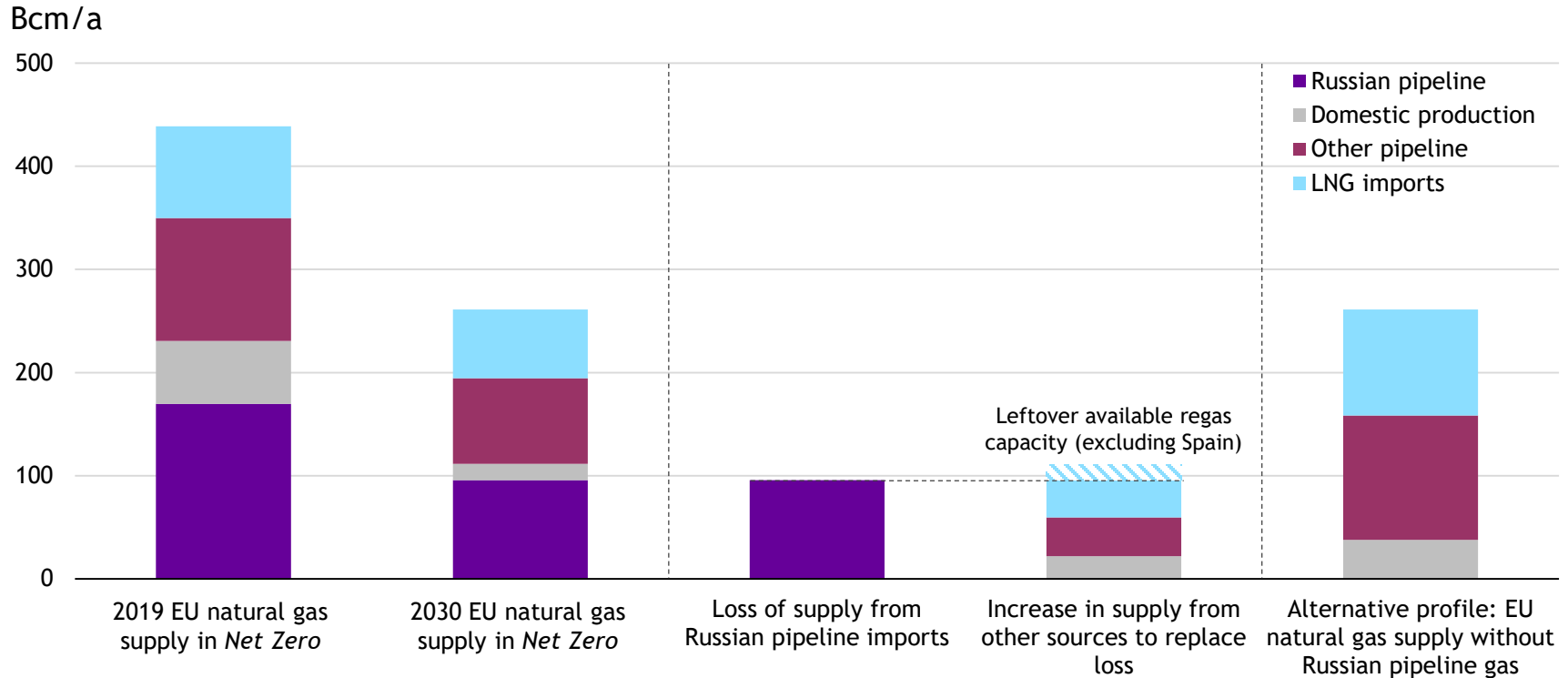
## Net Zero scenario: EU natural gas demand (2019-30)

