BNEF Global Energy & Industry Event

Bloomberg

New York Climate Week

Welcome

Jon Moore
Chief Executive Officer
BloombergNEF

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New York Climate Week

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Opening Remarks

Dana Perkins
Head of Market Development & Partnerships
BloombergNEF

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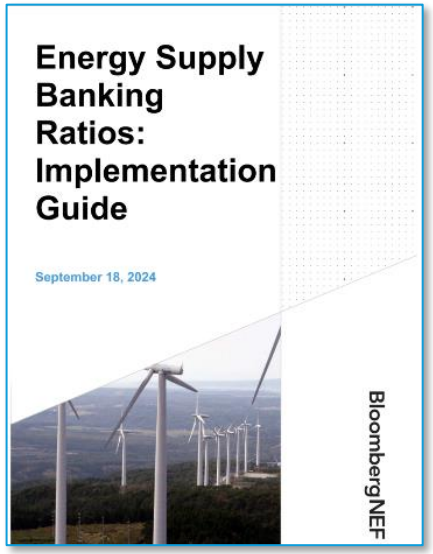
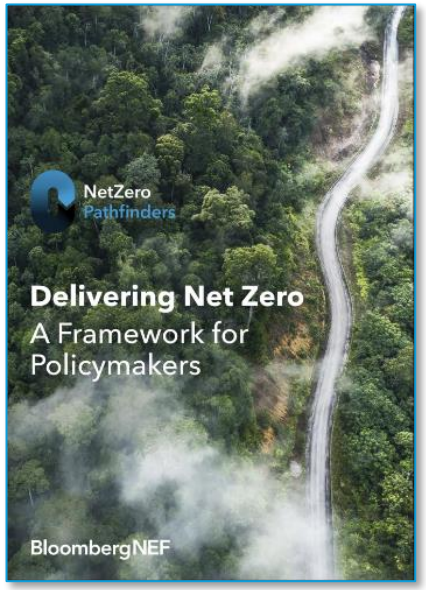
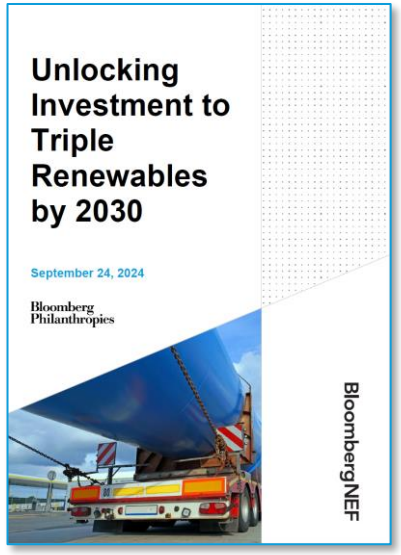
BNEF Public Research for Climate Week NYC







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BloombergNEF

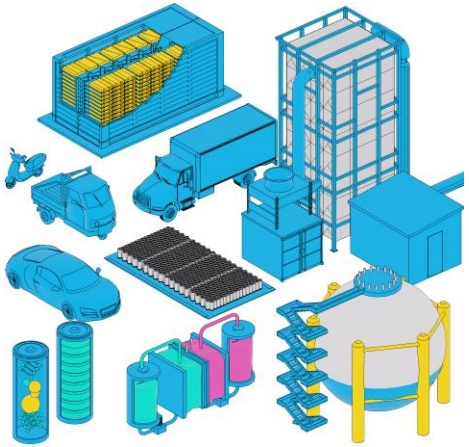
BNEF Pioneers

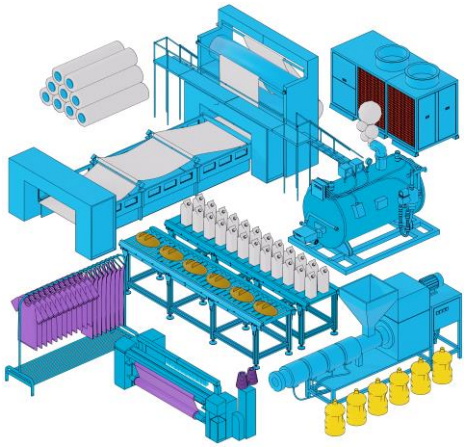
Applications for Pioneers 2025 are open!

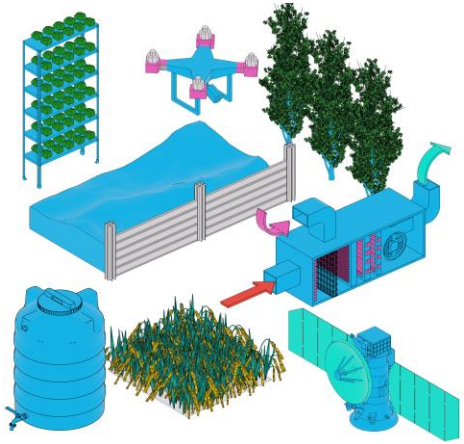
Challenge 1: Making light industry more sustainable

Challenge 2: Innovations in energy storage

Challenge 3: Boosting climate adaptation capabilities







Applications will close on November 1, 2024

BNEF Talk: Finding the Investment to Triple Global Renewables

Oliver Metcalfe
Head of Wind Research
BloombergNEF

Bloomberg
New York Climate Week

BloombergNEF

Unlocking Investment to Triple Renewables by 2030

BNEF Global Energy and Industry Event: Climate Week NYC

Oliver Metcalfe

September 26, 2024

BloombergNEF

Tripling renewables by 2030 – How are we doing?

Source: Global Renewables Alliance

Unlocking investment to triple renewables by 2030

Source: BloombergNEF

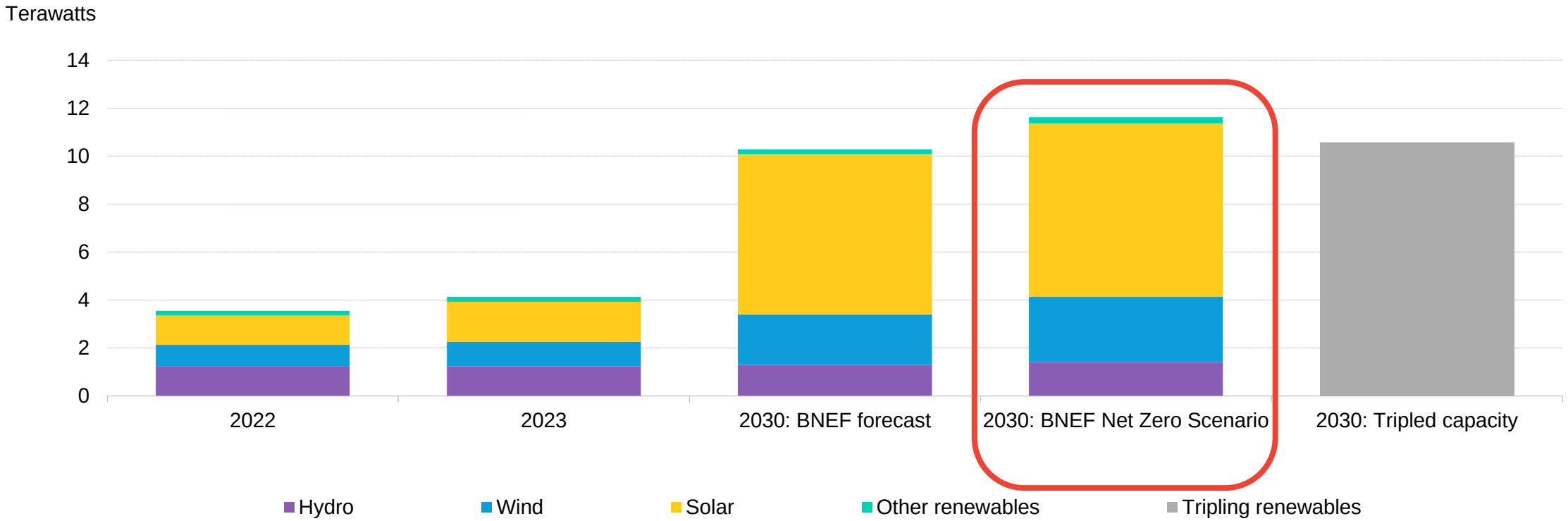
Unlocking investment to triple renewables by 2030

It’s the right goal

Source: BloombergNEF

Tripling renewables will put us on a net-zero pathway

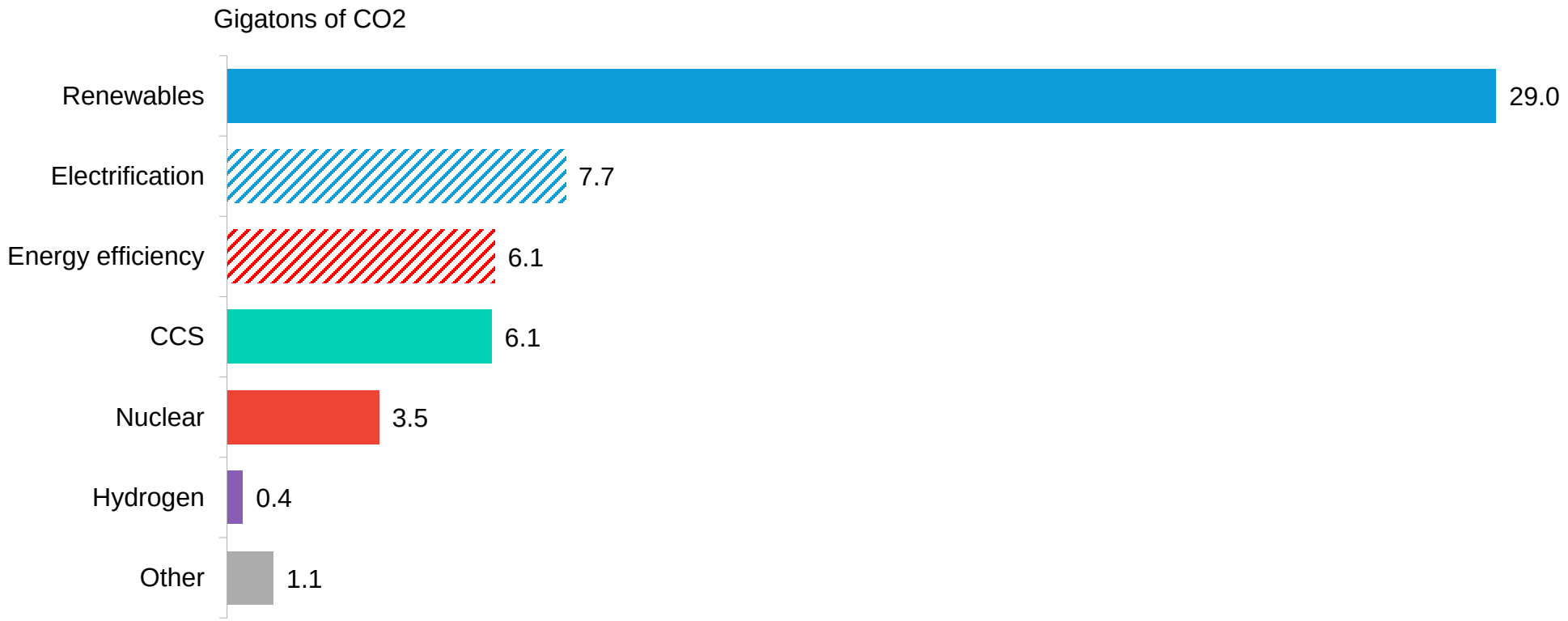
Global installed renewable energy capacity versus BNEF's 2030 forecast and Net Zero Scenario, and tripling renewables target



Source: BloombergNEF. Note: 'Other renewables' includes bioenergy, geothermal, solar thermal and marine. 'Tripled capacity' is compared with 2022.

Renewables will make the biggest contribution to cutting 2030 emissions

Cumulative emissions reductions in BNEF's Net Zero Scenario across 2024-2030, by measure



Source: BloombergNEF. Note: Reductions from fuel combustion by measure. CCS is carbon capture and storage.

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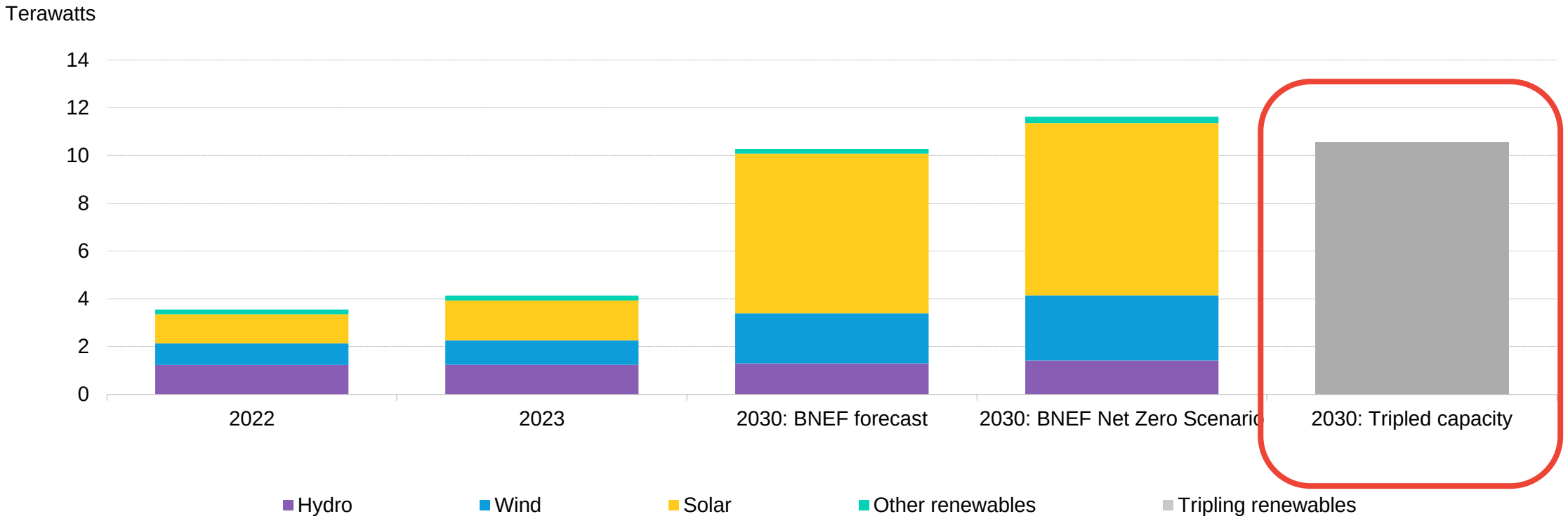

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Unlocking investment to triple renewables by 2030

It’s the right goal

Source: BloombergNEF

Unlocking investment to triple renewables by 2030

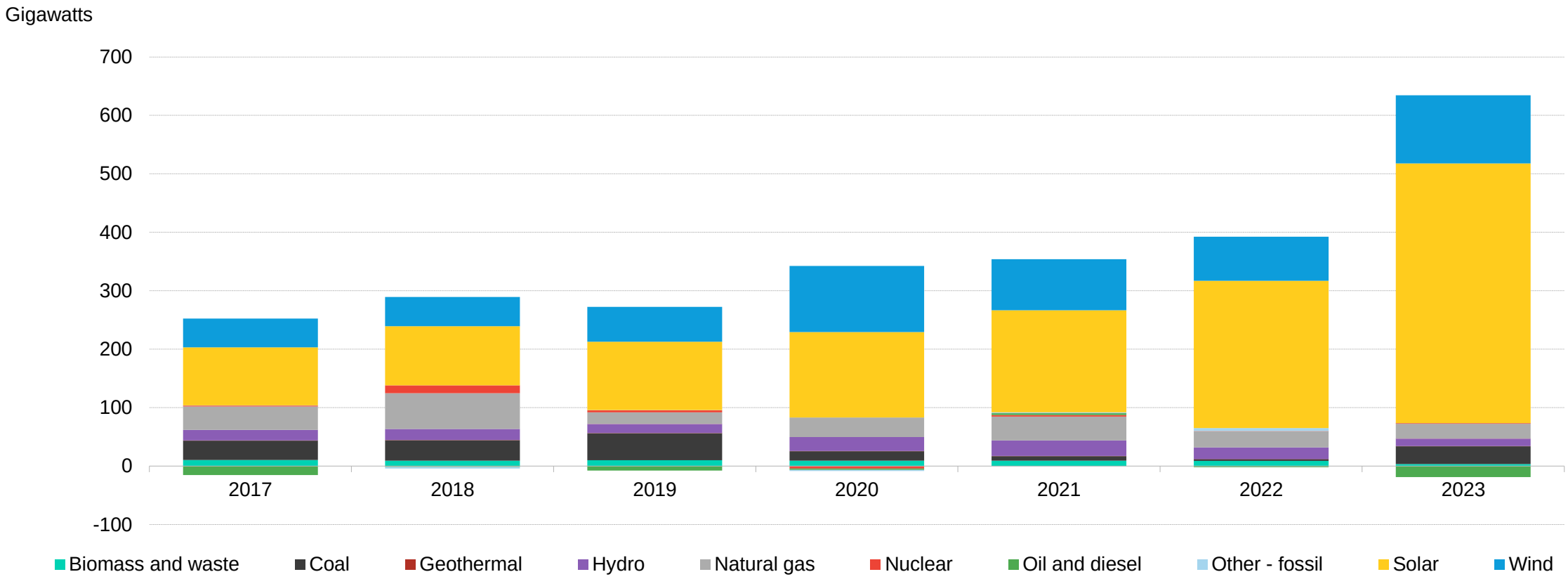
It’s the right goal

We need to accelerate

Source: BloombergNEF

The world added 561 gigawatts of wind and solar last year

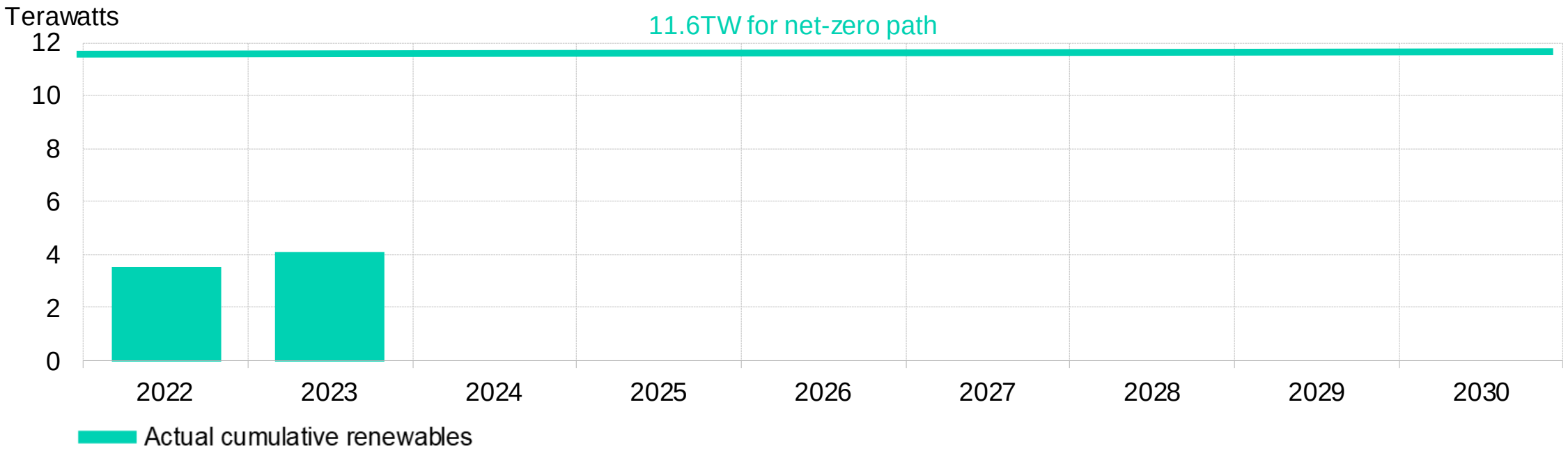
Global new power generation capacity, by technology



Source: BloombergNEF. Note: 'Other – fossil' accounts for plants that use more than one fuel or fuels other than coal, oil and gas.

Progress has been made, but the pace is still too slow

Pathways to reach tripling-renewables target at constant growth rates and forecasts



Source: BloombergNEF. Note: 'Constant annual build' shows the result of annual additions holding constant at 2022-23 levels. The 11.6TW line shows the 2030 capacity under BNEF's Net Zero Scenario. BNEF's forecasts for wind and solar are based on detailed country-level analysis of project pipelines, asset financing, renewable energy demand, economics and enabling policies. The forecast for 'other renewables' is based on project pipelines only and is aligned with BNEF's Economic Transition Scenario.

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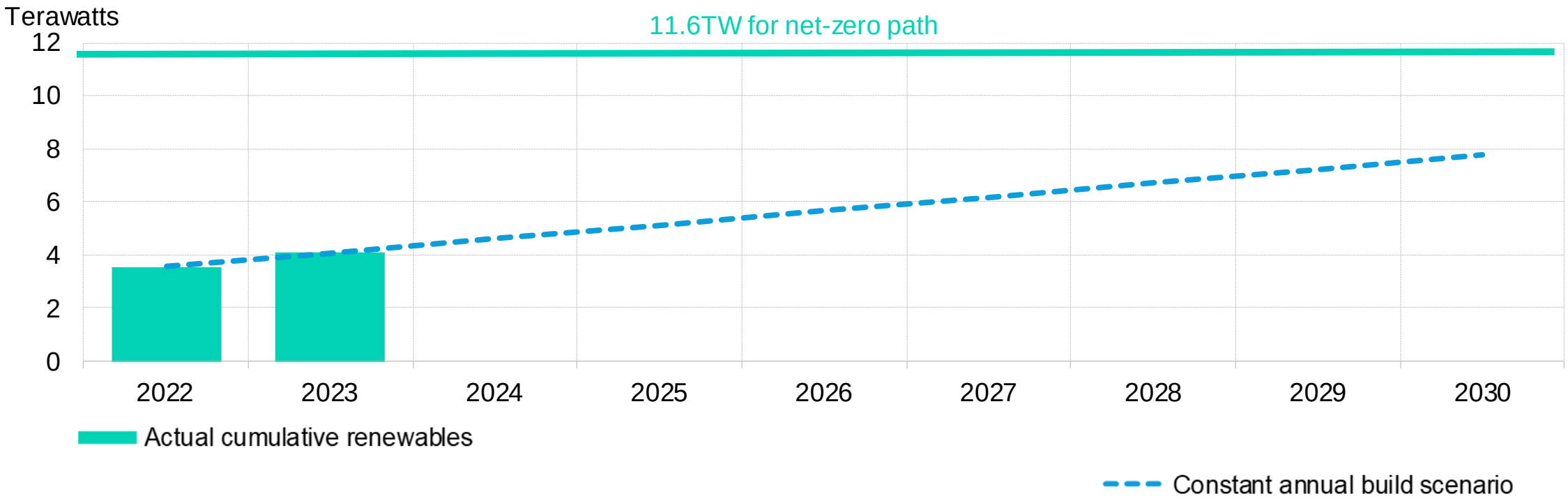

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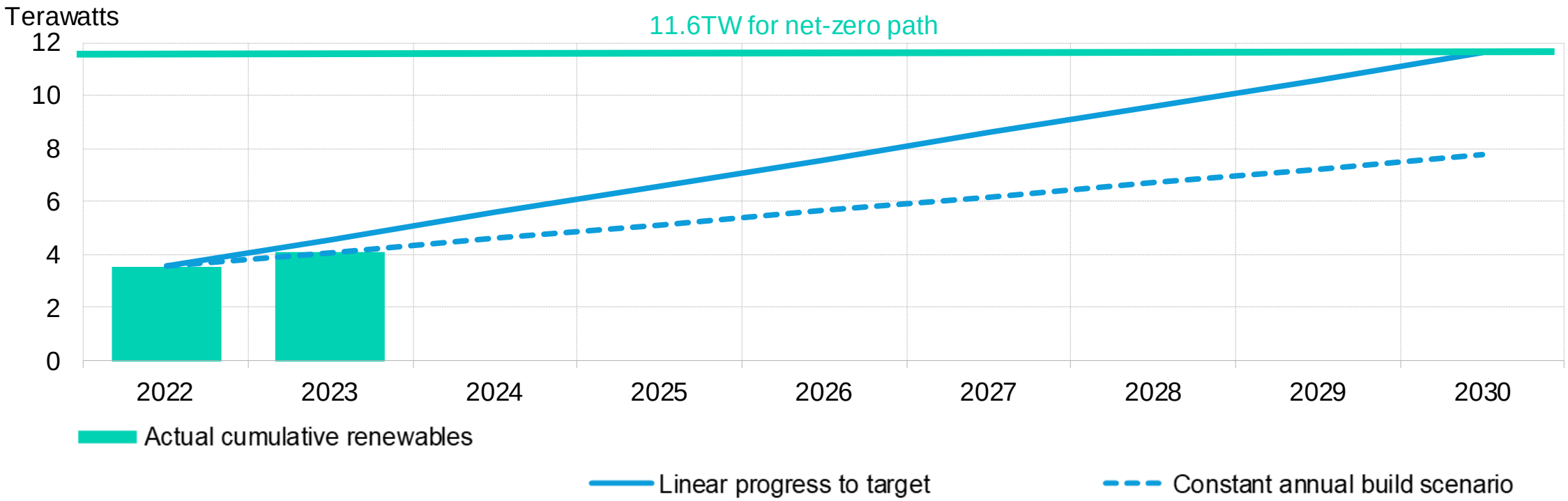

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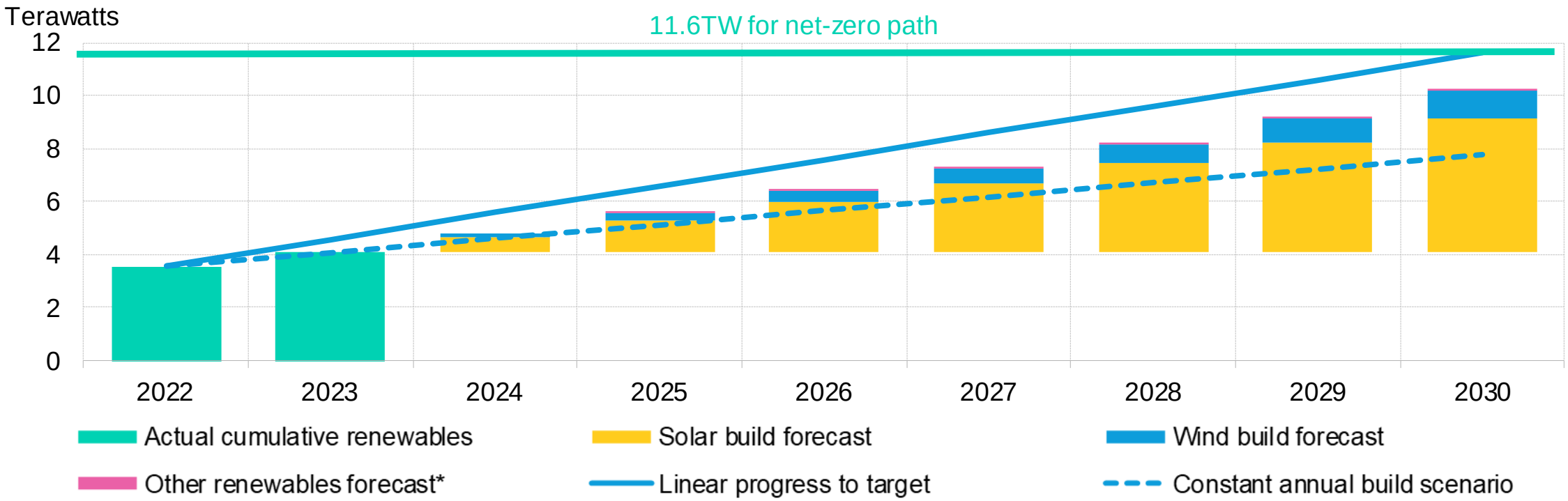

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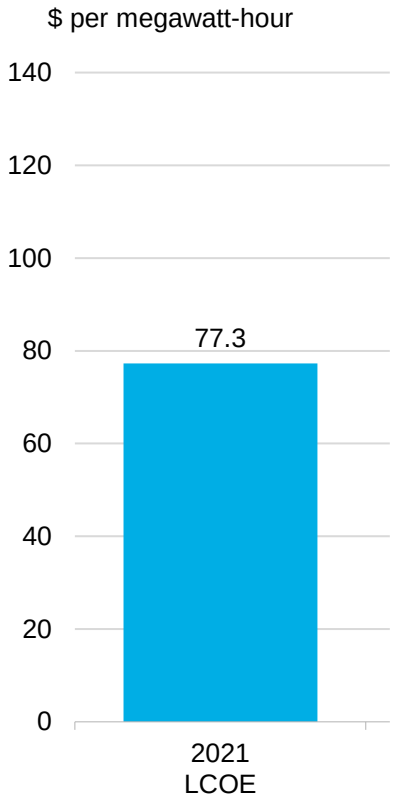
US offshore wind LCOEs increased by over 60% from 2021-24

