equinor

2023

Energy Perspectives

Global macroeconomic and energy market outlook

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A volatile and uncertain world

… with long-term repercussions, also for our ability to take collectively smart decisions

Geopolitics

Economics

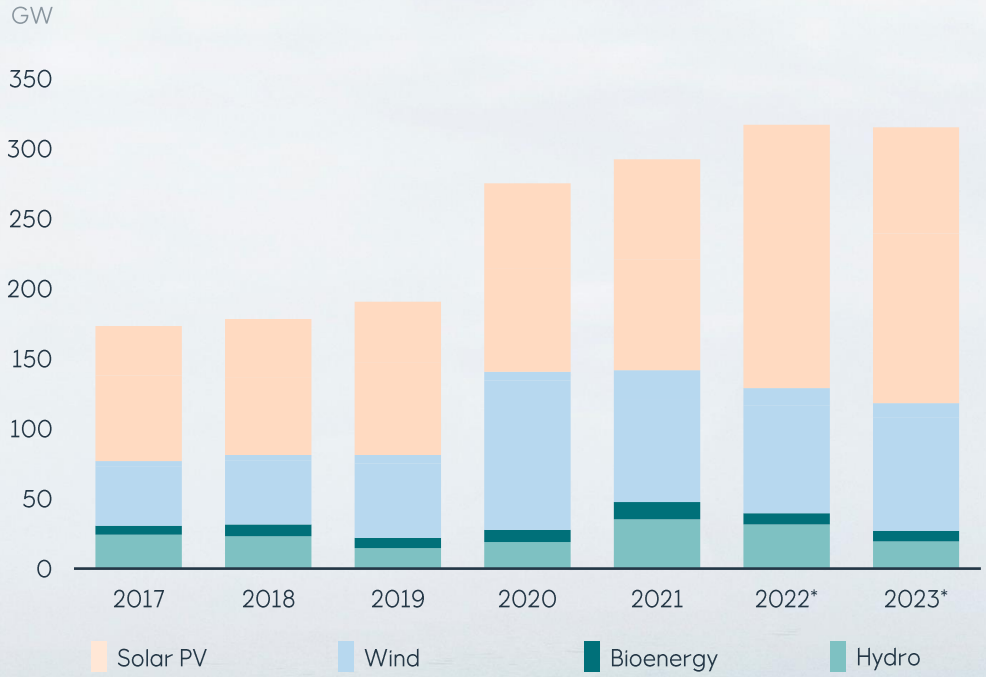
Society

Climate

Policy and technology progress on energy transition

… driving long-term change – but development is too slow…

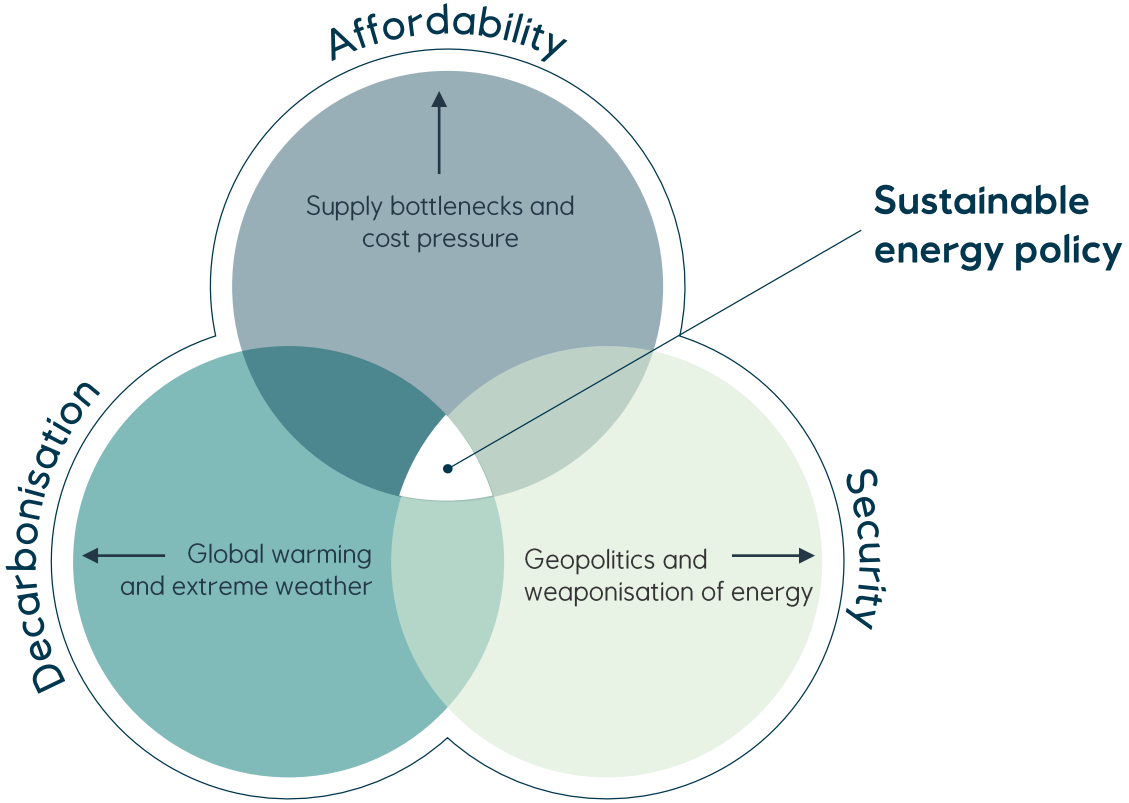
Net renewable capacity additions by technology



Source: IEA, 2019-2021 history, 2022*-2023* estimate

The energy trilemma is playing out and affected by events

Sustainability requires a balanced approach – but what about global inequalities and just transition?