EU natural gas demand

2019 - 2030 change, Bcm

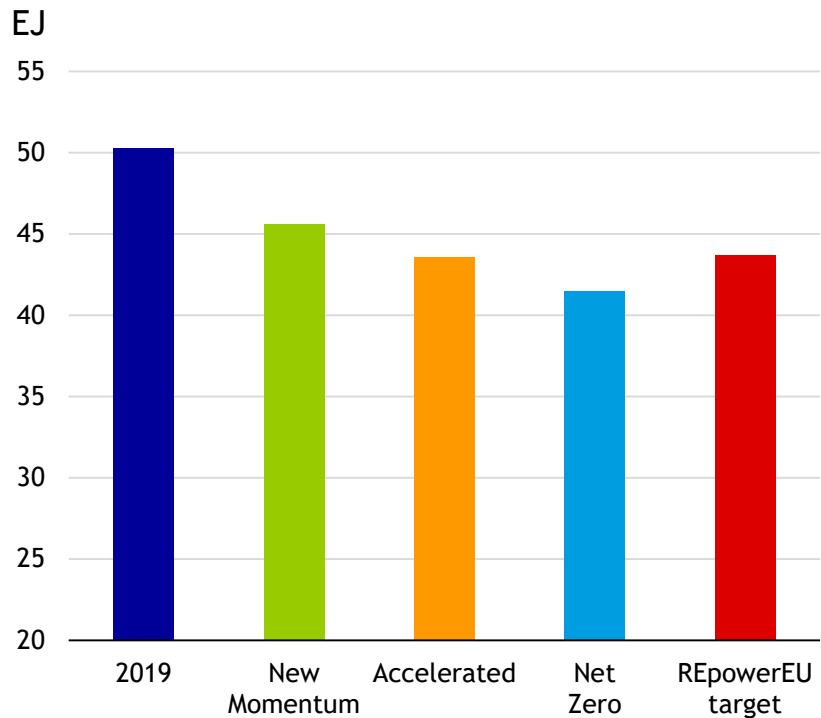


# Net Zero scenario: sources of EU natural gas supplies

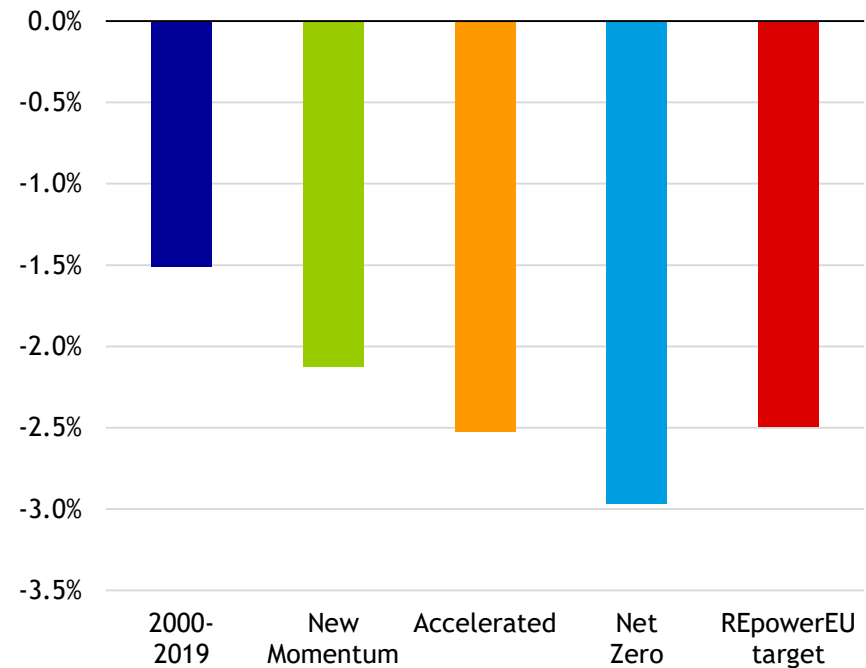


# EU 2030 targets versus Energy Outlook scenarios: energy efficiency

Total final consumption in 2030

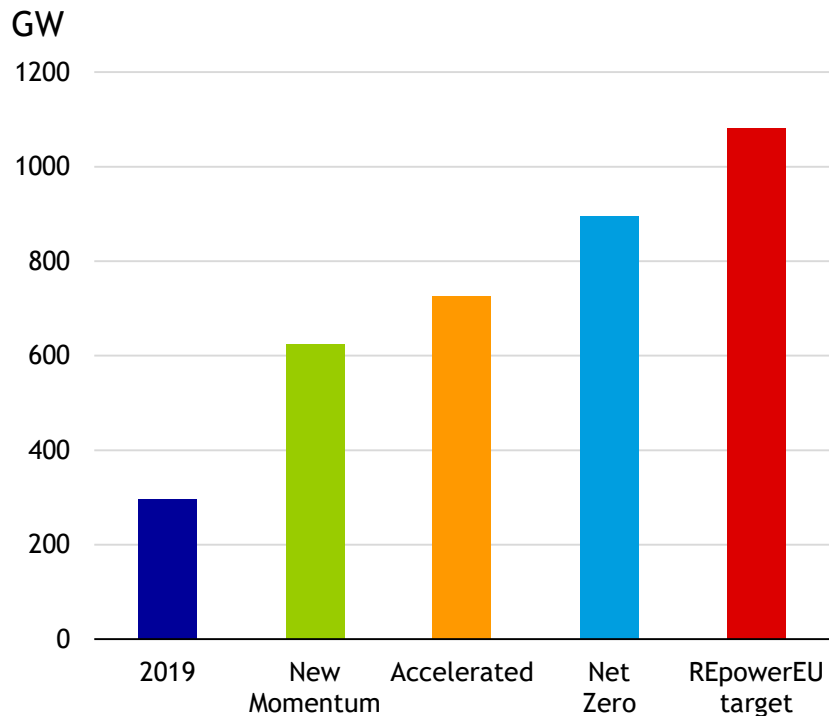


Average rate of energy efficiency in TFC (2019 - 2030)  
Share

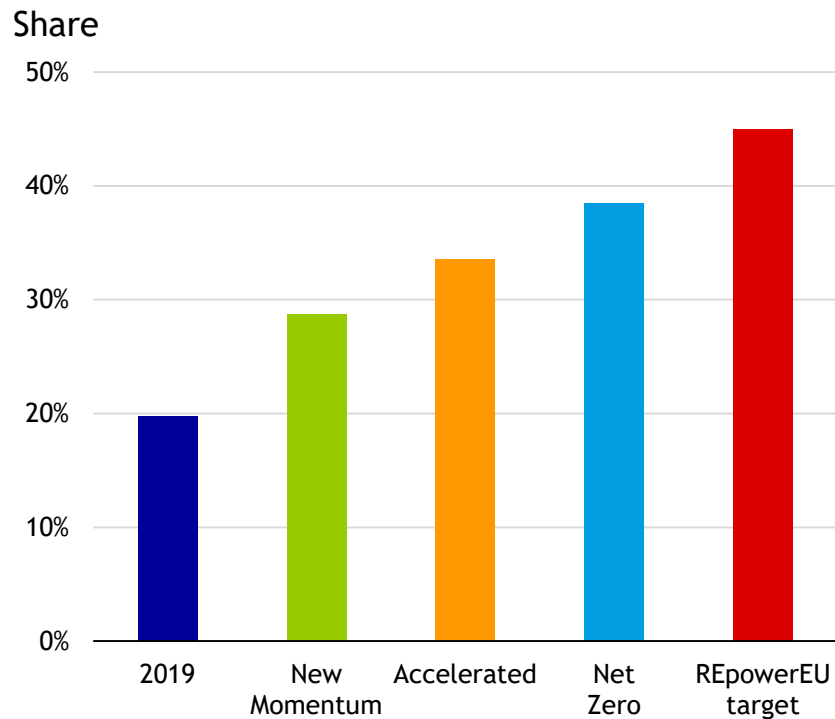


## EU 2030 targets versus Energy Outlook scenarios: renewables

### Installed wind and solar capacity in 2030

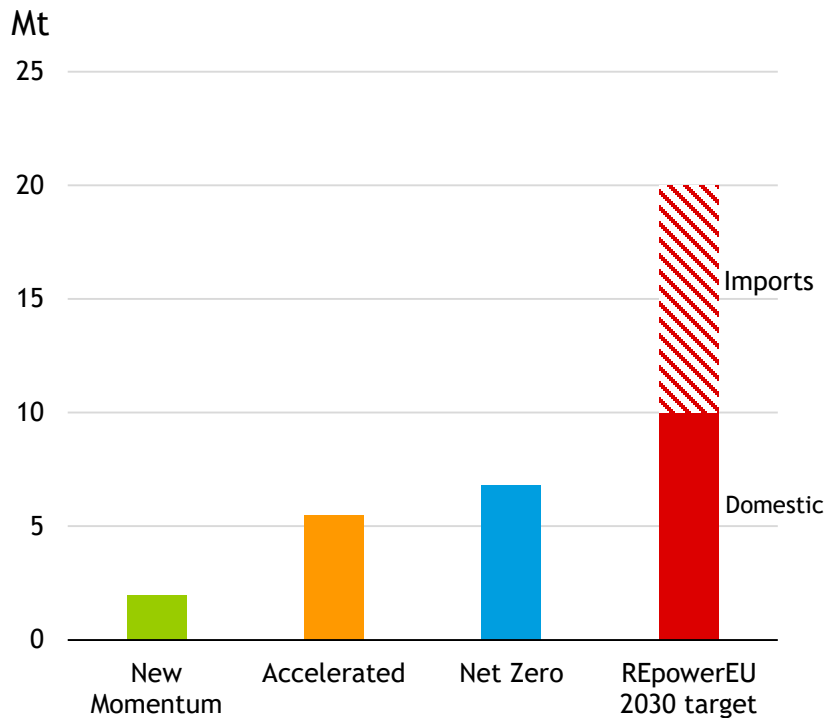


### Share of renewables in TFC in 2030

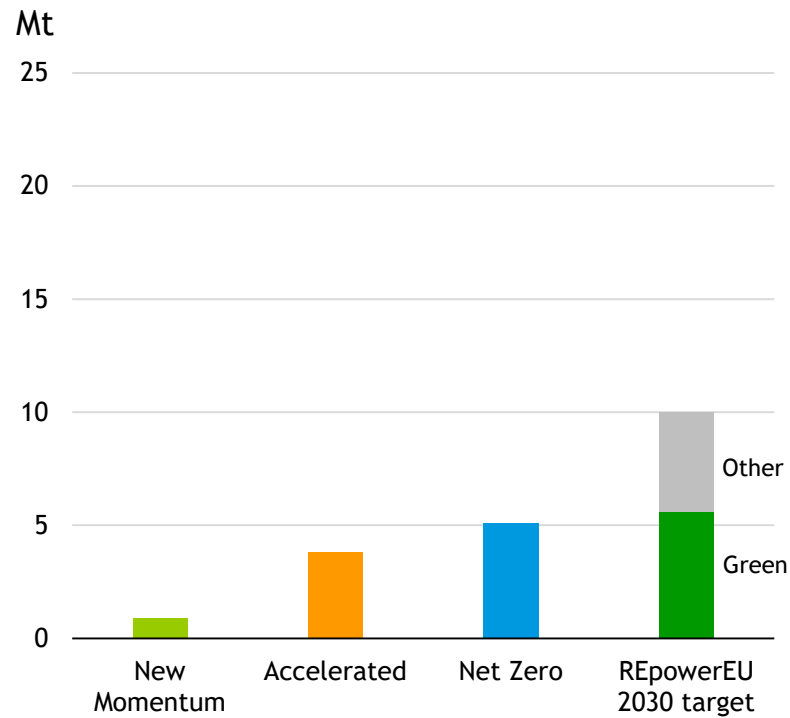


# EU 2030 targets versus Energy Outlook scenarios: low-carbon energy sources

## Low-carbon hydrogen demand in 2030



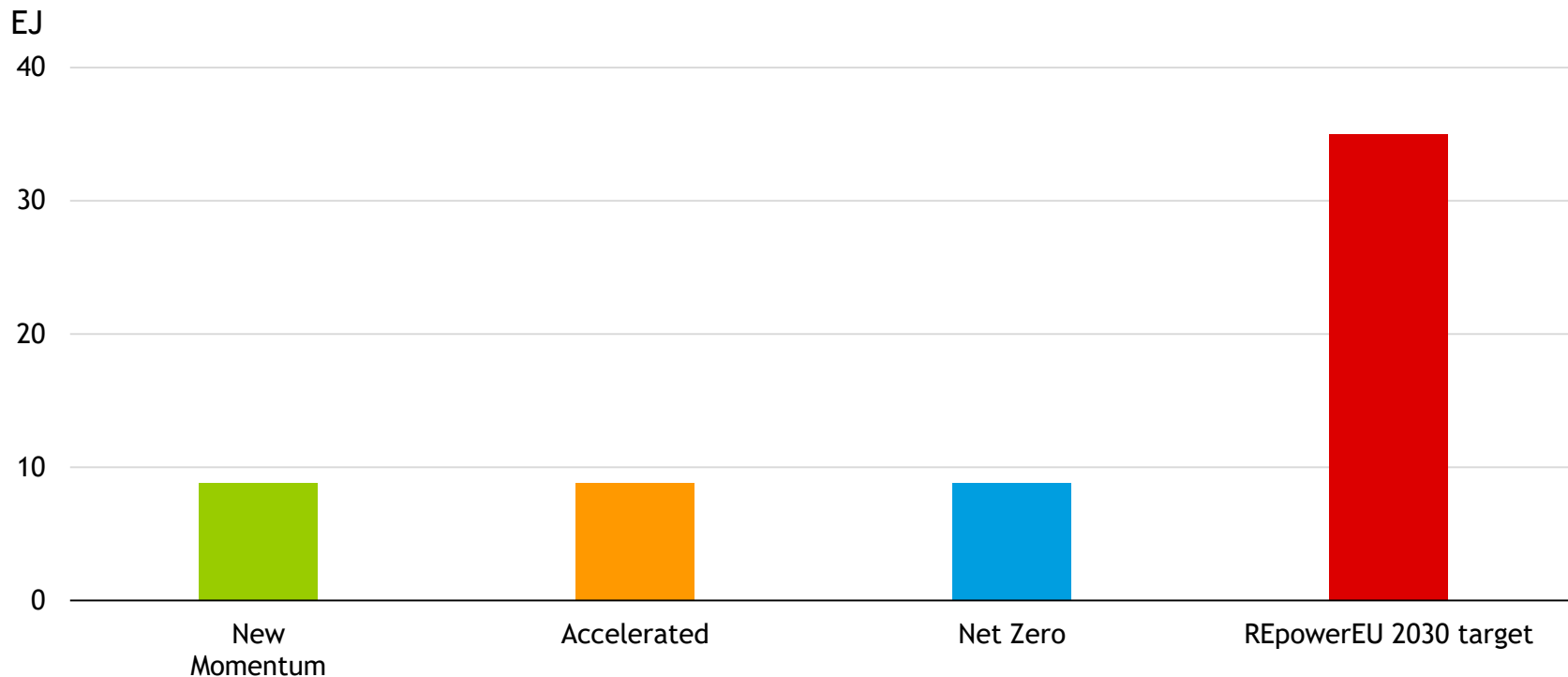
## Domestic low-carbon hydrogen supply in 2030



Other forms of low-carbon hydrogen include nuclear - COM(2022) 108 final

## EU 2030 targets versus Energy Outlook scenarios: low-carbon energy sources

### Biomethane supply in 2030



# Four issues

1. Three scenarios to explore the energy transition
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## Wider issues raised by war in Ukraine

### Challenging economic environment

- Stagflation shock
- Longer term drag on economic growth: less integration/shorter supply chains

### Increased focus on energy security

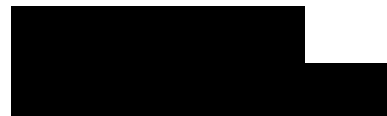
- Different implications for different countries
- Supportive of locally produced energy (boost to non-fossil fuels)
- Increased investment in energy security: diversity; storage and capacity
- Energy security is public good requires government intervention/direction

### Prospects for oil and natural gas

- Higher oil and gas prices in short-to-medium term
- Increased recognition (?) of importance of hydrocarbons during the transition
- Longer-term prospects for oil and gas challenged, especially in Asia

A large circular collage of various national flags, including the Australian flag, the flag of the Central African Republic, the flag of the United Kingdom, the flag of the United States, and the flag of the Republic of the Congo, among others. The flags are arranged in a circular pattern, with a large white circle in the center.