Impact of inflation, interest rates and tax credits on US offshore wind LCOE



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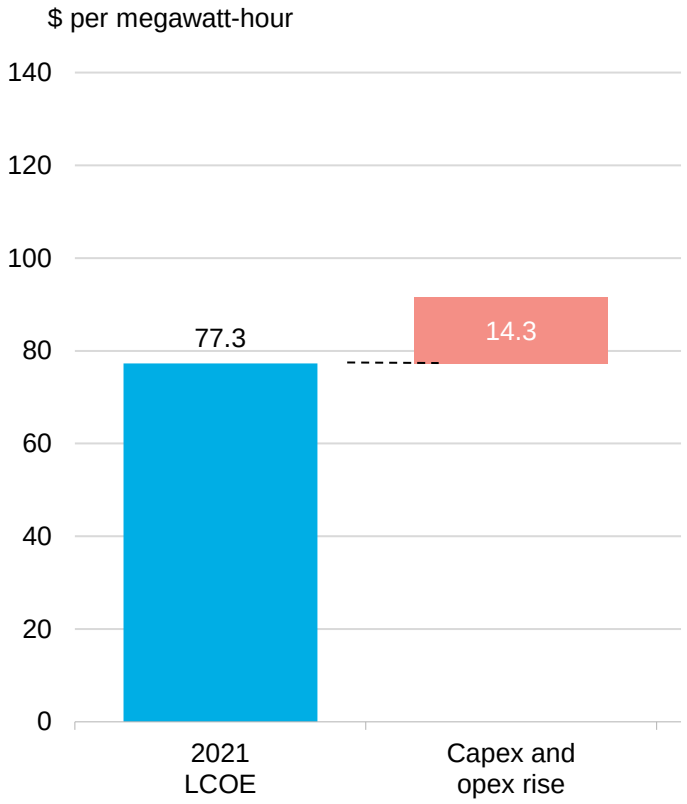

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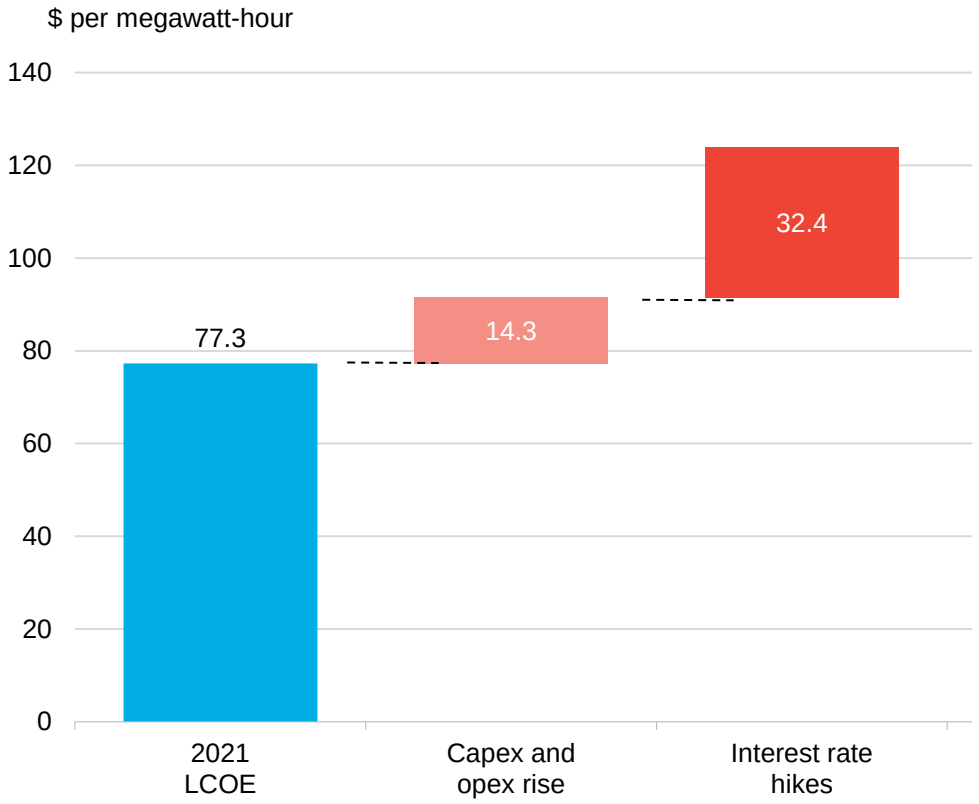

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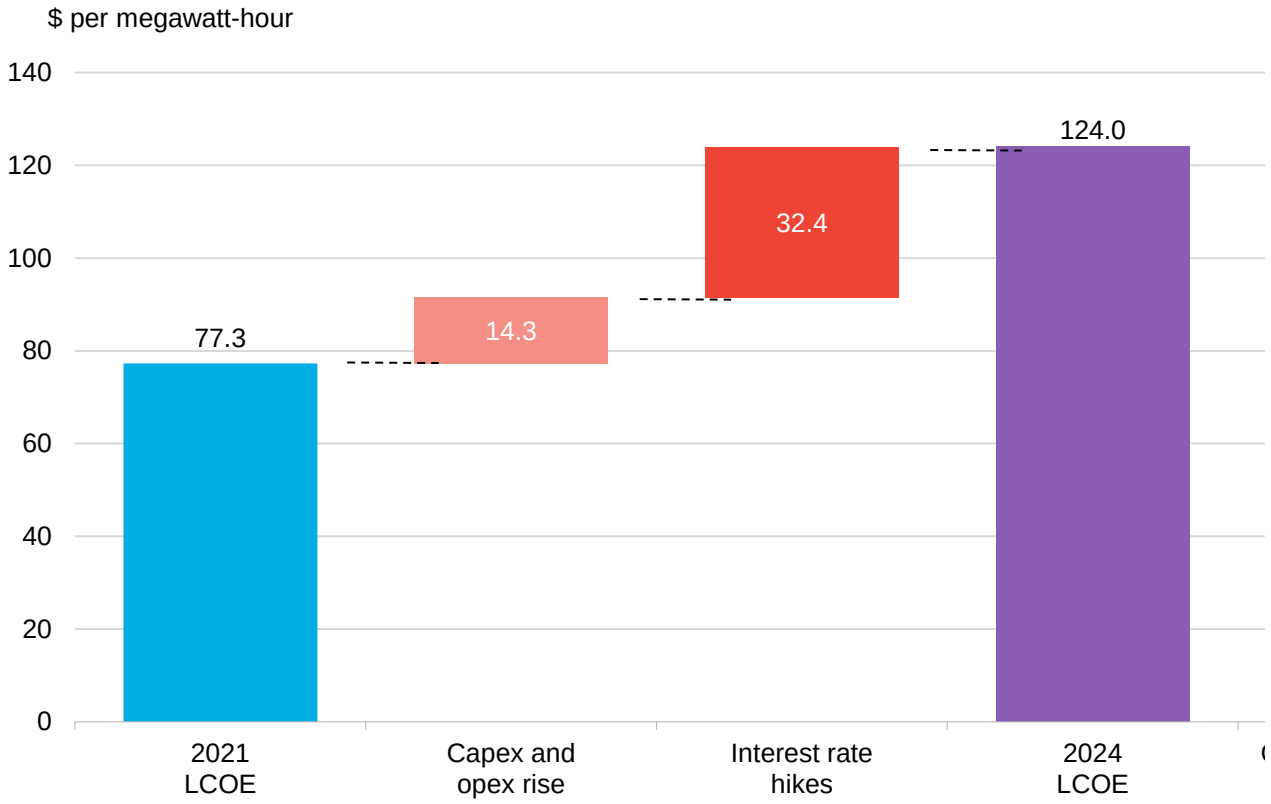

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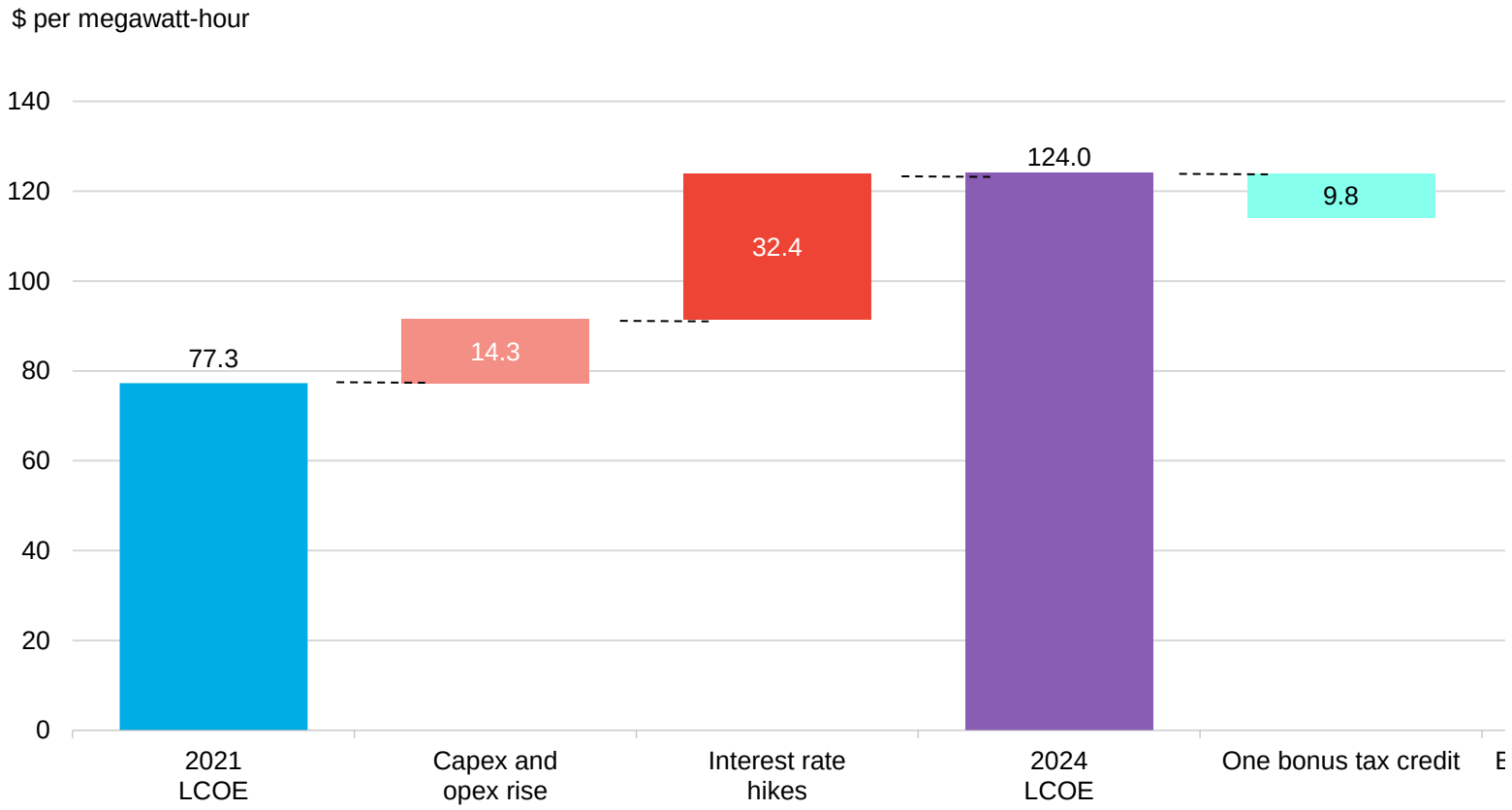
Access to bonus federal tax credits only partially offsets price increase

Impact of inflation, interest rates and tax credits on US offshore wind LCOE



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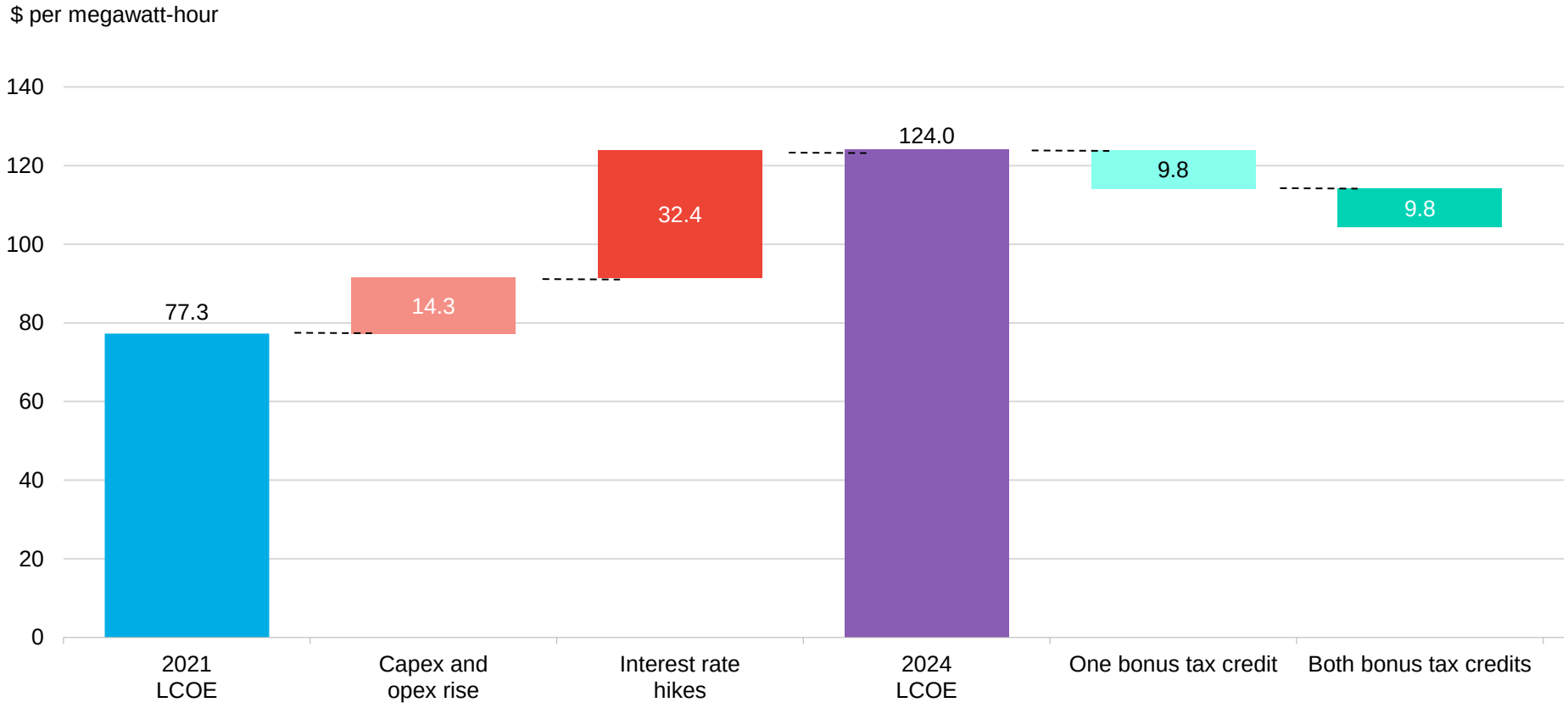

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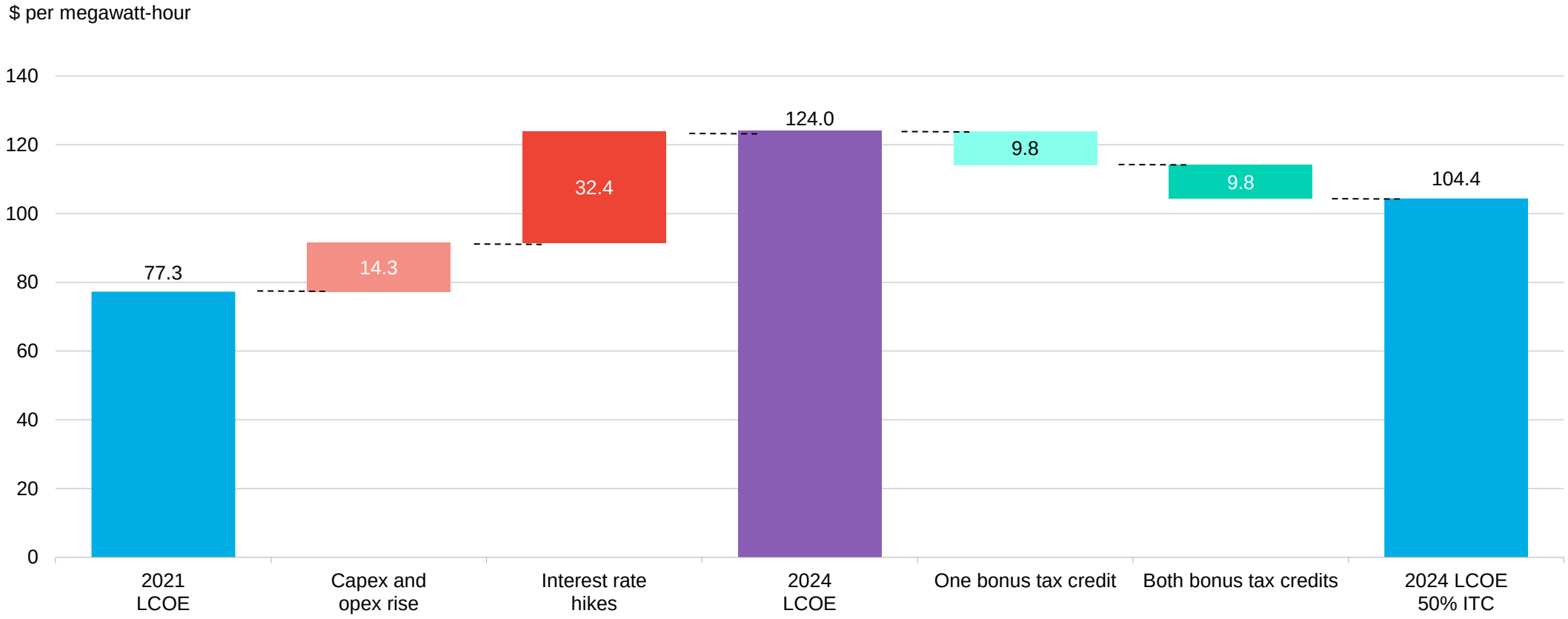

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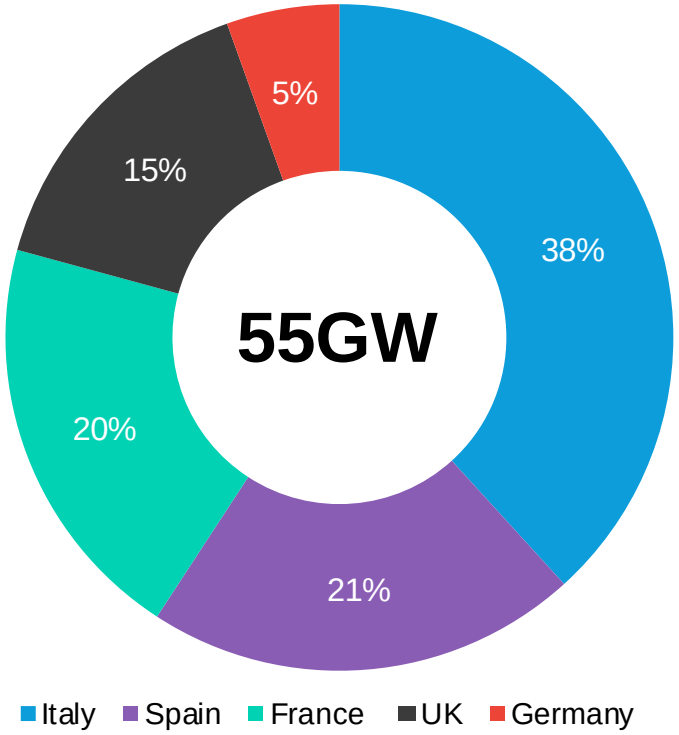
Grid and permitting constraints hit wind harder than solar

Onshore wind permitting pipeline across five major markets in Europe



Source: BloombergNEF. Note: GW stands for gigawatts.

Typical number of years of queuing for grid permit, by market

Country	Years
UK	5-7
Spain	3
Italy	5
France	3
Germany	1-2
US	2-4

Source: BloombergNEF, Lawrence Berkeley National Laboratory, National Grid, Northern Powergrid, SSE Networks, Scottish Power Energy Networks, UK Power Networks, Terna, Red Electrica, French Ministry of Ecological Transition.

Unlocking investment to triple renewables by 2030

It’s the right goal

We need to accelerate

Source: BloombergNEF

Unlocking investment to triple renewables by 2030

It’s the right goal

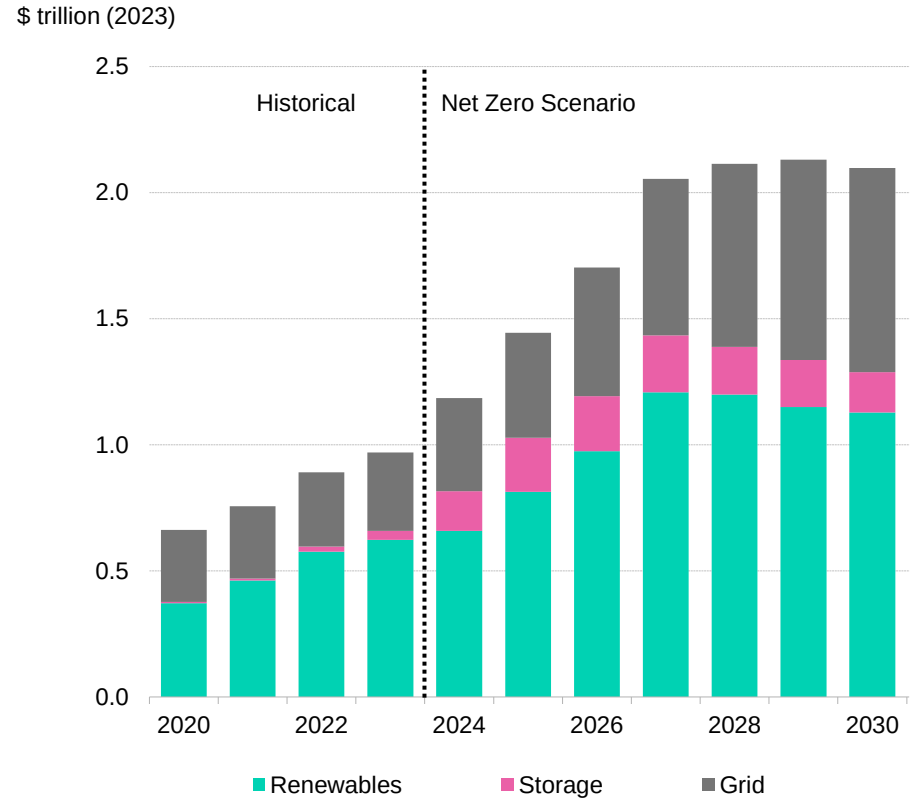
We need to accelerate

Getting investment on track

Source: BloombergNEF

Energy investment needs to ramp up, particularly for storage and grid

Outlook for energy investment in BNEF's Net Zero Scenario



Renewables

Annual investment required 2024-2030: $1 trillion

Grid

Annual investment required 2024-2030: $607 billion

Storage

Annual investment required 2024-2030: $193 billion

Source: BloombergNEF

Five ways to boost clean energy investment

Increased access
(Cut fossil-fuel subsidies, ease generation licensing, encourage market participation)

Source: BloombergNEF

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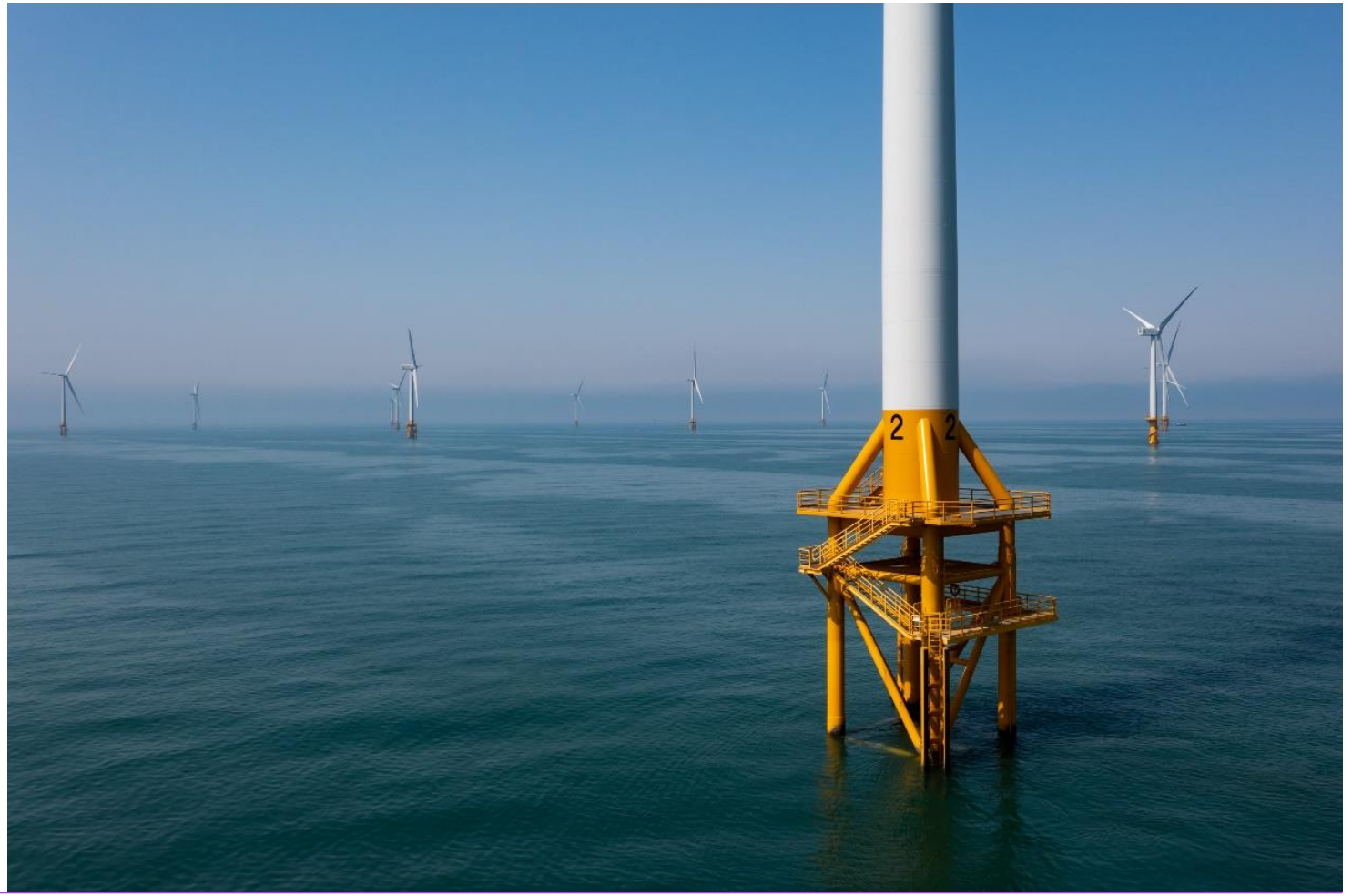
Increased access
(Cut fossil-fuel subsidies, ease generation licensing, encourage market participation)

Auctions and offtakes
(Trustworthy offtakes, de-risking projects, diverse technologies)



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Permitting and land
(Clarifying appeals, data sharing, staffing of municipal offices)

Source: BloombergNEF

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Power market design
(Long-term targets, competitive price signals for capacity and dispatch)

Source: BloombergNEF

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Getting investment on track

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Getting investment on track

Leaders and laggards

Source: BloombergNEF

Different regions, different challenges

Key challenges for scaling investment in renewables, by market

Region	Market	Key challenges for scaling investment				
		Increased access	Power market design	Permitting and land	Grids and infrastructure	Auctions and offtakes
Americas	Brazil					
	US					
Europe, Middle East and Africa	Europe					
	Middle East, North Africa and Turkey					
	Sub-Saharan Africa					
Asia Pacific	India					
	Indonesia					
	Japan					
	China					

*Source: BloombergNEF. Note: Qualitative assessment undertaken by BNEF. **Red** shading indicates issues of most importance to that region. **Yellow** indicates the region has some challenges of this sort. **Gray** indicates these are issues that are not what is currently deterring investment in the region.*

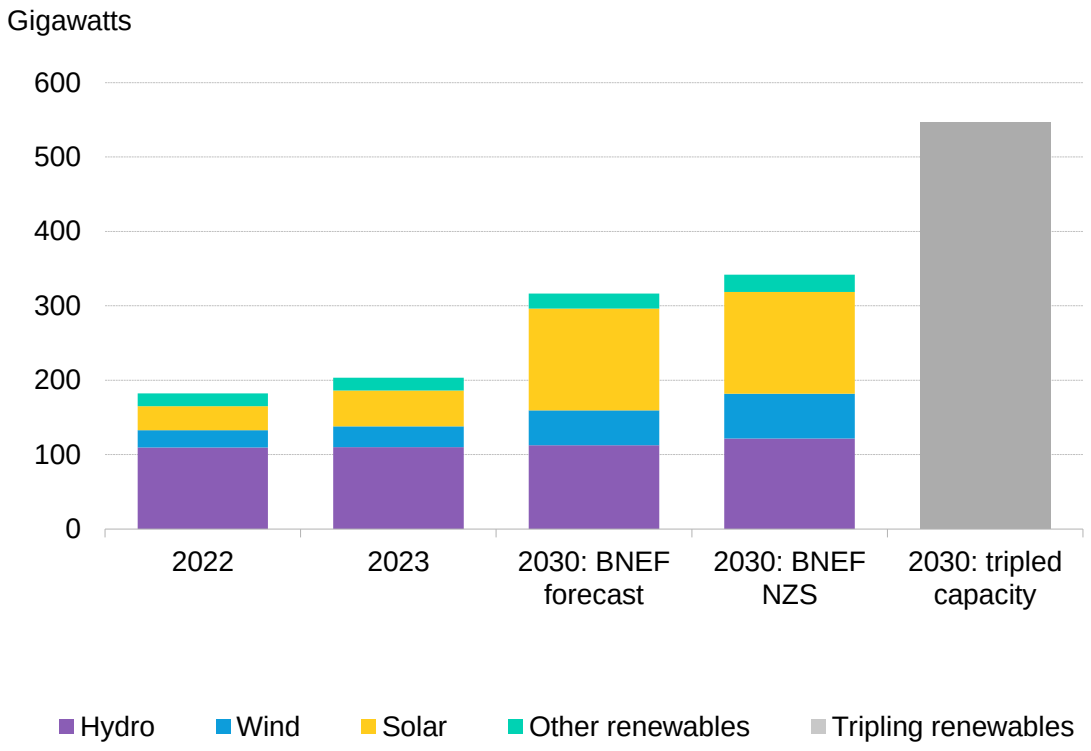
Brazil – Vast hydro resources put Brazil on track

Key challenges

Grids and infrastructure
(Expanding grid capacity, regional interconnectors, managing grid queues)

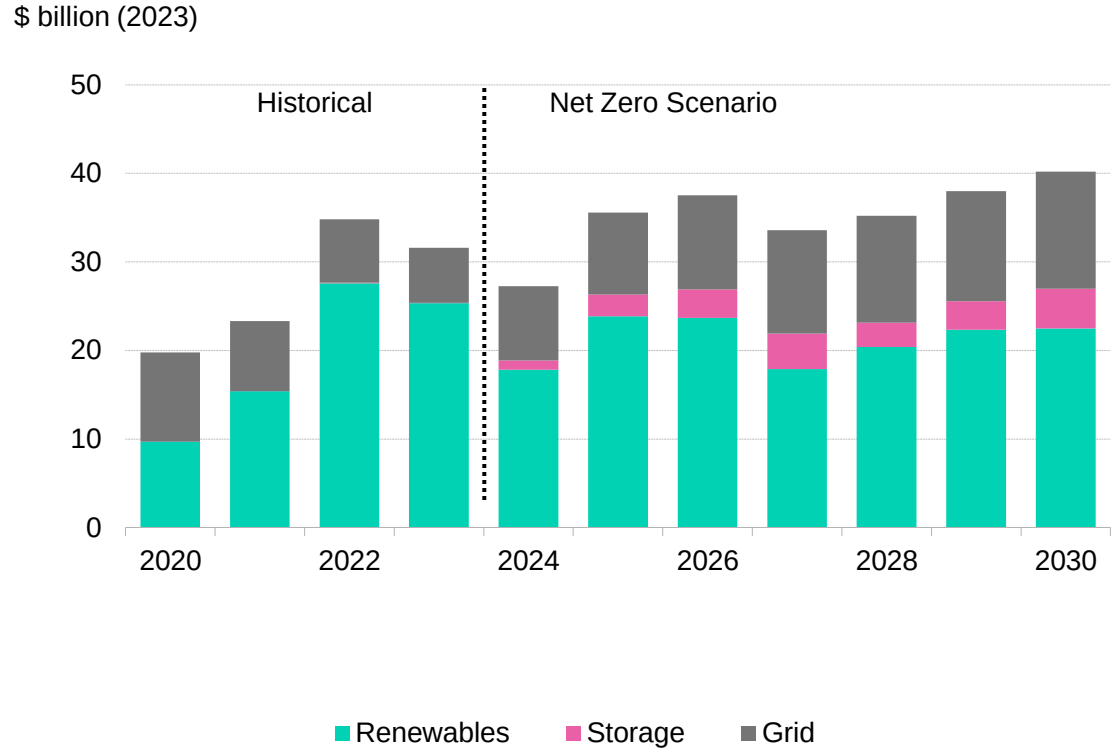
Power market design
(Long-term targets, competitive price signals for capacity and dispatch)

Brazil renewables capacity – 2022-23 versus BNEF's 2030 forecast and NZS



Source: BloombergNEF. Note: NZS is Net Zero Scenario.