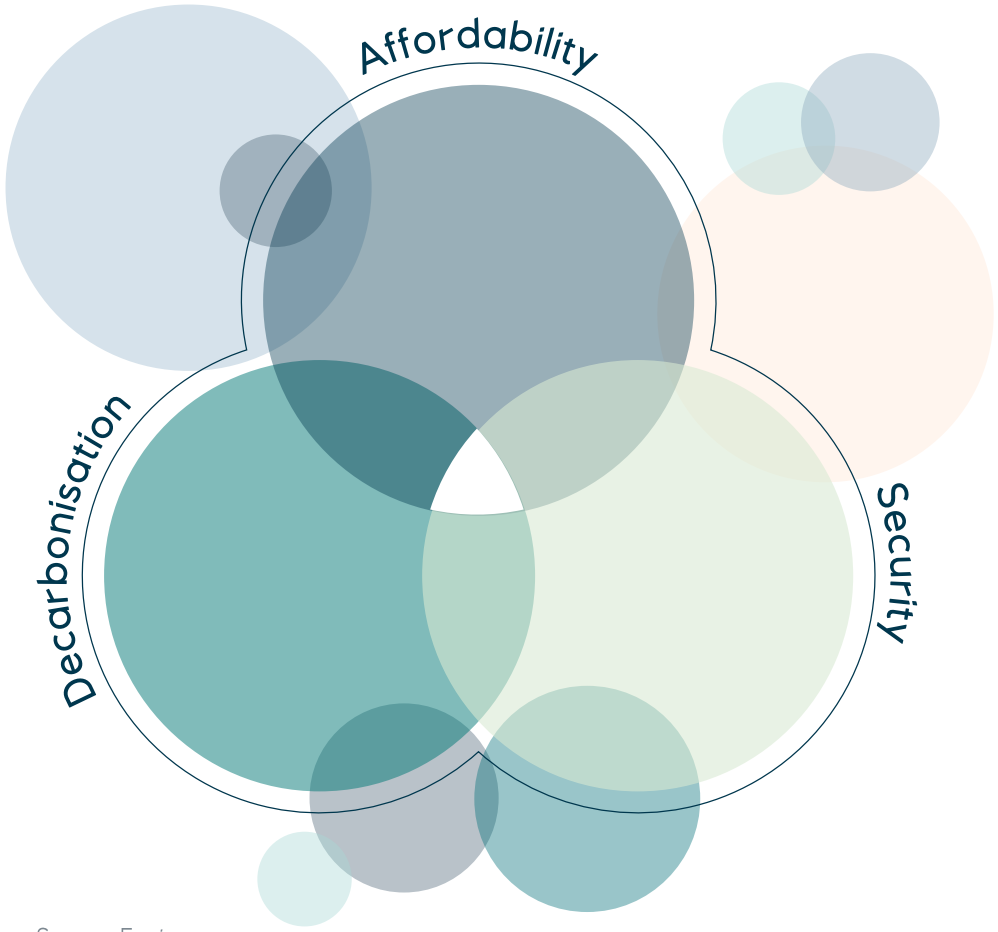


Source: Equinor

Source: United Nations

The energy trilemma is playing out and affected by events

Sustainability requires a balanced approach – but what about global inequalities and just transition?



Source: Equinor

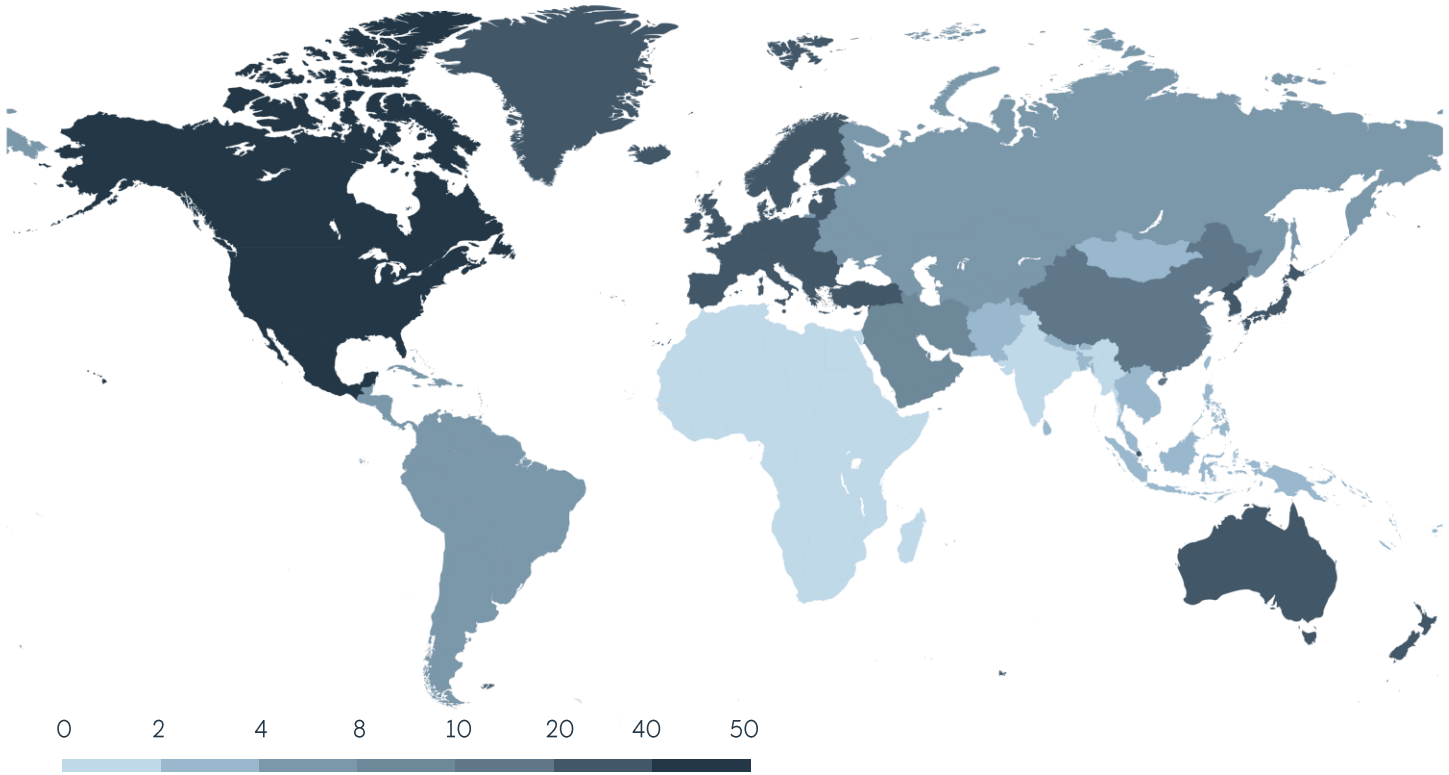
Source: United Nations

The ultimate dilemma – reducing income differences while reducing emissions

Emerging economies are less energy efficient than industrialised countries – transfer of wealth will increase energy use and emissions?

