

Live Pulse Webinar

Energy investing for your client portfolios

Presented by Will Riley, CA, (Co-manager),
Guinness Global Investors

novia
global

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The energy transition

- 1) What does the energy transition look like?
- 2) Likely path for hydrocarbon markets
- 3) Outlook for renewable energy & energy efficiency
- 4) How we invest in these themes

Investment team biographies



Will Riley

CA (Co-manager)

- Joined Guinness Asset Management in 2007
- Company valuation expert for PricewaterhouseCoopers 2000-2007
- Qualified as a Chartered Accountant in 2003
- Graduated from Cambridge University with a Masters degree in Geography in 1999



Jonathan Waghorn

(Co-manager)

- Joined Guinness Asset Management in 2013
- Co-portfolio manager of the Investec Global Energy Fund from February 2008 to May 2012
- Co-head of energy equity research at Goldman Sachs from 2000-2008
- Drilling engineer in Dutch North Sea for Shell



Jamie Melrose

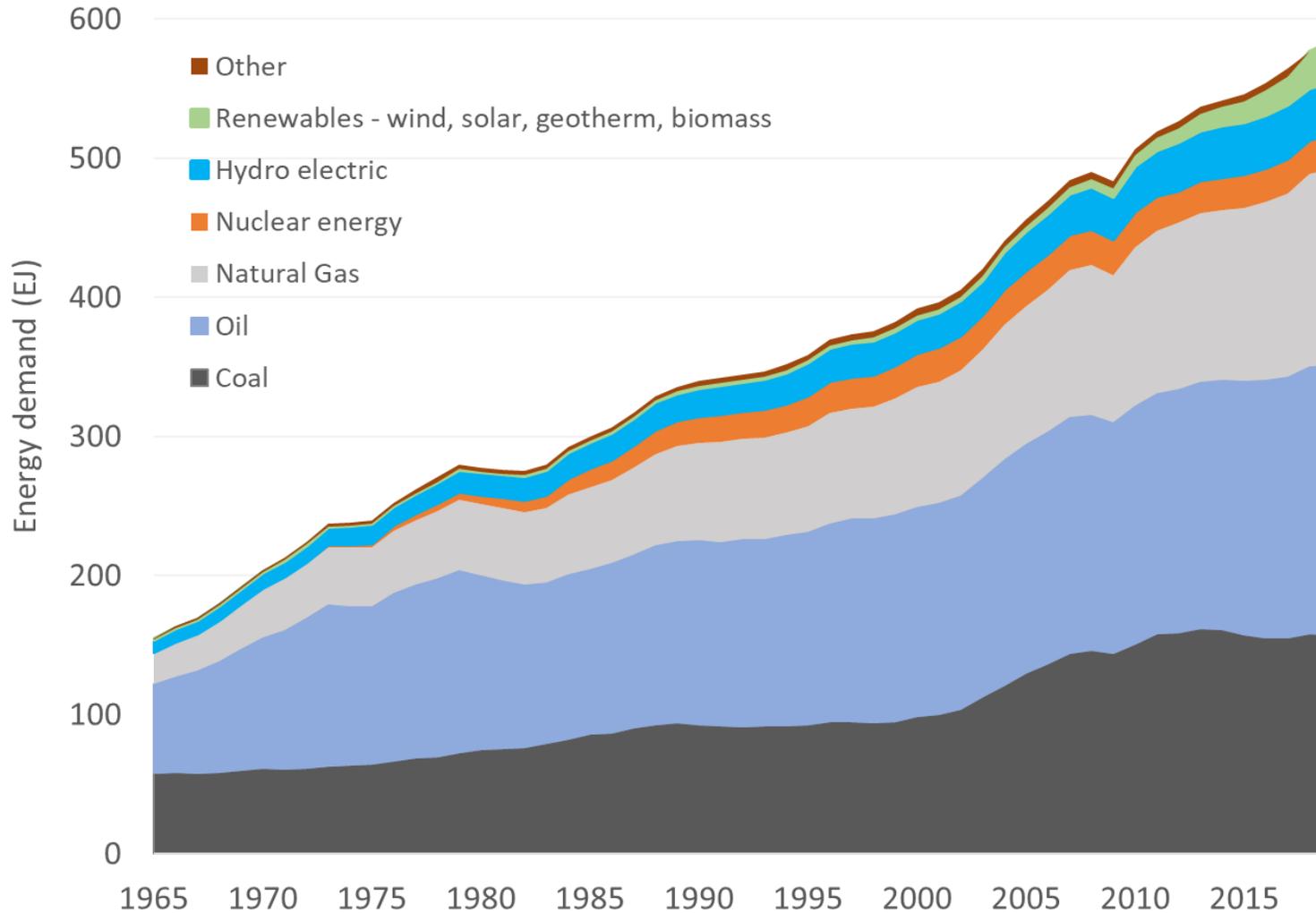
CFA, CAIA (Analyst)

- Joined Guinness Asset Management in April 2019
- Investment Manager in Sustainable Ownership at RPMI Railpen from May 2016 to March 2019
- Thematic Analyst in Equity Research at Berenberg from September 2014 to April 2016
- Graduated from the University of Bath with a Bachelor's degree in Mathematics in 2014

What does the energy transition look
like?

Energy demand has grown historically, more growth ahead

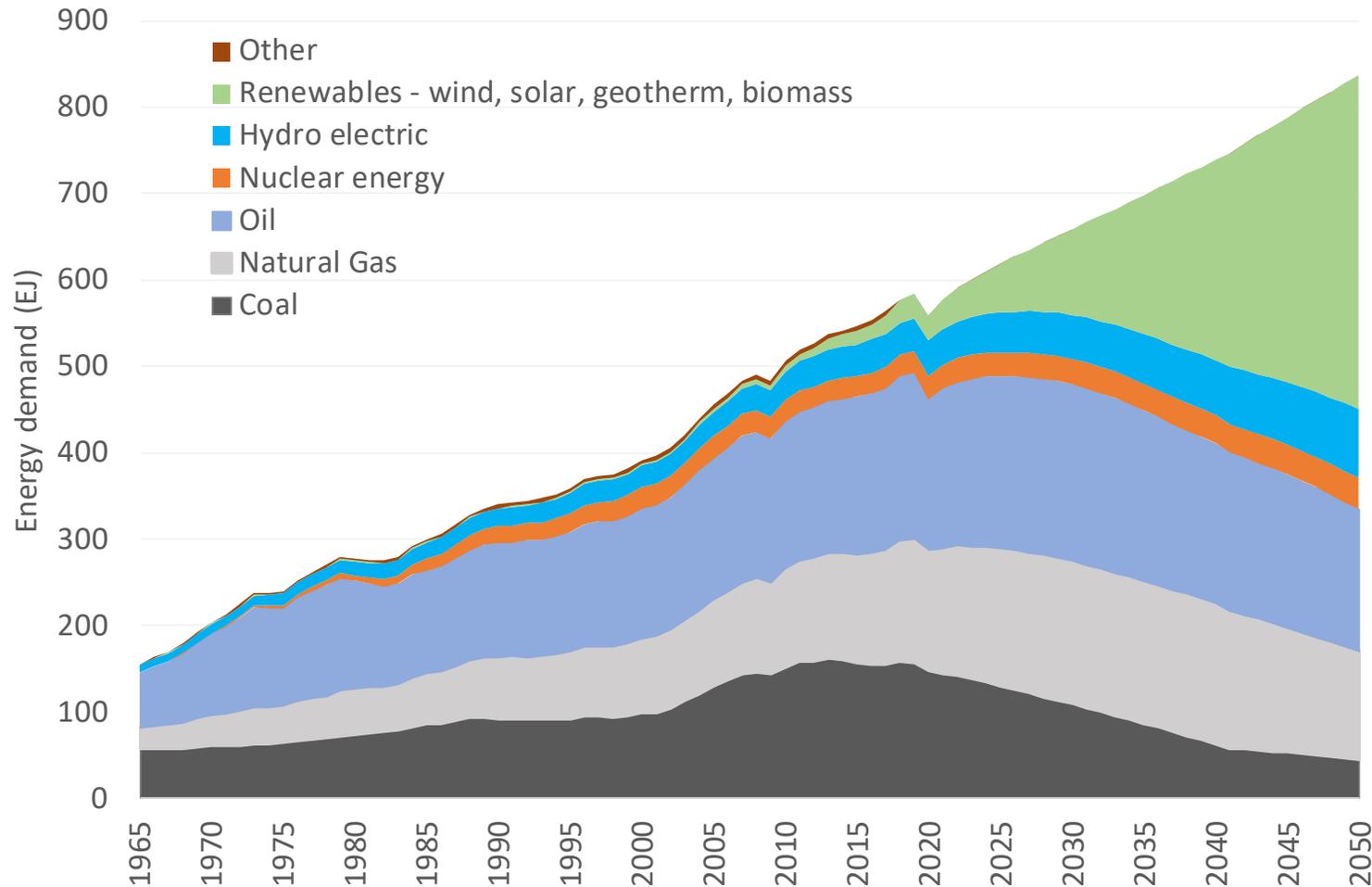
Global primary energy demand (1965-2018)



- Global energy demand has expanded by 70% since 1990, from 340EJ to 584EJ of demand
- Hydrocarbons dominate, comprising 84% of the current energy mix

A future transition to renewables at the expense of coal

Global primary energy demand (1965-2050)



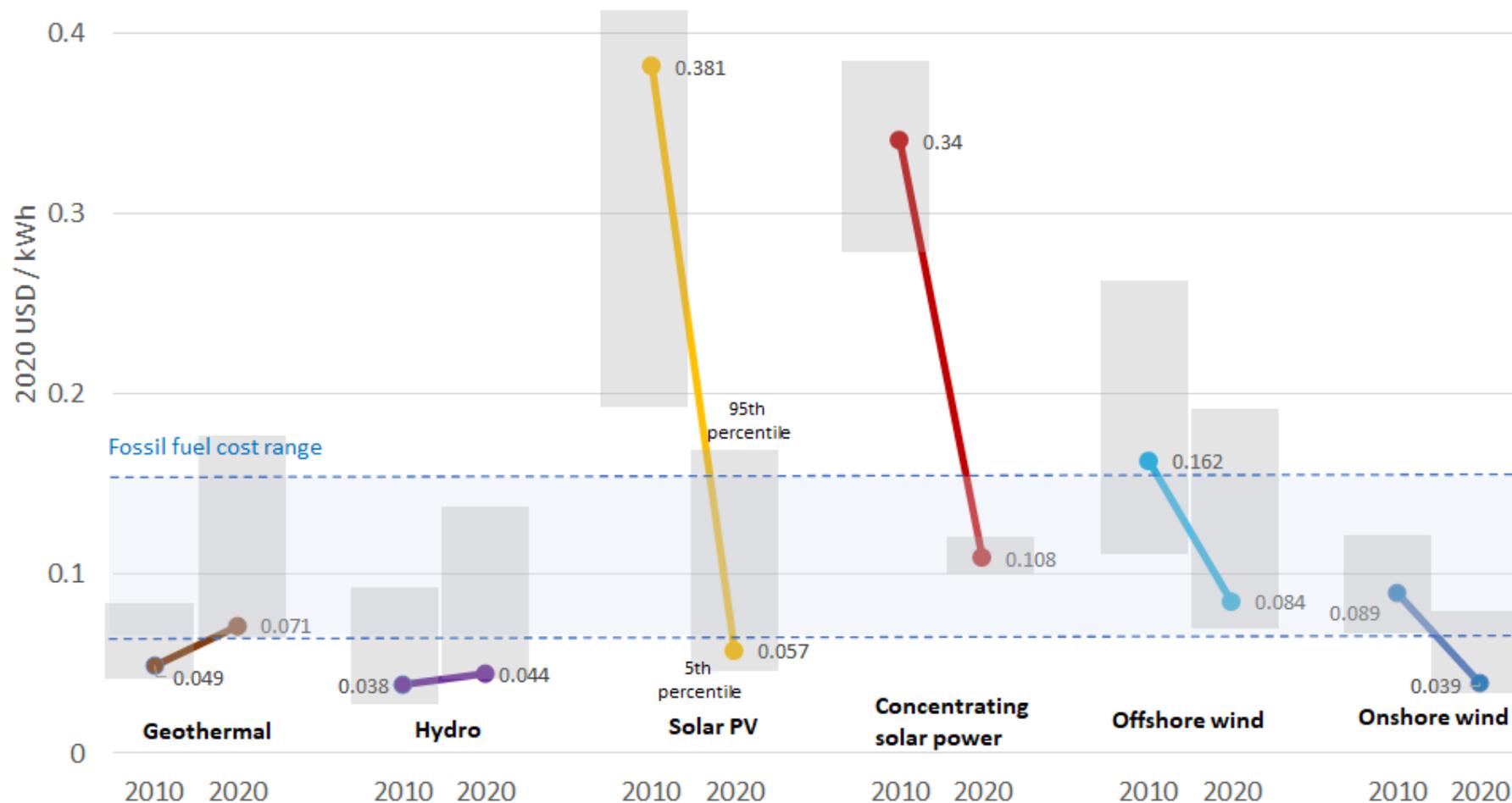
- Coal demand is in terminal decline, falling by over 70% by 2050
- Natural gas grows before declining by 2050 to around 90% of the 2021 levels
- Coal and natural gas are 20% of the mix in 2050, down from 50% in 2021
- Renewables (wind, solar, geothermal and biomass) expand rapidly from 4% in 2018 to 40% in 2050

Why will the sustainable energy transition occur?