Brazil clean energy and grid investment – historical and Net Zero Scenario



Source: BloombergNEF

BloombergNEF

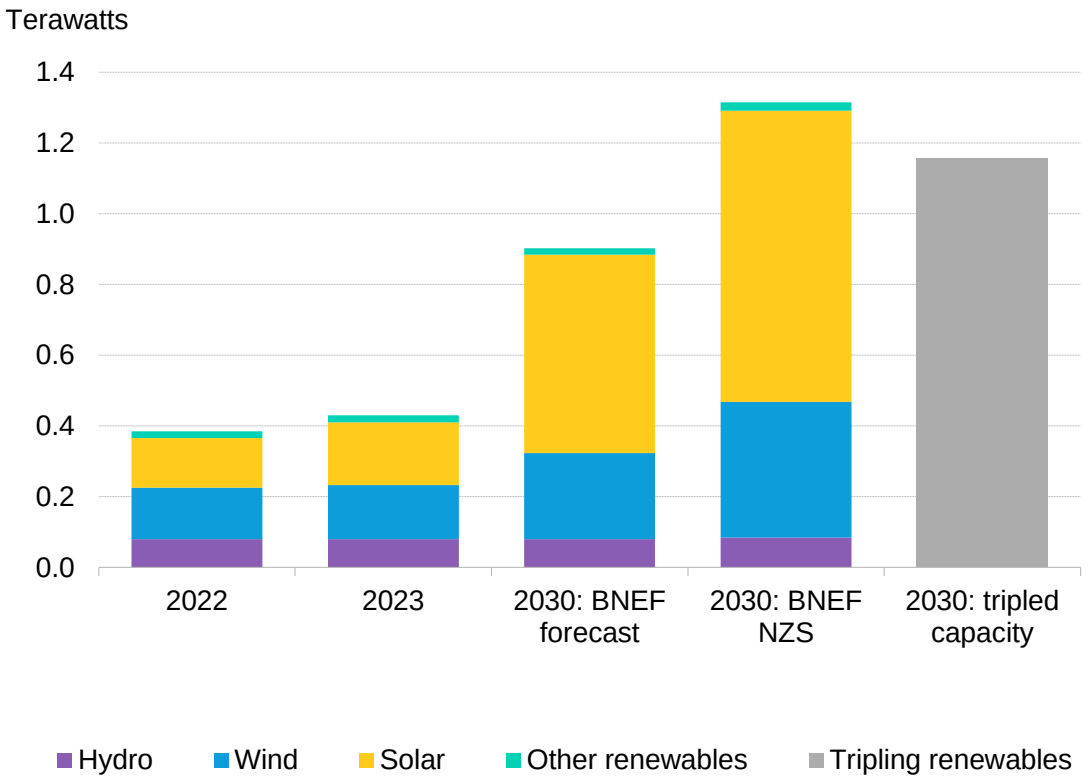
US – Non-economic factors holding back required growth

Key challenges

Grids and infrastructure (Expanding grid capacity, regional interconnectors, managing grid queues)

Permitting and land (Clarifying appeals, data sharing, staffing of municipal offices)

US renewables capacity – 2022-23 versus BNEF's 2030 forecast and NZS



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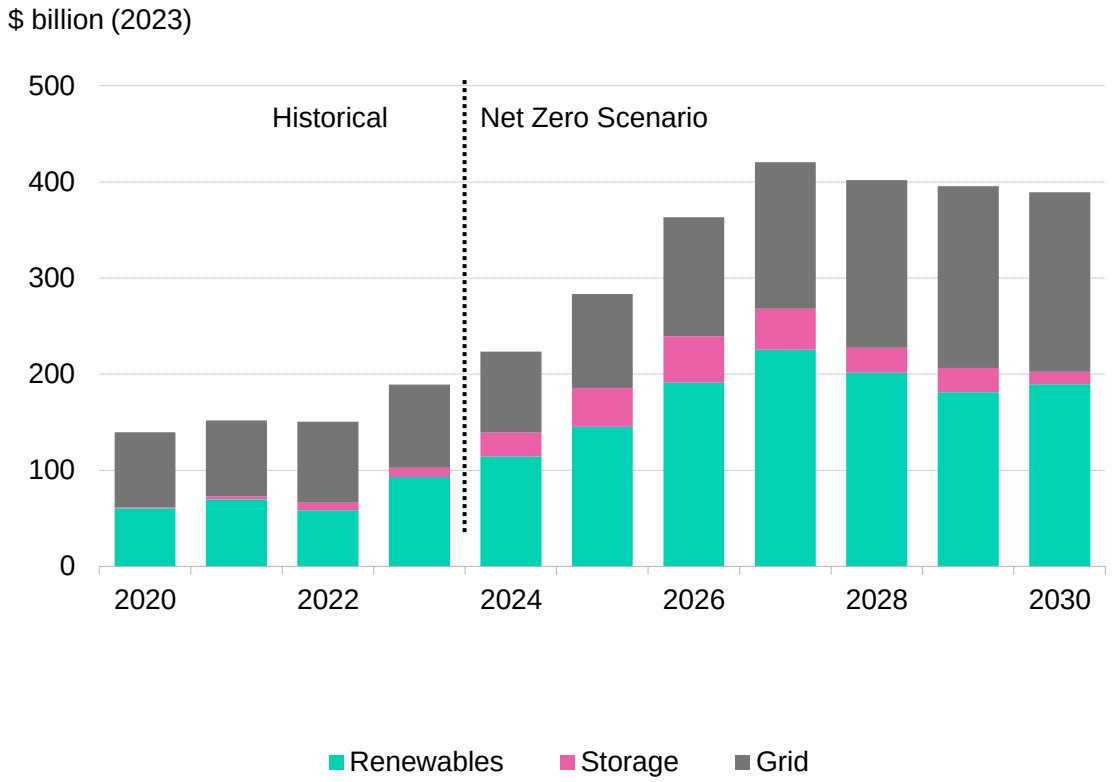
US clean energy and grid investment – historical and Net Zero Scenario



Source: BloombergNEF

BloombergNEF

Middle East and North Africa – On track for tripling, but that's still not enough

Key challenges

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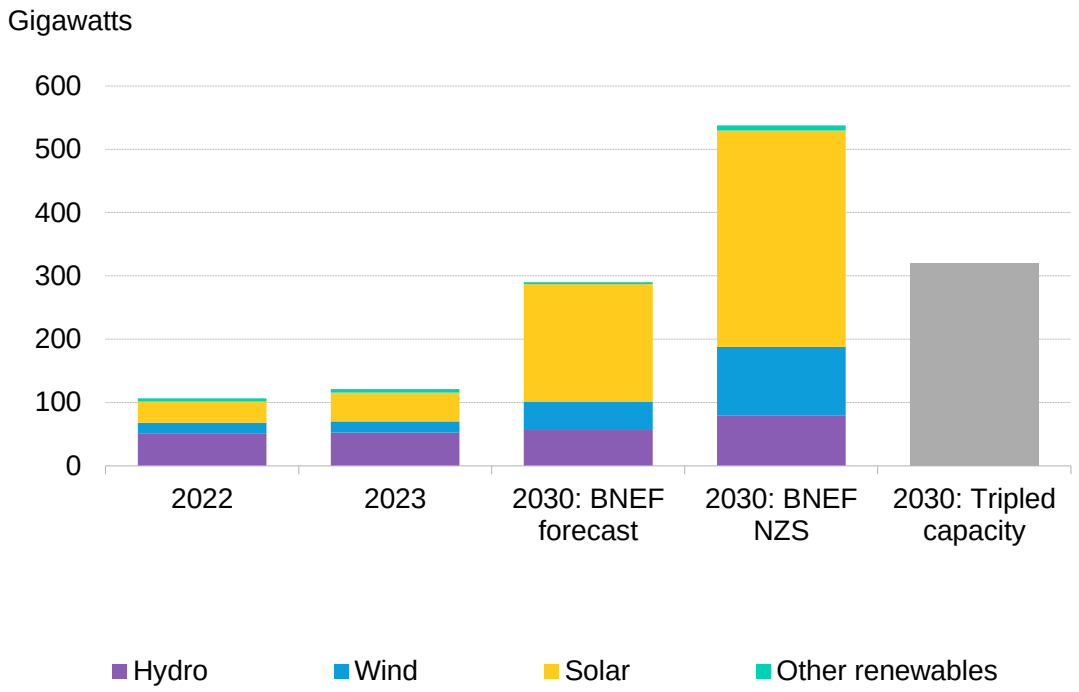
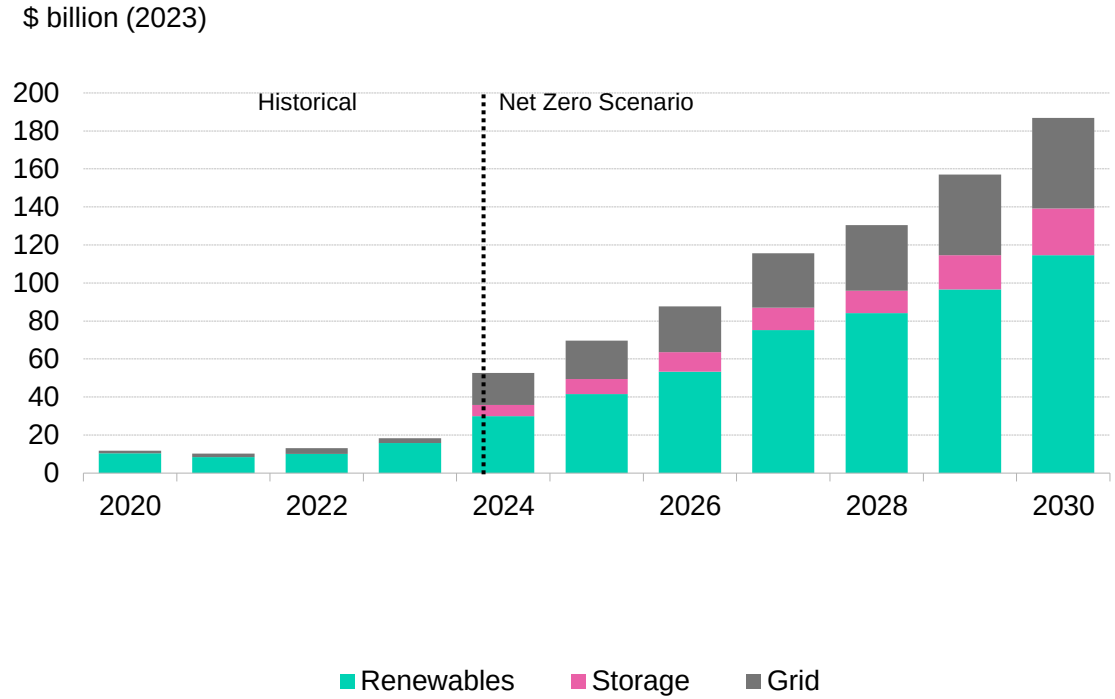
Auctions and offtakes
(Trustworthy offtakes, de-risking projects, diverse technologies)

MENAT renewables capacity – 2022-23 versus BNEF's 2030 forecast and NZS



Source: BloombergNEF. Note: NZS is Net Zero Scenario. MENAT is Middle East, North Africa and Turkey.

MENAT clean energy and grid investment – historical and Net Zero Scenario



Source: BloombergNEF

BloombergNEF

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Leaders and laggards

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Leaders and laggards

Ramping up now will pay off later

Source: BloombergNEF

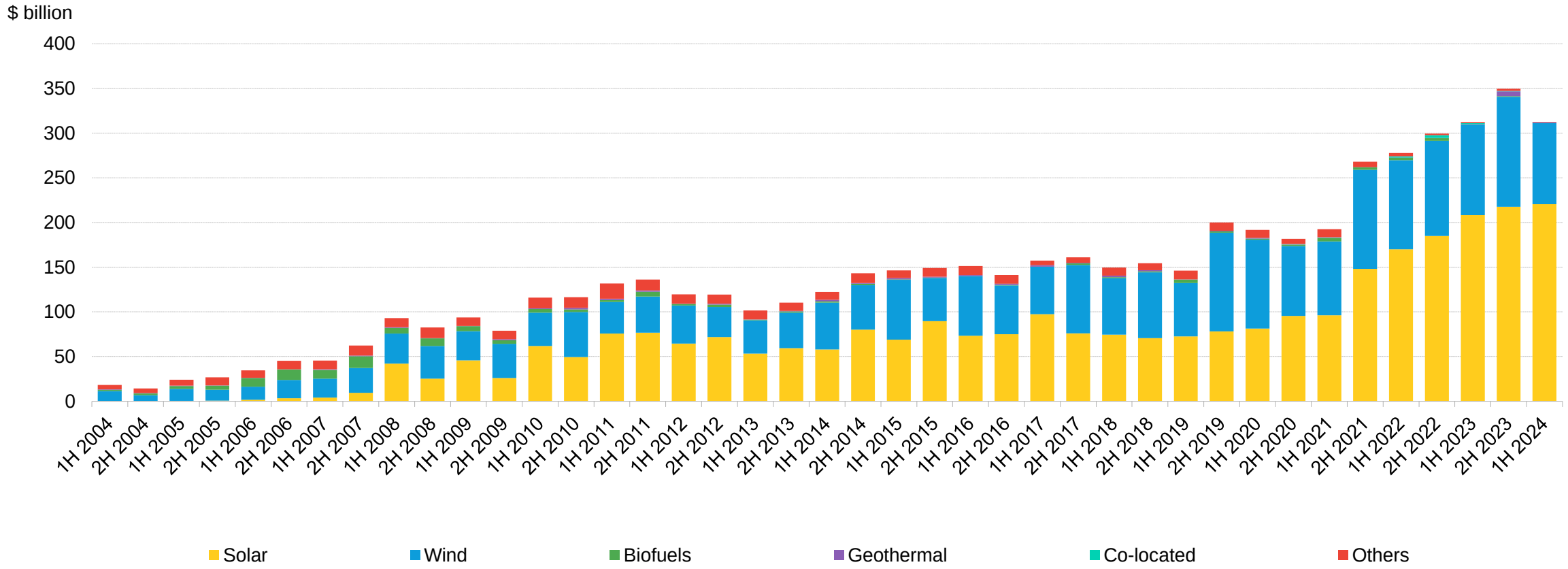
Scaling investment to 2030 is hard *but achievable*

Outlook for energy investment in BNEF's Net Zero Scenario

Source: BloombergNEF

Early signs for 2024 look steady

Global bi-annual investment in renewable energy



Source: BloombergNEF. Note: 'Others' includes biomass and waste, small hydro and marine.

BloombergNEF

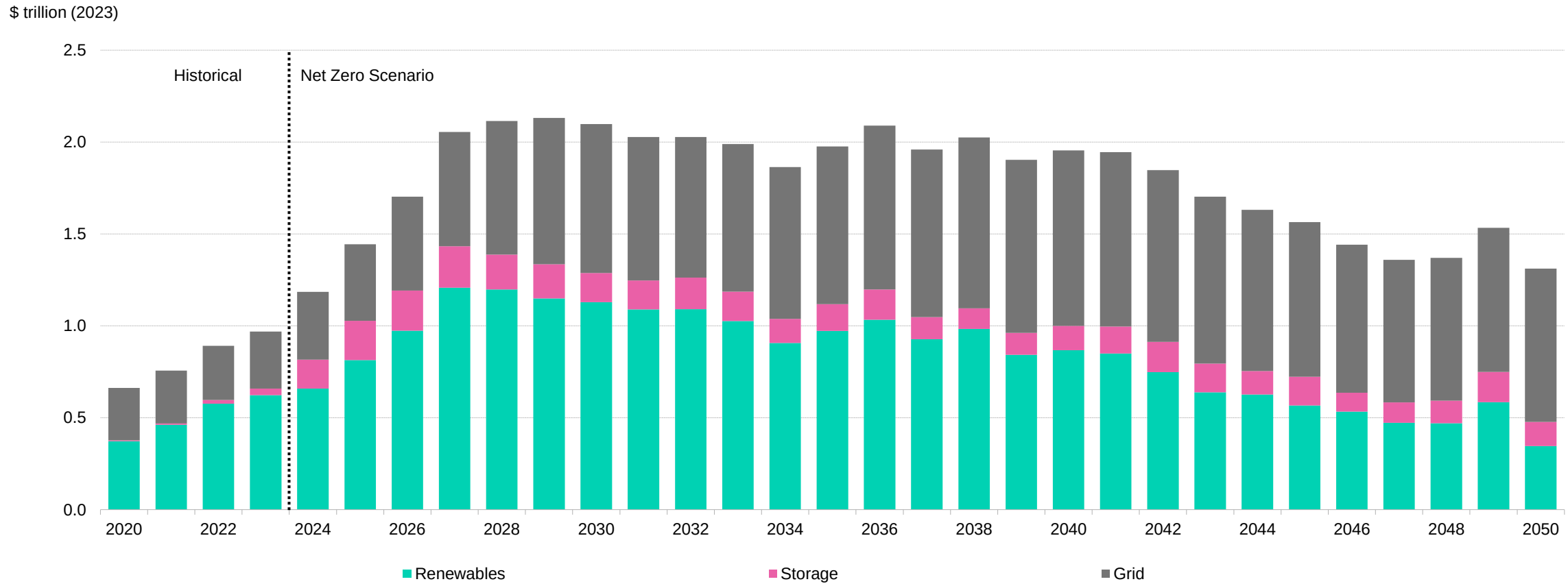
If we can unlock the investment growth required this decade…

Outlook for energy investment in BNEF's Net Zero Scenario

Source: BloombergNEF

…the challenge gets easier

Outlook for energy investment in BNEF's Net Zero Scenario



Source: BloombergNEF

Panel Discussion: Tripling Renewables Deployment at Speed and Scale

Thomas Rowlands-Rees
Global Head of Power
BloombergNEF

Caroline Choi
Senior Vice President, Corporate Affairs & Public Policy
Edison International and Southern California Edison

Doreen Harris
President & Chief Executive Officer
New York State Energy Research and Development Authority

Cam Hosie
Senior Vice President of New Energy
SLB

Bloomberg
New York Climate Week

BloombergNEF

BNEF Talk: Zero Emission Vehicles Report launch

Colin McKerracher
Head of Clean Transport
BloombergNEF

Bloomberg
New York Climate Week

BloombergNEF

Zero-Emission Commercial Vehicles

The Time Is Now

A factbook for investors

September 2024

Smart Freight Centre

Ministry of Infrastructure and Water Management of the Netherlands

BloombergNEF

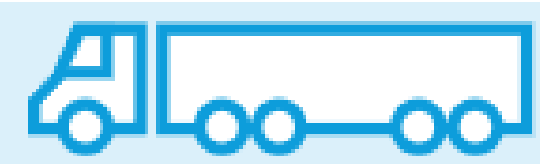
EV adoption has spread to all areas of road transport

Two-wheelers

Buses

Passenger cars

Light commercial vehicles



Medium/heavy commercial vehicles

EV share of *sales*

Two-wheelers	Buses	Passenger cars	Light commercial vehicles	Medium/heavy commercial vehicles
43%	35%	20%	8%	2%

*Source: BloombergNEF. All data for 2024 from Long-Term Electric Vehicle Outlook 2024; includes battery electric and plug-in hybrid vehicles; includes estimates for some countries; buses include municipal buses, and municipal and non-municipal buses in China; * includes 8,500 fuel cell buses, ** includes 9,500 fuel cell trucks.*

EV adoption has spread to all areas of road transport

Two-wheelers

EV share of *sales*

43%

EV share of *fleet*

21%

EV size of *fleet*

234,000,000

Buses

35%

23%

792,000*

Passenger cars

20%

4%

57,300,000

Light commercial vehicles

8%

1%

2,300,000

Medium/heavy commercial vehicles

2%

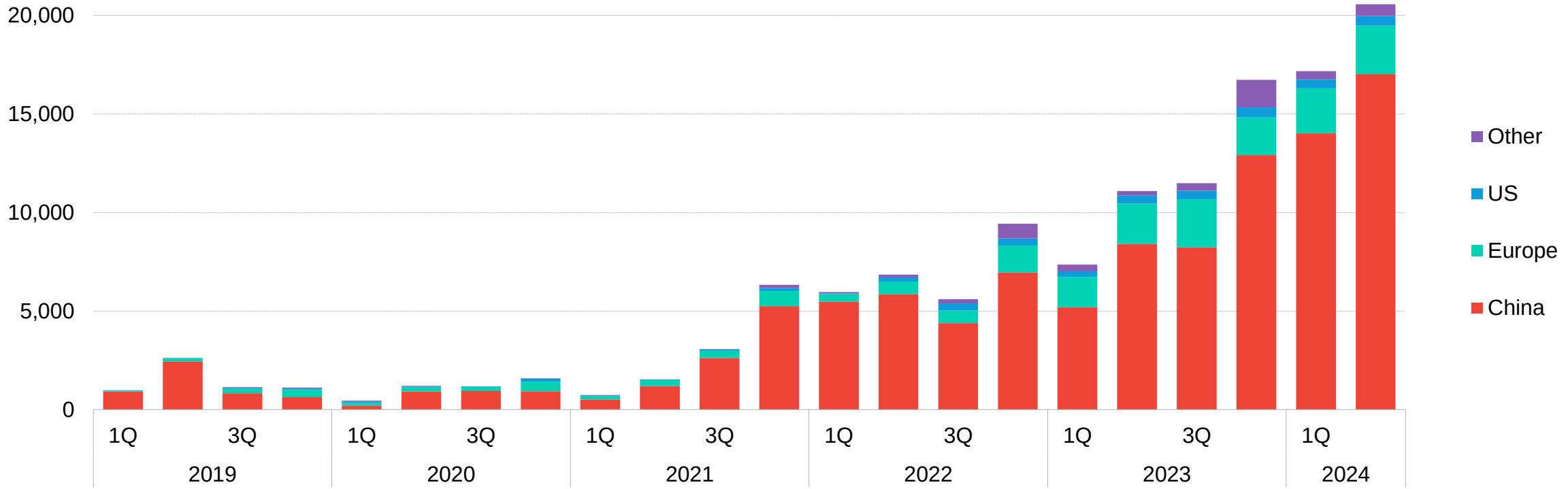
0.2%

203,000**

*Source: BloombergNEF. All data for 2024 from Long-Term Electric Vehicle Outlook 2024; includes battery electric and plug-in hybrid vehicles; includes estimates for some countries; buses include municipal buses, and municipal and non-municipal buses in China; * includes 8,500 fuel cell buses, ** includes 9,500 fuel cell trucks.*

Low- and zero-emission commercial vehicle sales are growing, but the vast majority are in China

Global sales of zero-emission medium- and heavy-duty trucks *by region*



Source: BloombergNEF; see full list of sources in the Appendix of the report. Note: Europe is the EU 27, the UK, Norway, Switzerland, Iceland and Liechtenstein.

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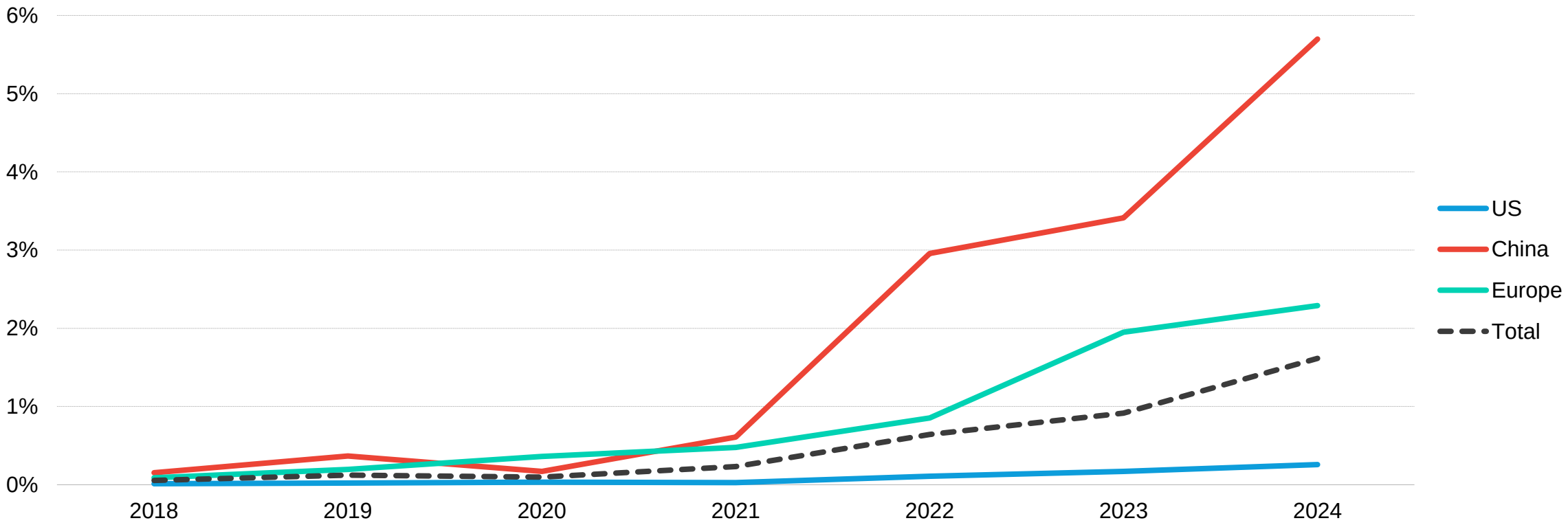
BloombergNEF

Adoption rates differ widely between countries, with China and the Nordics far ahead of the rest

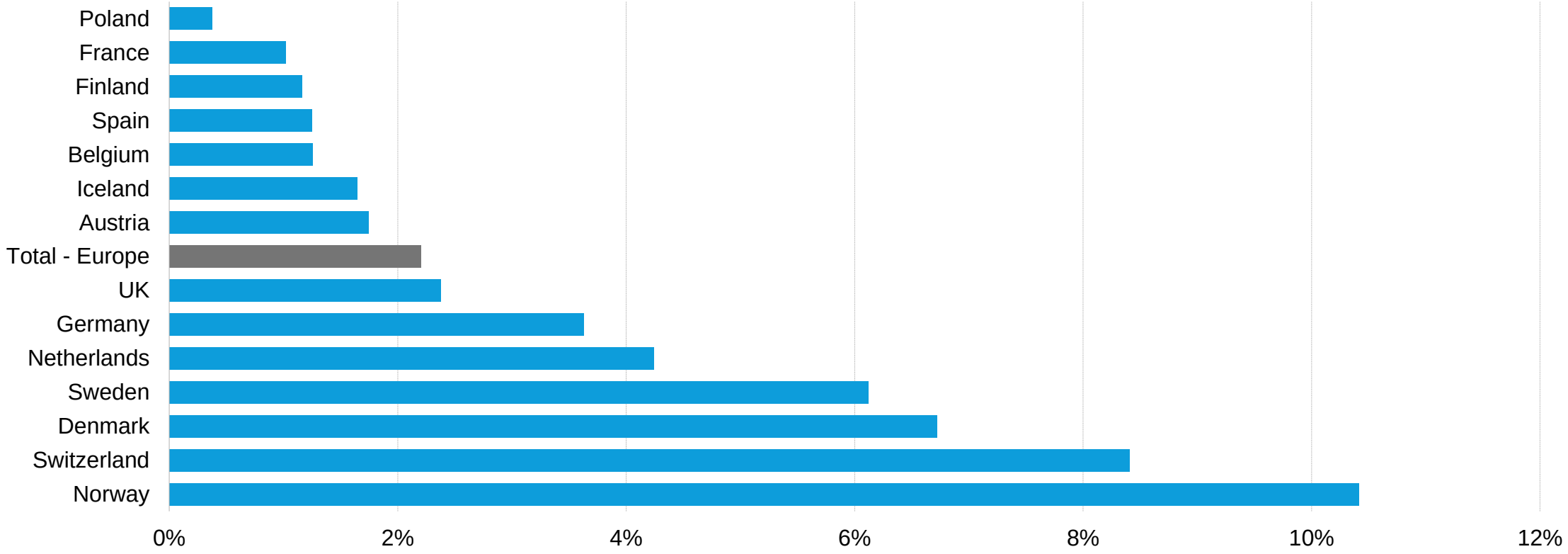
Sales share of low- and zero-emission commercial vehicles by region



Source: BloombergNEF; see full list of sources in the Appendix of the report. Note: adoption rate in 2024 is between January and June. Includes battery-electric, fuel-cell and plug-in hybrid vehicles.