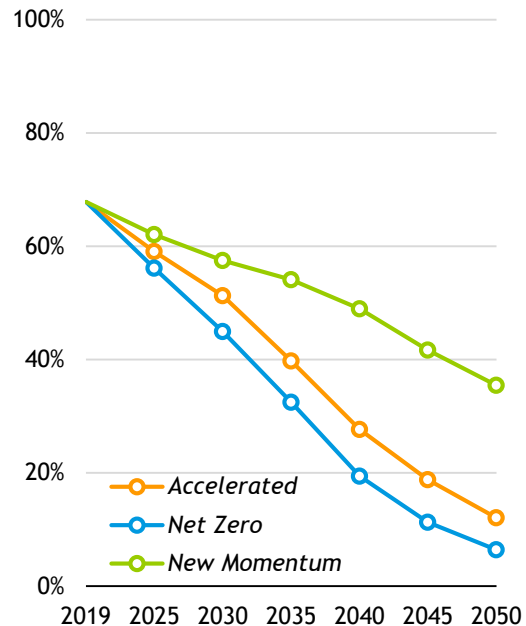
## bp Energy Outlook 2022 edition



# EU primary energy

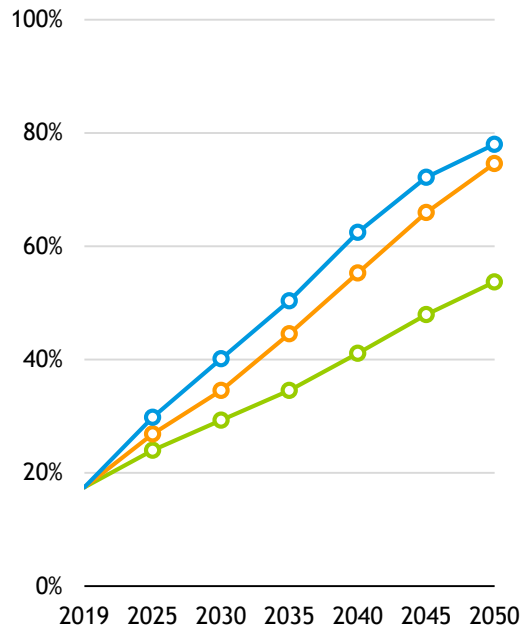
## Fossil fuels

### Share of primary energy



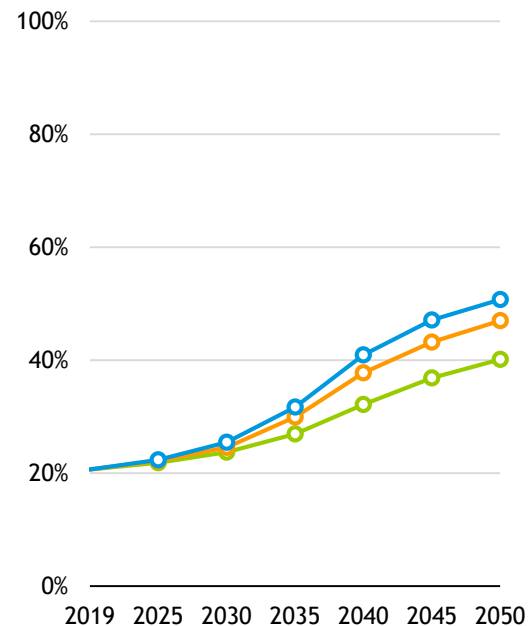
## Renewables

### Share of primary energy



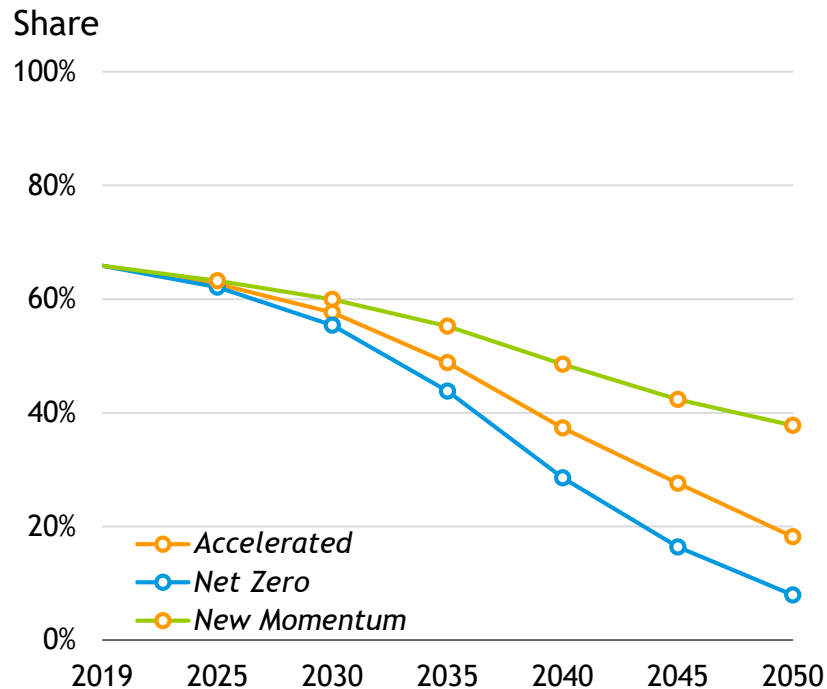
## Electricity

### Share of final consumption

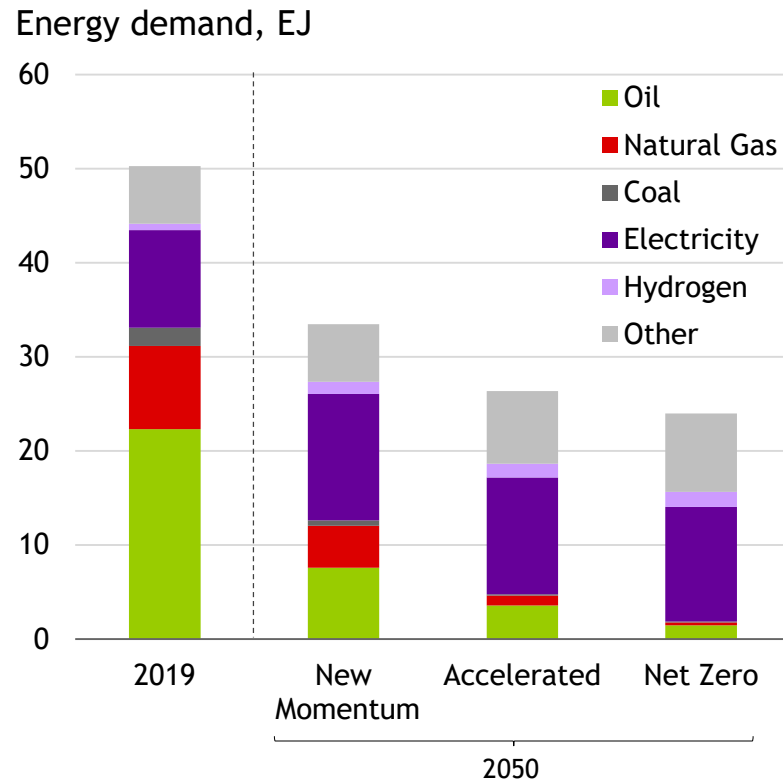


# EU total final energy consumption

## Fossil fuels as share of final consumption



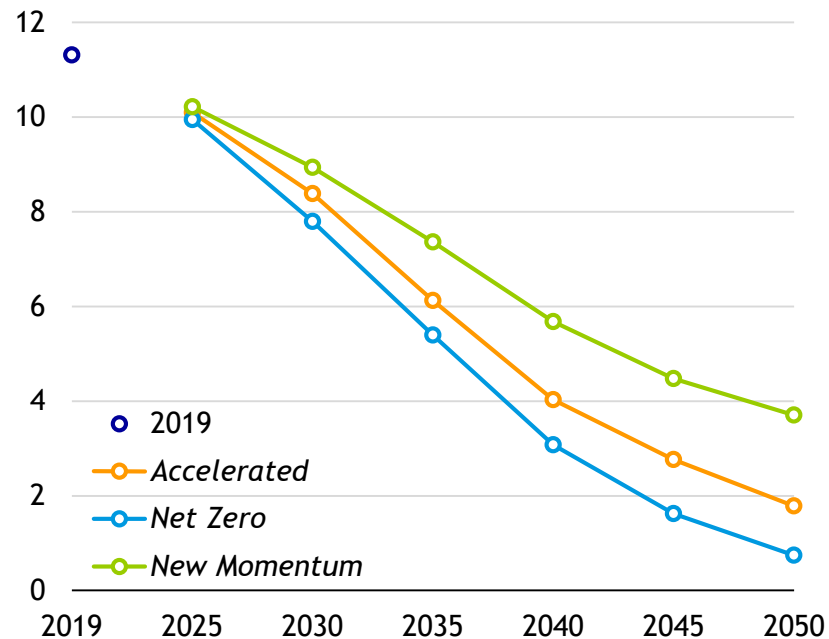
## Fuel composition of final consumption