- Over the next thirty years, the world will transition to a sustainable energy system. The key factors driving the transition are:
- **Population and GDP growth** put a significant strain on today's energy supply
- **Climate change** The world will reduce carbon emissions via cleaner energy
- **Pollution** Governments will drive air pollution out of cities via cleaner energy
- **Energy security** Sustainable energy tends to be distributed, will lower reliance on energy imports
- **Economics** Sustainable sources of energy will be cheaper than the incumbents

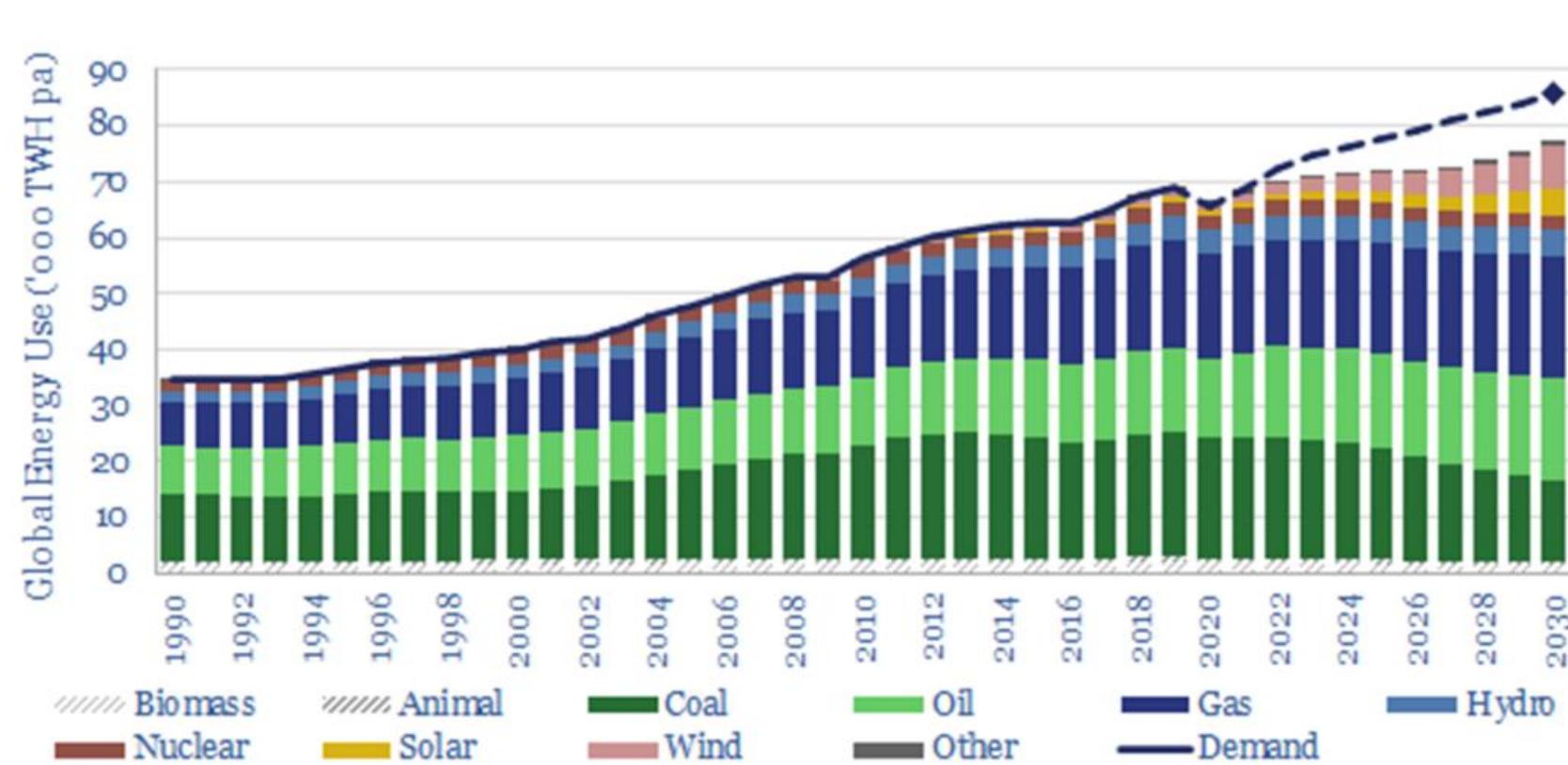
The cost of generating renewable electricity has collapsed

Global LCOE of utility-scale renewable power generation technologies (2010–2020)



Global energy shortage likely opening up in the 2020s

Global energy demand vs supply ('000s TWH pa)



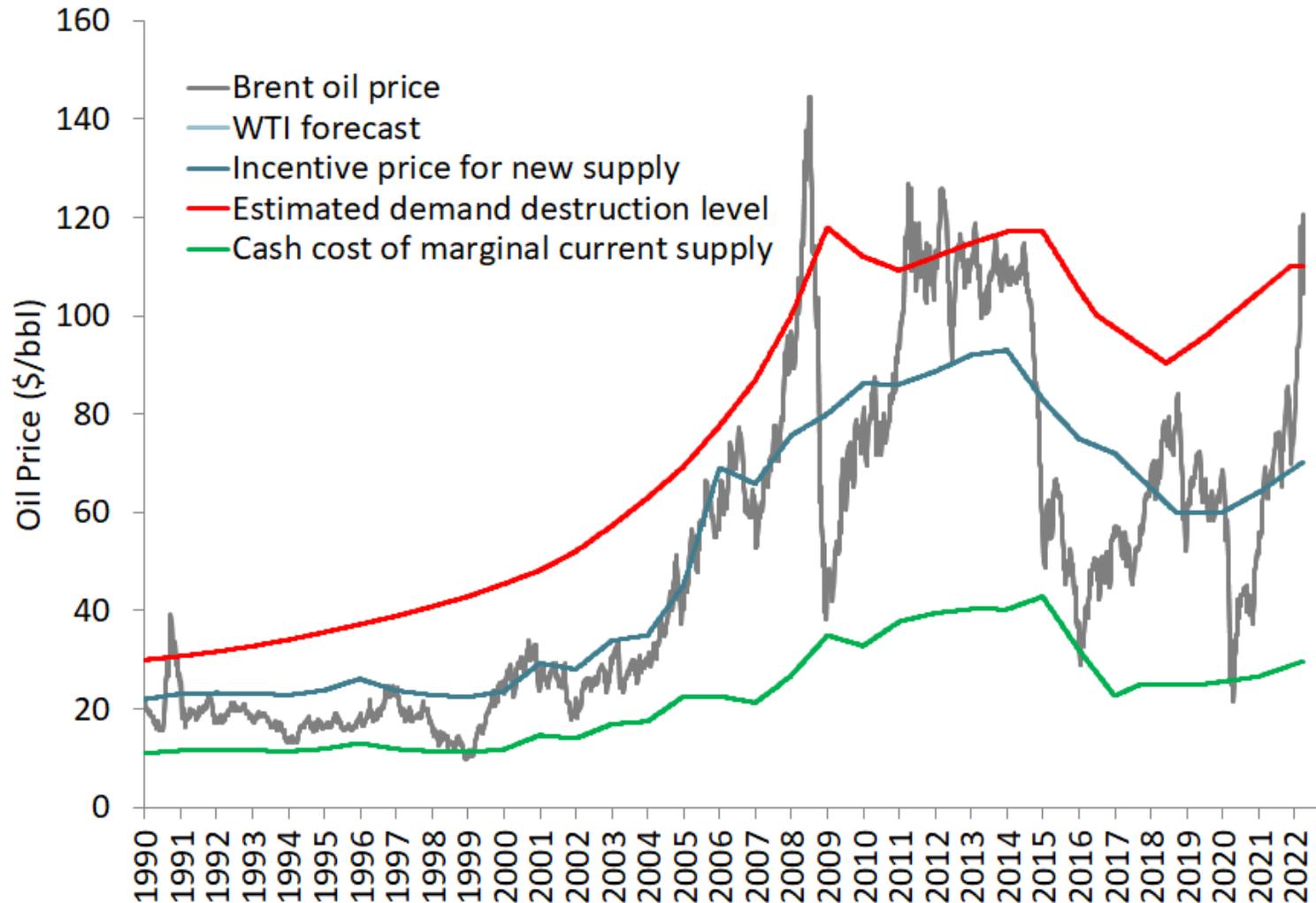
- Global energy demand and supply have been well matched over the last 30 years
- An energy supply deficit is opening up in 2022 of around 2%, potentially widening to c.8% by 2030 (if current plans are pursued)
- Likely to result in some demand destruction (via higher energy prices), acceleration of renewables, and some easing of conventional energy winddown

Likely path for hydrocarbon markets in the energy transition

oil

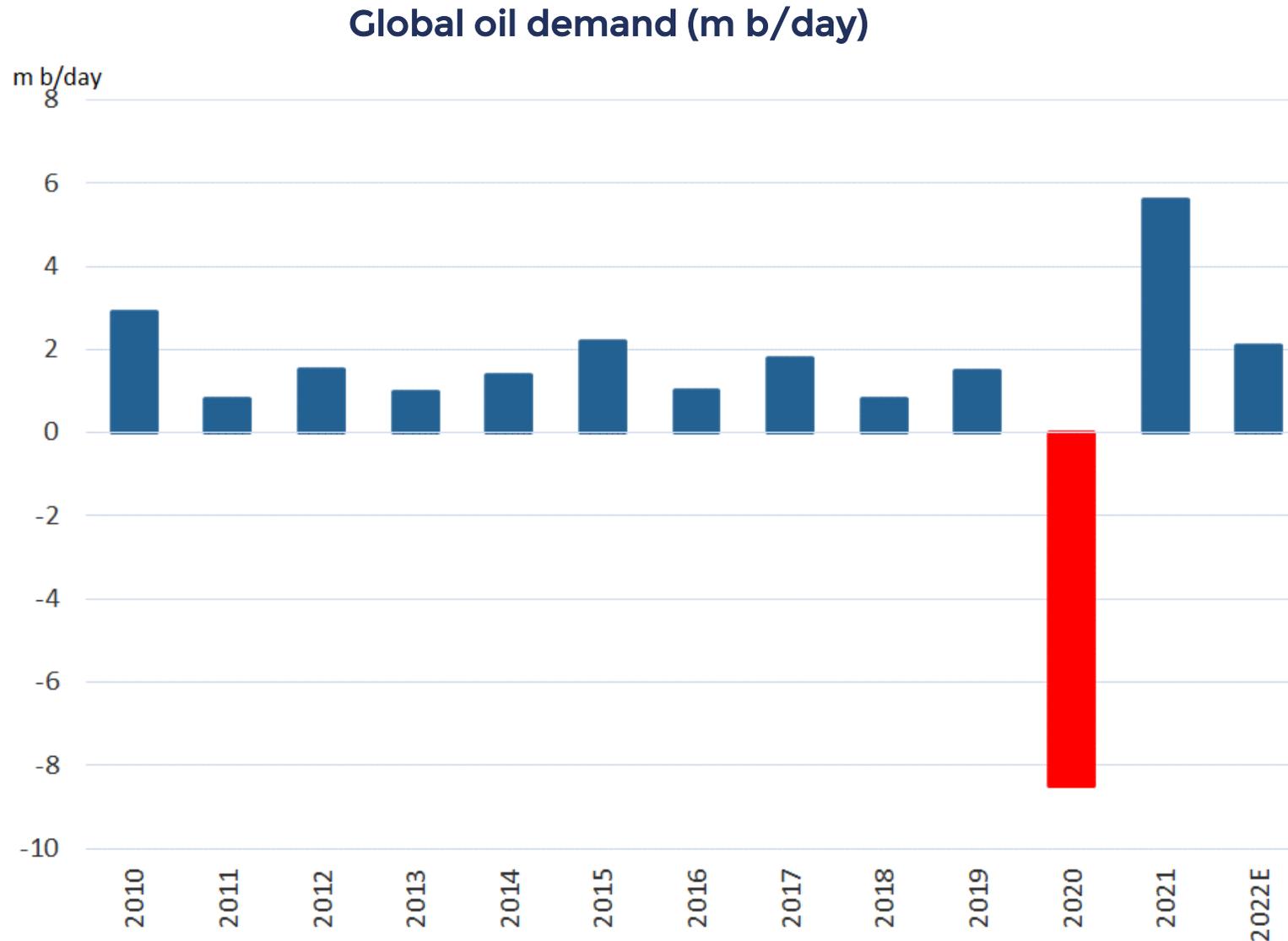
Economics: marginal cost of supply has historically defined price

Economics of crude oil



- Historically, both crude oil and natural gas commodity prices have traded between the cash cost of supply and the price at which demand is destroyed

Global oil demand: slower recovery continues in 2022



- Global oil demand in 2020 down by 8.5m b/day - dwarfing any previous downturn
- A recovery of 5.6m b/day in 2021, followed by 2.1m b/day in 2022
- 2022 recovery slowed by higher prices and lower global growth forecasts stemming from Russia/Ukraine crisis

Near term oil demand: post-COVID recovery continuing

- 2022: OECD still 3% behind 2019 demand, whereas non-OECD 2% ahead (and 3% ahead ex Russia)

Global oil demand (m b/day)