Adoption rates differ widely between countries, with China and the Nordics far ahead of the rest

Sales share of low- and zero-emission commercial vehicles by region in 2024



Source: BloombergNEF; see full list of sources in the Appendix of the report. Note: adoption rate in 2024 is between January and June. Includes battery-electric, fuel-cell and plug-in hybrid vehicles.

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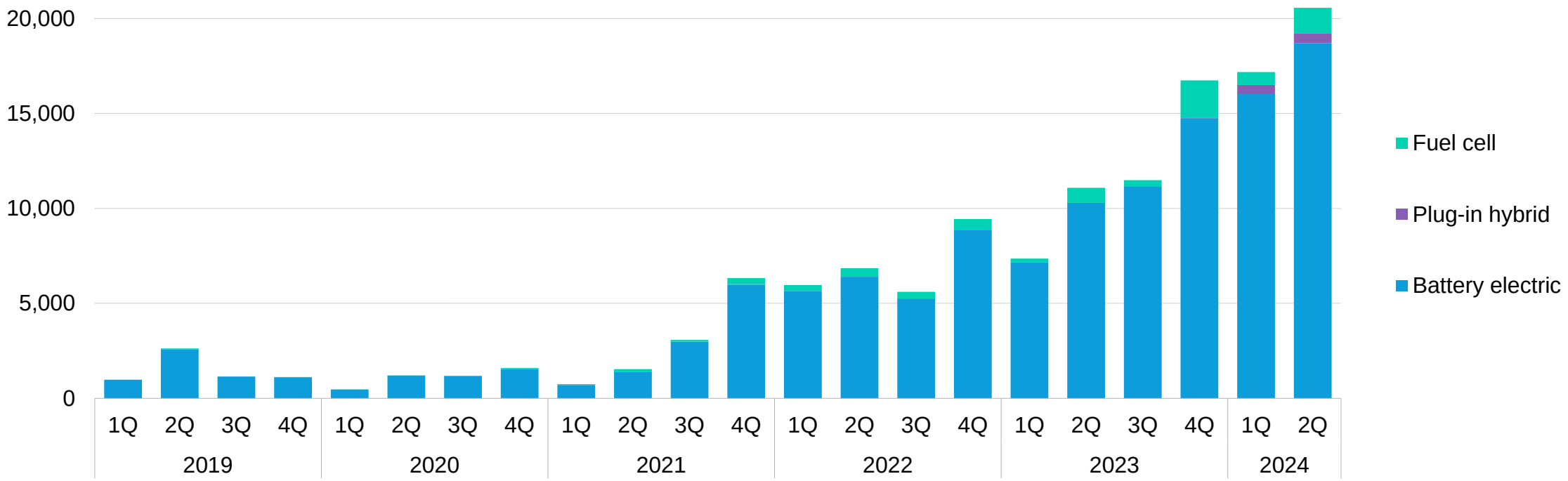
Batteries are driving the clean truck market

Global sales of zero-emission medium- and heavy-duty trucks *by powertrain*



Source: BloombergNEF; see full list of sources in the Appendix of the report.

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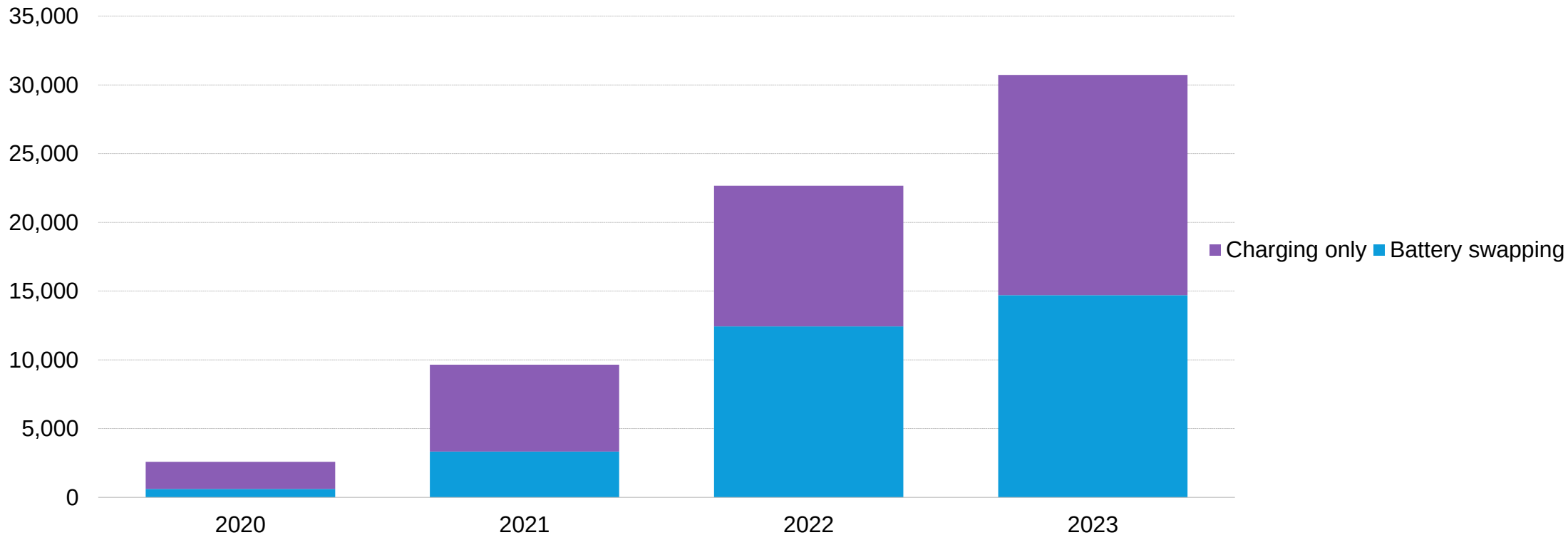
BloombergNEF

Battery swapping is also playing an important role

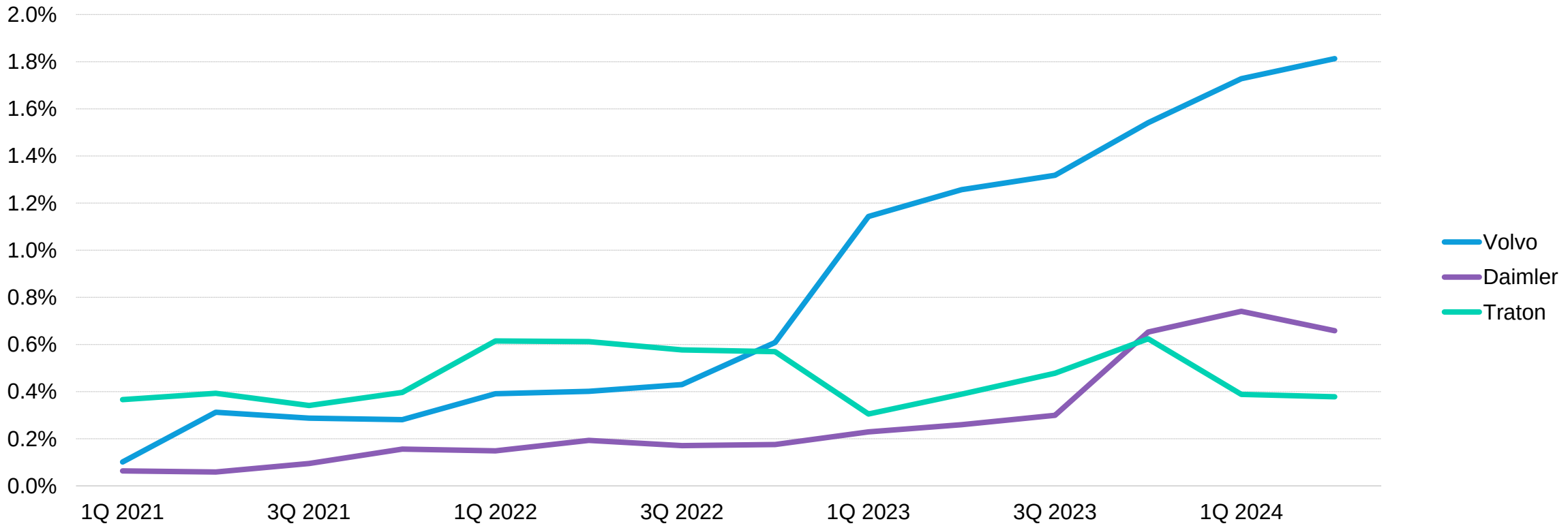
Sales of heavy-duty commercial battery-electric vehicles in China by refuelling type



Source: BloombergNEF, Evpartner

ZEV sales remain low for many large truckmakers and far from their targets

Zero-emission vehicle sales shares for Volvo, Daimler and Traton



Source: Bloomberg Terminal, BloombergNEF, company reports. Note: Shows cumulative share of sales within a year.

Ambitious CO2 emissions targets are set to shake up the trucking market

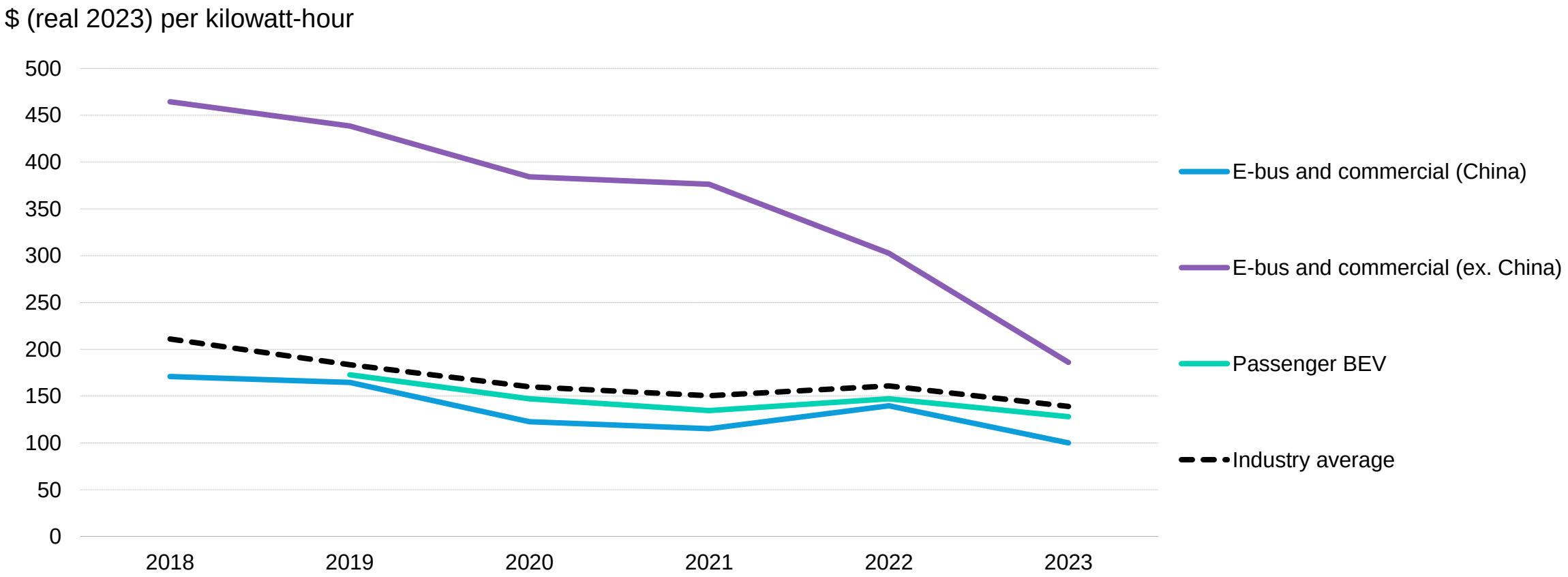
CO2 emissions targets and zero-emission truck sales and fleet mandates

Country or Region	Period	Target by the end year of the period shown
EU 	2019 to 2035	• 65% lower tailpipe CO2
US 	2027 to 2032	• 15-53% lower tailpipe CO2
California 	2024 to 2035	• 55-75% ZEV sales share for manufacturers • 100% ZEV purchase share for certain fleets
China 	2019 to 2025	• 11-18% lower fuel consumption
Japan 	2015 to 2025	• 3-15% lower fuel consumption

Source: BloombergNEF. Note: ranges refer to changes across commercial vehicle sub-segments; several of these targets extend beyond the years shown; California's Advanced Clean Fleets regulation hasn't yet received a waiver from the US Environmental Protection Agency and applies to certain fleets in the state.

Battery prices continue to fall and are converging across sectors

Historical volume-weighted average lithium-ion battery pack prices by sector



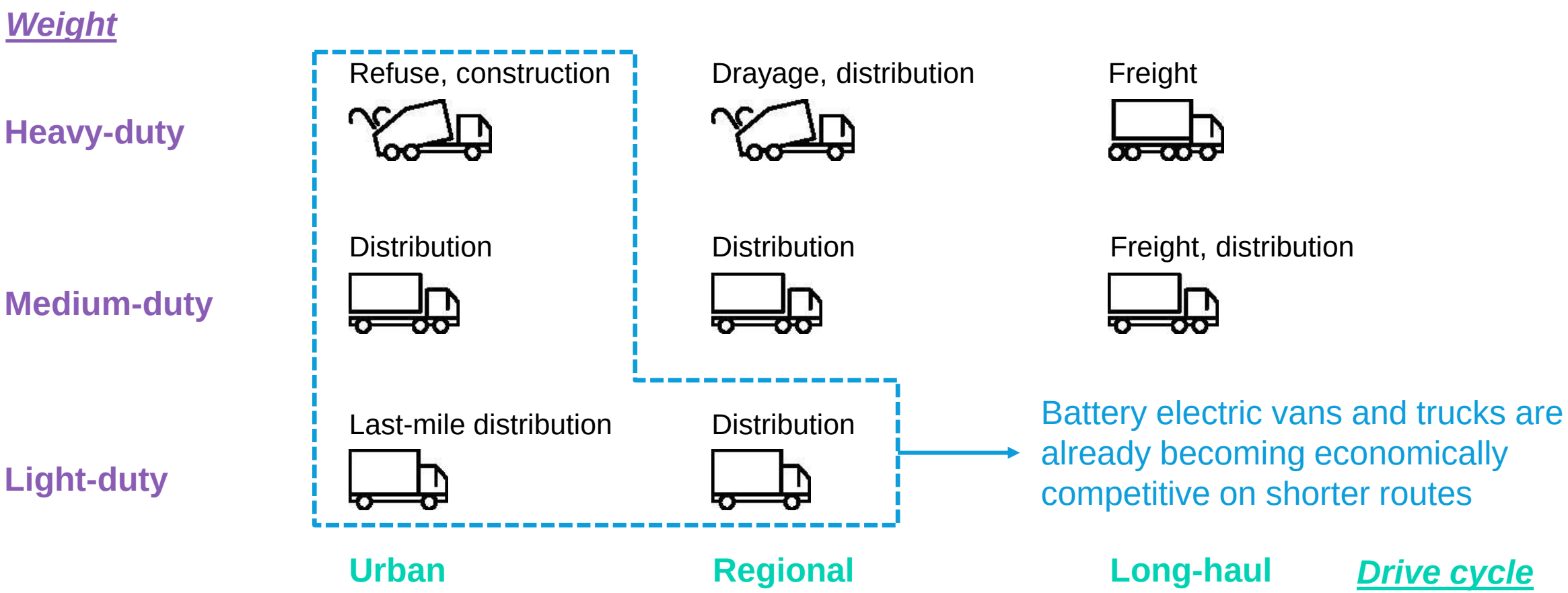
Source: BloombergNEF. Note: Passenger battery-electric vehicle figures are a global average.

Urban duty cycles and light trucks have immediate electrification potential

Weight				
Heavy-duty	Refuse, construction 	Drayage, distribution 	Freight 	
Medium-duty	Distribution 	Distribution 	Freight, distribution 	
Light-duty	Last-mile distribution 	Distribution 		
	Urban	**Regional**	**Long-haul**	***Drive cycle***

Source: BloombergNEF.

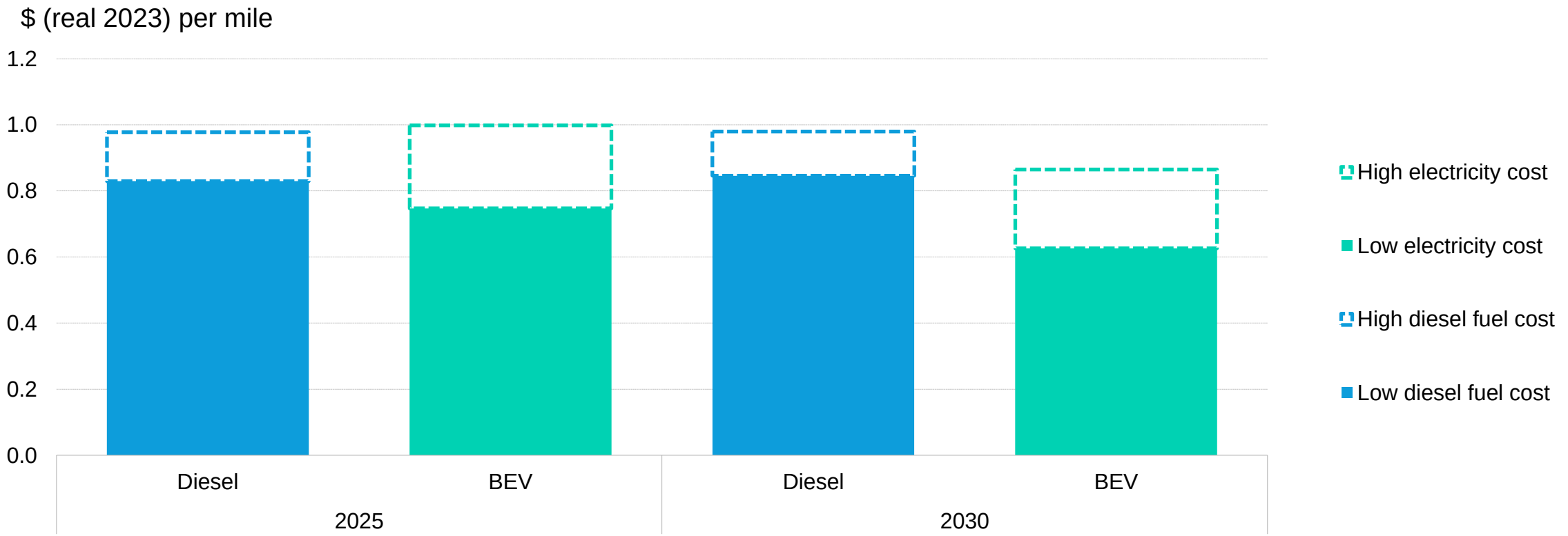
Urban duty cycles and light trucks have immediate electrification potential



Source: BloombergNEF.

Battery trucks within cities become economically competitive soon in the US, China and Europe

Total cost of ownership of Class 4-5 trucks with range of 200 miles (320 km) in the US



Source: BloombergNEF. Note: For diesel, fuel costs are $3/gallon and $6/gallon; for electricity, fuel costs are $0.2/kilowatt-hour and $0.75/kWh. 'BEV' refers to battery-electric vehicle.

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New challenges create new opportunities

Genuine or perceived challenges in further adoption of electric trucks…

- Capital costs
- Battery residual value
- Electricity and hydrogen refueling costs

…are being addressed through technology advancements and new business and financing models

- Declining battery prices, repurposing and recycling
- Charging stations with on-site power generation and energy storage
- Demand aggregation for vehicle procurement and refueling station utilization
- Offtake agreements with fleets

Opportunities for infrastructure funds, banks and equity investors

Zero-emission commercial vehicles factbook and other BNEF publications for Climate Week

Produced in partnership with:

Smart Freight Centre

Ministry of Infrastructure and Water Management of the Netherlands

Full report publicly available here

Access BNEF Research for Climate Action as part of New York Climate Week here

Executive Remarks: Christoph Wolff, CEO, Smart Freight Center

Christoph Wolff
Chief Executive Officer
Smart Freight Center

Bloomberg
New York Climate Week

BloombergNEF

Coffee Break

Program will resume at 10:45 AM

BNEF Talk: US New Energy Outlook

Tara Narayanan
Lead Analyst, North America Regional Trends
BloombergNEF

Bloomberg
New York Climate Week

BloombergNEF

New Energy Outlook 2024

Halfway to 2050

Tara Narayanan

September 26th, 2024

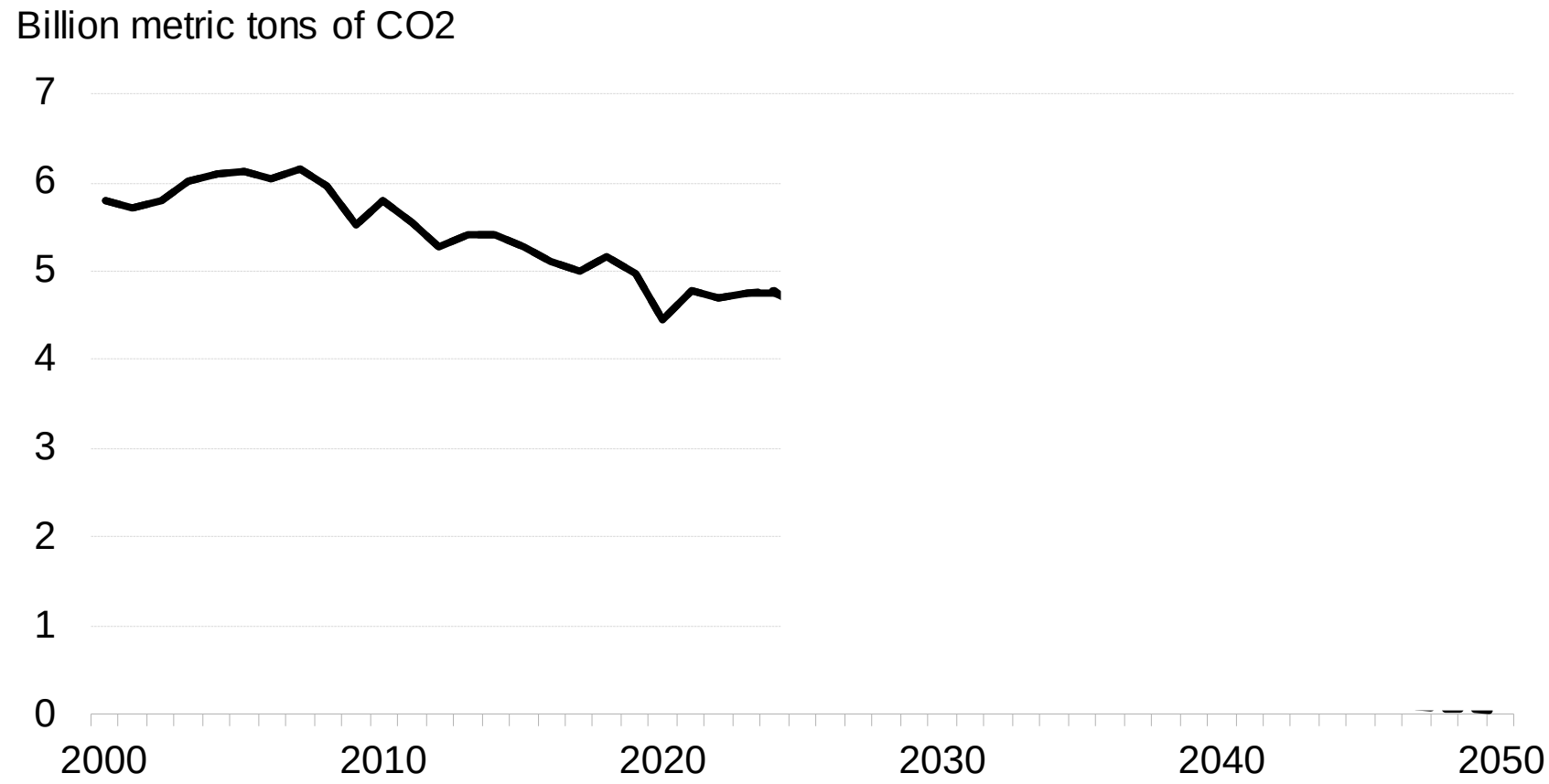
BloombergNEF

Where are we going?