# EU oil demand

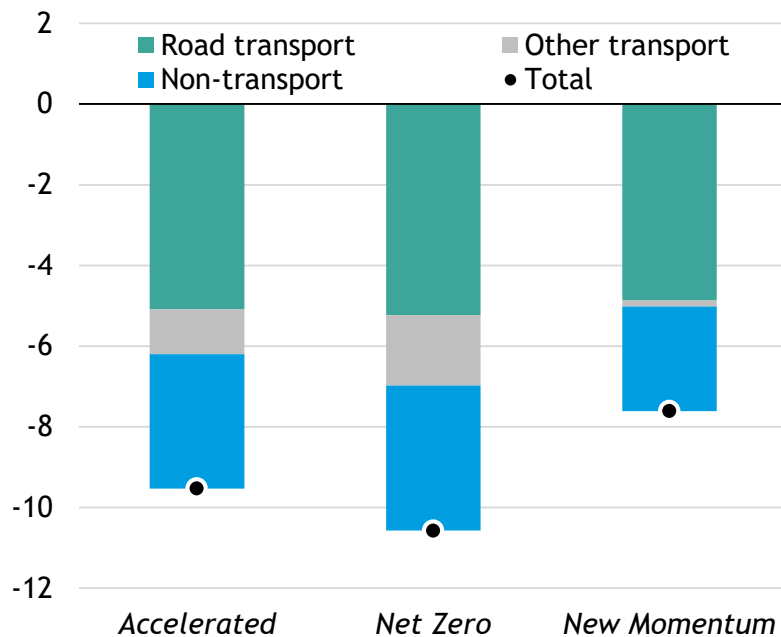
## Oil demand

Mb/d



## Change in oil demand (2019 - 2050)

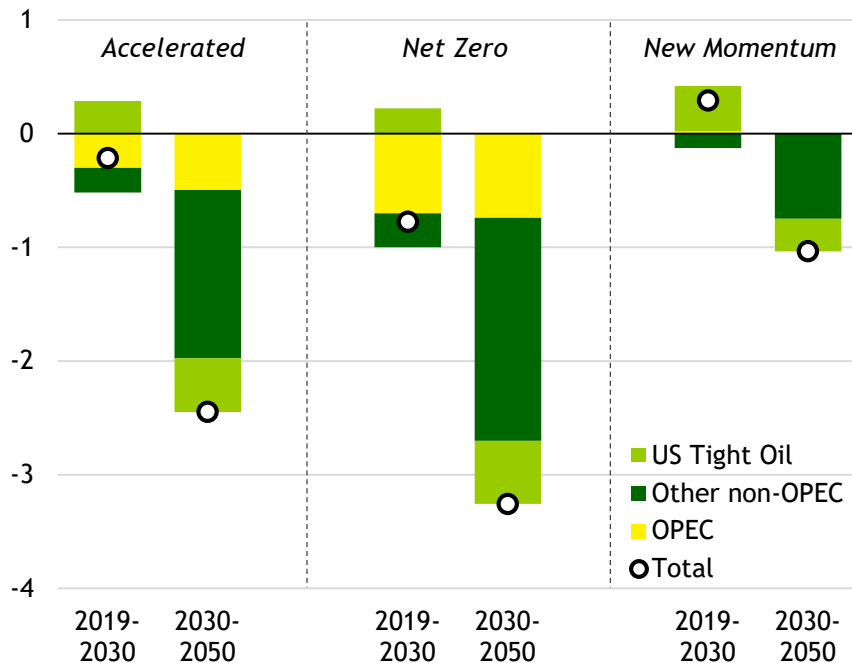
Mb/d



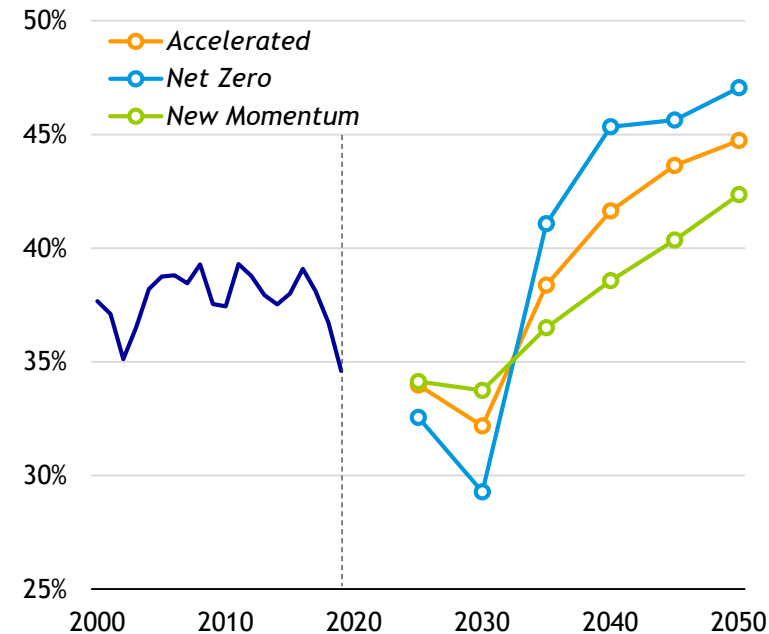
# Global oil production

## Oil supply growth

Average annual growth, Mb/d



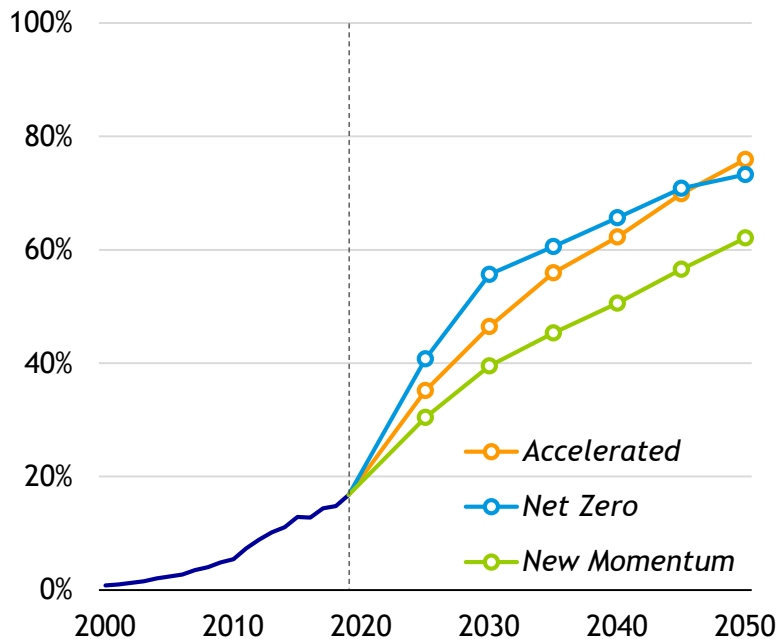
## OPEC's market share of global oil supply