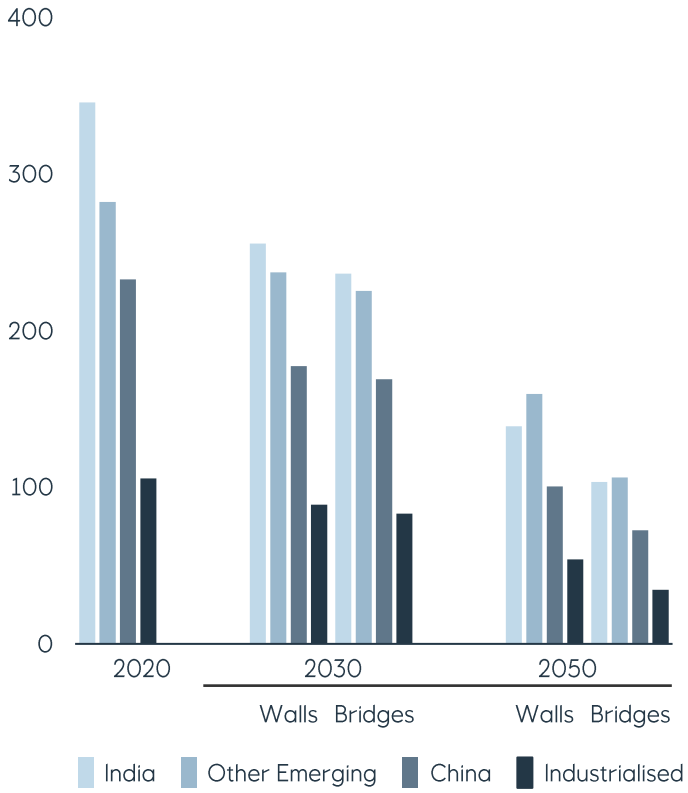
GDP per capita, 2020

Real thousand USD at market exchange rate



Energy intensity

toe/million USD



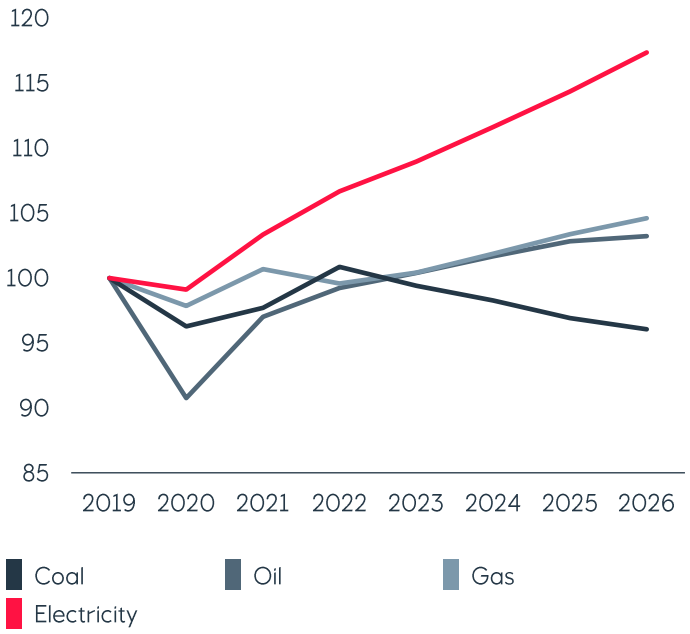
Source: © Oxford Economics Limited 2023 (GDP), UN (population), MapChart

Our short-term outlook to 2026 – moderate growth and flat emissions

Out of Covid, handling the energy crisis and supply bottlenecks, food inflation and re-globalisation

Coal, oil, gas and electricity demand

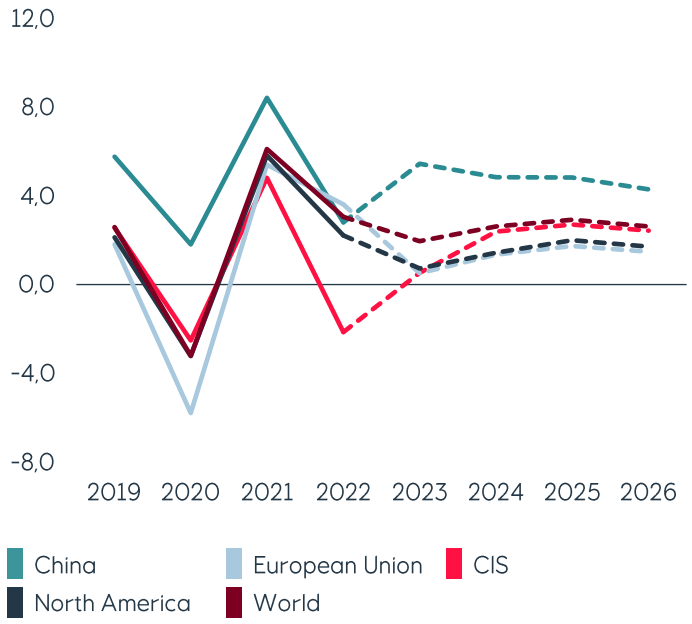
Indexed, 2019 = 100



Source: IEA (history), Equinor (projections)

GDP growth

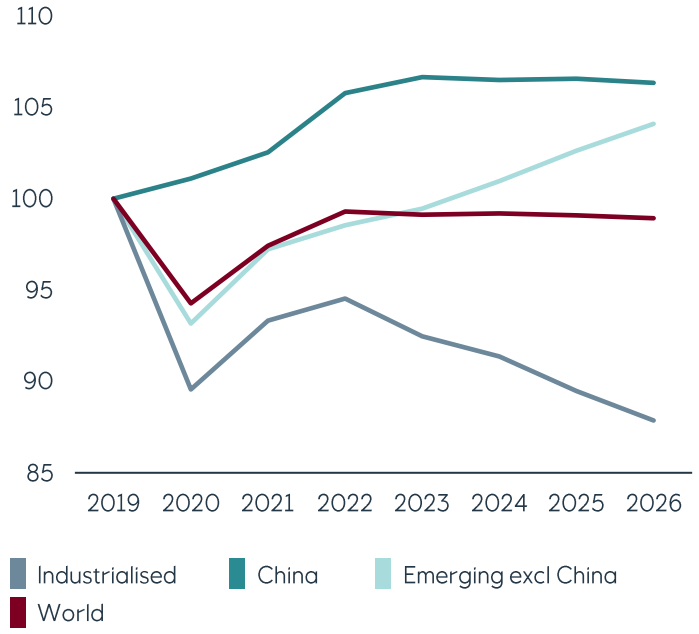
% change y/y



Source: © Oxford Economics Limited 2023 (history), Equinor (forecast from April 2023)

Energy-related CO_2 emissions

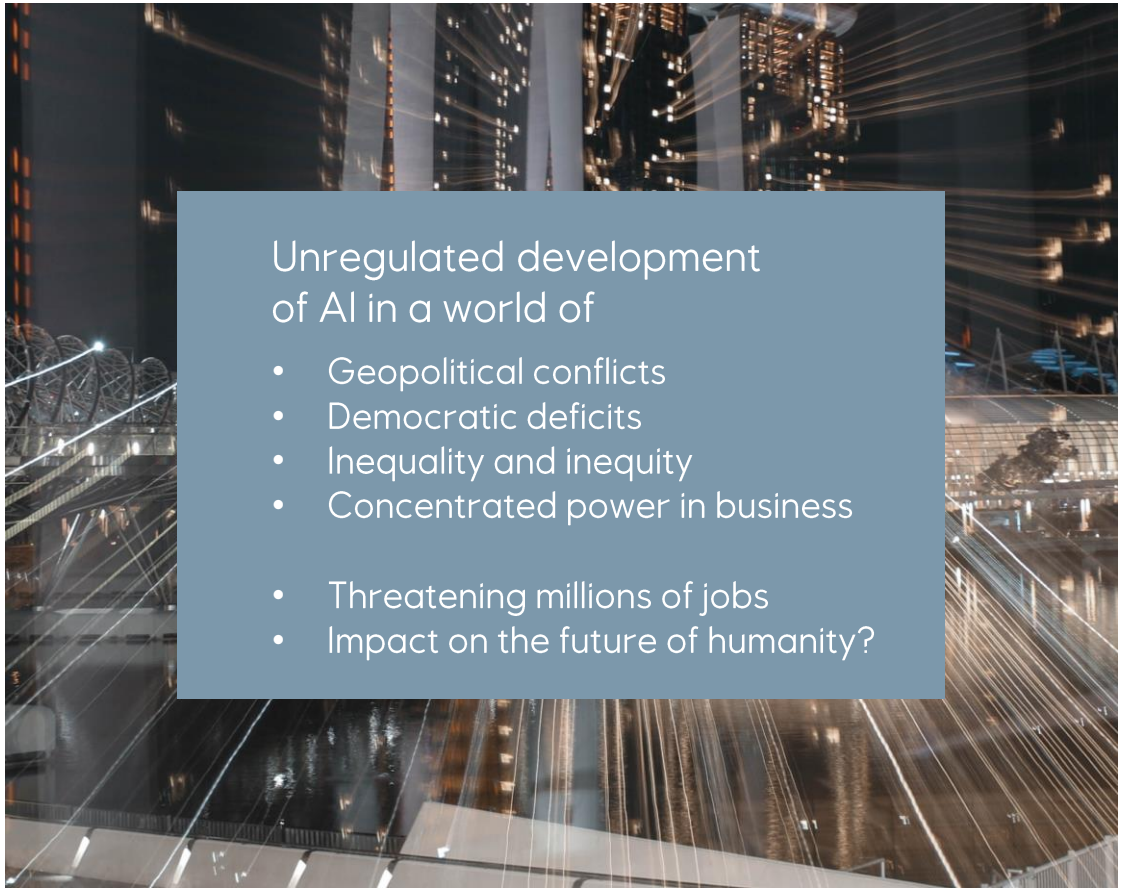
Indexed, 2019 = 100



Source: IEA (history), Equinor (projections)

Uncertainties that can fundamentally change short- and long-term outlooks

.... some are truly scary....