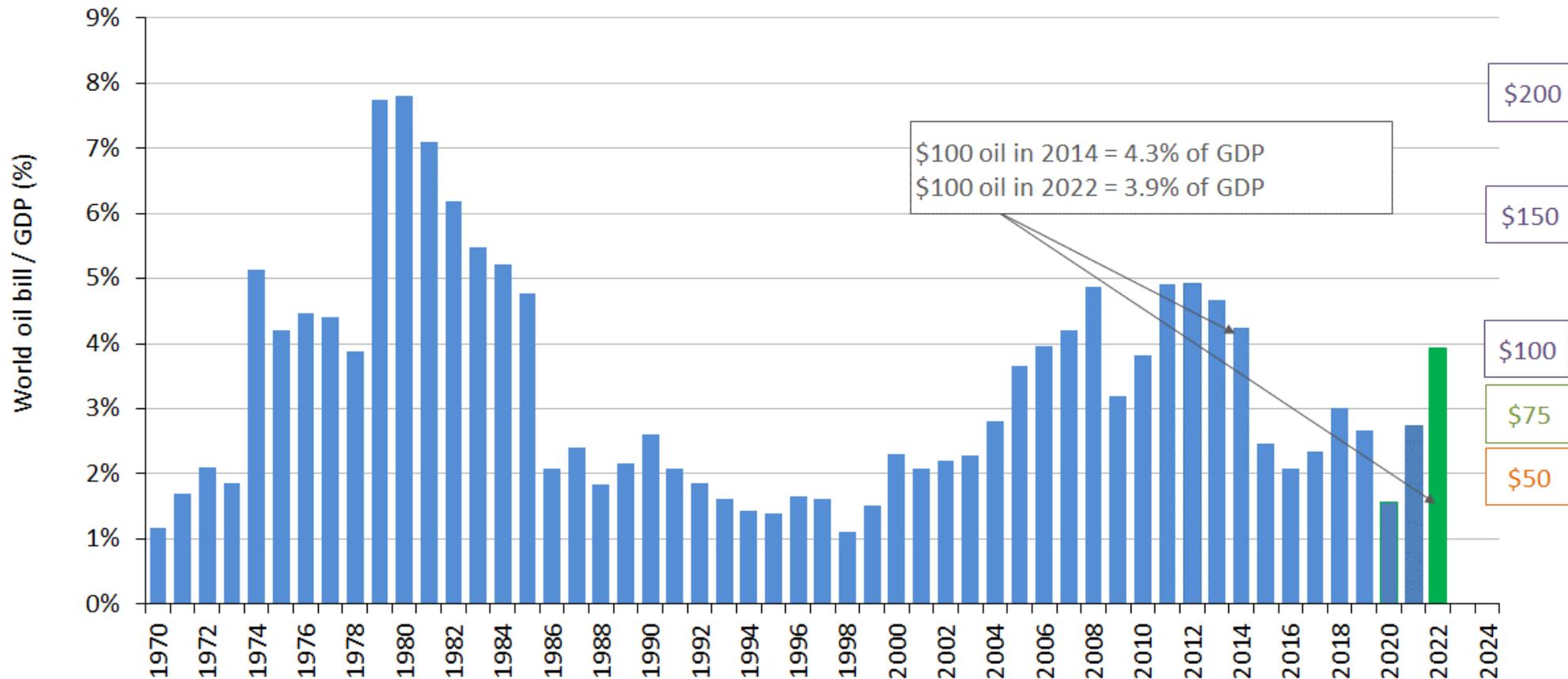
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022E
OECD demand												IEA	IEA
North America	24.1	24.0	23.6	24.2	24.2	24.6	24.9	25.1	25.4	25.5	22.6	24.3	24.9
Europe	14.7	14.3	13.8	13.6	13.5	13.8	14.0	14.4	14.3	14.3	12.4	13.1	13.5
Pacific	8.2	8.2	8.5	8.3	8.1	8.1	8.1	8.1	8.0	7.9	7.1	7.4	7.6
Total OECD	47.0	46.5	45.9	46.1	45.8	46.5	47.1	47.7	47.7	47.7	42.1	44.6	46.0
<i>Change in OECD demand</i>	0.6	-0.5	-0.6	0.2	-0.3	0.7	0.6	0.6	0.0	0.0	-5.6	2.5	1.4
NON-OECD demand													
FSU	4.1	4.4	4.6	4.5	4.6	4.6	4.4	4.7	4.7	4.7	4.5	4.8	4.4
Europe	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.8	0.8
China	8.9	9.3	9.9	10.4	10.8	11.6	12.0	12.5	13.0	13.9	14.3	15.5	15.9
India	3.3	3.5	3.7	3.7	3.8	4.2	4.4	4.8	5.0	5.0	4.5	4.7	4.9
Other Asia	7.5	7.6	7.6	7.9	8.0	8.3	8.8	8.9	9.0	9.0	8.1	8.4	8.9
Latin America	6.1	6.2	6.5	6.6	6.8	6.7	6.5	6.4	6.3	6.3	5.6	6.0	6.0
Middle East	7.3	7.5	7.9	8.0	8.4	8.5	8.4	8.3	8.2	8.7	8.2	8.5	8.6
Africa	3.5	3.5	3.8	3.8	3.9	4.2	4.2	4.2	4.2	4.3	3.8	4.0	4.1
Total Non-OECD	41.4	42.7	44.8	45.6	47.4	48.8	49.3	50.4	51.1	52.7	49.8	52.7	53.6
<i>Change in non-OECD demand</i>	2.3	1.3	2.1	0.8	1.8	1.4	0.5	1.1	0.7	1.6	-2.9	2.9	0.9
Total Demand	88.4	89.2	90.7	91.7	93.1	95.3	96.3	98.1	98.9	100.4	91.9	97.5	99.6
<i>Change in demand</i>	2.9	0.8	1.5	1.0	1.4	2.2	1.0	1.8	0.8	1.5	-8.5	5.6	2.1

Source: IEA Oil Market Report March 2022

Oil price: \$100 oil implies spend of 3.9% of world GDP in 2022

- L-T, we believe Saudi is targeting a price that gives a “reasonable” world oil bill
- Ten year average world oil bill is 3.6%, 20yr average is 3.3%, 30yr average is 2.8%

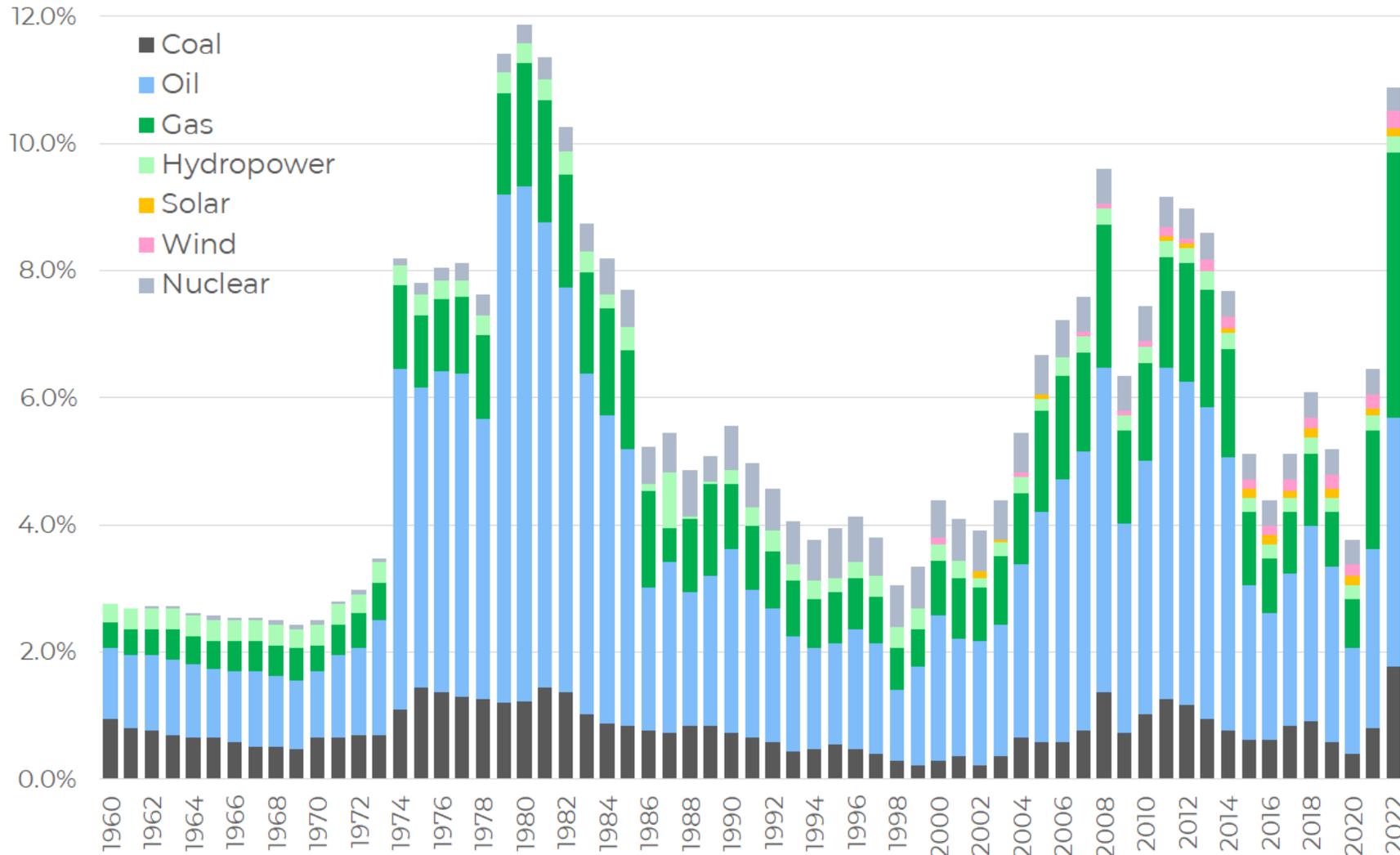
The world oil ‘bill’ as a percentage of world GDP



Source Bloomberg LP; Guinness Global Investors, data as of April 2022

Energy prices: 2022 prices creating similar burden as 1979/80 crisis

The world primary energy 'bill' as a percentage of world GDP

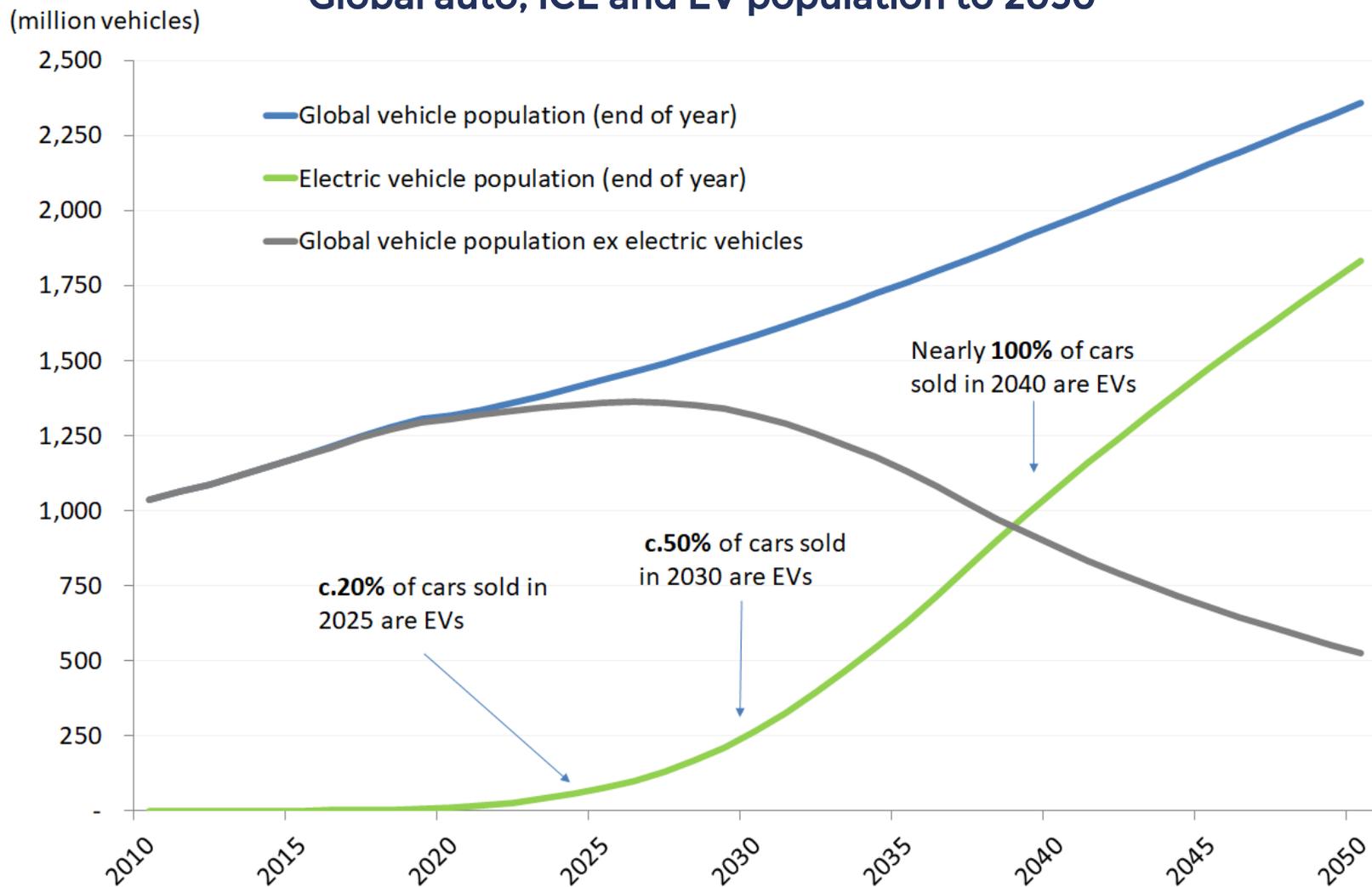


- Assuming \$100/bl oil and \$20/mcf gas in 2022, world energy bill is around 11%, the highest in >40 years
- Similar conditions in 1979/80 caused a global GDP slowdown

Source Bloomberg LP; Thunder Said; Guinness Global Investors, data as of April 2022