All about the emissions

US emissions have steadily been declining since 2007

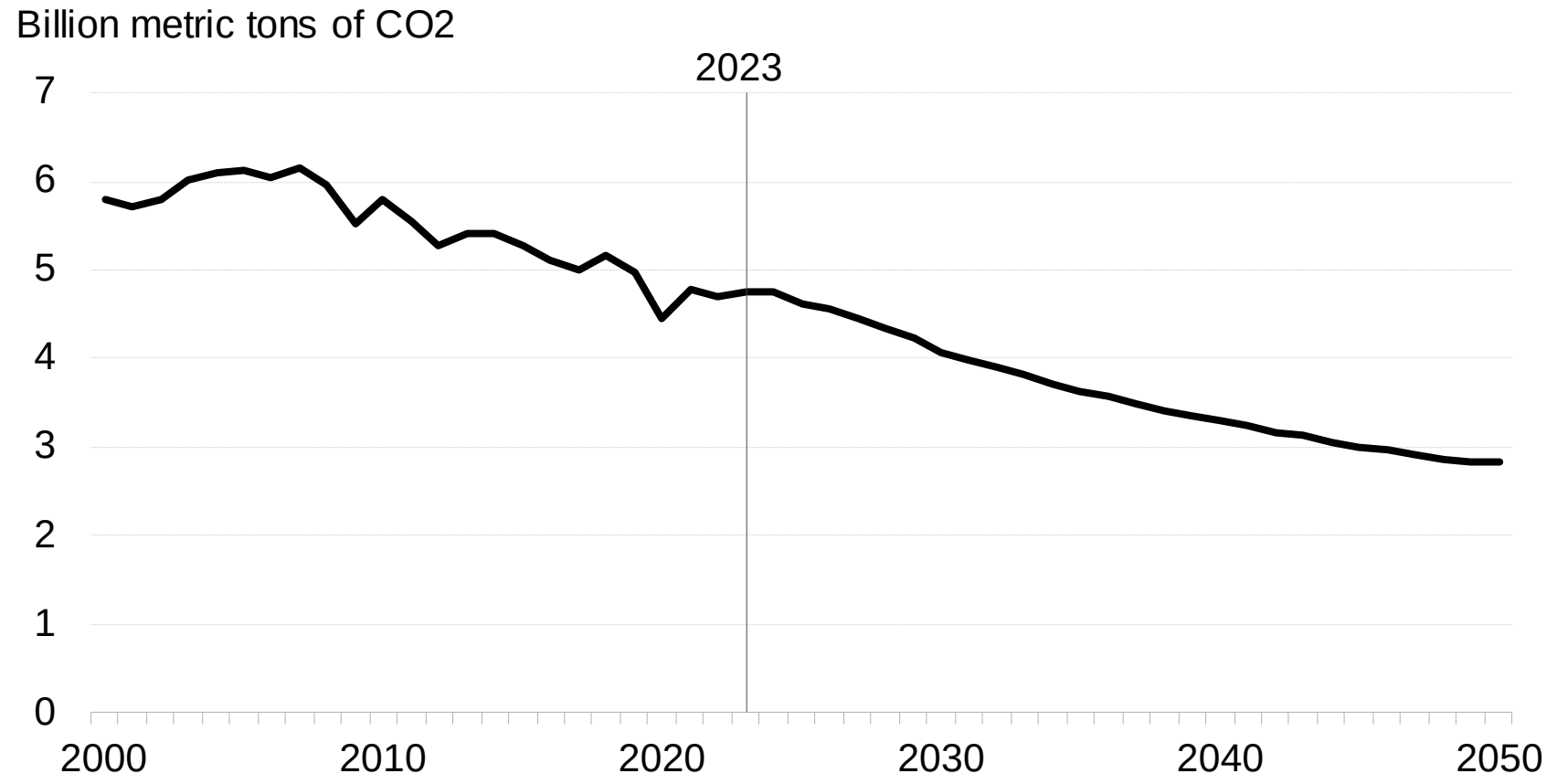
US energy-related emissions



Source: BloombergNEF

And they will keep going down

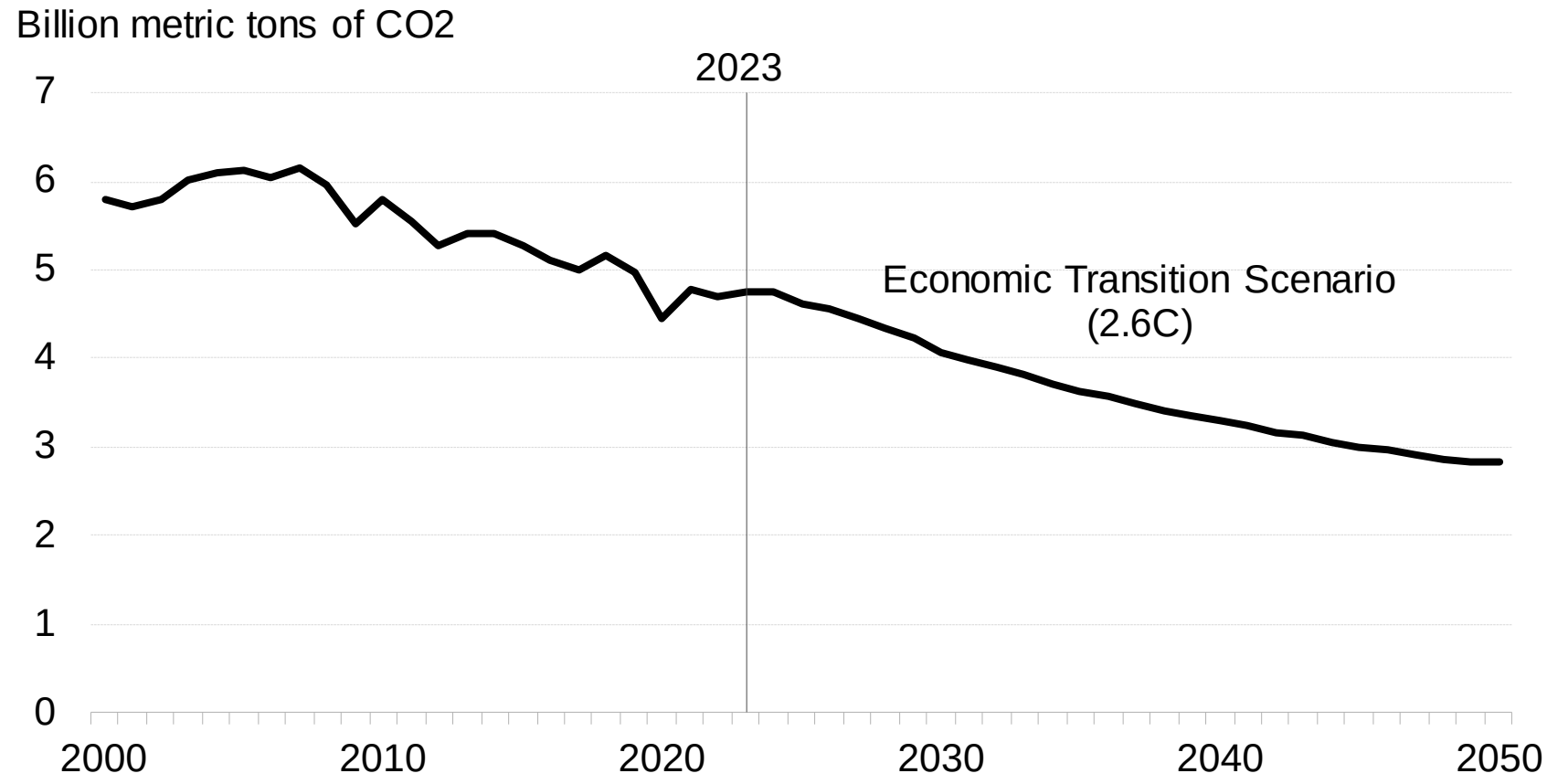
US energy-related emissions



Source: BloombergNEF

And they will keep going down… but not quickly enough

US energy-related emissions



Source: BloombergNEF

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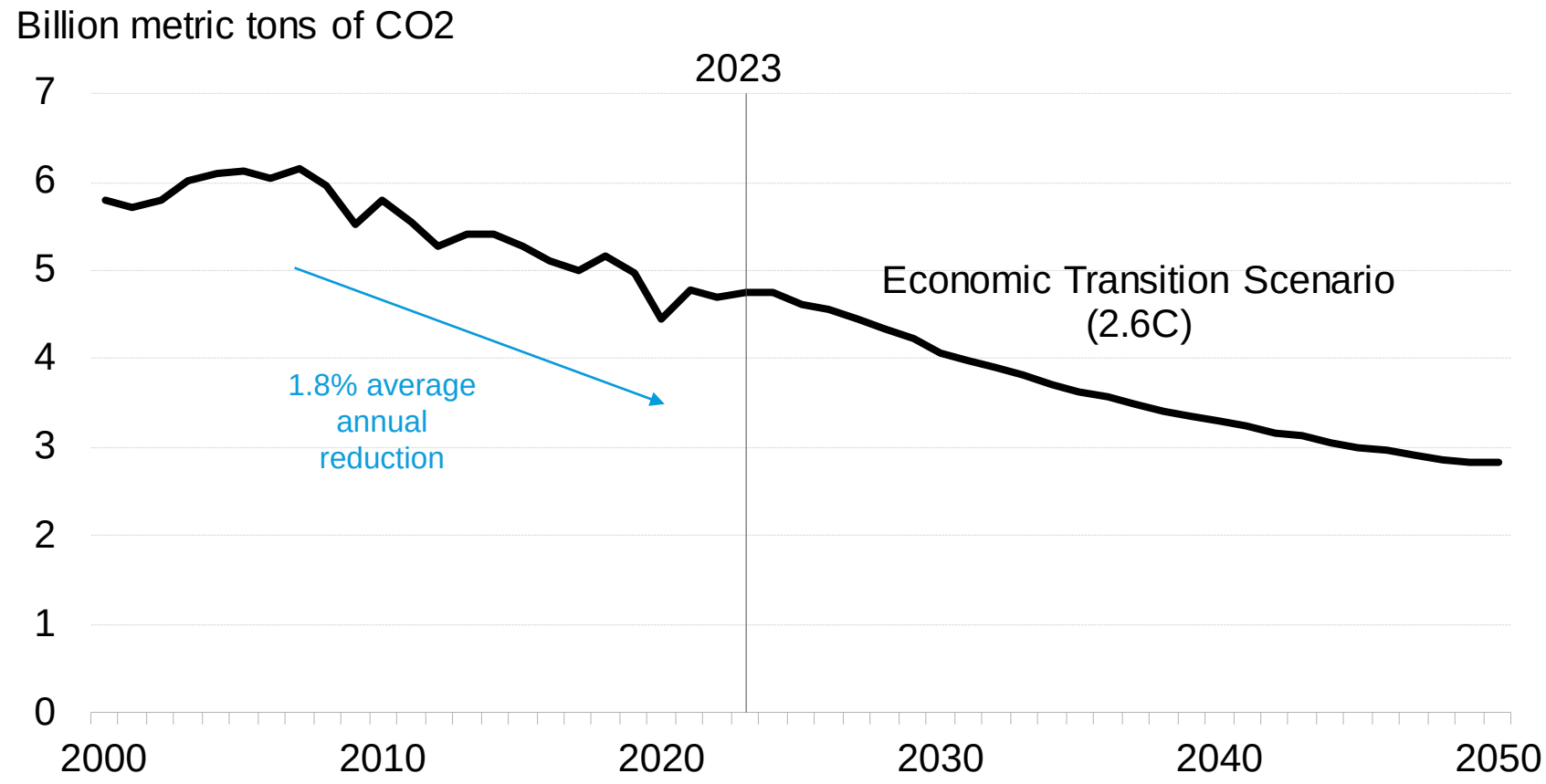
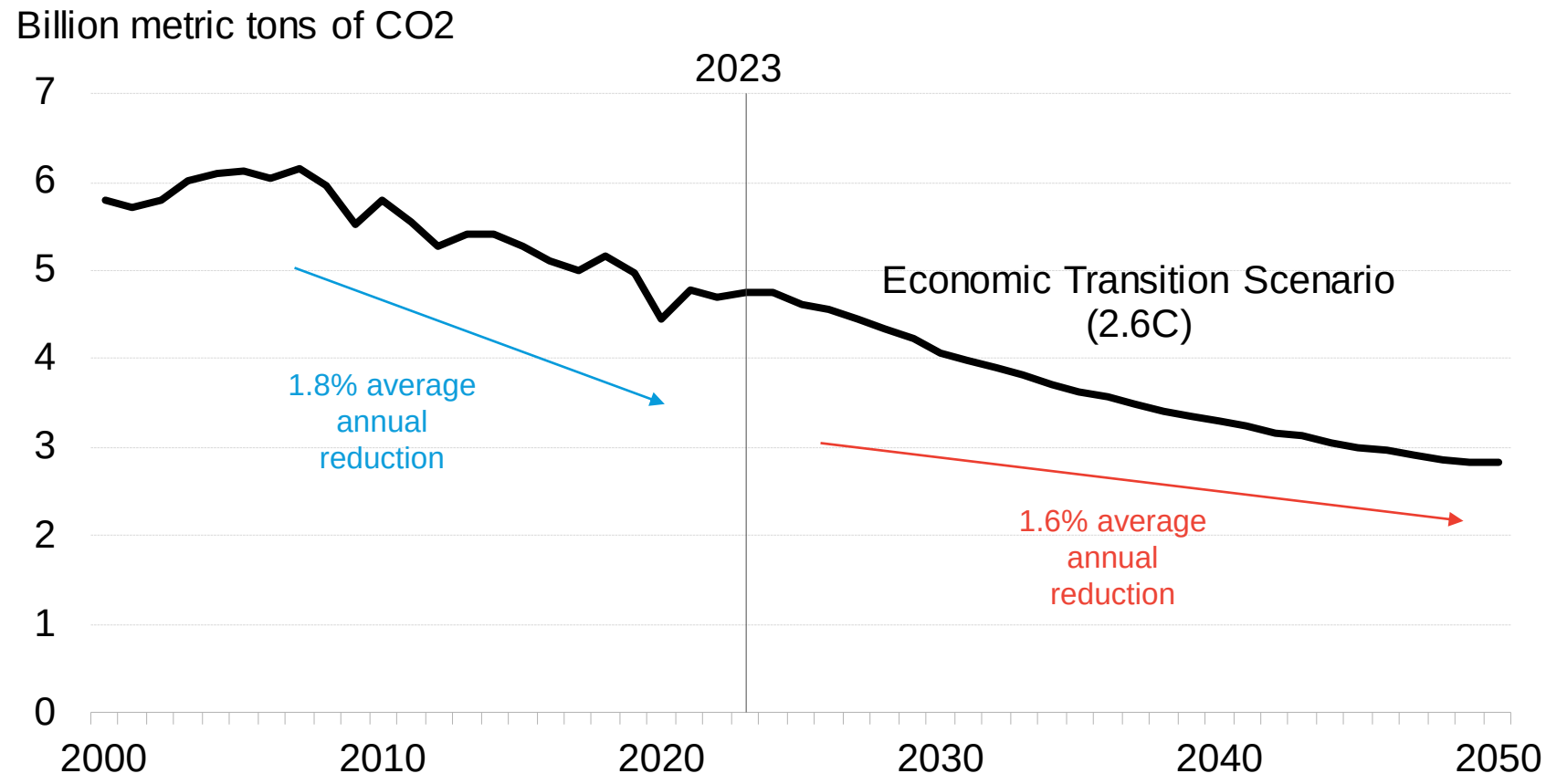
US energy-related emissions



Source: BloombergNEF

And they will keep going down… but not quickly enough

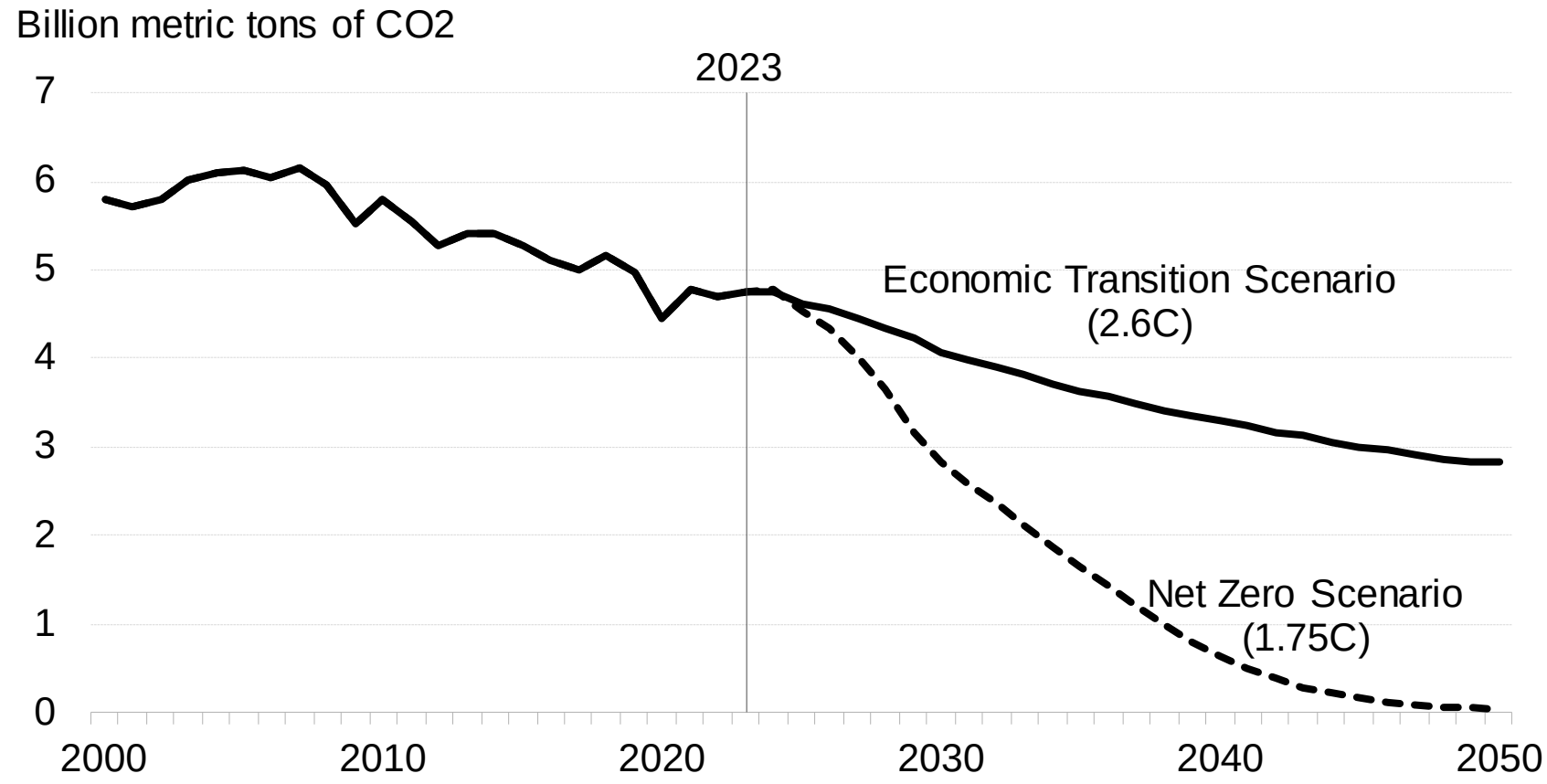
US energy-related emissions



Source: BloombergNEF

A net zero transition needs sharp emission cuts, right away

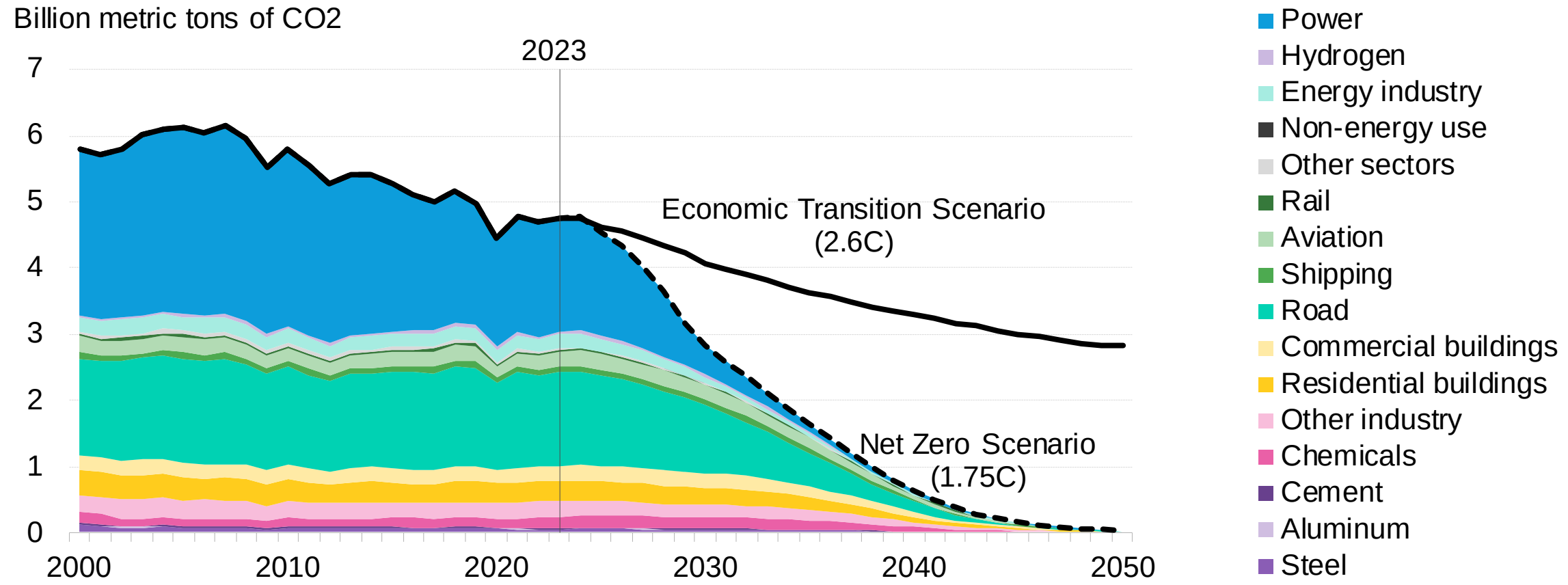
US energy-related emissions and net-zero carbon budget



Source: BloombergNEF

A net zero transition needs sharp emission cuts, across all sectors

US energy-related emissions and net-zero carbon budget

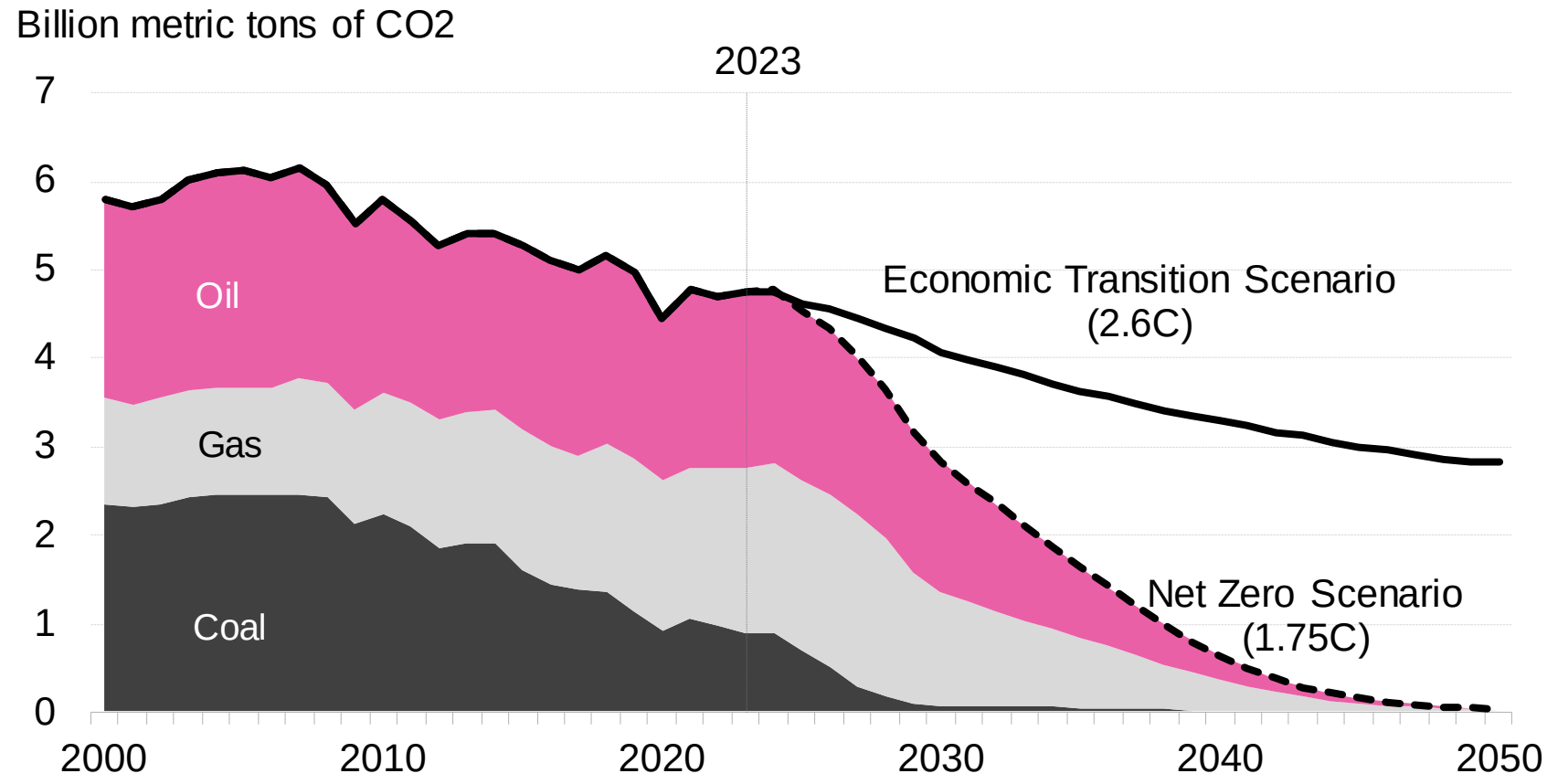


Source: BloombergNEF

BloombergNEF

A net zero transition needs a pivot away from fossil fuels

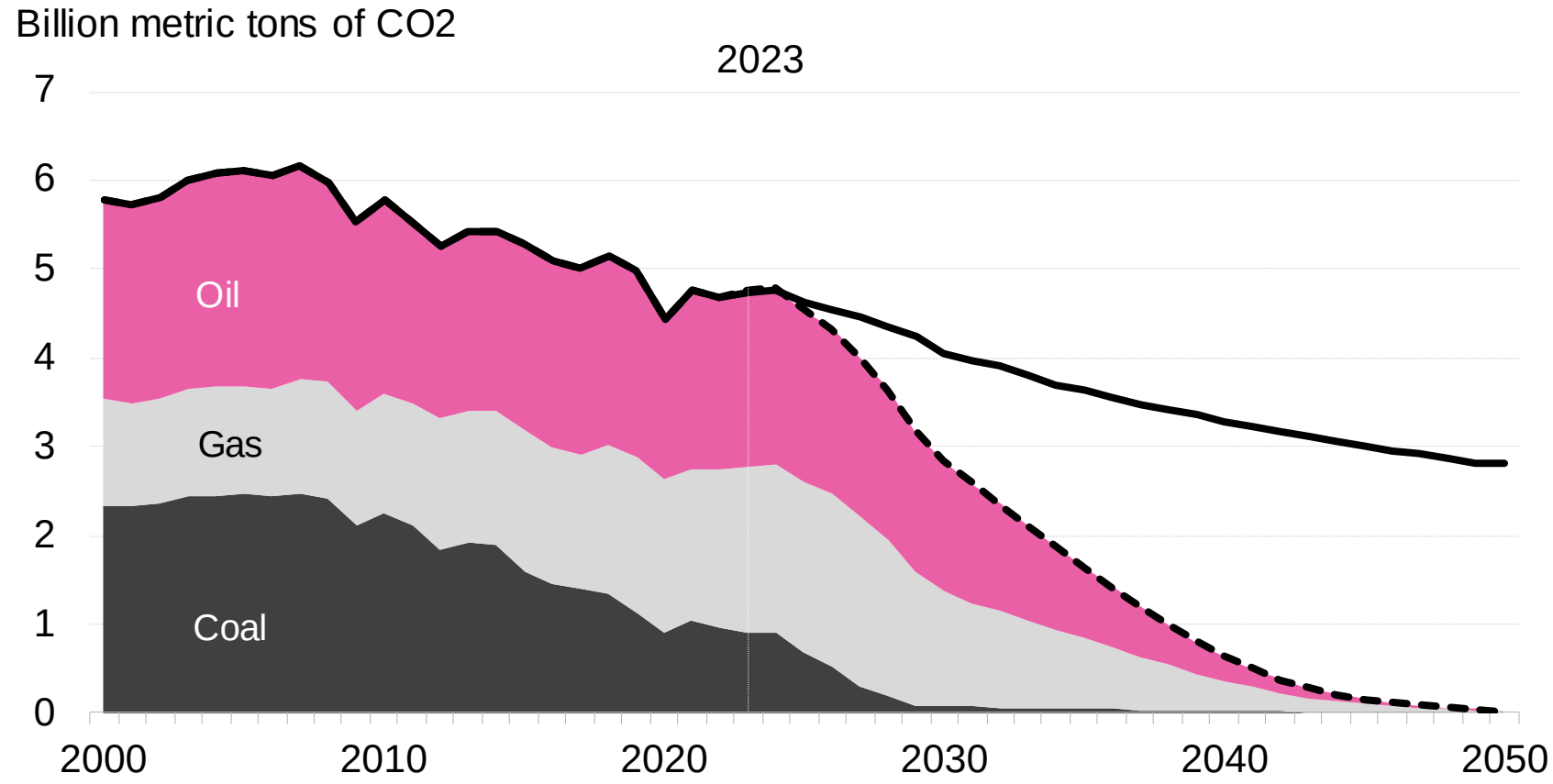
US energy-related emissions and net-zero carbon budget



Source: BloombergNEF

What bridges the gap between where we are and where we need to be?

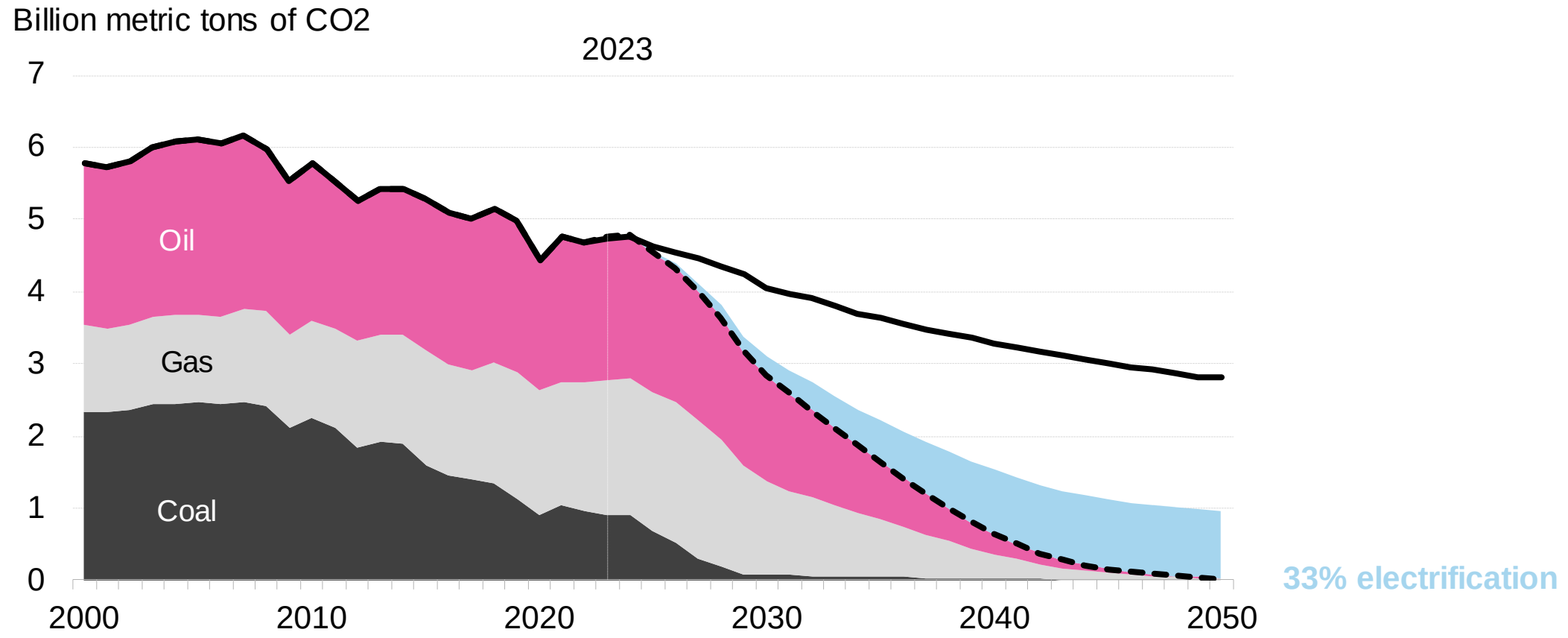
US energy-related emissions and net-zero carbon budget



Source: BloombergNEF

What bridges the gap between where we are and where we need to be?