Unregulated development of AI in a world of

- Geopolitical conflicts
- Democratic deficits
- Inequality and inequity
- Concentrated power in business

- Threatening millions of jobs
- Impact on the future of humanity?

Walls protect but also divide

Walls

- Builds on current market trends, policy developments and policy signals
- Russia´s invasion of Ukraine and geopolitical tensions give rise to obstacles for global cooperation
- Energy security is increasingly important in the short-to-medium term
- Regional differences in speed and scale of the energy transition

Bridges connect and enable

Bridges

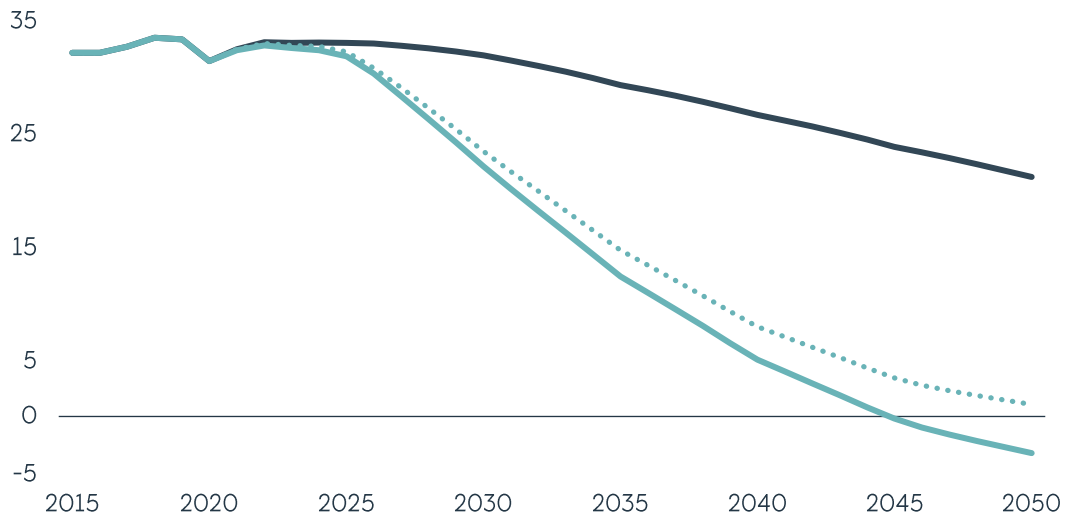
- A normative back-cast scenario
- Consistent with a 1.5°C temperature rise
- Immediate and coordinated international action needed
- Illustrates the kind of drastic measures needed to meet the goals of the Paris Agreement

Emissions in Walls and Bridges decline, but at very different speeds

The challenge of staying within the 1.5°C carbon budget is formidable and requires carbon removal technologies

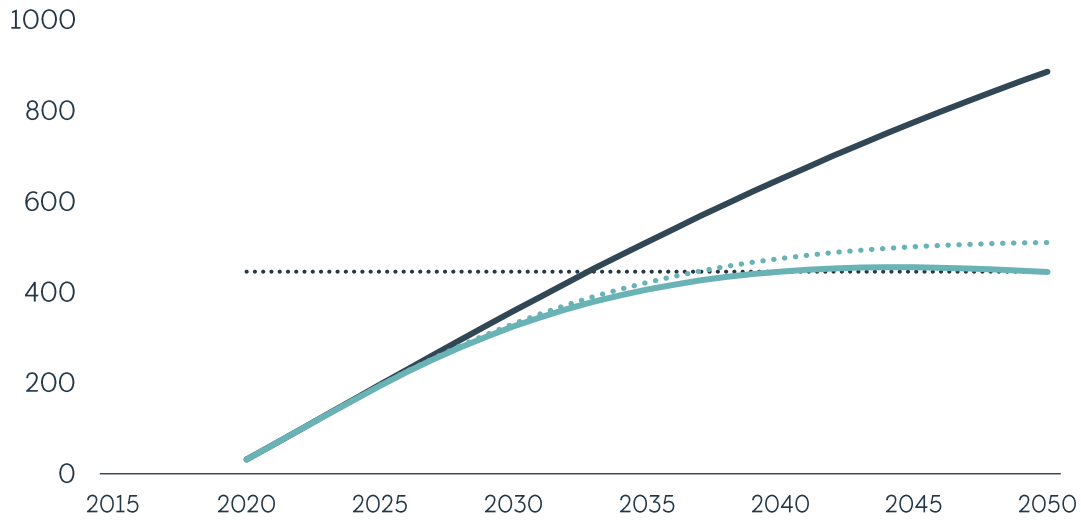
Annual energy-related emissions

Gt CO_2



Cumulative energy-related emissions

Gt CO_2



Source: IEA (history), Equinor (projections)

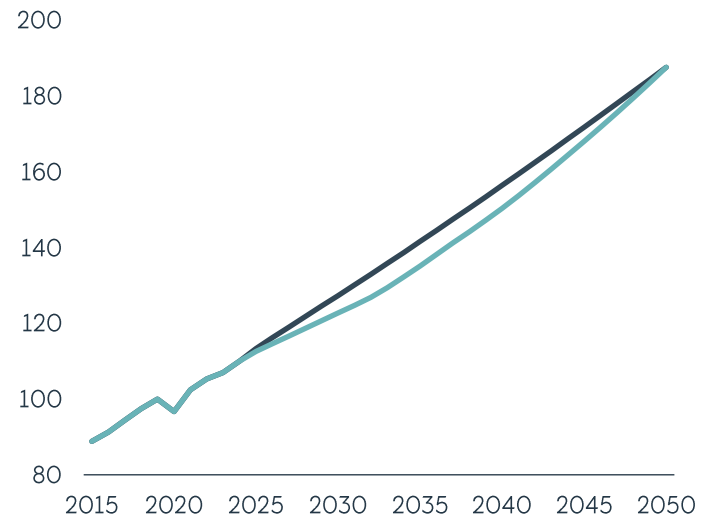
Source: Equinor (projections)

The global economy continues to grow and becomes more energy efficient

Reaching the 1.5°C target requires a reduction of 26% in total primary energy demand, GDP doubles, energy intensity must go down