Oil demand: EVs starting to pressure light auto oil demand

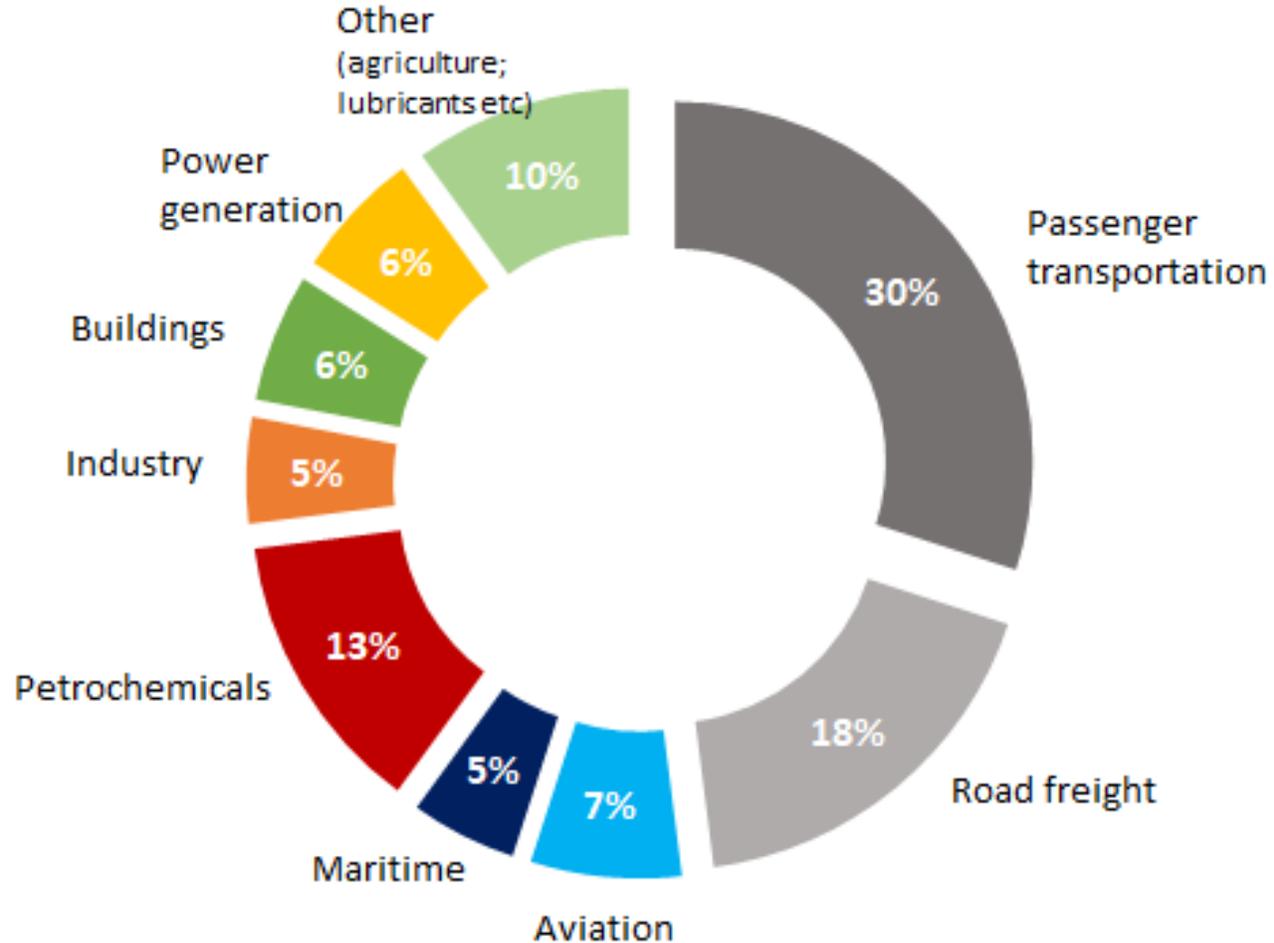
Global auto, ICE and EV population to 2050



- Crude oil is 30% used in light auto transportation - EVs starting to show up
- Global light auto oil demand likely peaks in the next 5 years

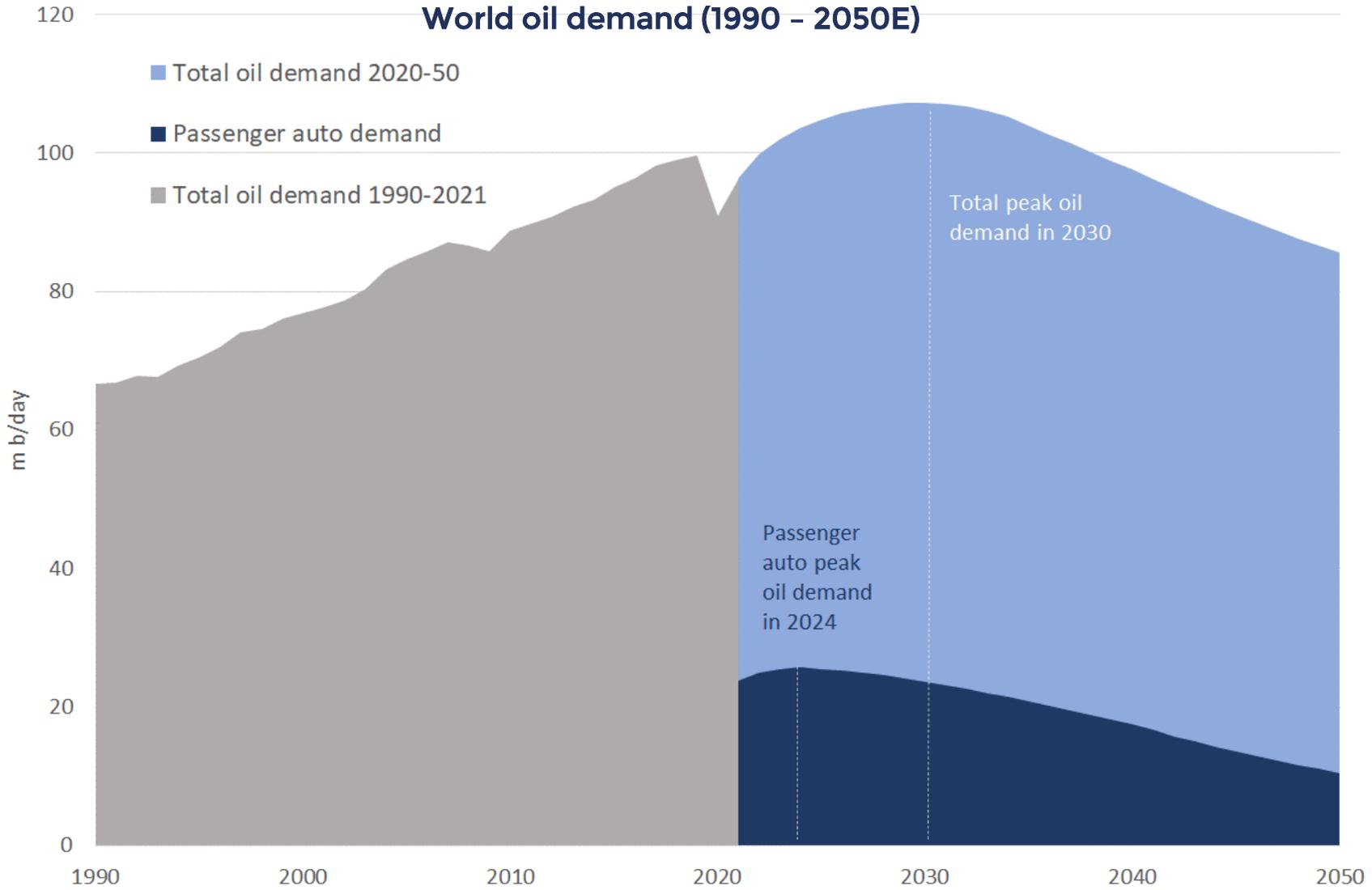
Oil demand: what about the rest?

Oil demand by sector



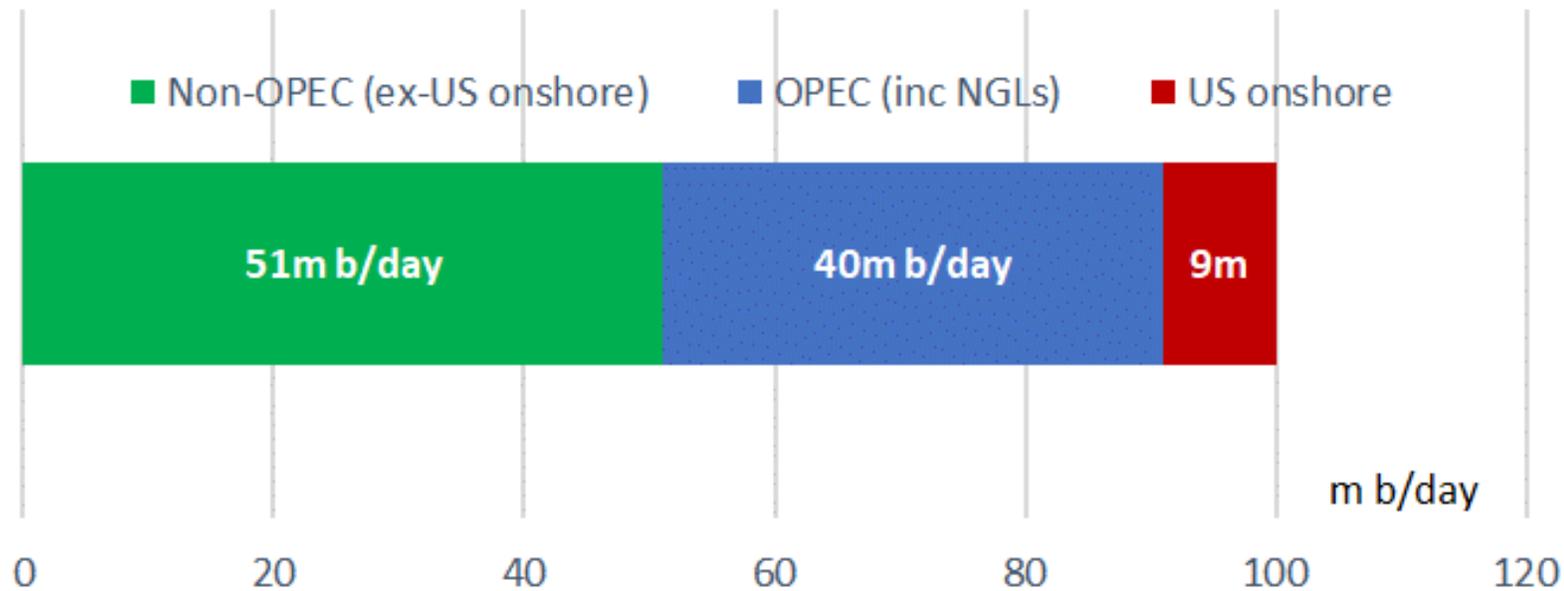
- Passenger vehicles account for 30% of oil demand. Other key sources of demand (heavy transport; petrochemicals) more closely linked to GDP growth

Global oil demand: we see peak around 2030



Global oil supply: three main components

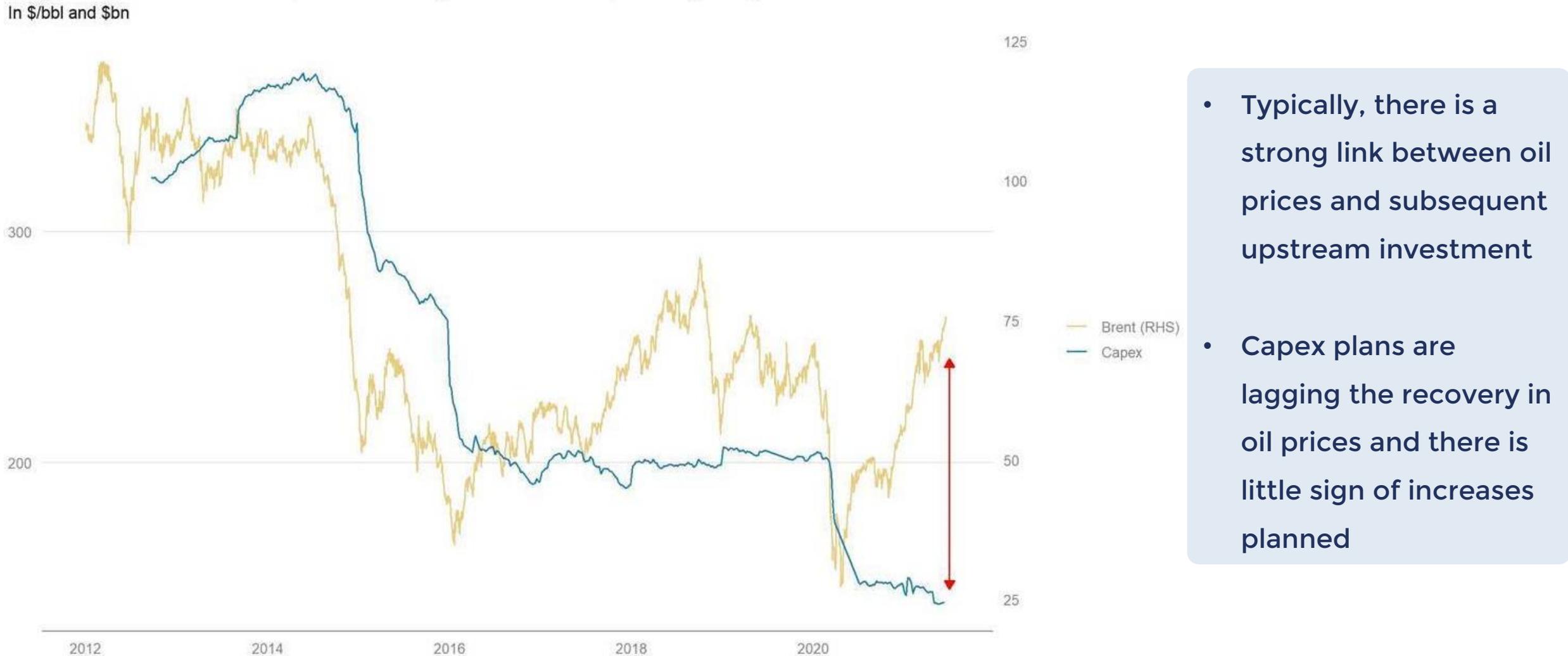
Global oil supply in 2022 (m b/day)



- **Non-OPEC (ex-US onshore):** holding up thanks to legacy projects, but facing decline
- **OPEC (inc NGLs):** low cost production, but in countries struggling to breakeven fiscally
- **US onshore:** shorter cycle, able to grow at \$50+/bl