# EU power generation

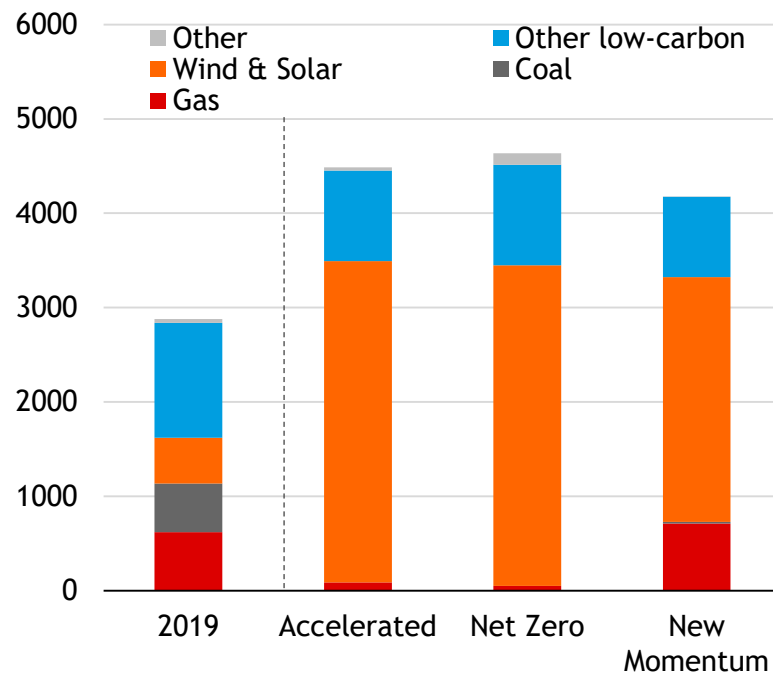
## Wind and solar in power generation

Share

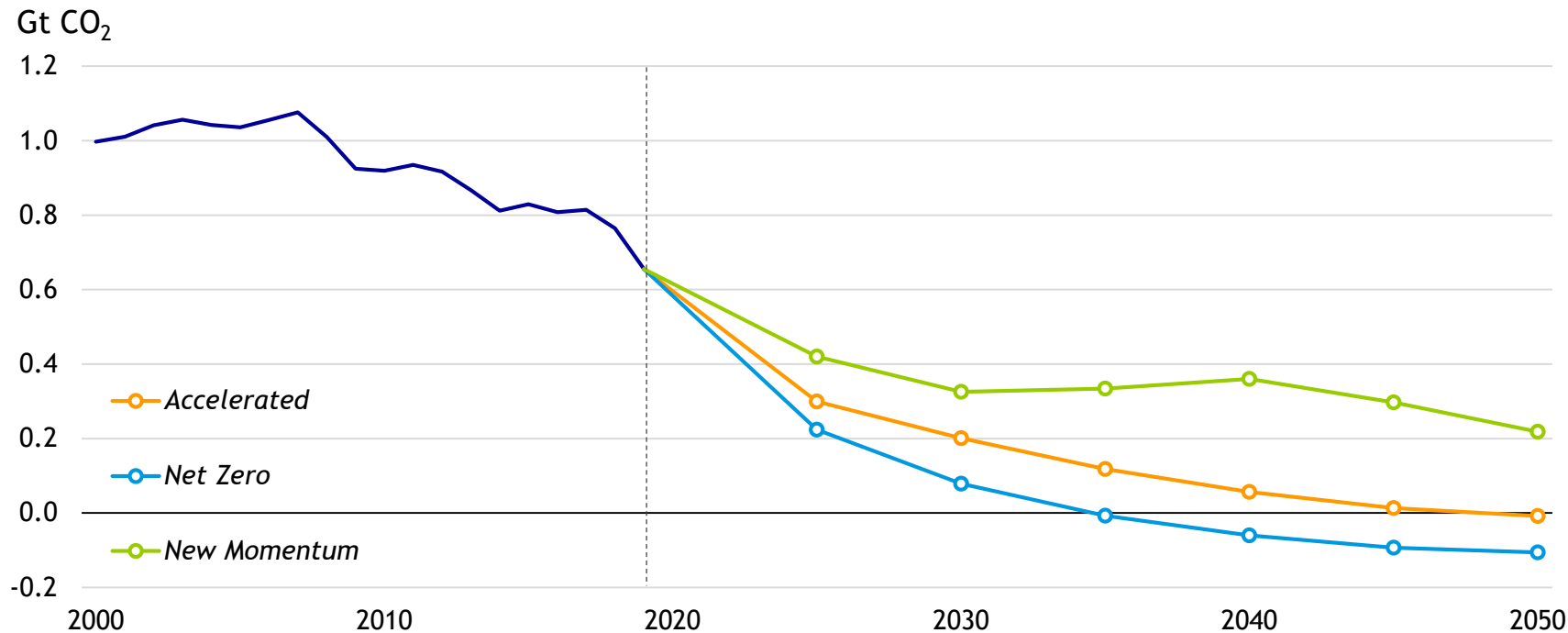


## Electricity generation by fuel

Change, TWh



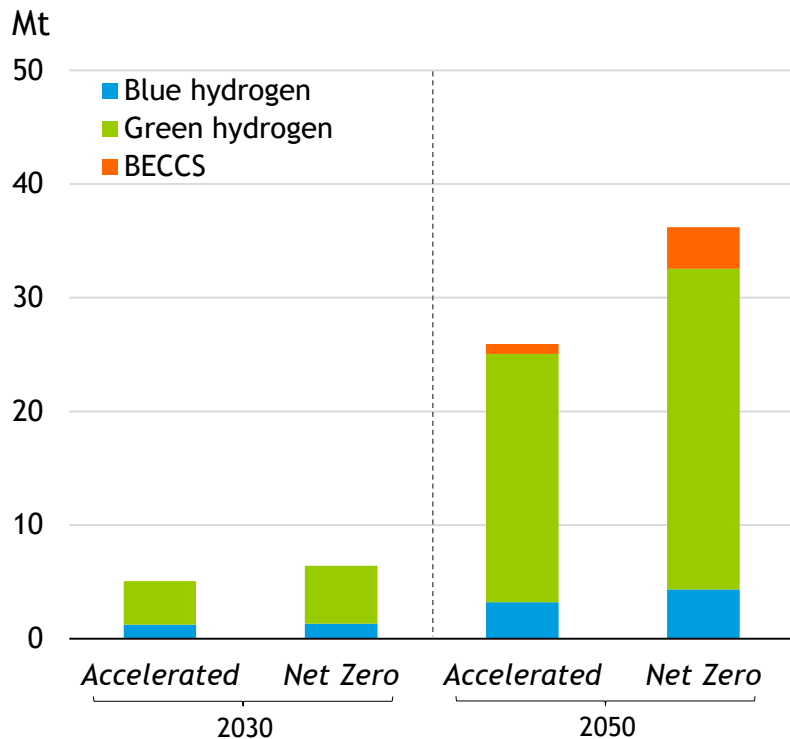
# CO<sub>2</sub> emissions from EU power sector