Global GDP

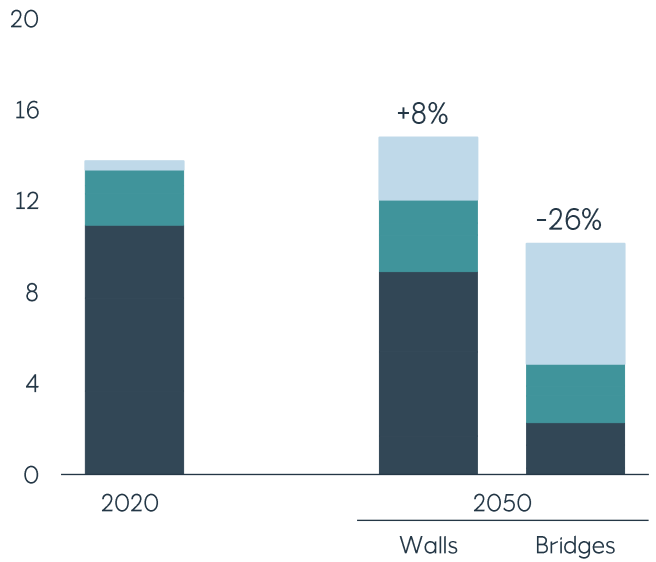
Indexed to 100 in 2020, constant USD



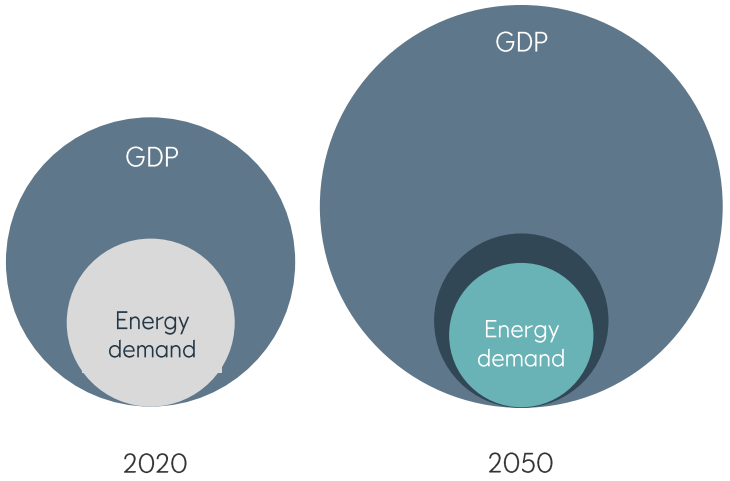
Walls Bridges

Total primary energy demand

Gtoe



Fossil fuel Other New renewables



Walls Bridges

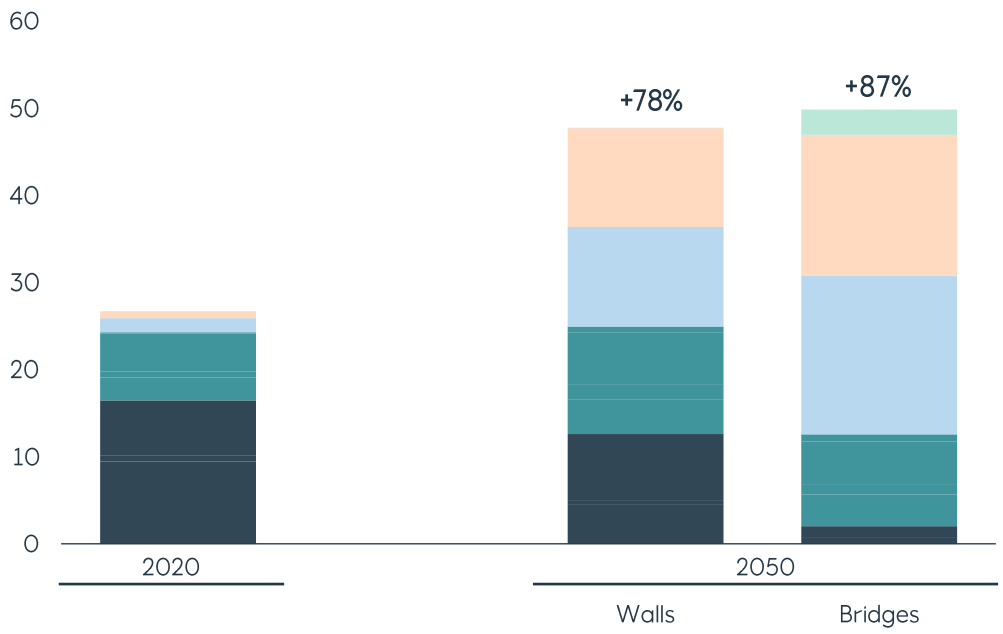
Source: IEA and © Oxford Economics Limited 2023 (history), Equinor (projections)