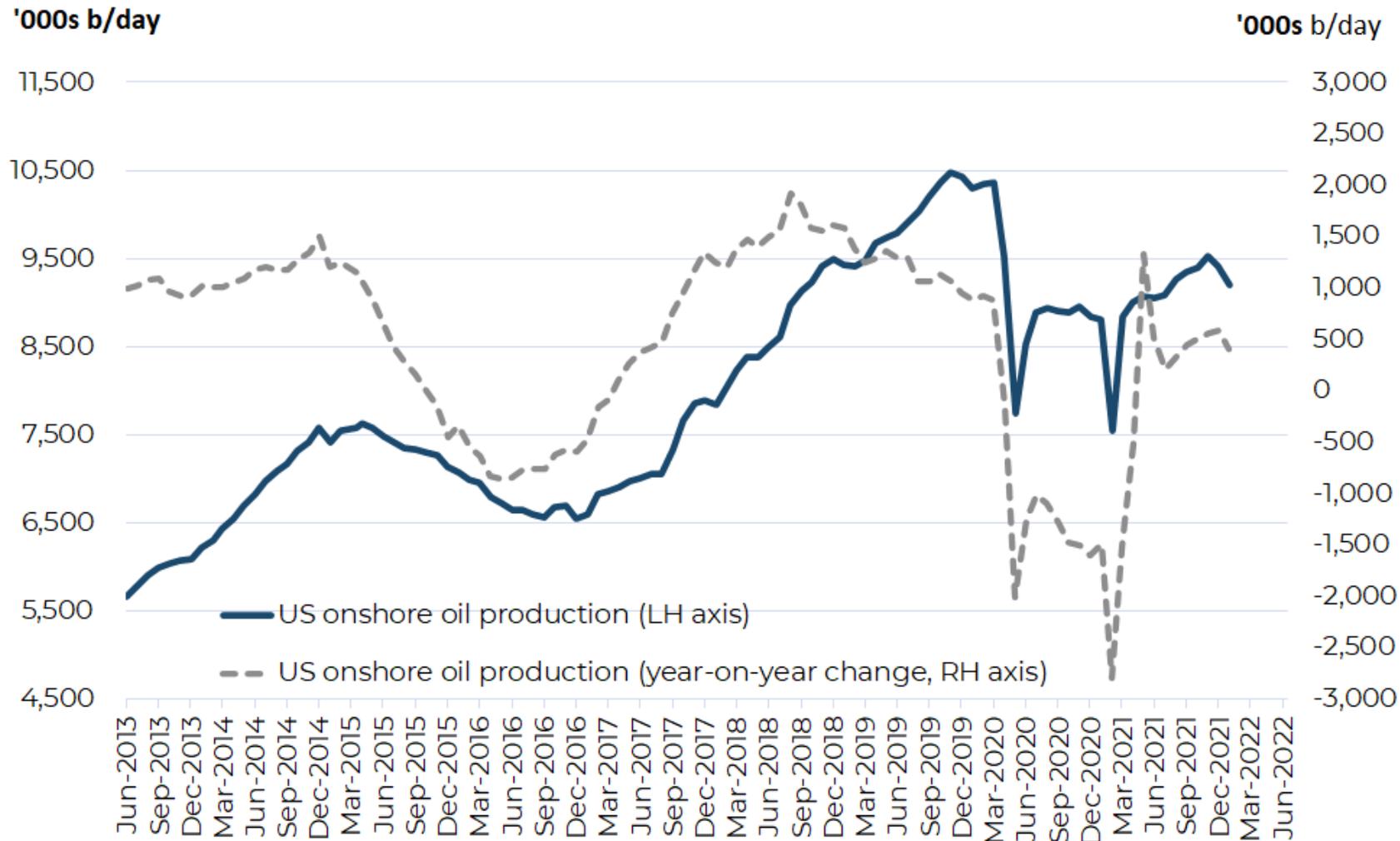
Capital expenditure lagging in the oil price recovery

Oil prices vs CAPEX for the 112 largest listed oil companies globally



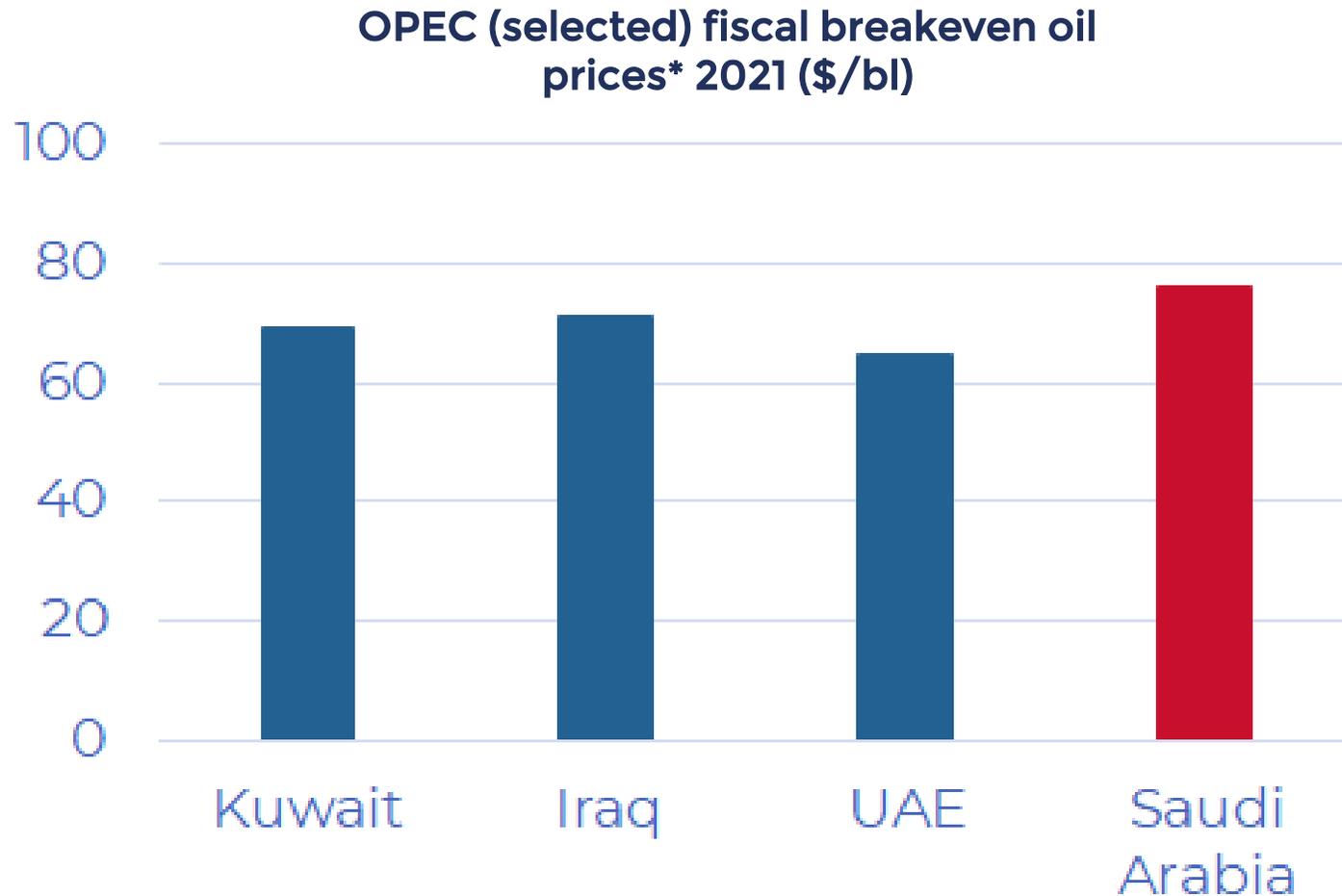
Non-OPEC oil supply: US oil supply recovering gradually

US onshore oil production (k b/day)



- US shale oil supply remains 1.2m b/day behind Nov 2019 peak
- Growth of at least 0.75m b/day expected in 2022

OPEC oil supply: fiscal budgets imply high oil price needs

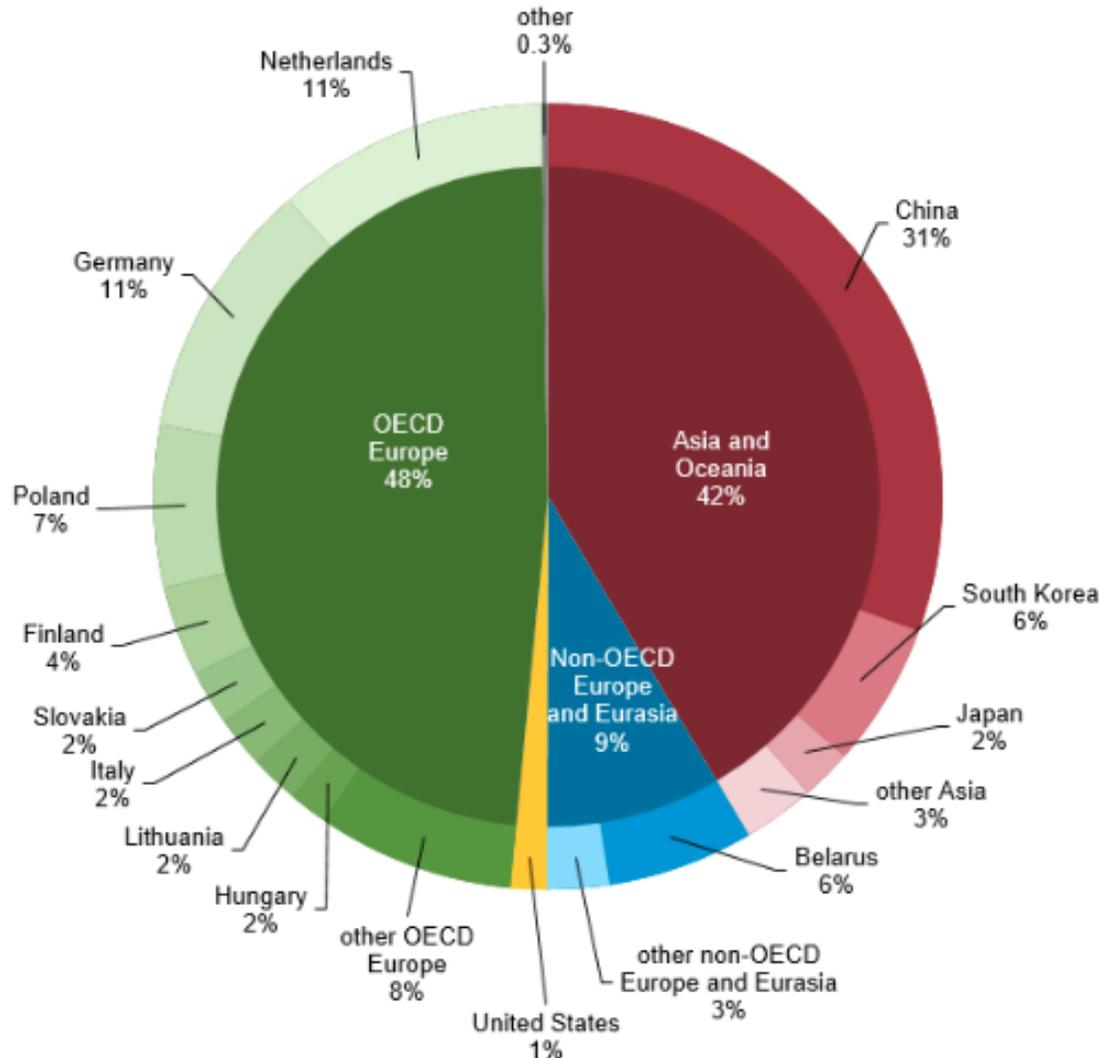


- The actual economic cost of developing most OPEC oil remains very low
- Higher levels of government expenditure necessitate greater oil revenues
- The fiscal breakeven oil price* for Saudi in 2021 is estimated to be \$76 per barrel

*Required oil price' is defined as the oil price that is needed by each country to balance fiscal budgets (source: IMF; Guinness Global Investors)

Russian oil supply disruption building

Russia's crude and other liquids exports by destination (2020)

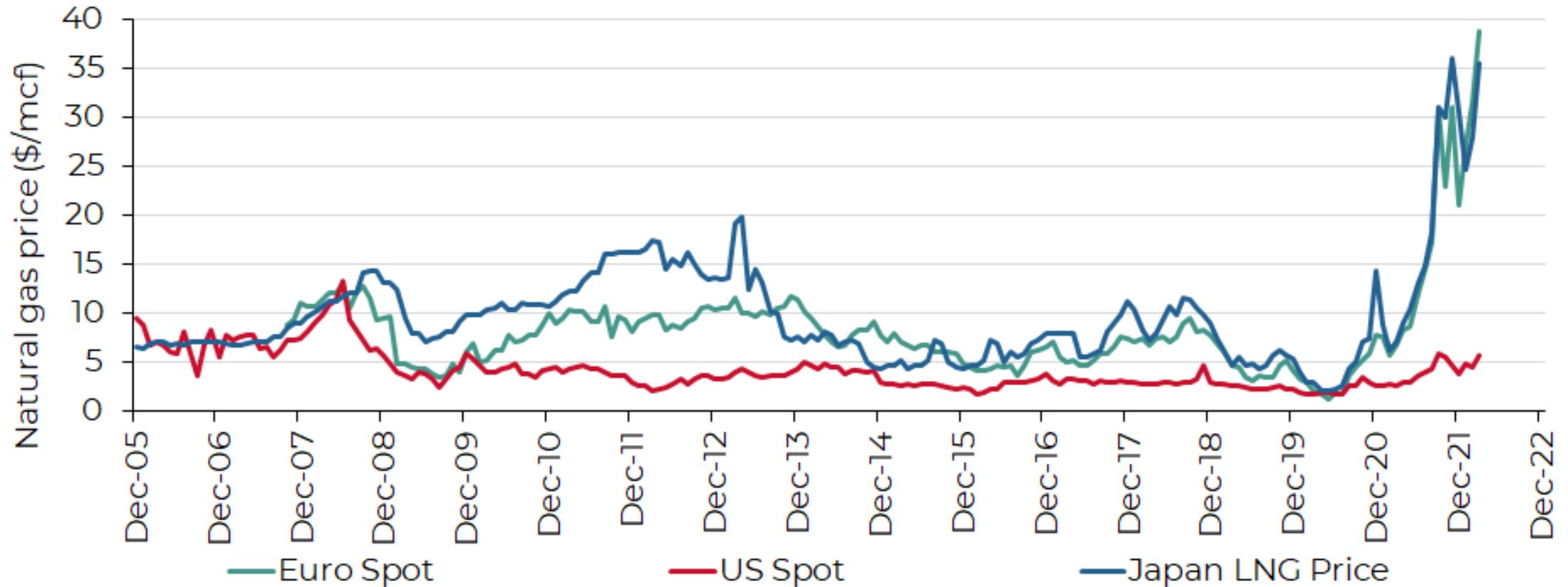


- Russia normally exports around 8m b/day of crude oil and oil products
- The IEA estimates a supply shortfall from Russia of around 3m b/day in the coming few months (2.5m b/day reduction in oil and product exports; 0.5m b/day reduction in Russian domestic demand)
- A portion of Russian exports already being rerouted to Asia - expect this to grow

Natural gas: summary views

- Extraordinary spike in Asian and European gas prices on tight market conditions
- US gas price also being pulled higher, though largely dislocated from the world market

Global natural gas prices (US\$/mcf)



How we invest in the oil & gas theme:

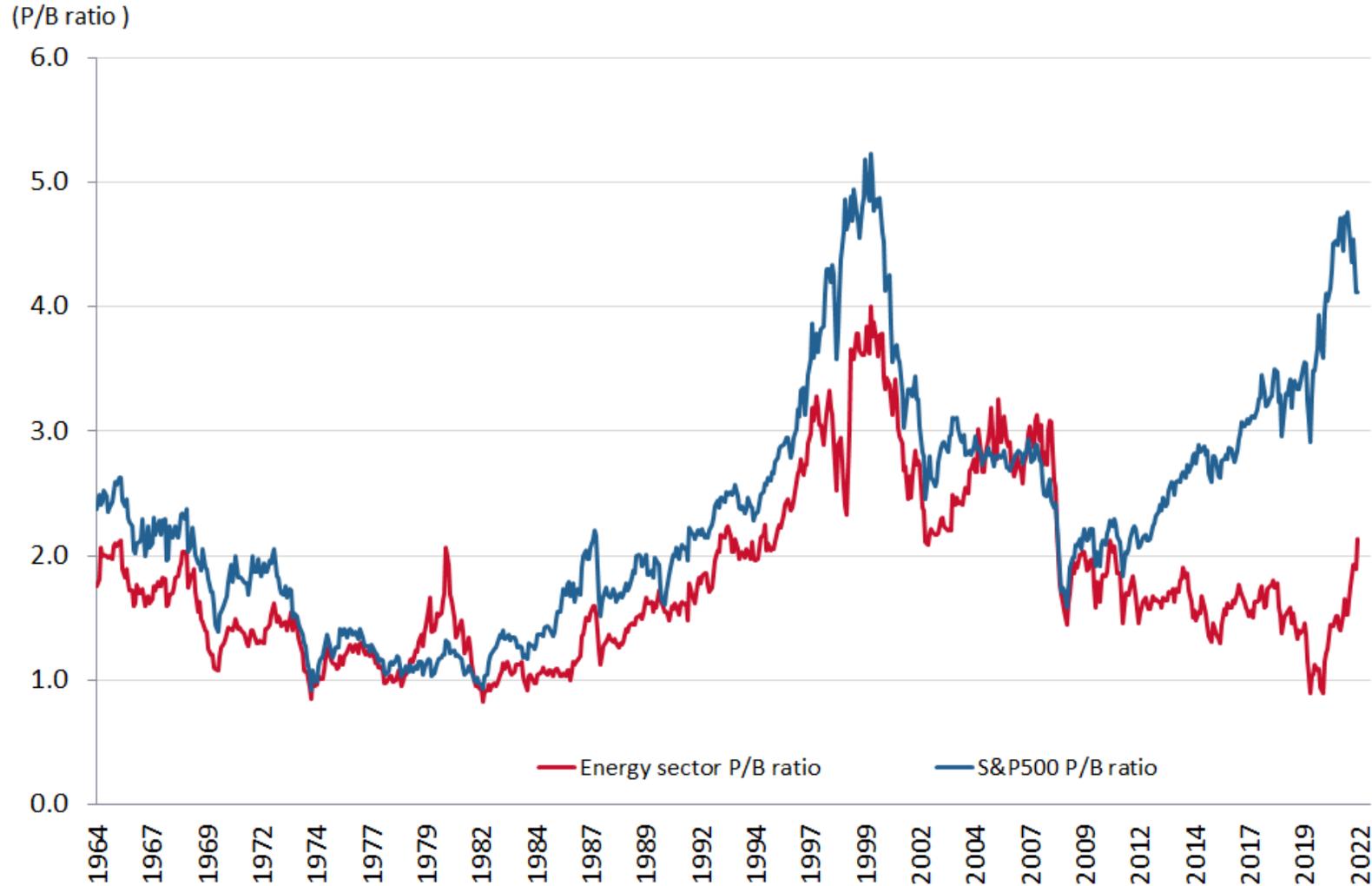
Guinness Global Energy Fund

Global Energy Fund characteristics

Single sector	Companies engaged in the production and distribution of energy (oil, natural gas, coal, alternative energy, nuclear and utilities)
High conviction	Equally weighted, concentrated portfolio (30 positions)
Unconstrained	No reference to index
Global	Diversified globally
Investment type	Listed equities (long-only)
Fund structure	Dublin OEIC (UCITS IV); daily dealing; no performance fees

Energy equities: price to book at extreme

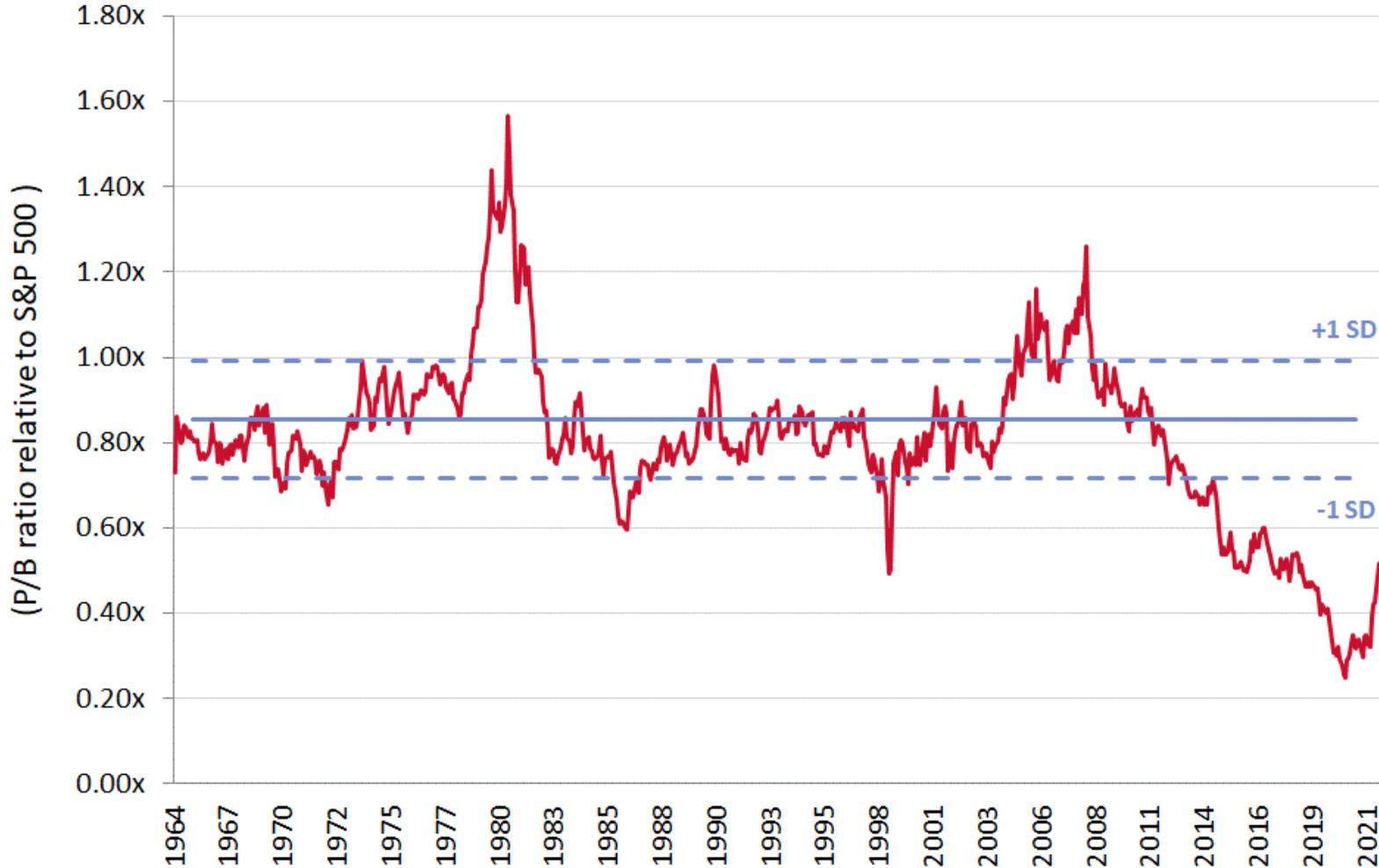
Energy companies: historic price to book valuation relative to S&P 500



- The energy sector is trading at a P/B ratio of 2.1x vs the S&P 500 on 4.1x

Energy equities: relative price to book still low

Energy companies: historic price to book valuation relative to S&P 500

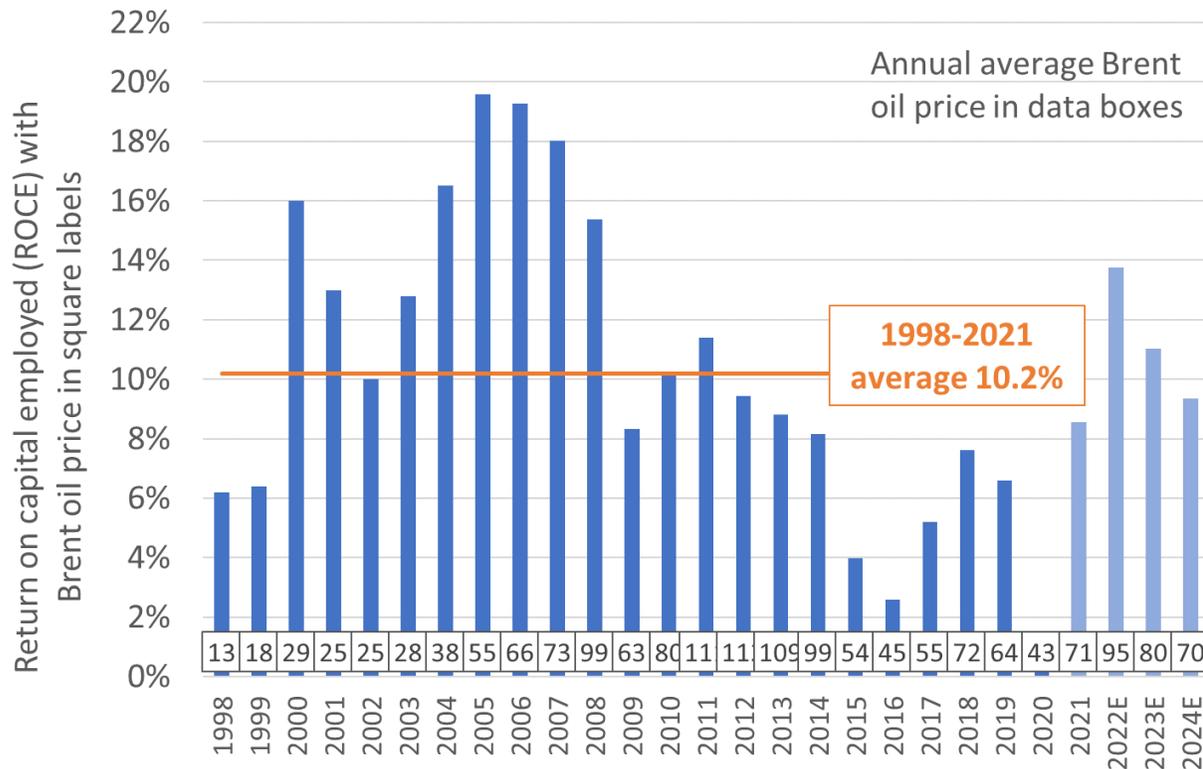


- The energy sector (at 0.52x the S&P500) is trading >2 standard deviations below its long run average

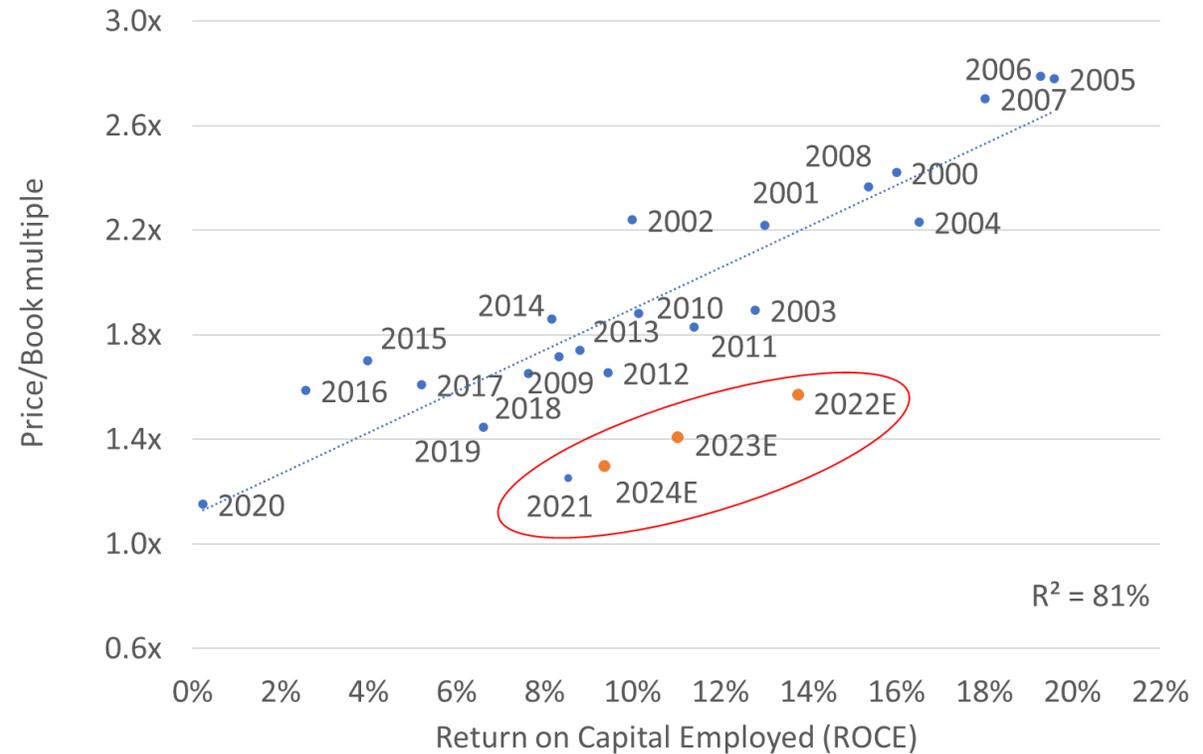
ROCE back to long term average and above

- Higher oil prices in 2021 took ROCE back to 8%+
- 11% ROCE would imply P/B ratio for portfolio in 2023 rising to around 2.0x (+40%)