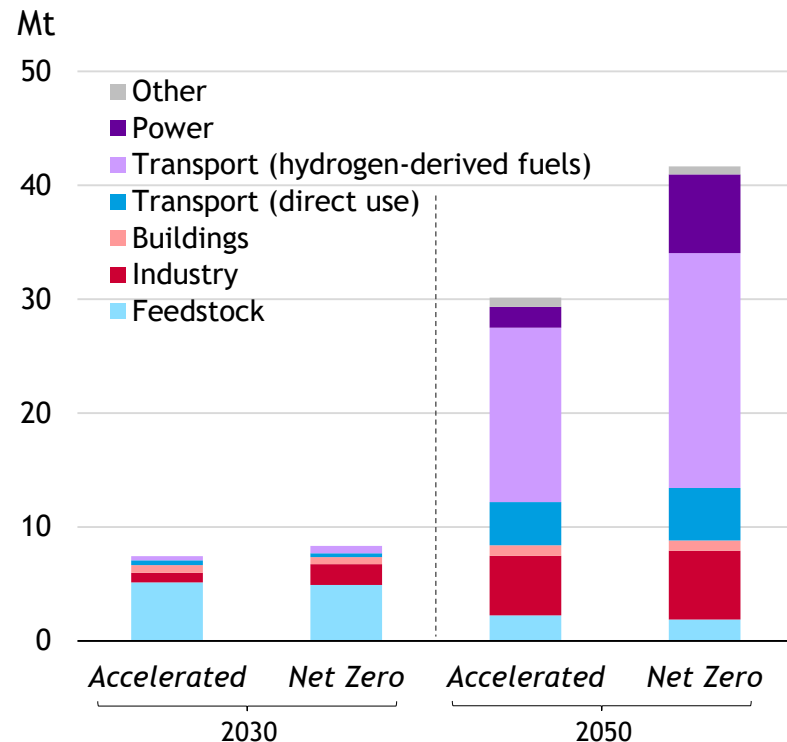


# EU: low-carbon hydrogen

## Low-carbon hydrogen supply

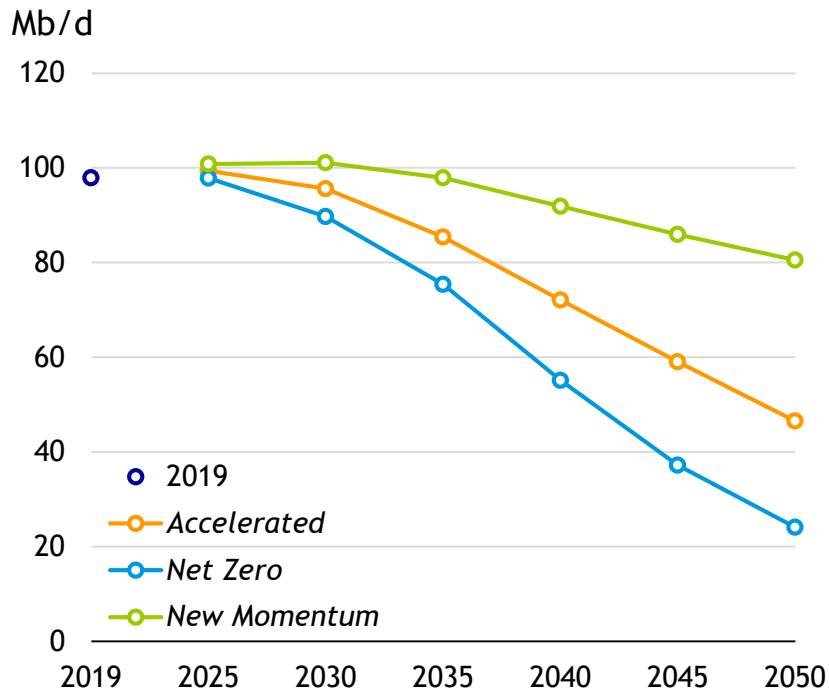


## Hydrogen demand by sector

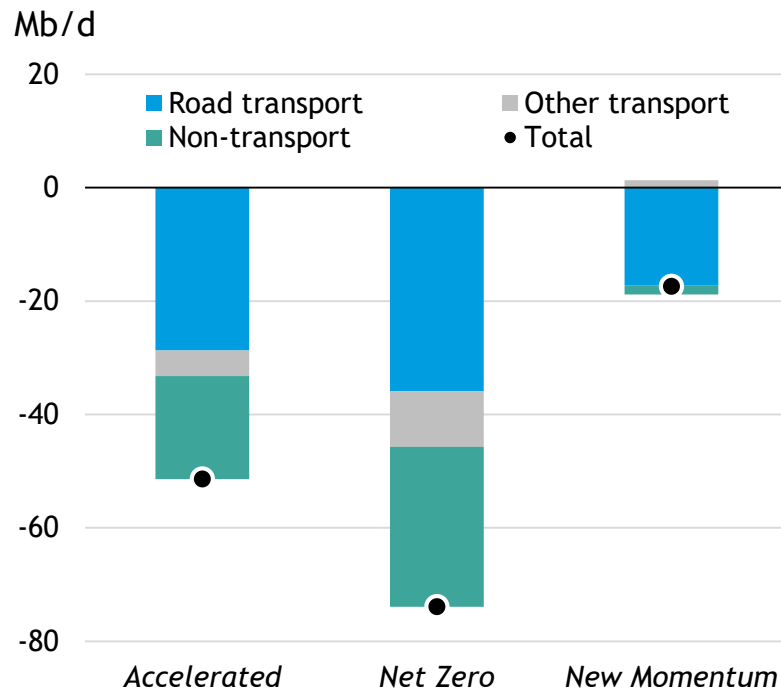


# Global outlook for oil demand

## Oil demand

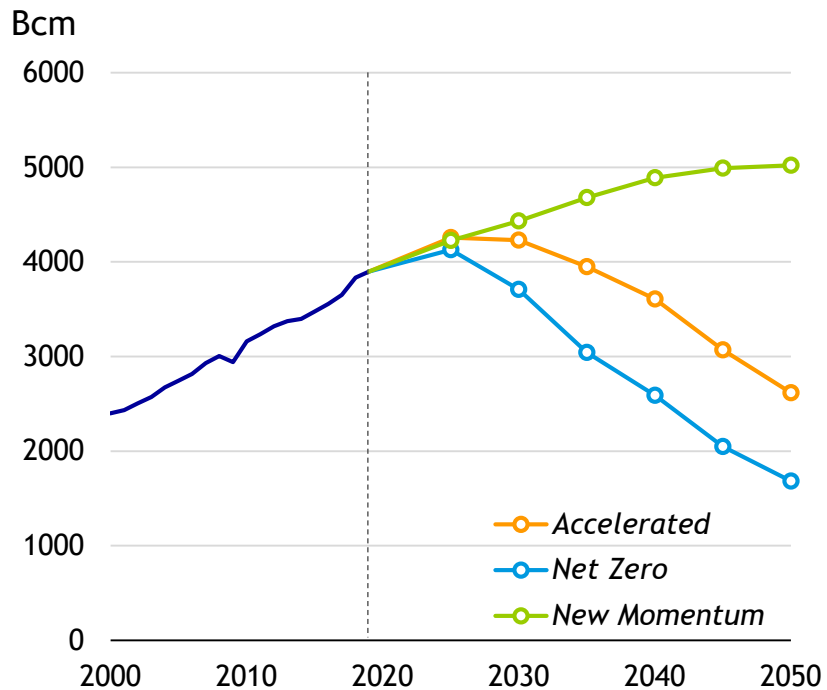


## Change in oil demand (2019 - 2050)

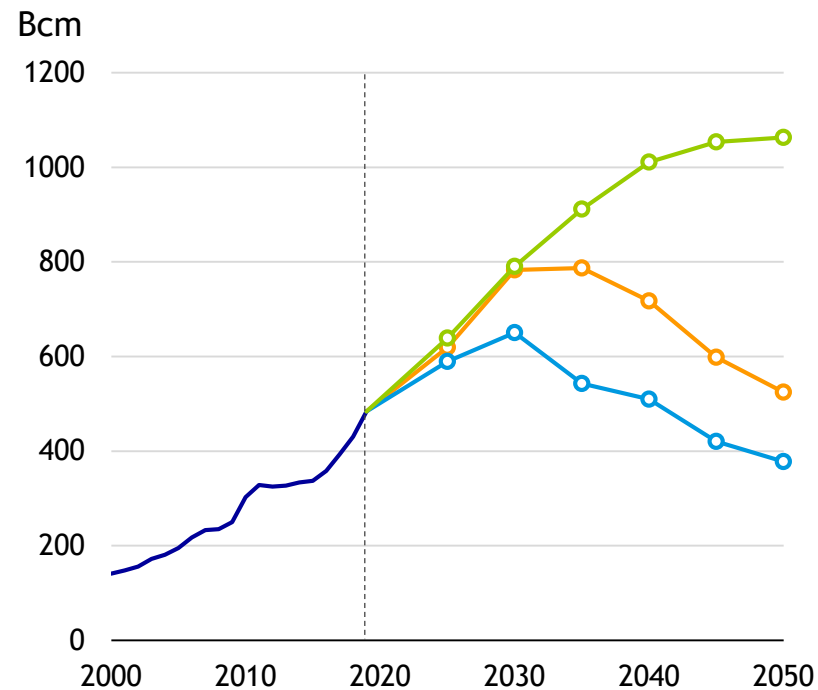


# Global outlook for natural gas demand

## Natural gas demand

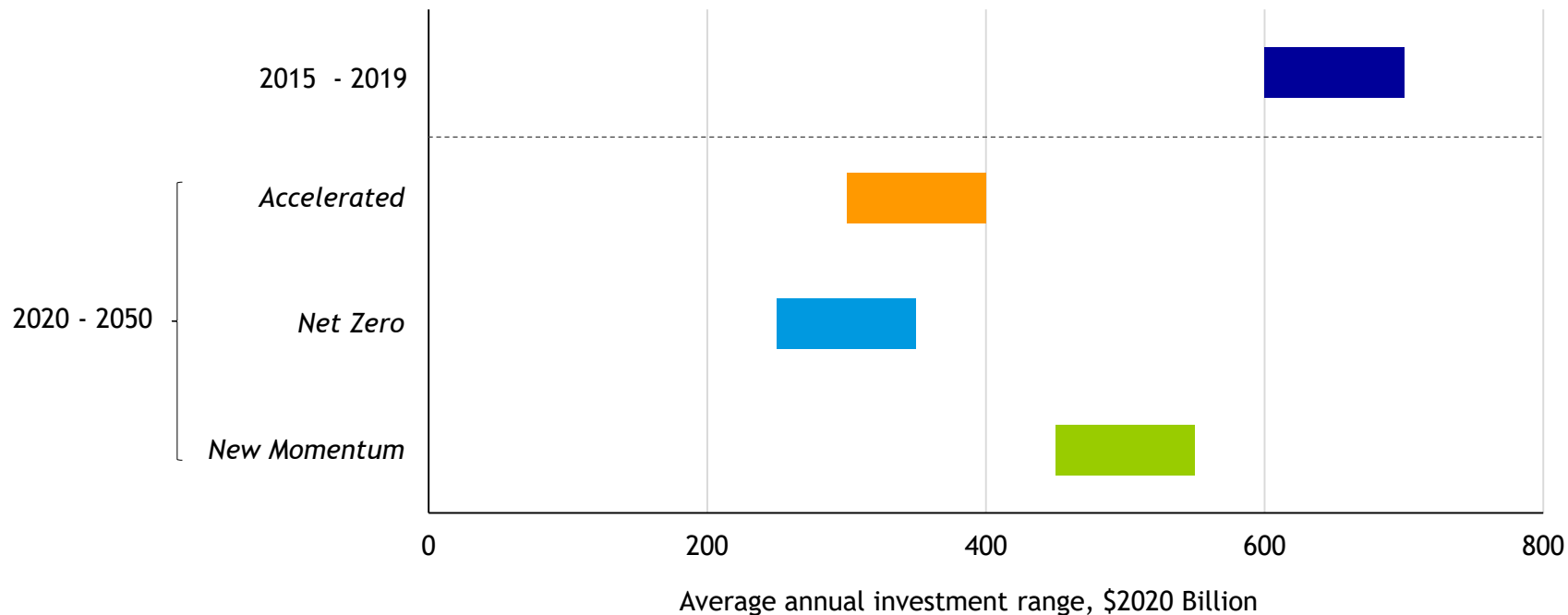