Electrification is the key enabler

Renewables continue to grow and replace fossil fuels

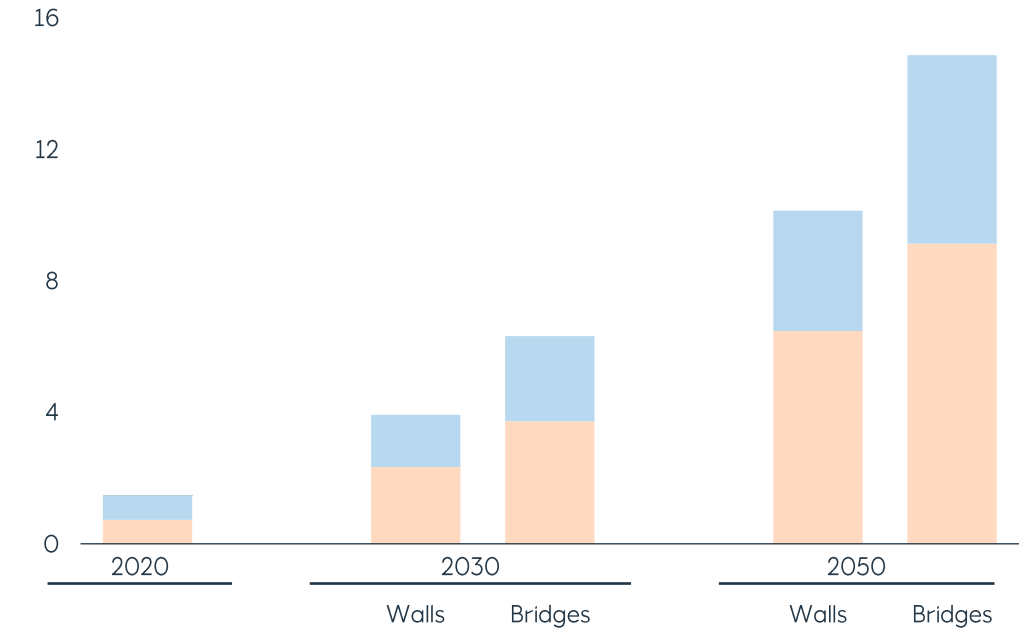
Electricity generation

Thousand TWh



Wind and solar PV capacity

Thousand GW

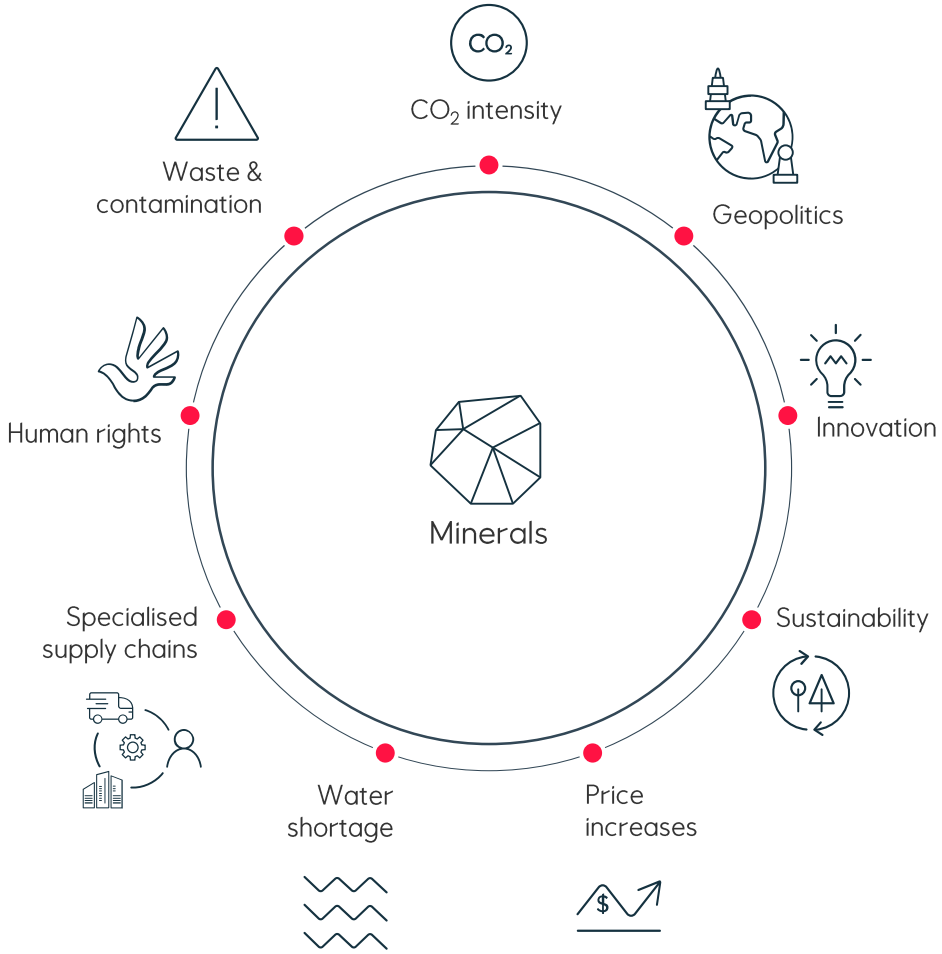


Fossil fuels | Other | Wind | Solar | Hydrogen

Source: IEA (history), Equinor (projections)

Solar and wind expansion requires critical minerals

... raising a lot of issues...

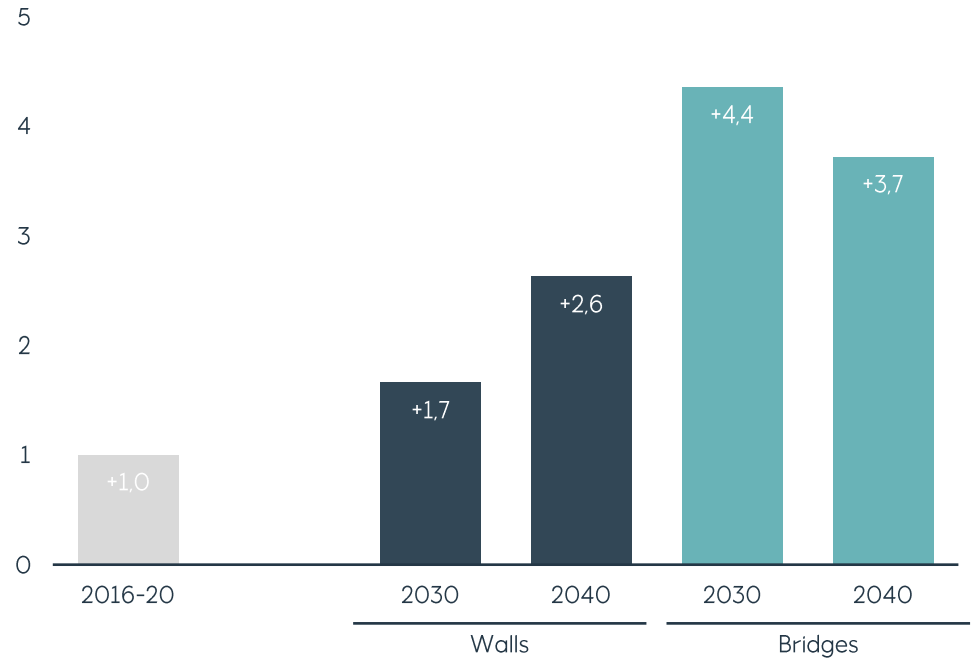


Mineral demand growth in renewable power will challenge production levels

Must be addressed by massive investments in mining, processing, refining and logistics across the globe, in a sustainable manner

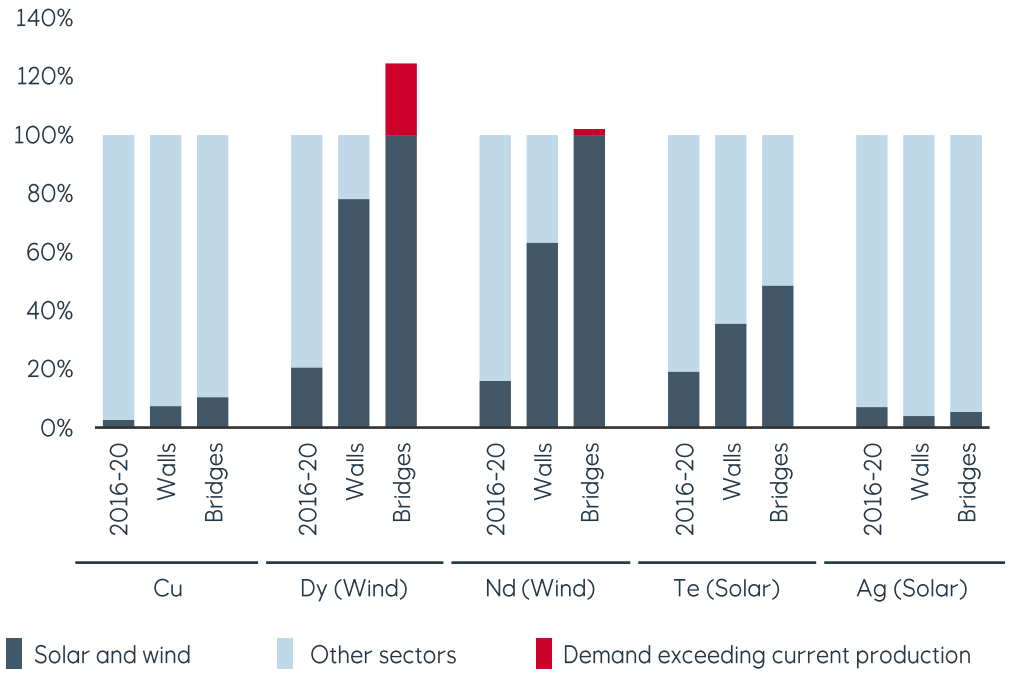
Mineral demand*

Indexed 2016-20 (average demand) = 1



Minerals demand in 2040 as share of 2022 production

2022 production = 100%



Source: Equinor, USGS, Wang et al. (2023) Future demand for electricity generation materials under different climate mitigation scenarios, Joule 7, 309-332. Elsevier Inc.