ROCE of current Guinness Energy portfolio



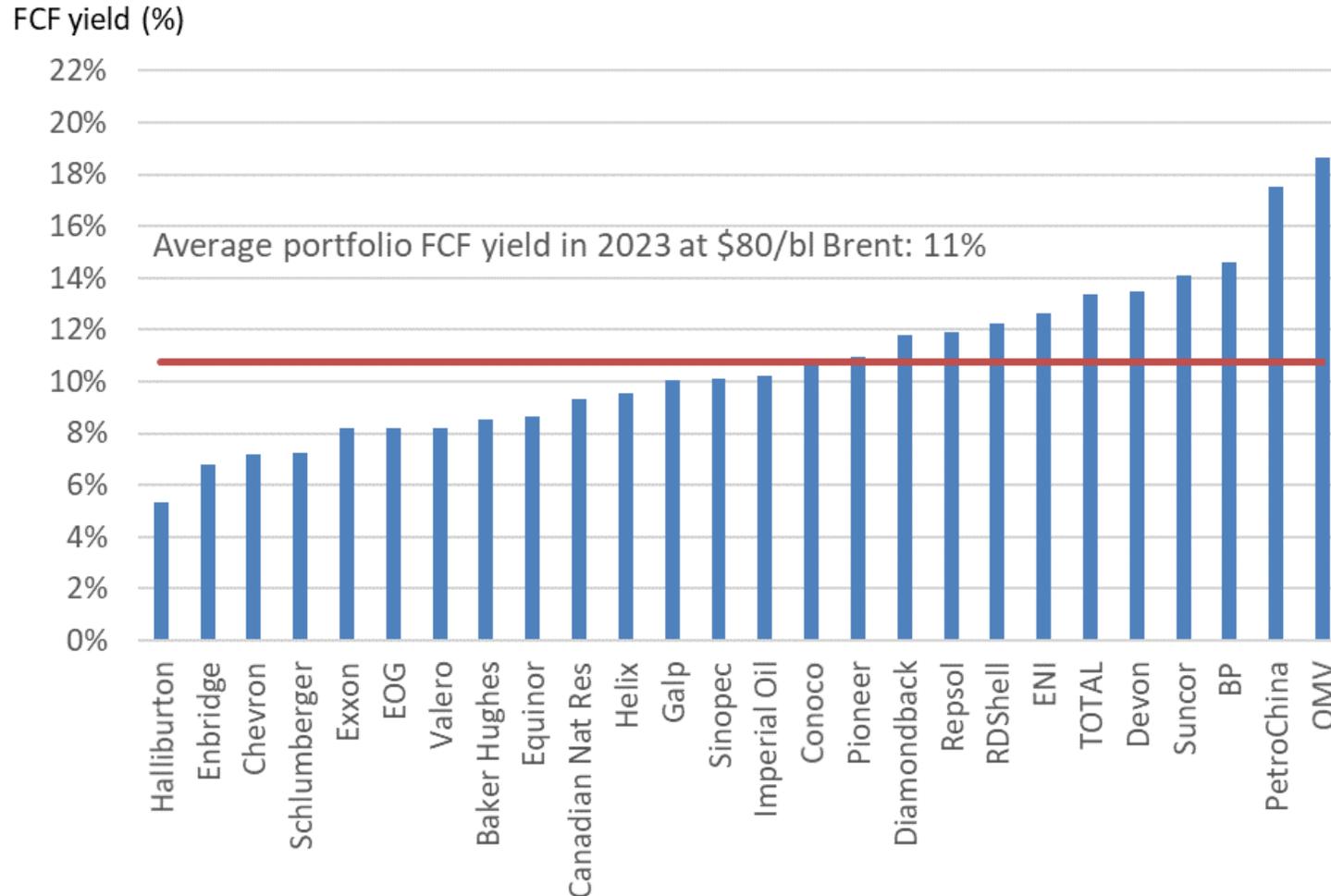
ROCE vs P/B multiple for Guinness Energy portfolio



a is available) in the Guinness Energy fund as of 31 March

Energy equities: strong portfolio FCF generation

Guinness global energy fund: est FCF yield in 2023 (%) by holding



- The estimated average free cashflow yield (after CAPEX) of holdings in the Guinness Global Energy Fund is 13% in 2022 (assumes \$95/bl Brent) and 11% in 2023 (assumes \$80/bl Brent)

Fund positioning: key themes in the fund for 2022

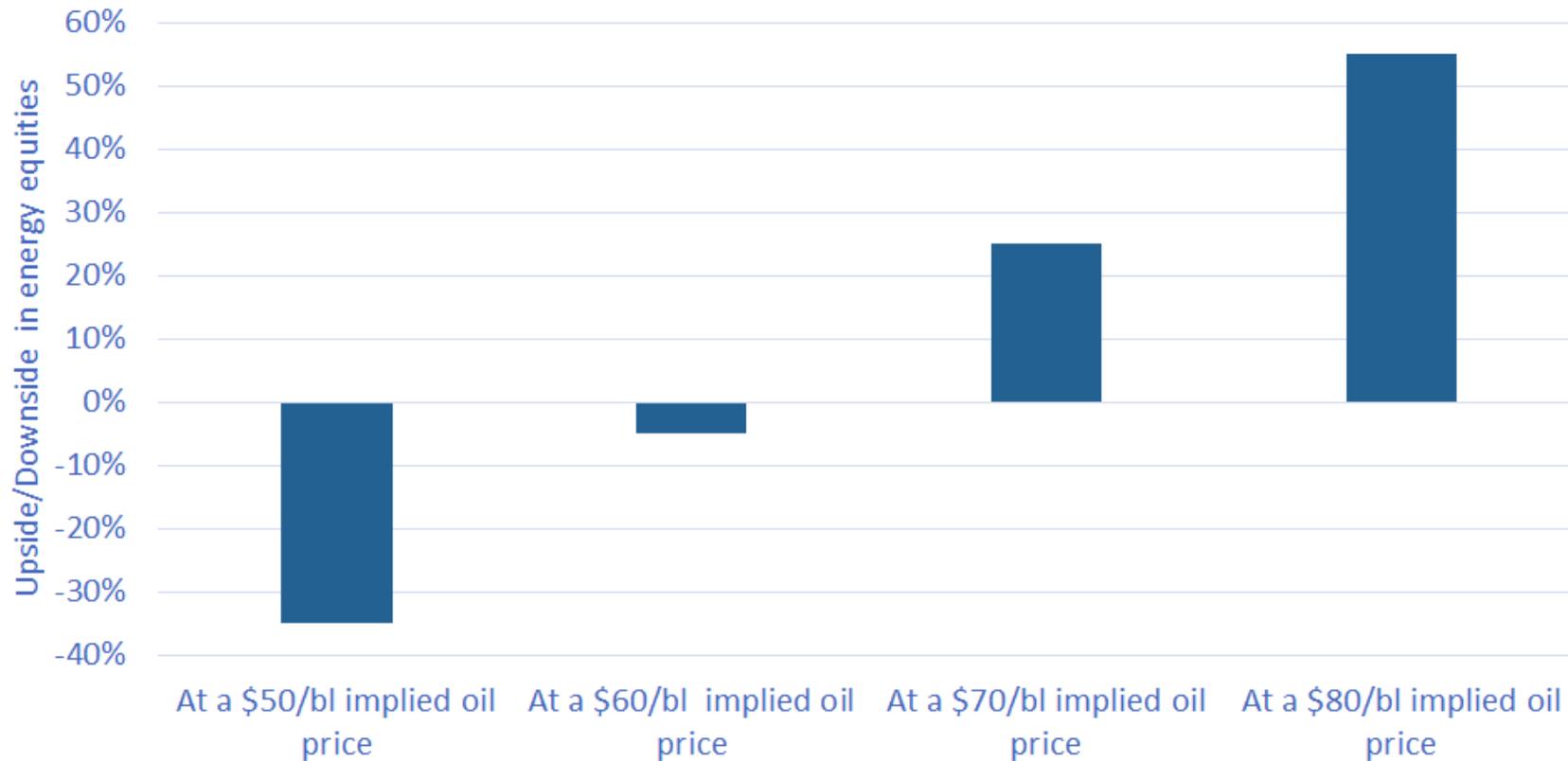
Theme	Example holdings	Weighting (%)
1 Higher quality large cap oil & gas	 	29.1%
2 Oil & gas majors	  	24.1%
3 North American shale exposure	  	19.2%
4 Refining-focused	 	8.7%
6 International service exposure	 	8.0%
5 International natural gas-focus	 	7.0%
7 Other (incl cash)		3.8%
		100.0%

Source: Guinness Asset Management, April 2022

Fund valuation: sensitivities to oil price

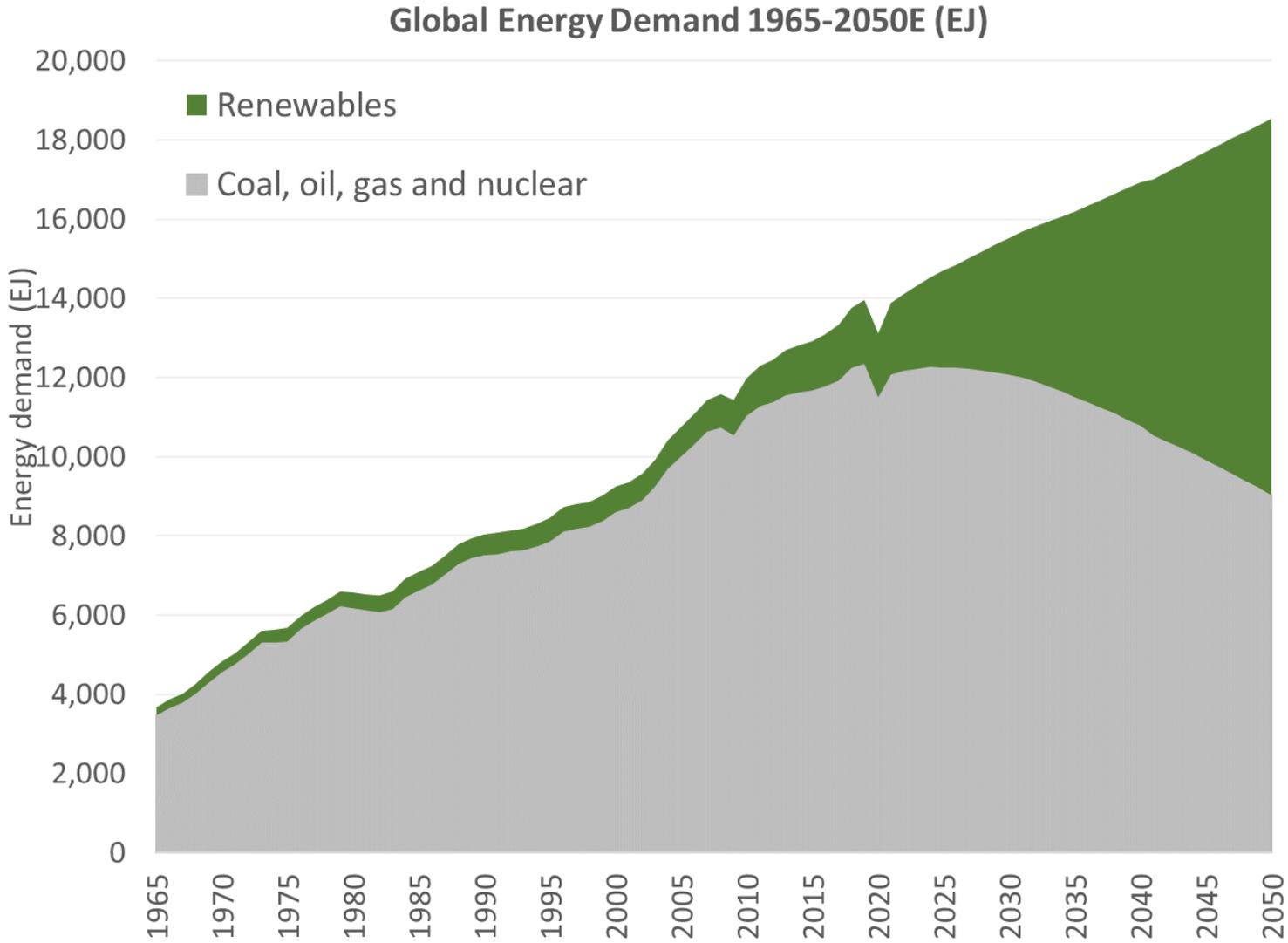
- Energy equities look to be about fair value if oil remains at c.\$64/bl forever
- Energy equities look c. -35%/-5%/25%/55% cheap if oil at \$50/\$60/\$70/\$80bl (WTI/Brent) is priced in

Upside/downside for Guinness energy portfolio (1 year forward view)