US energy-related emissions, net-zero carbon budget, abatement by technology

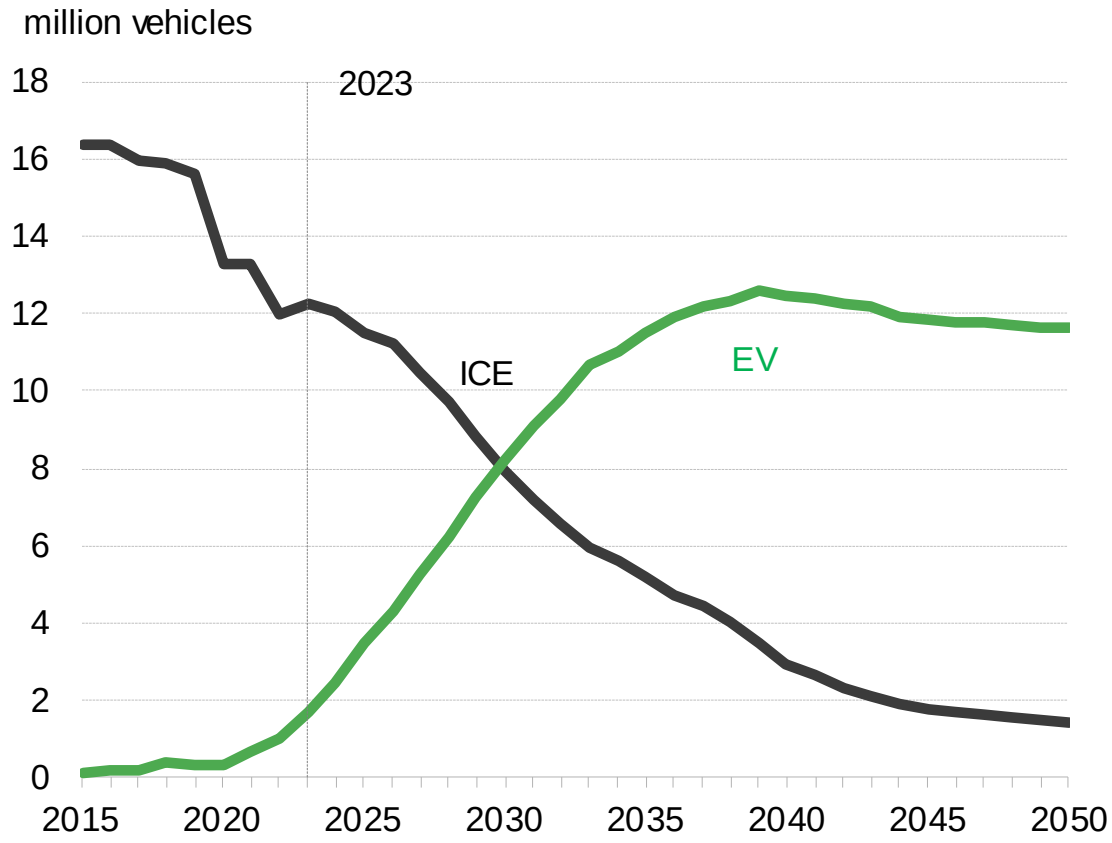


Source: BloombergNEF

BloombergNEF

Road transport is electrifying already

Vehicle sales by technology, ETS



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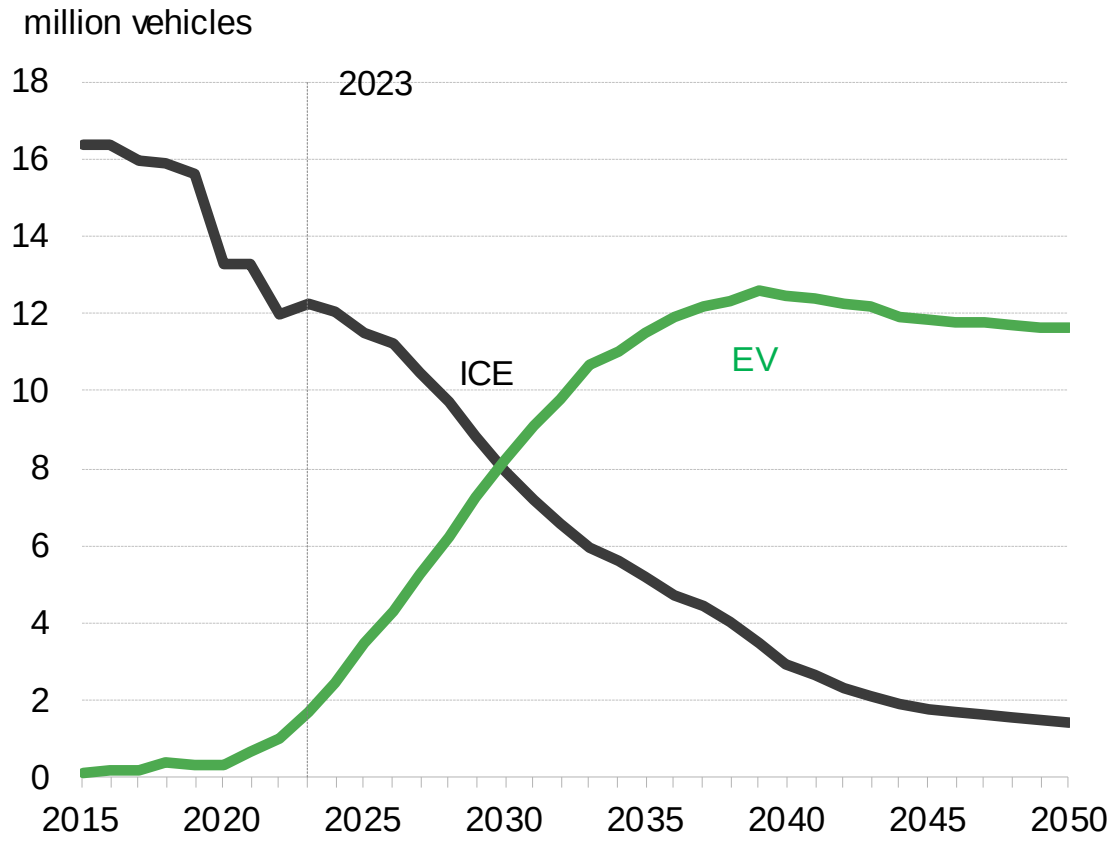
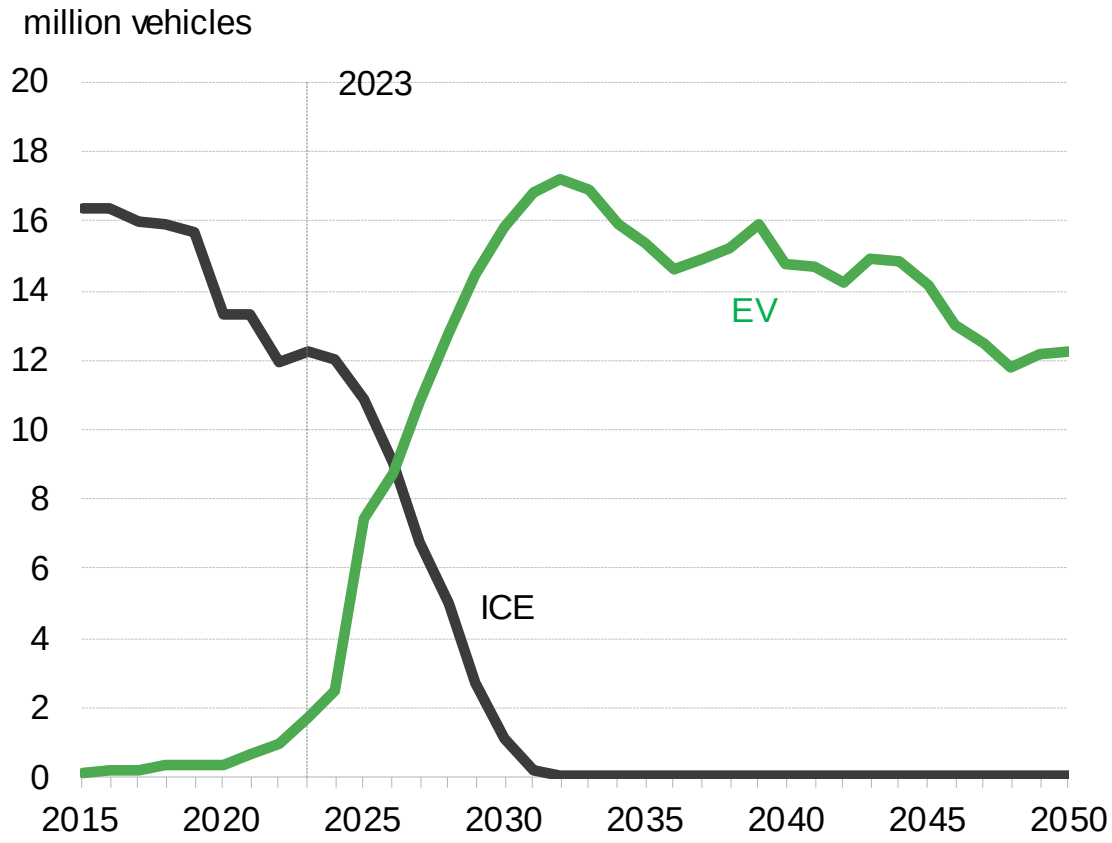


Source: BloombergNEF

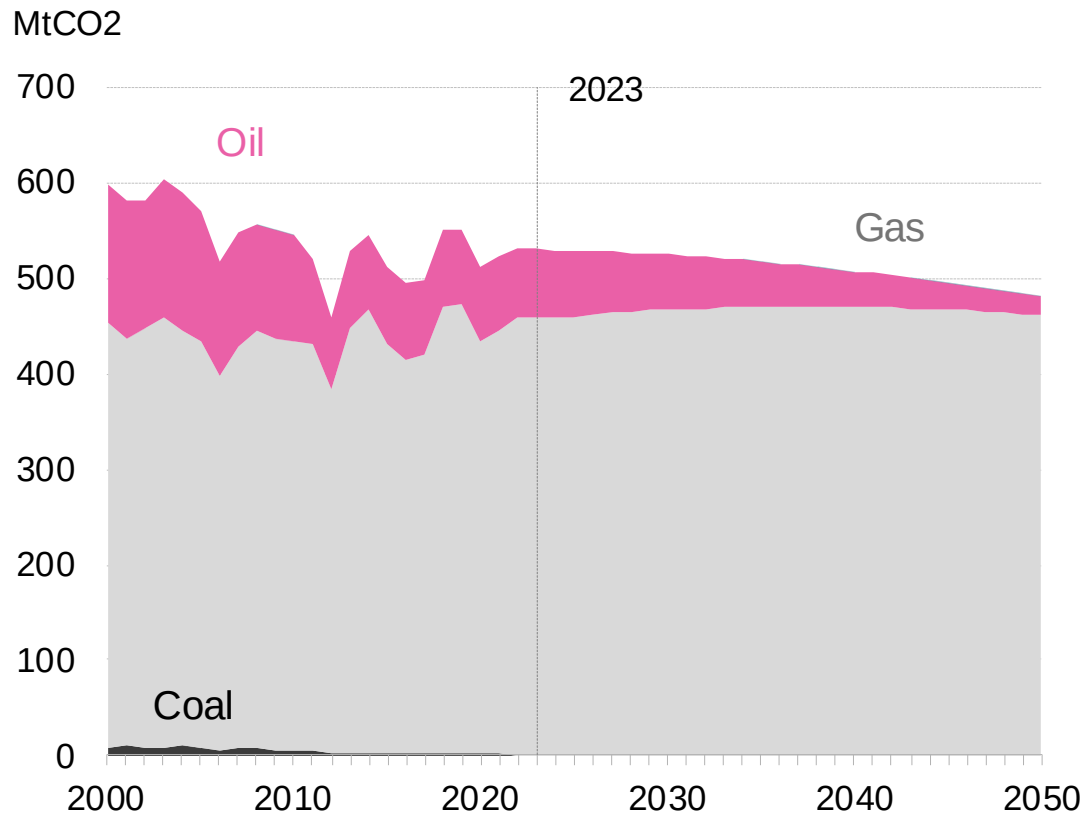
Vehicle sales by technology, NZS



Source: BloombergNEF

But buildings are not

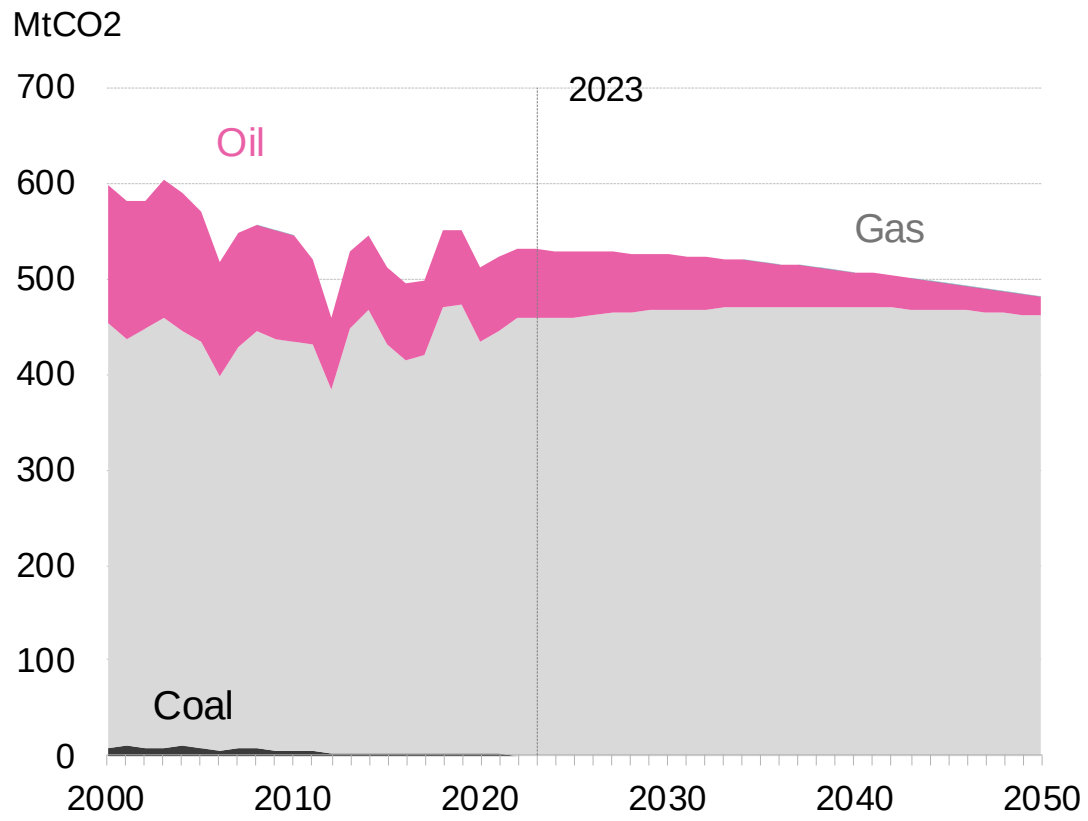
US buildings emissions by fuel, ETS



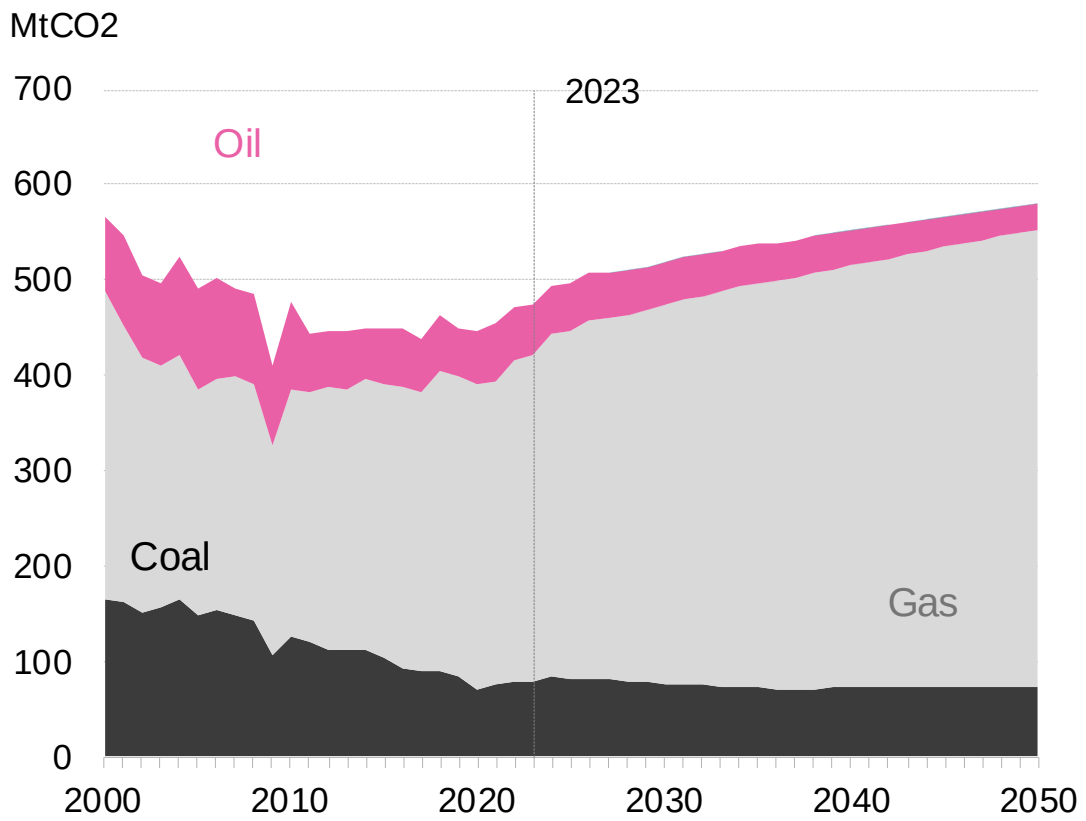
Source: BloombergNEF

But buildings are not, and neither are industrial processes

US buildings emissions by fuel, ETS



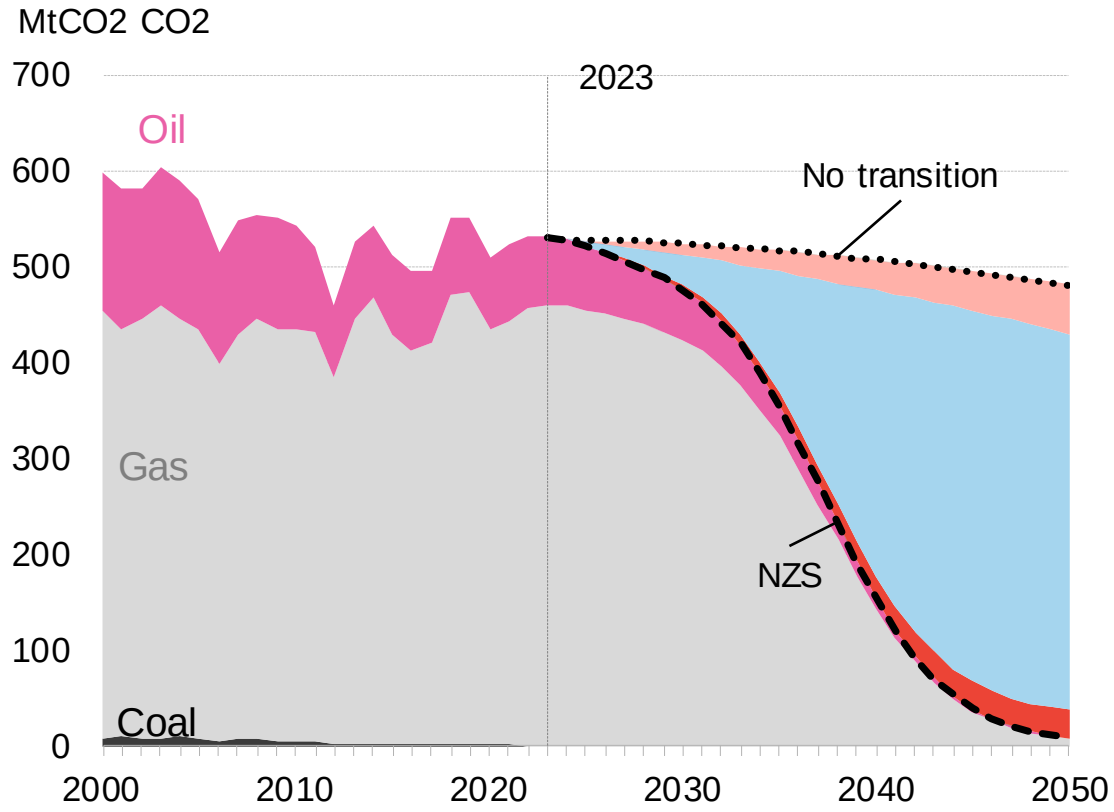
US industry emissions by fuel, ETS



Source: BloombergNEF

Electrification plays a large role in decarbonizing these sectors

US buildings emissions and abatement, NZS



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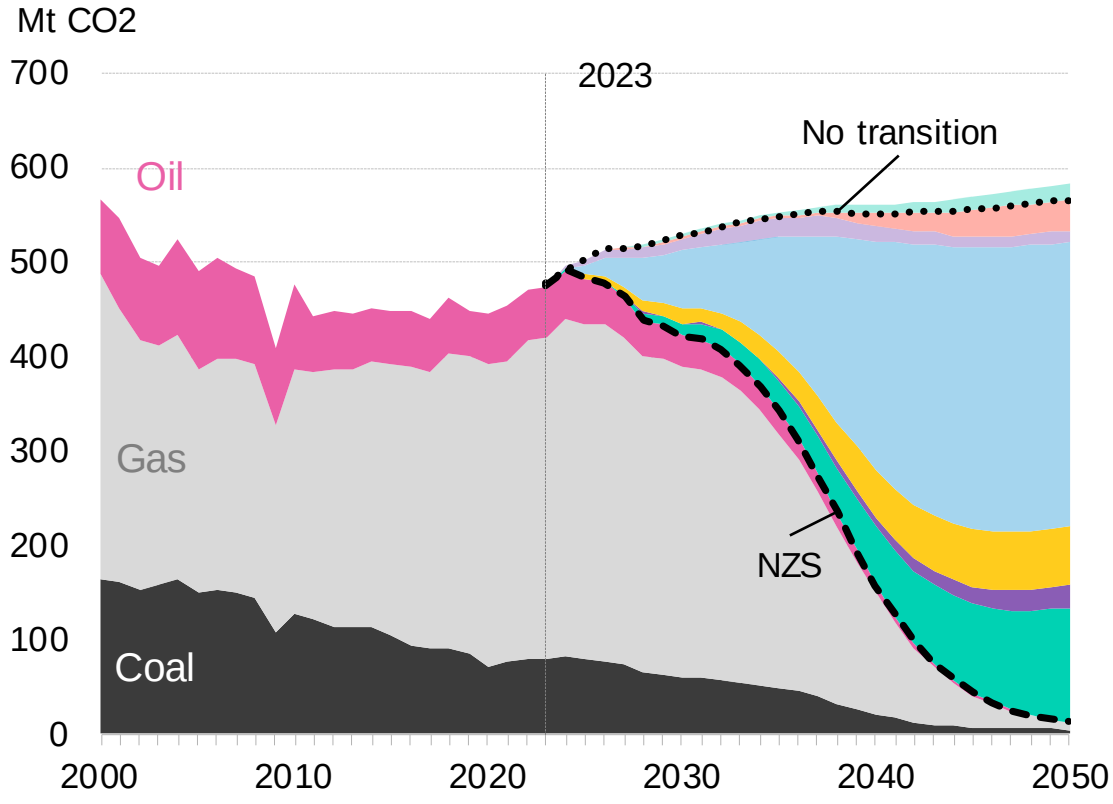


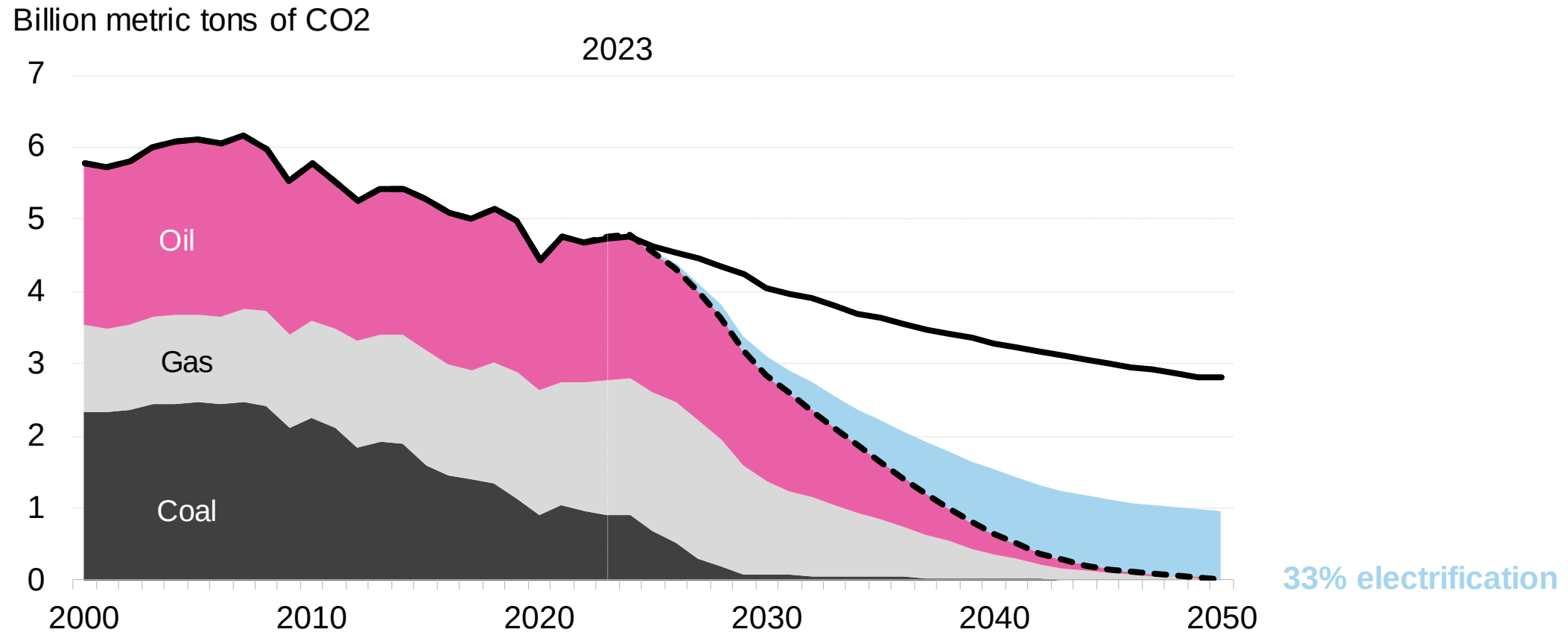
CCS Hydrogen Bioenergy Heat Electrification Energy efficiency Carbon removals

Source: BloombergNEF

1. Electrification emerges as least-cost, when everything else is expensive and hard

What bridges the gap between where we are and where we need to be?