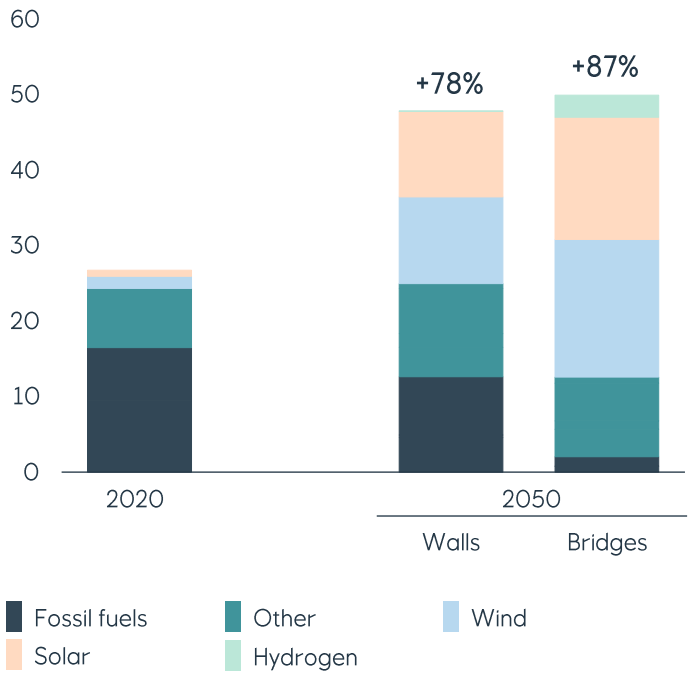
* Mineral demand needed to support annual solar PV and wind capacity additions in power generation.

Massive changes in different parts of the energy system

Electrification is the key element of the energy transition, and a major factor in efficiency improvements

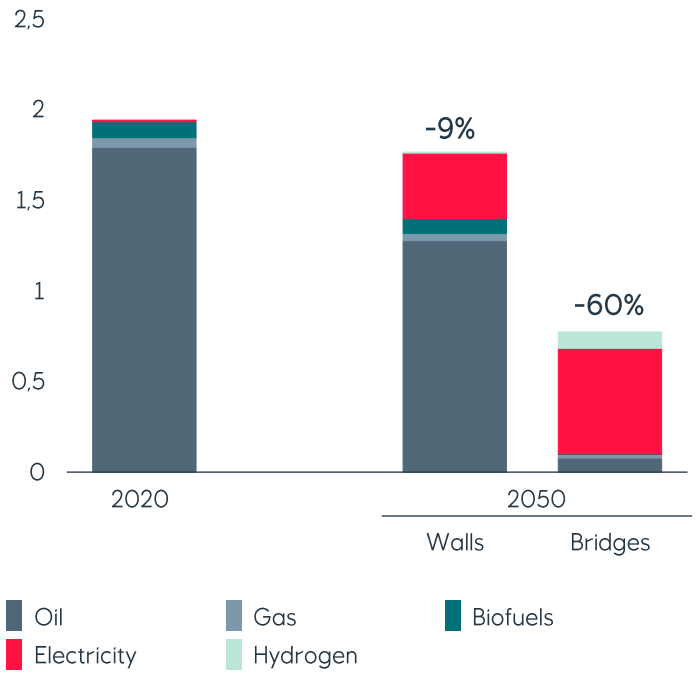
Electricity generation

Thousand TWh



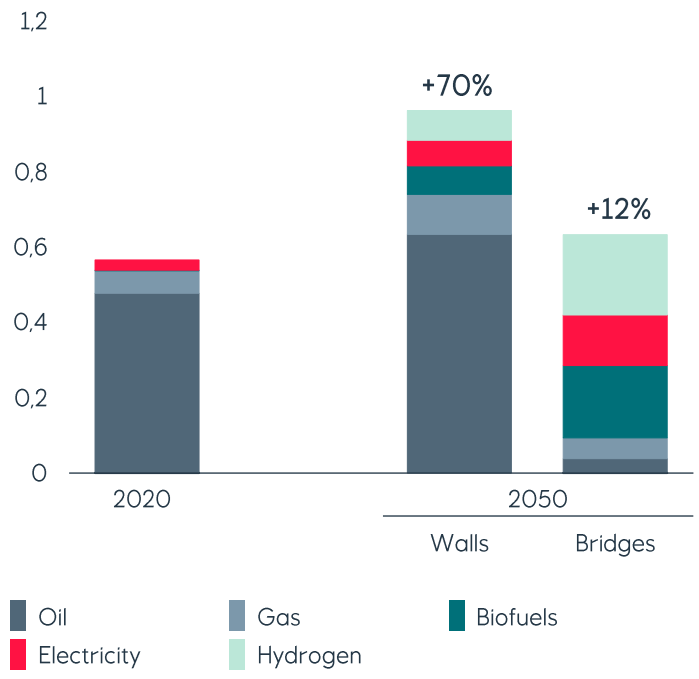
Road transport fuel demand

Gtoe



Non-road transport fuel demand

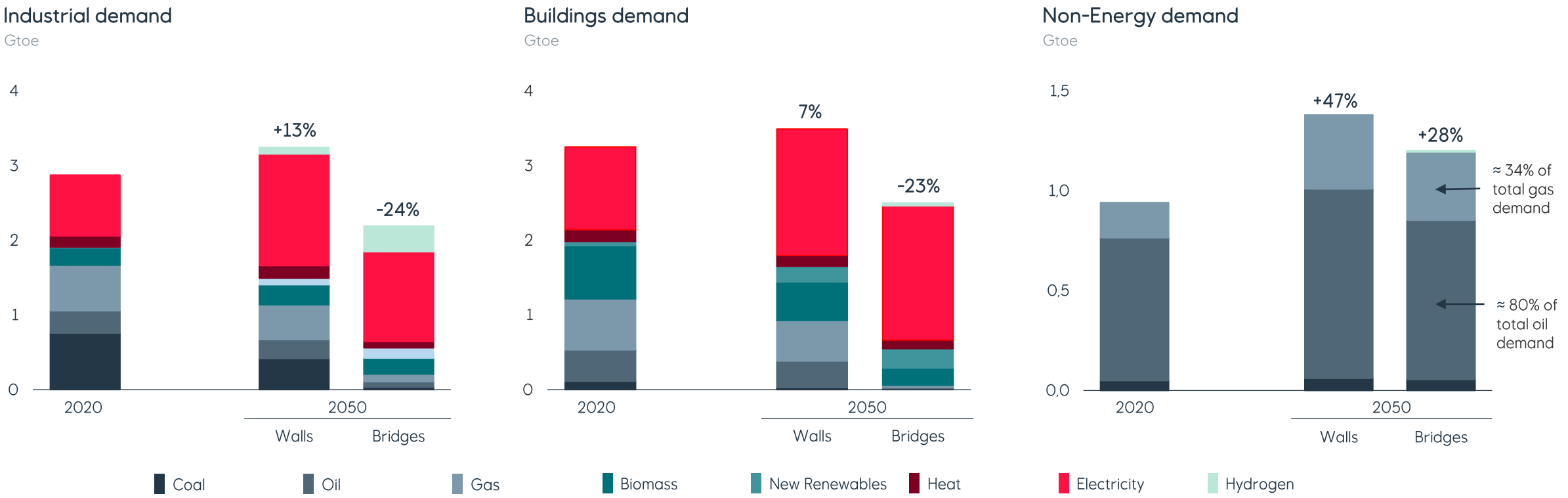
Gtoe



Source: IEA (history), Equinor (projections)