## LNG trade



# Global investment in upstream oil and natural gas

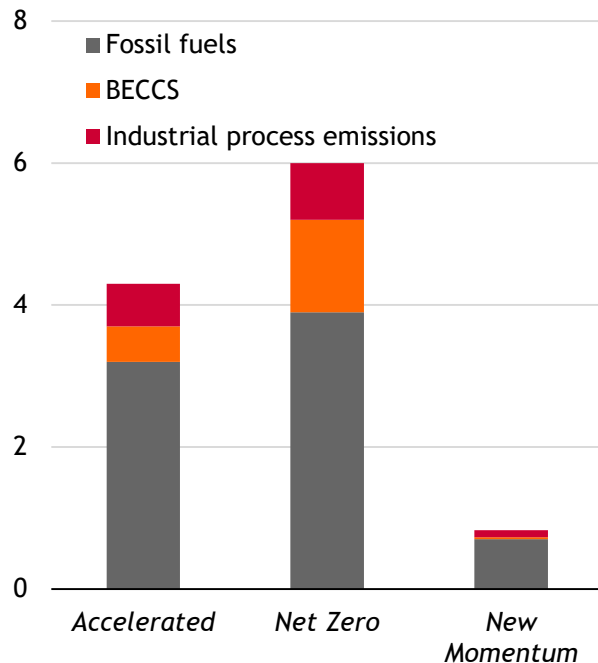
Oil and gas: average annual investment



# Global CCUS

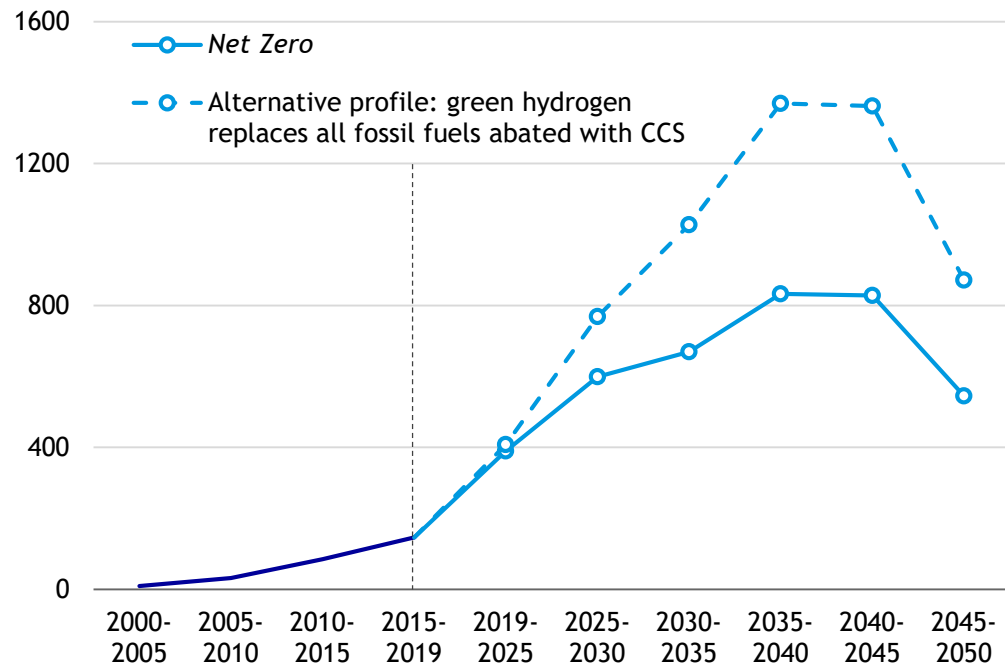
## CCUS in 2050 by emission source

Gt of CO<sub>2</sub>



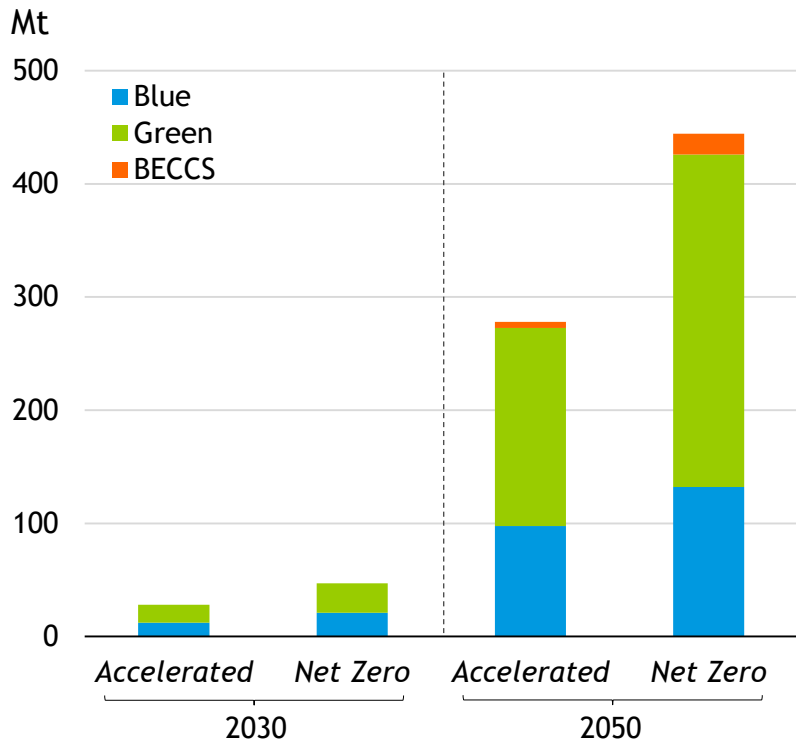
## Average annual increase in wind and solar capacity

GW

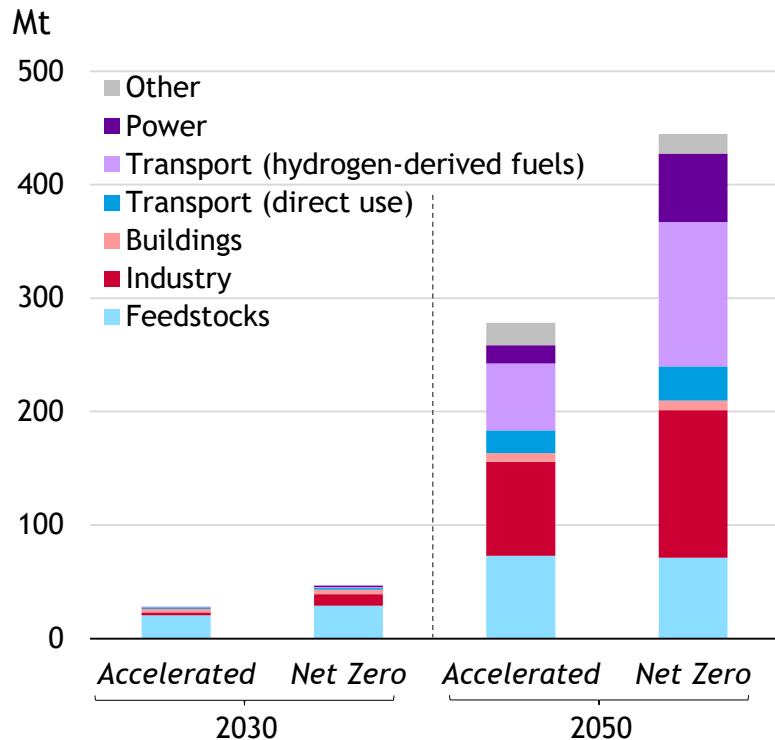


# Global low-carbon hydrogen

## Supply



## Demand



BECCS hydrogen from biomass gasification with carbon capture and storage