US energy-related emissions, net-zero carbon budget, abatement by technology



Source: BloombergNEF

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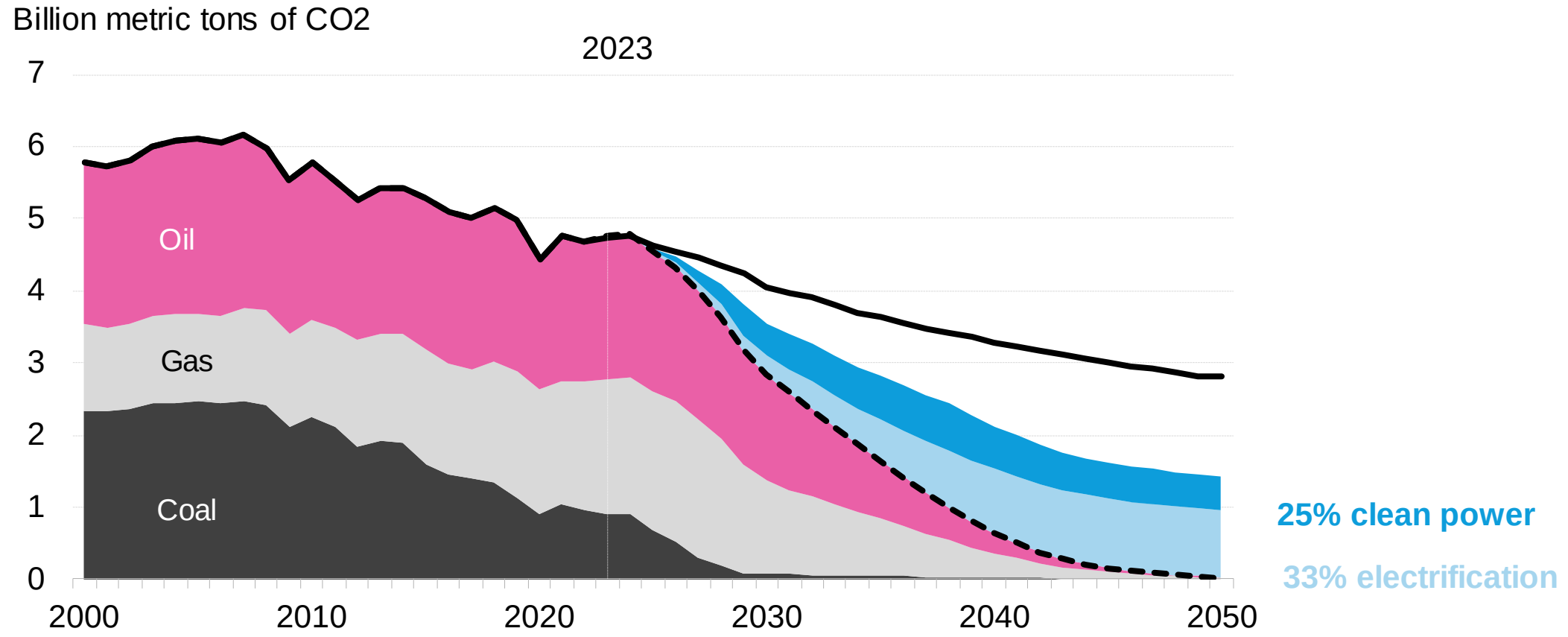
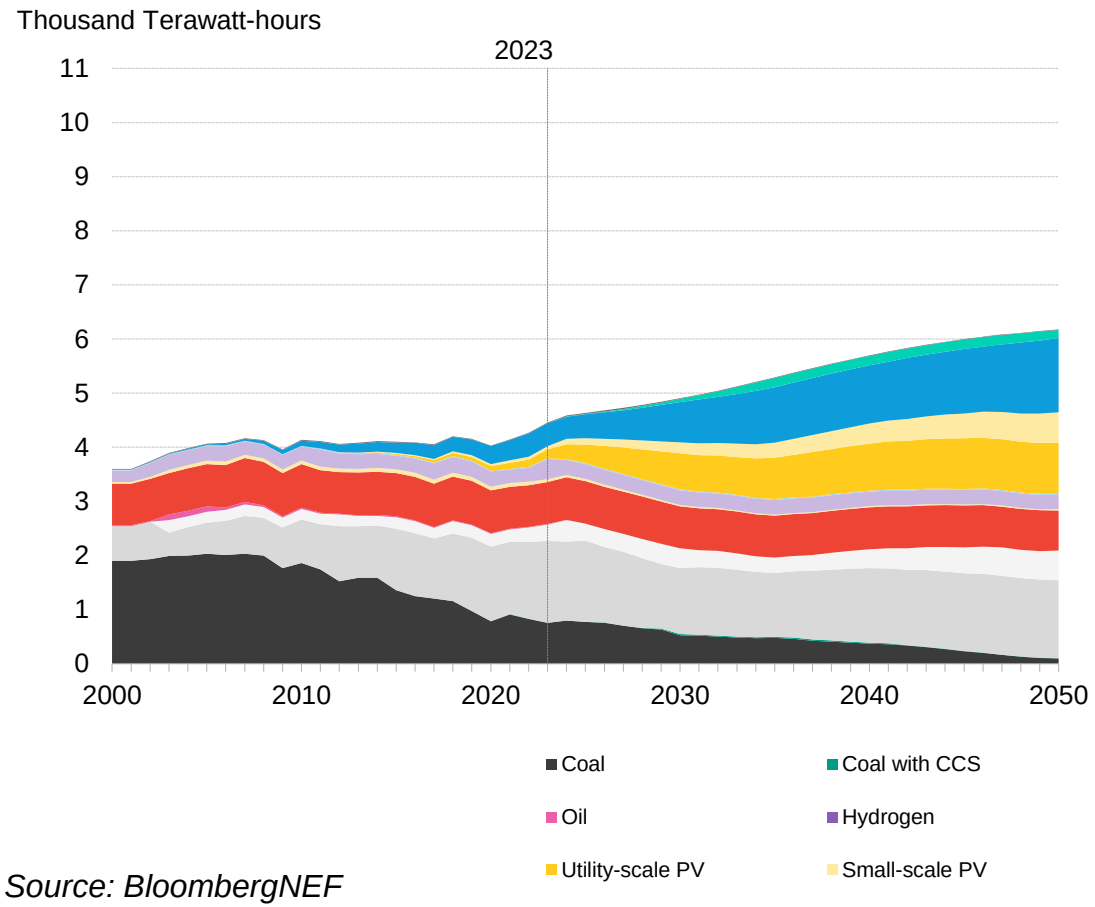


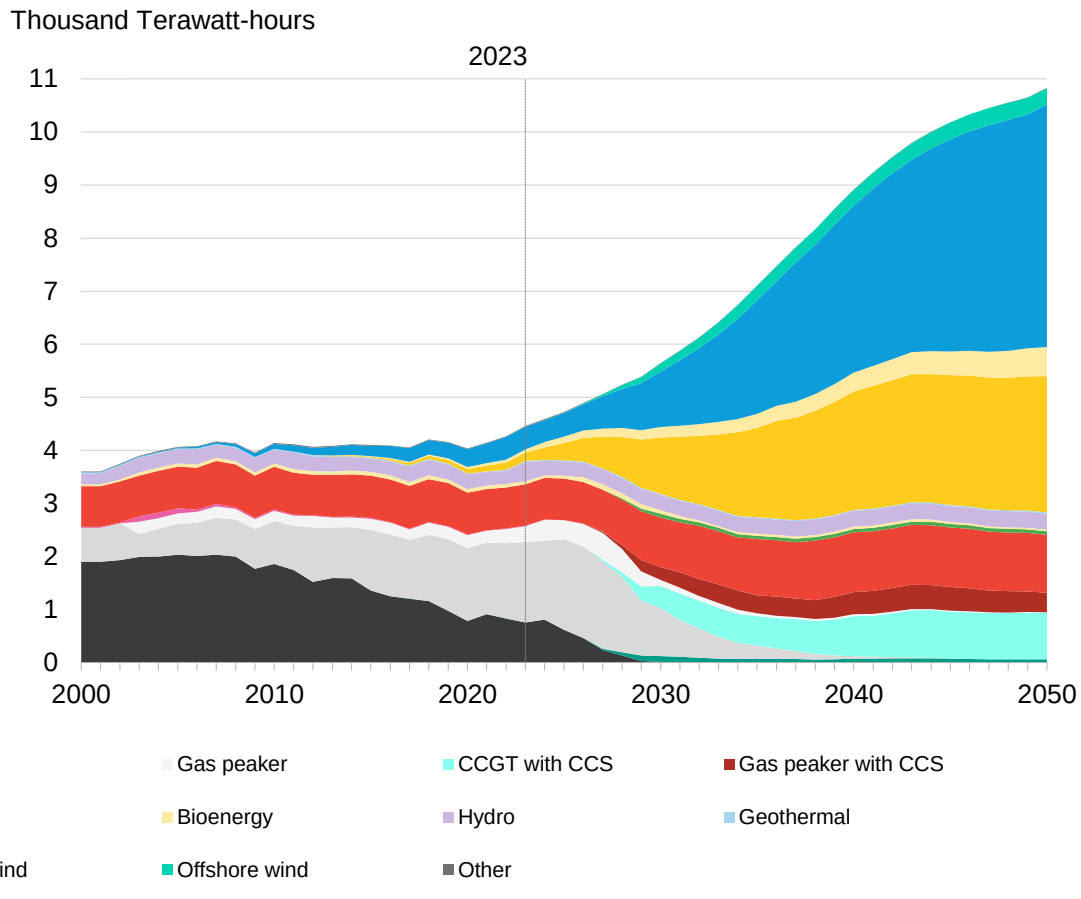
Source: BloombergNEF

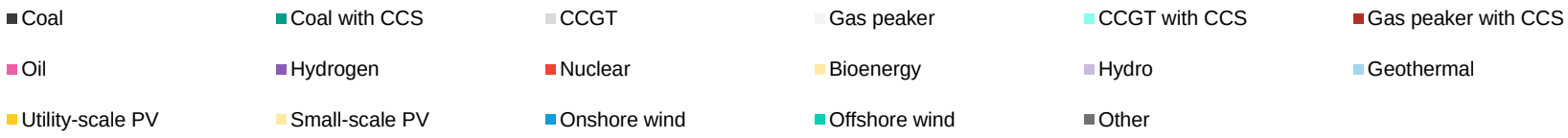
A net zero transition needs 2.6 times the power generation of today

Economic Transition Scenario



Net Zero Scenario



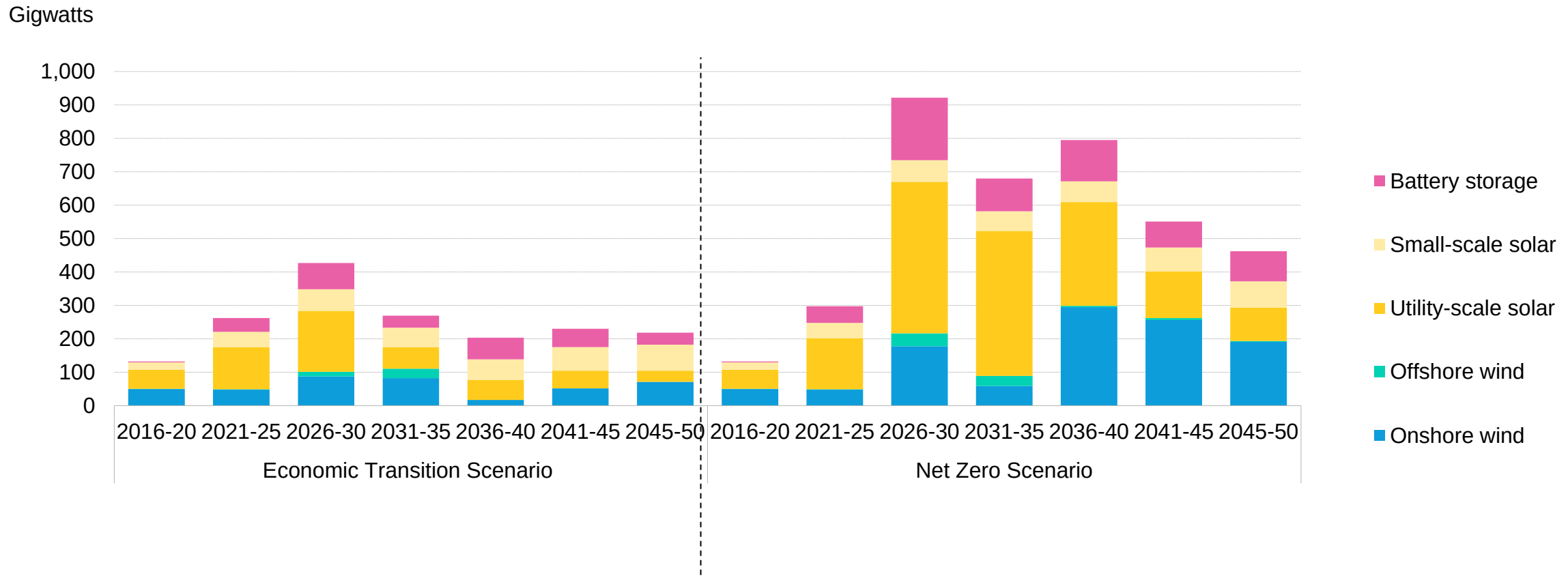


Source: BloombergNEF

BloombergNEF

Clean power capacity additions jump this decade

Wind, solar and battery storage capacity build



Source: BloombergNEF

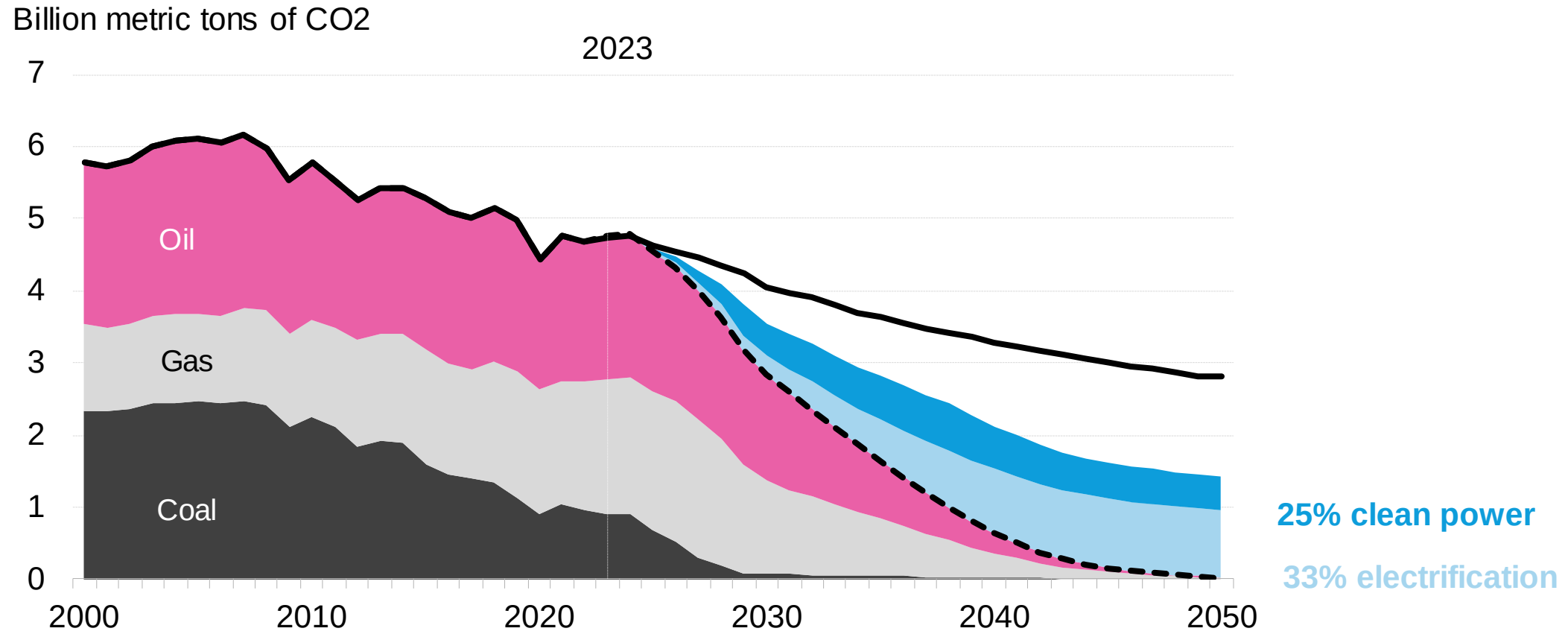
BloombergNEF

1. **Electrification emerges as least-cost, when everything else is expensive and hard**

2. **Clean power needs to ramp up, like, yesterday**

What bridges the gap between where we are and where we need to be?

US energy-related emissions, net-zero carbon budget, abatement by technology



Source: BloombergNEF

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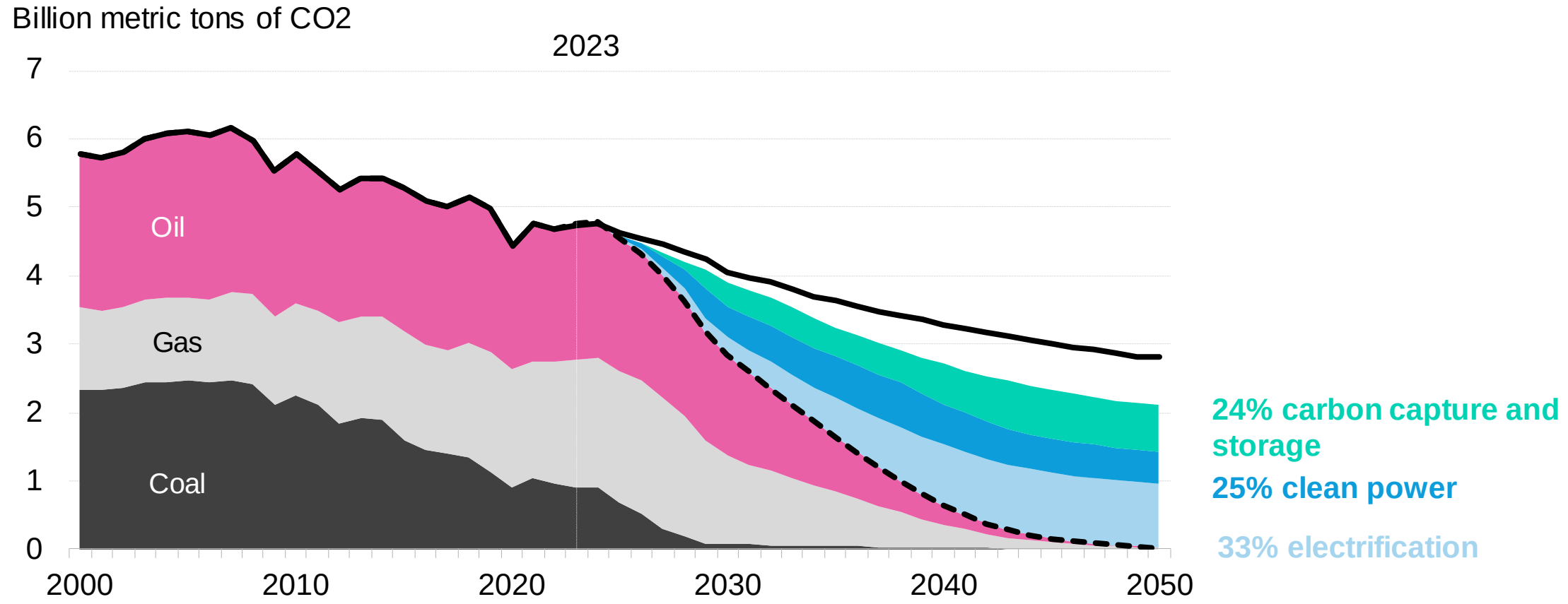
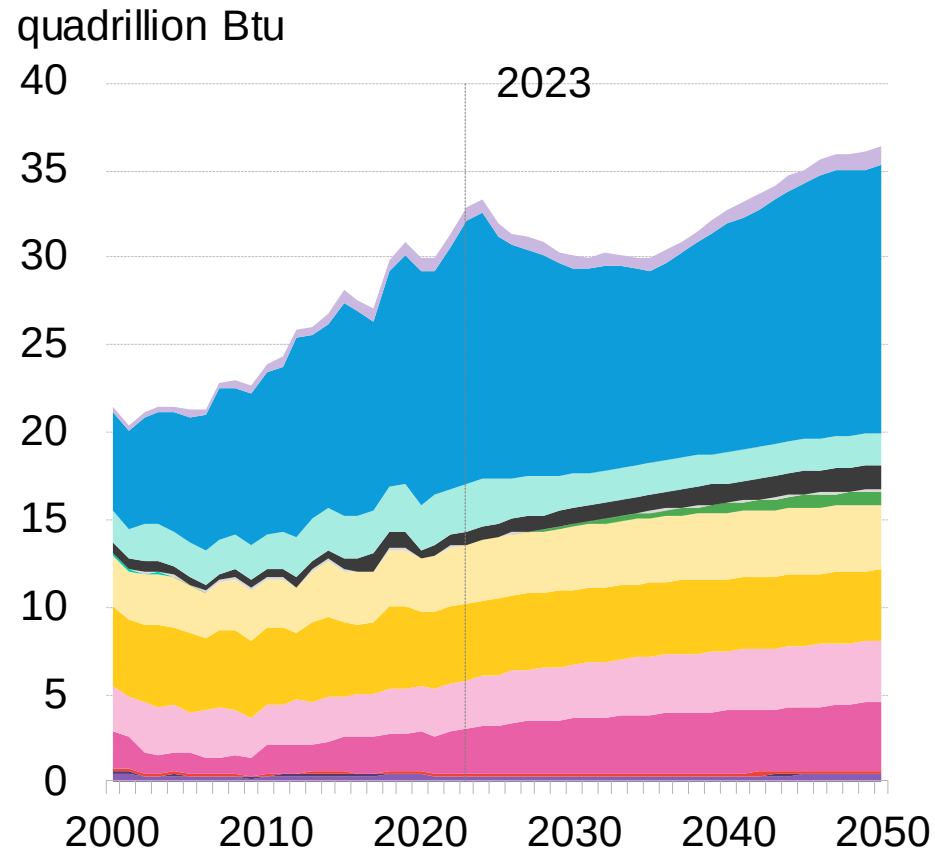


Source: BloombergNEF

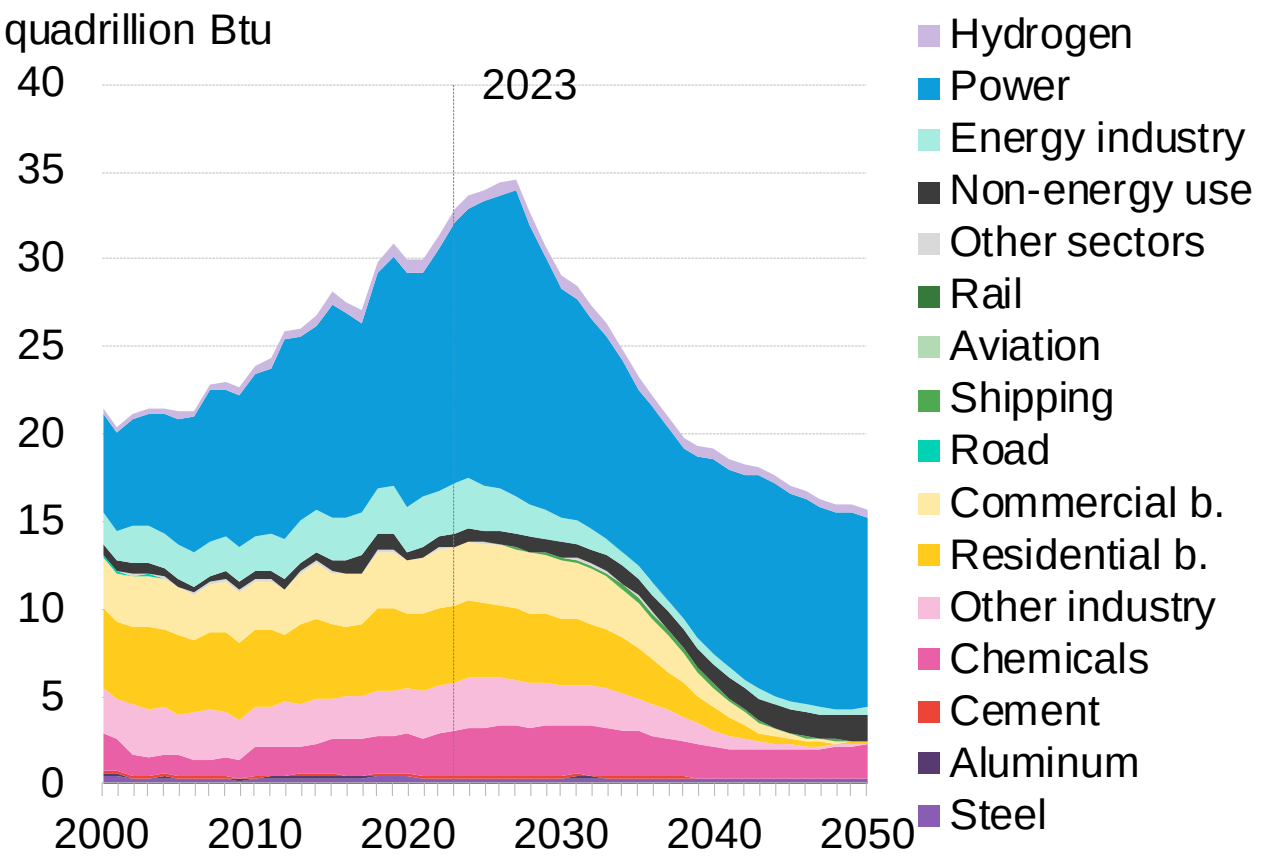
We need to talk about gas

The economics of natural gas are hard to challenge

Economic Transition Scenario



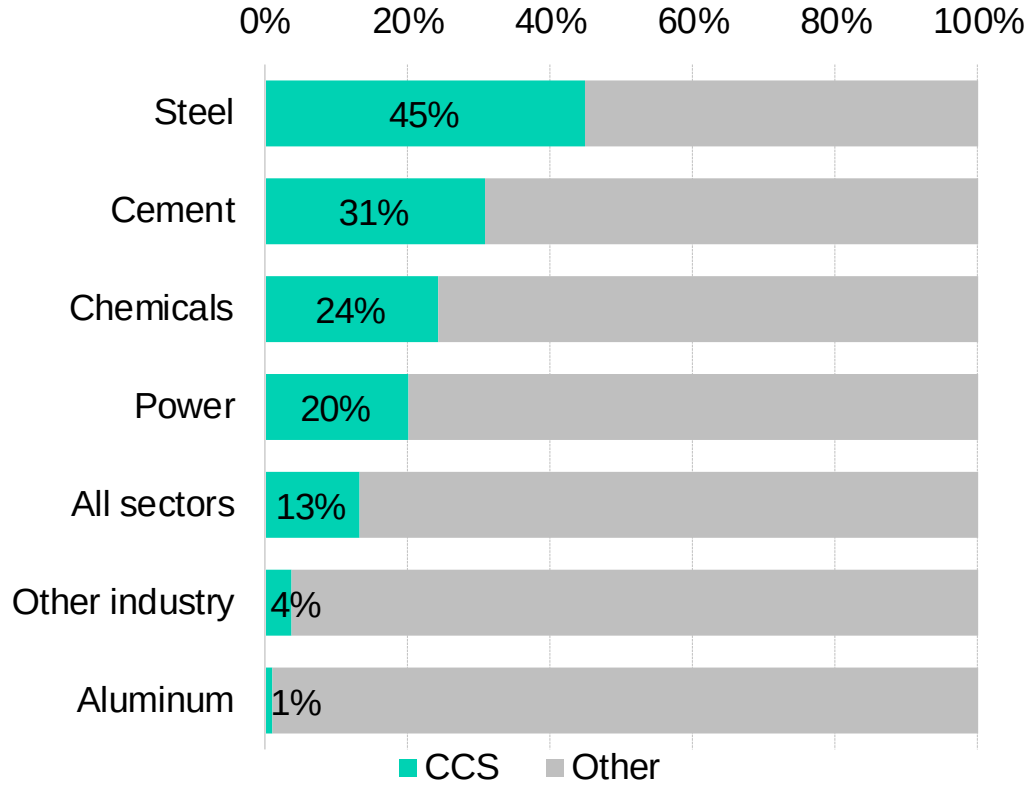
Net Zero Scenario



Source: BloombergNEF. Note: B. is buildings

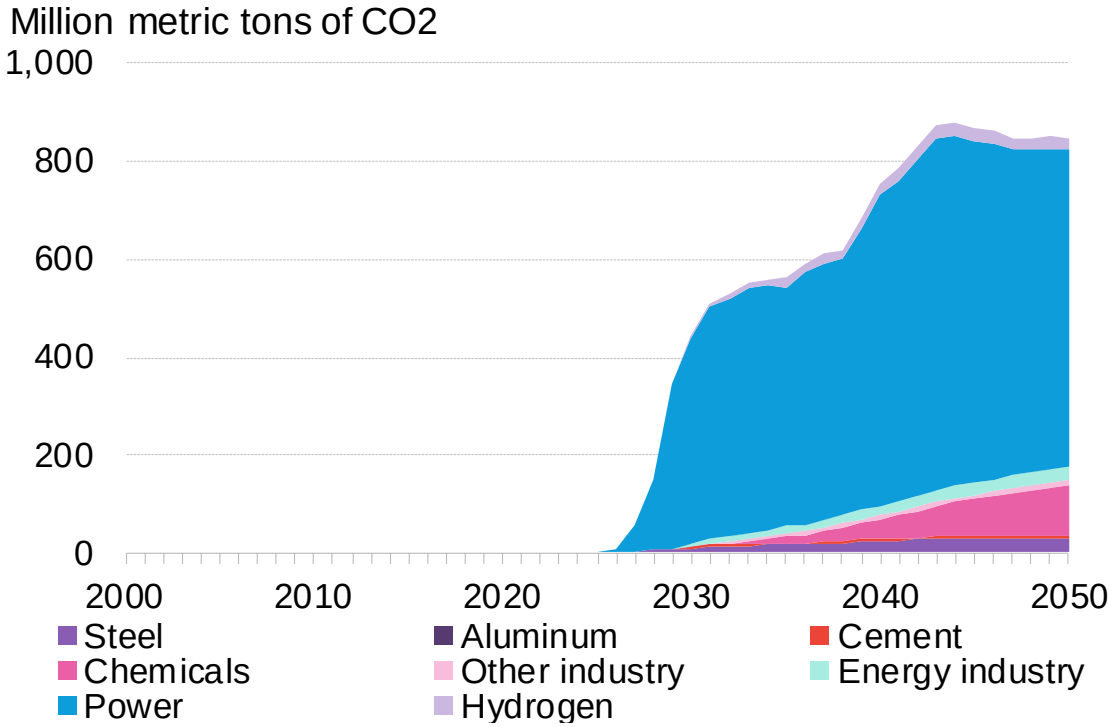
Carbon capture and storage sees largest absolute role in power

Share of CCS in 2050 emissions abatement, NZS



Source: BloombergNEF. Note: NZS is Net Zero Scenario; CCS refers to carbon capture and storage.

Annual CO2 emissions captured, by CCS by sector, NZS



Source: BloombergNEF. Note: NZS is Net Zero Scenario. 'Other industry' includes food and tobacco, paper, pulp and printing; wood and wood products; textile and leather; machinery, transport equipment, construction and non-ferrous metals.

BloombergNEF

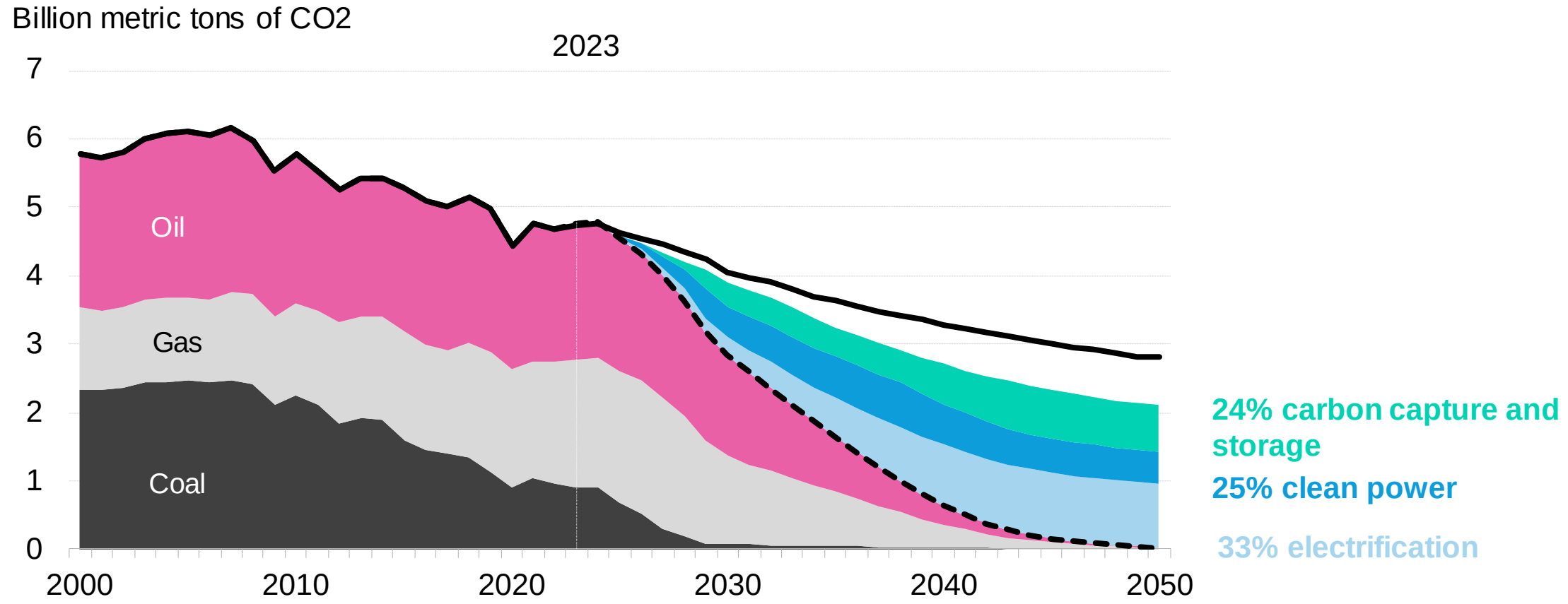
1. Electrification emerges as least-cost, when everything else is expensive and hard

2. Clean power needs to ramp up, like, yesterday

3. Carbon capture keeps a lid on natural gas emissions

What bridges the gap between where are and where we need to be?