Electrification and efficiency improvements are keys in other sectors

Fossil fuels still needed as feedstock



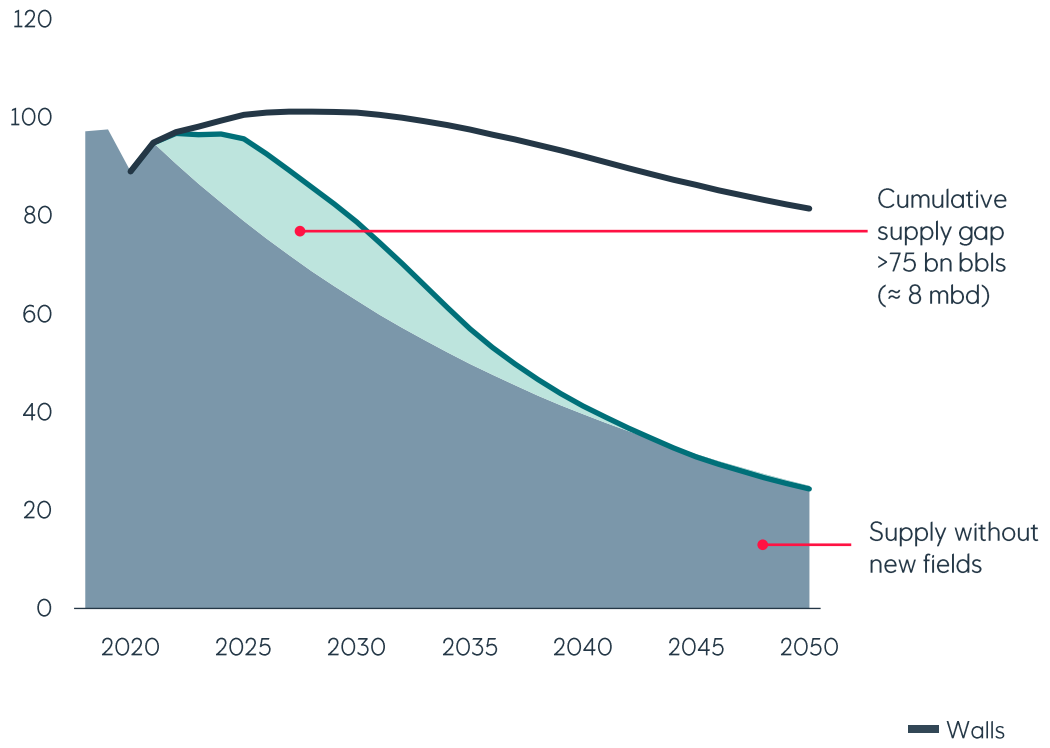
Source: IEA (history), Equinor (projections)

Wide outcome space for oil and gas demand

Large oil and gas investments in both scenarios, although significantly less in Bridges

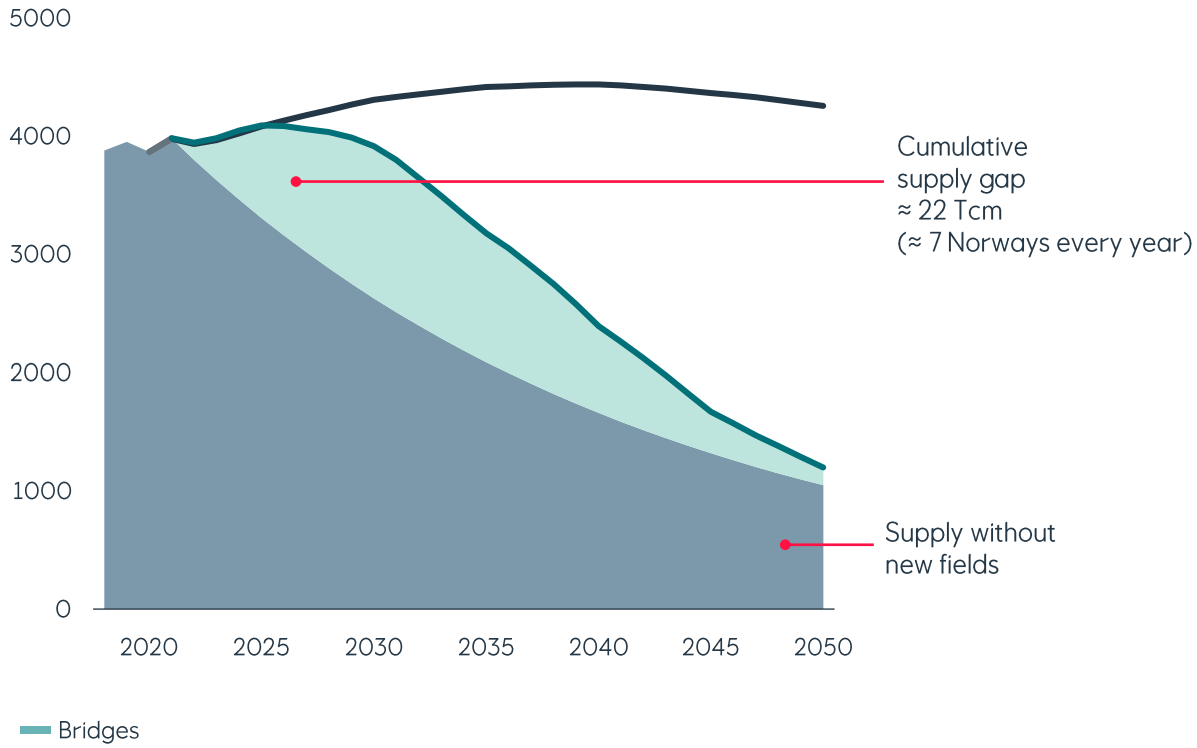
Oil demand and supply from existing fields

mbd



Gas demand and supply from existing fields

Bcm



Walls Bridges

Source: IEA (history), Equinor (projections)

A change of pace and a revolution in transforming the energy system

	History 1990 - 2020	Walls 2020 - 2050	Bridges 2020 - 2050
Total primary energy demand CAGR %	1.6%	0.2%	-1.0%
Energy intensity CAGR %	-1.2%	-1.9%	-3.2%
Fossil fuel demand (Change in period - Gtoe)	3.9	-2.0	-8.7
Solar and wind in power generation (Change in period - Thousand TWh)	2	20	32
	History 2016 – 2020 (avg.)	**Walls** Peak 2050	**Bridges** Peak 2035
Mineral demand from solar and wind in power generation (Mt)	2.3	6.3	10.2

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"We build too many walls and not enough bridges."

- Attributed to Sir Isaac Newton