US energy-related emissions, net-zero carbon budget, abatement by technology



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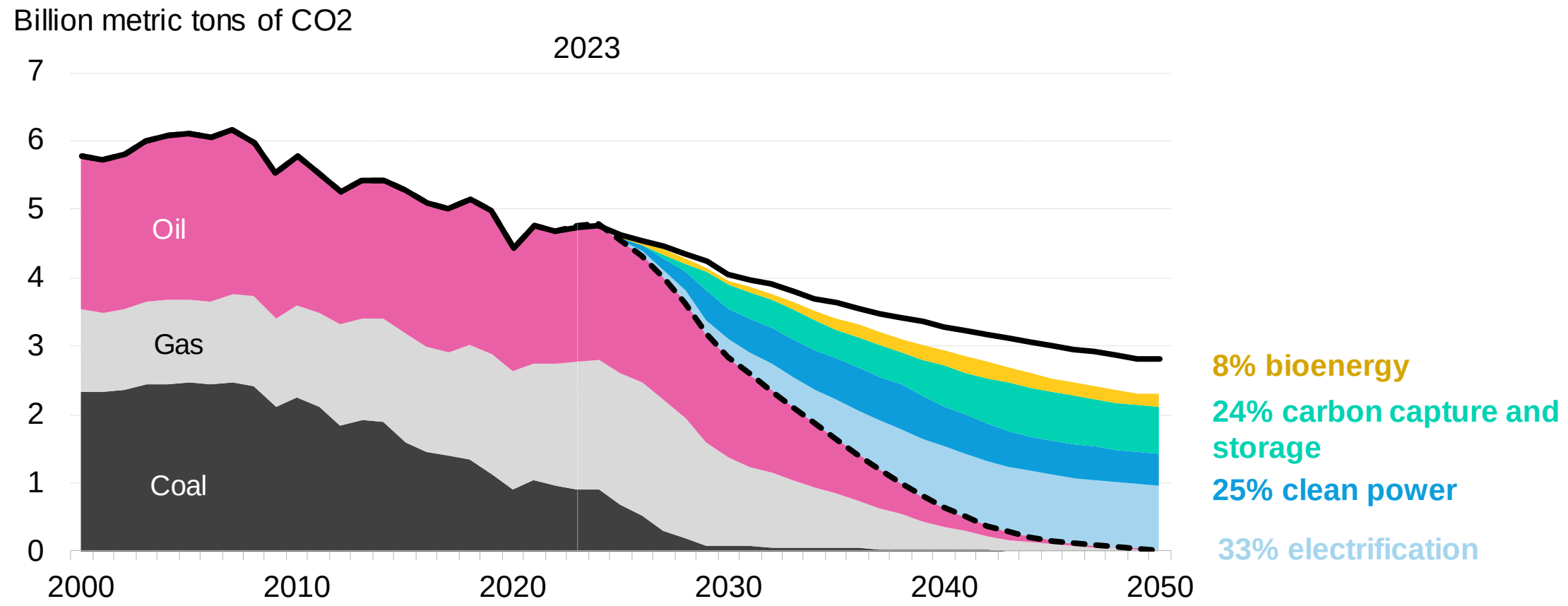
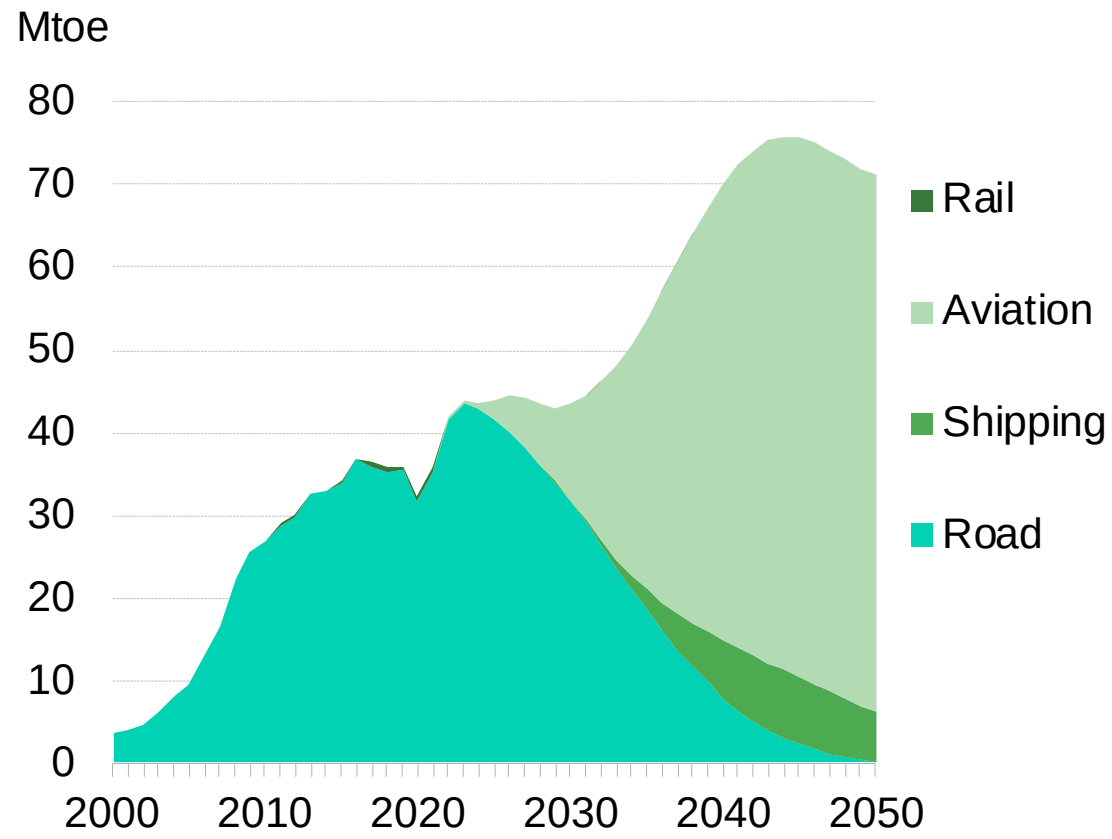


Source: BloombergNEF

BloombergNEF

Heavy transport has few alternatives to high energy densities

Biofuels consumption in transport, NZS



Source: BloombergNEF

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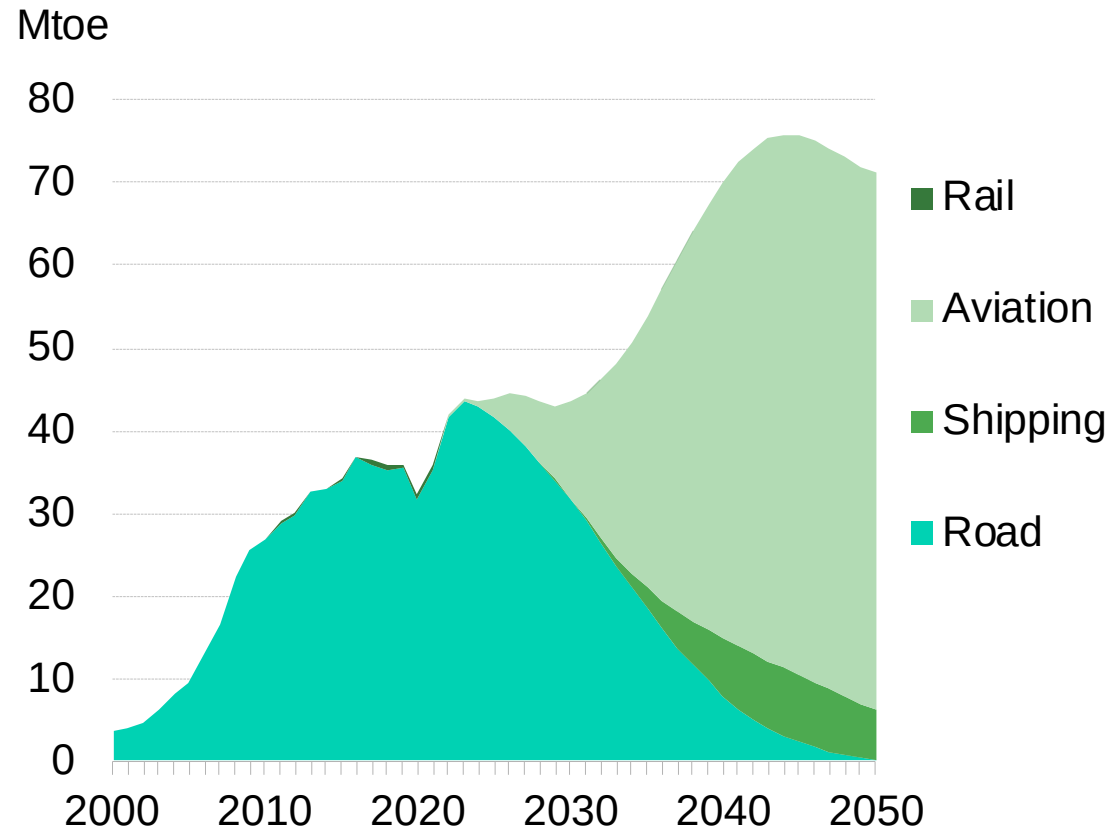


Source: BloombergNEF

Source: Bloomberg Mercury

1. Electrification emerges as least-cost, when everything else is expensive and hard

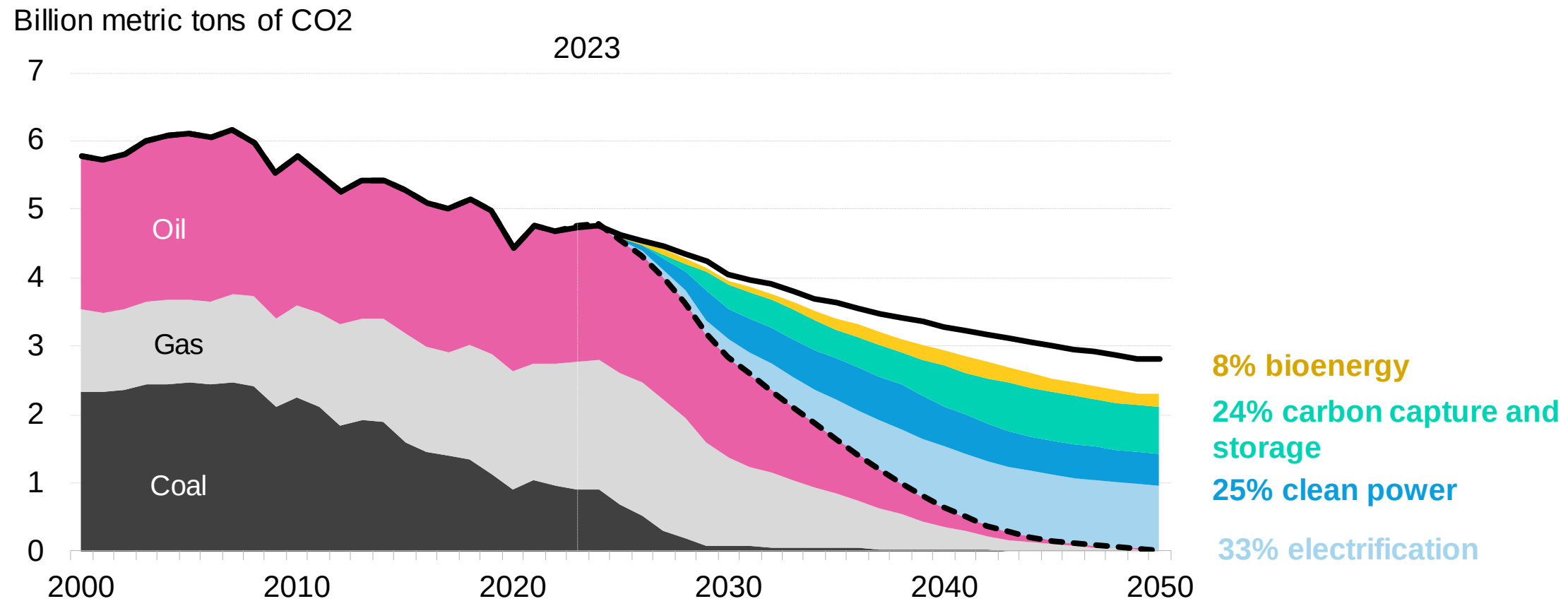
2. Clean power needs to ramp up, like, yesterday

3. Carbon capture keeps a lid on natural gas emissions

4. Clean molecules are needed for the last mile of decarbonization

What bridges the gap between where are and where we need to be?

US energy-related emissions, net-zero carbon budget, abatement by technology



Source: BloombergNEF

BloombergNEF

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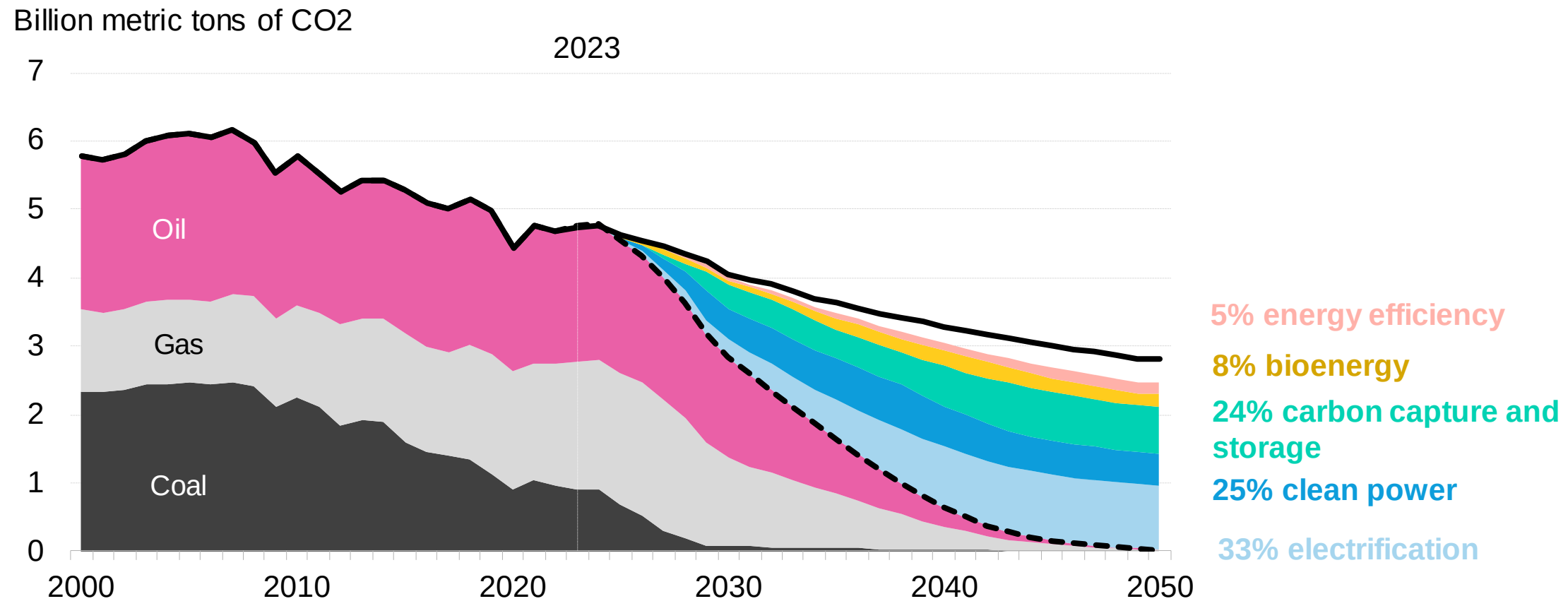

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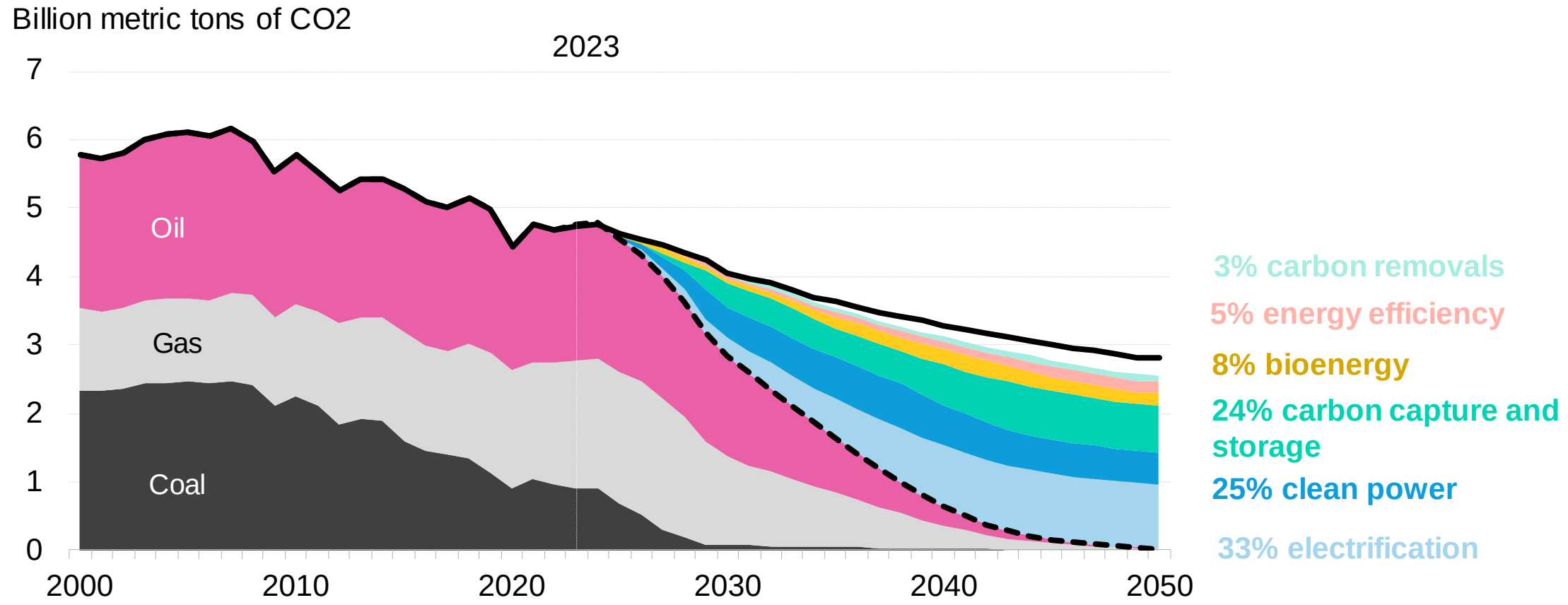

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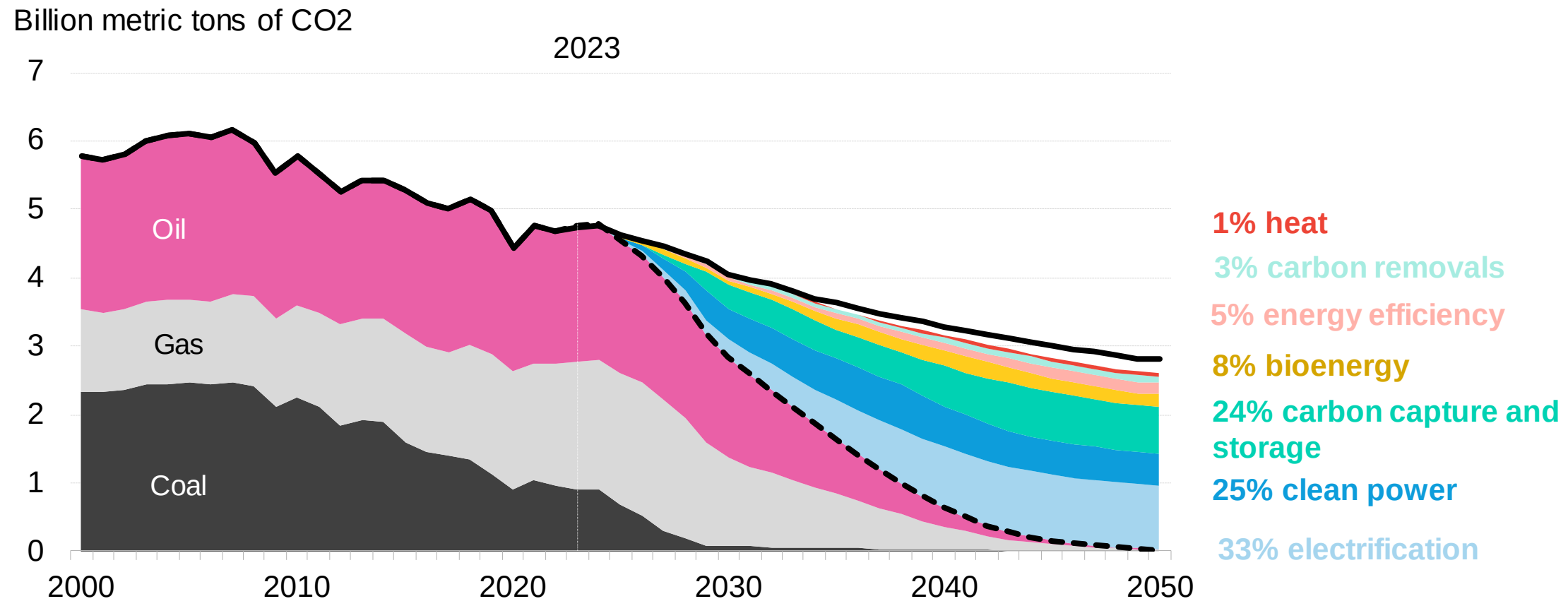

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BloombergNEF

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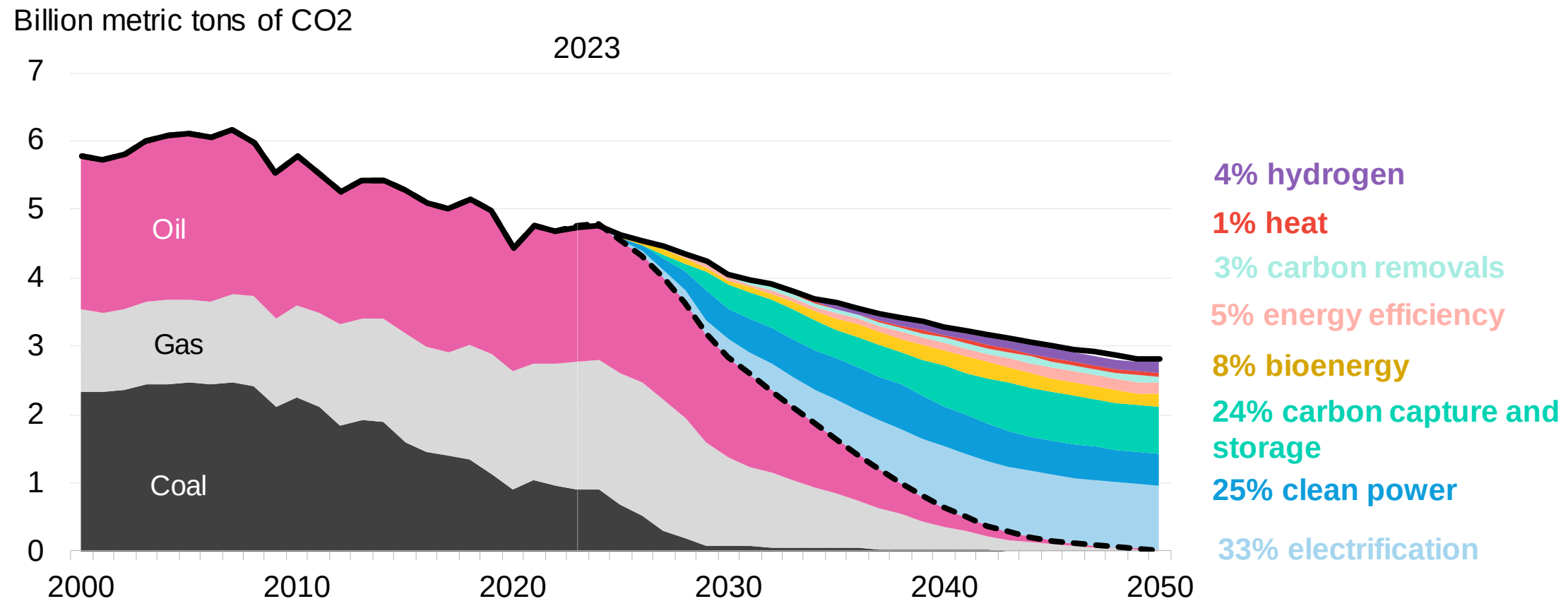
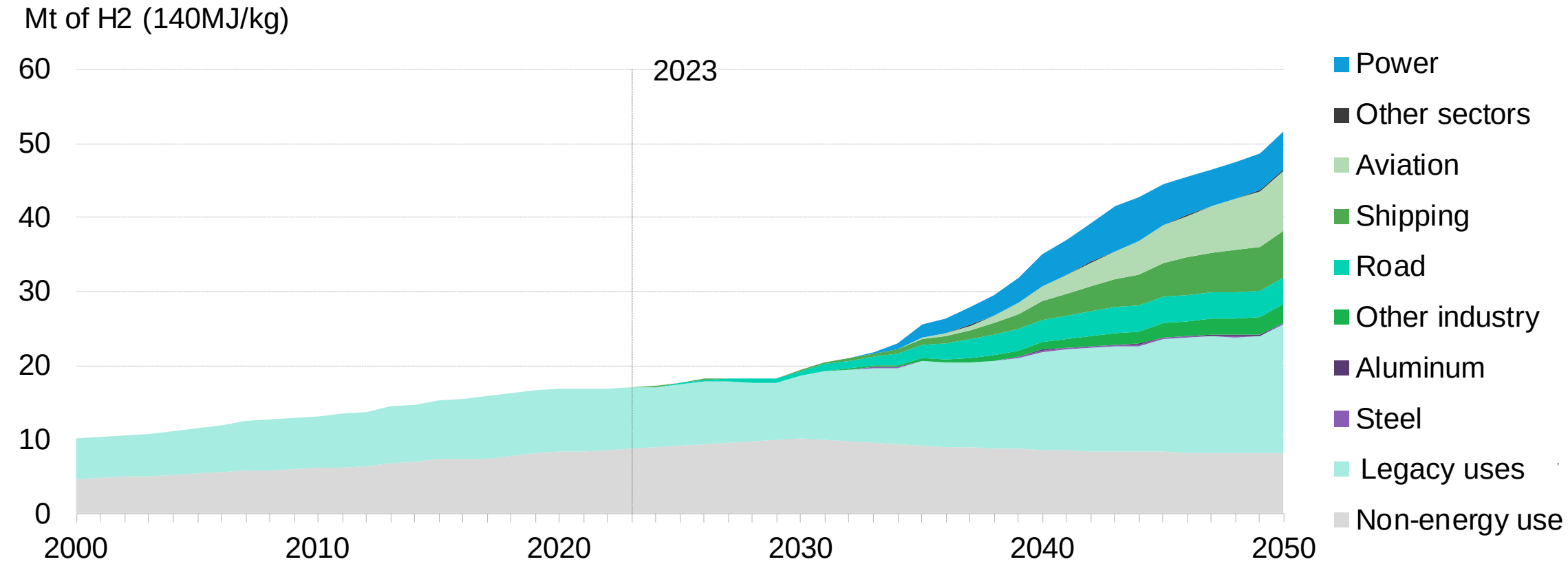


Source: BloombergNEF

BloombergNEF

Hydrogen produced by electrolysis helps to decarbonize heavy transport

Hydrogen consumption per sector, Net Zero Scenario



Source: BloombergNEF

BloombergNEF

1. Electrification emerges as least-cost, when everything else is expensive and hard

2. Clean power needs to ramp up, like, yesterday

3. Carbon capture keeps a lid on natural gas emissions

4. Clean molecules are needed for the last mile of decarbonization

5. Hydrogen matters, but there are cheaper ways to do most things

Thank you!

Panel Discussion: Public or Private? Financing the U.S. Energy Transition

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Policy Associate, North America
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Ravina Advani
Managing Director, Head of Energy Natural Resources & Renewables Coverage
BNP Paribas

Nicole Iseppi
Director of Energy Innovation
Bezos Earth Fund

Jeff Marootian
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Panel Discussion: Financing Industrial Decarbonization at Scale

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Charles Cherington
Managing Partner
Ara Partners

Nollaig Forrest
Chief Sustainability Officer
Holcium

Arne Jahn
Vice President – Treasurer & Chief Risk Officer
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Closing Remarks

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Thank you for joining us.