Outlook for renewable energy & energy efficiency

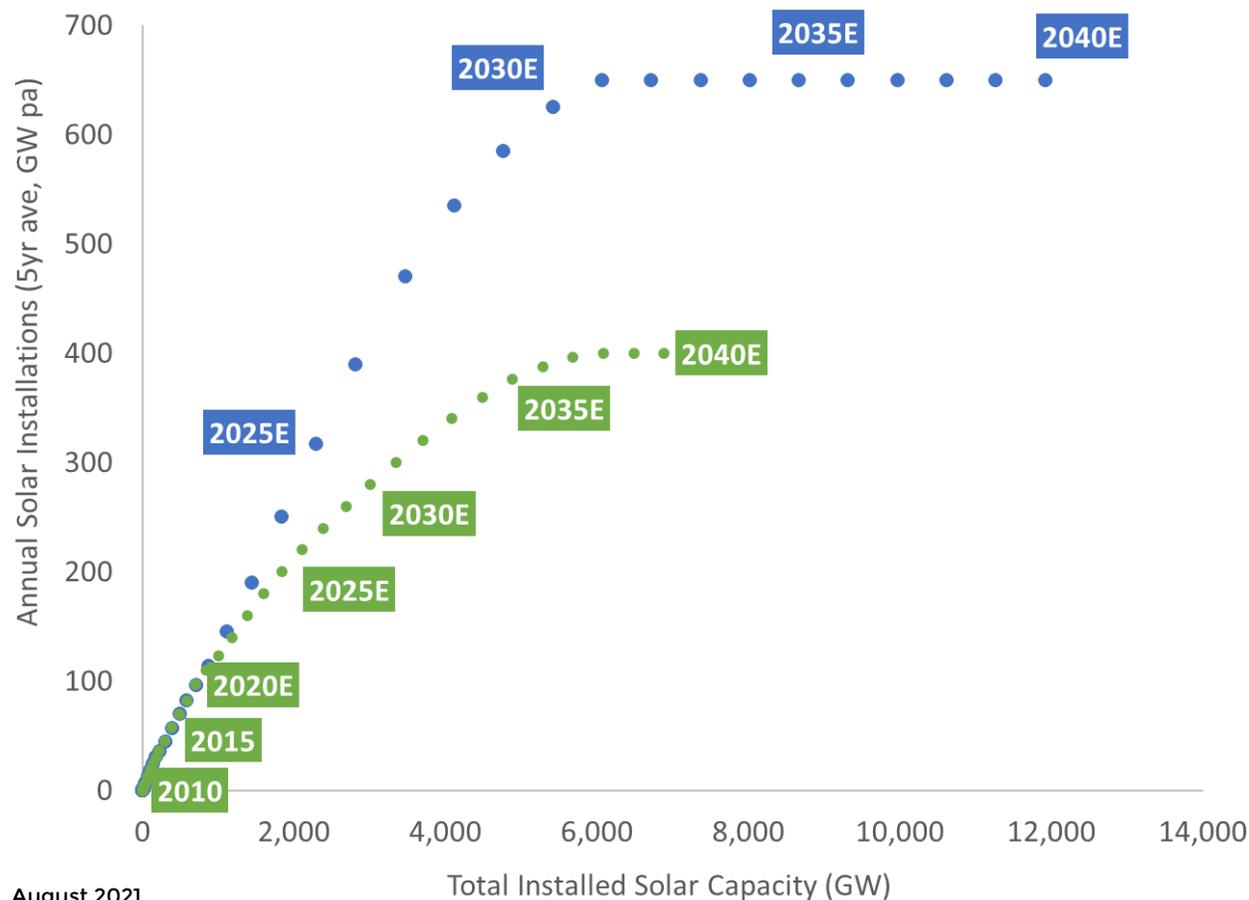
The energy transition: renewables will dominate growth



Solar annual installation to grow rapidly

- Annual solar installations have increased from 1 GW in 2006 to 173 GW in 2021
- Between 1998-2019, 586GW of solar cells were installed at a max 5yr average rate of 100 GW pa

Global solar annual installations and installed capacity (5 year average)

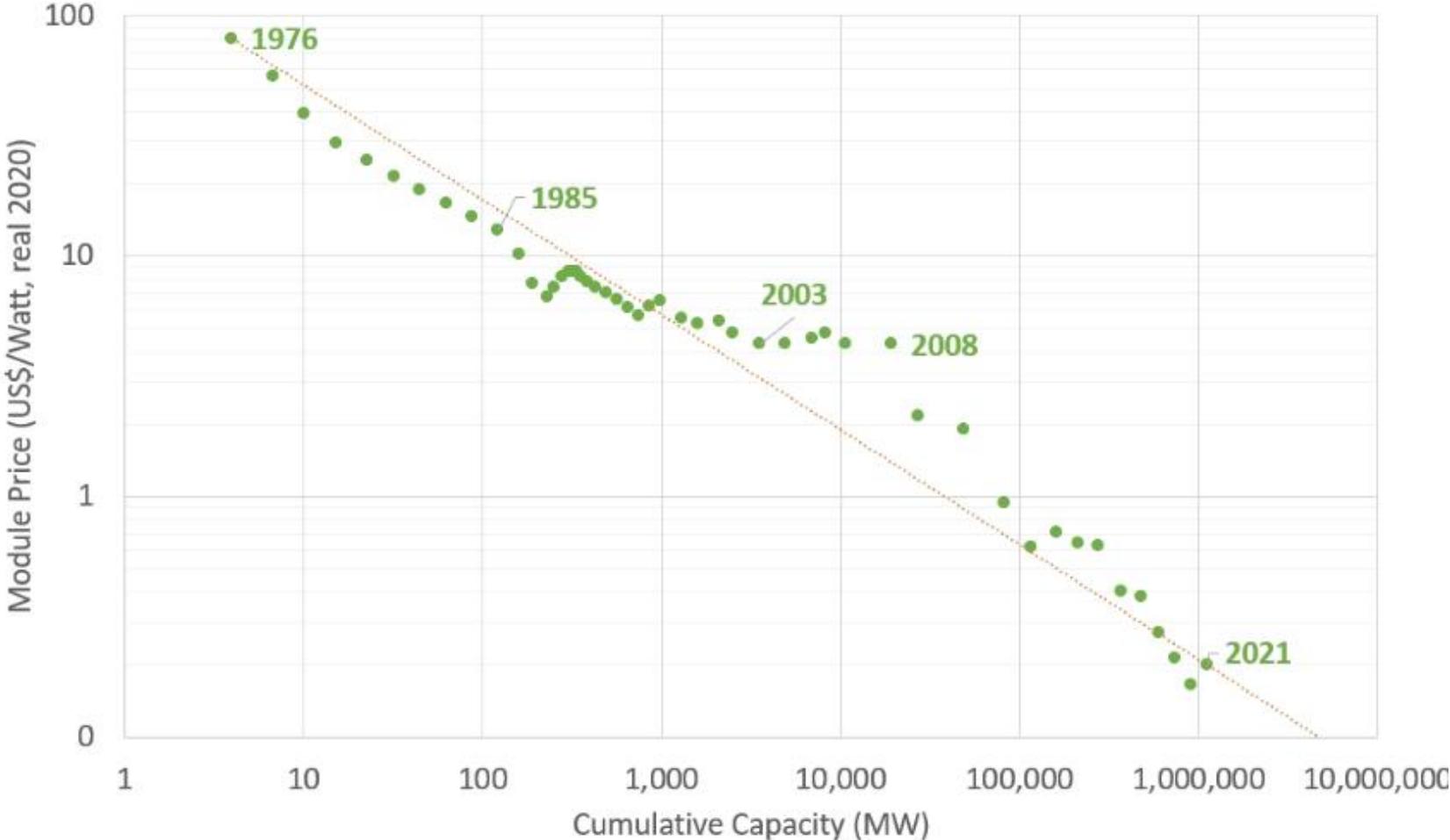


Guinness base case: Between 2020 and 2040, solar installations are 5,900GW (10x more than were installed between 1998 and 2019) with the 5yr average rate reaching a maximum rate of 400GWpa in the late 2030s

Achieving the **IPCC 1.5° scenario** would require installations to reach nearly 700GWpa with a total of 11,900GW being installed between 2020 and 2040

The learning rate for solar has been 28%

Solar module prices (1976 - 2021)

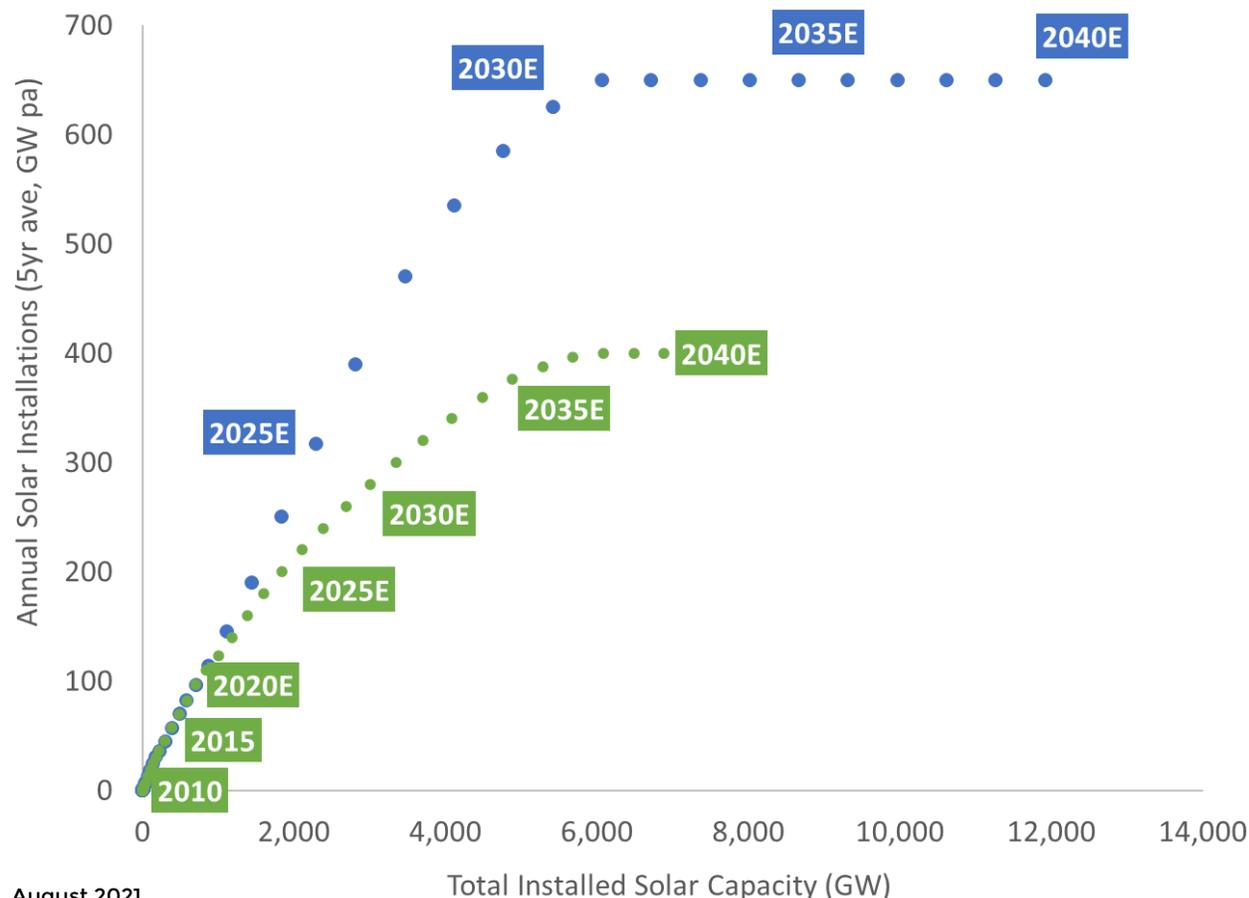


- The 'learning rate' is the cost reduction achieved on average for every doubling of capacity

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Global solar annual installations and installed capacity (5 year average)

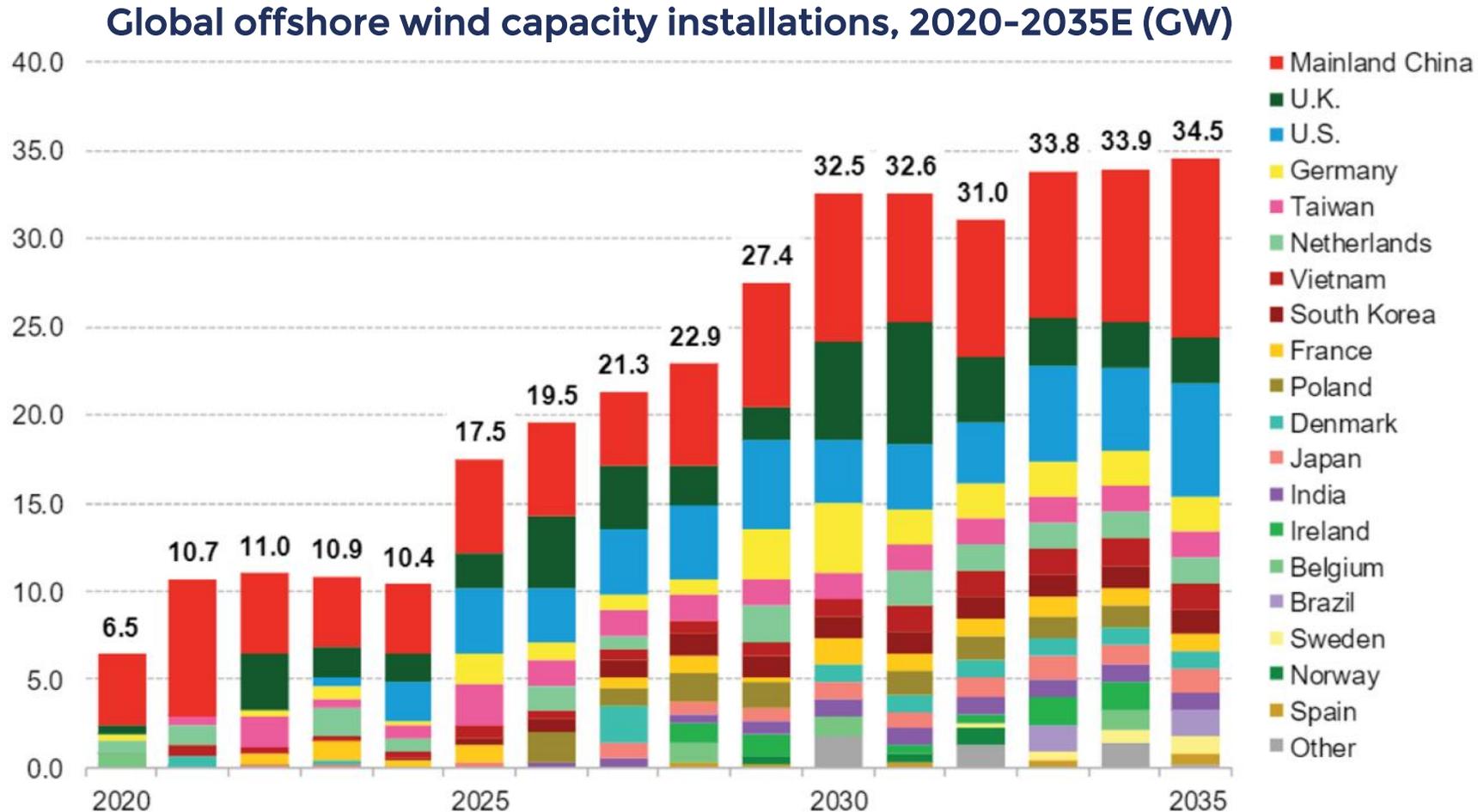


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Wind: annual offshore installations to treble by 2030

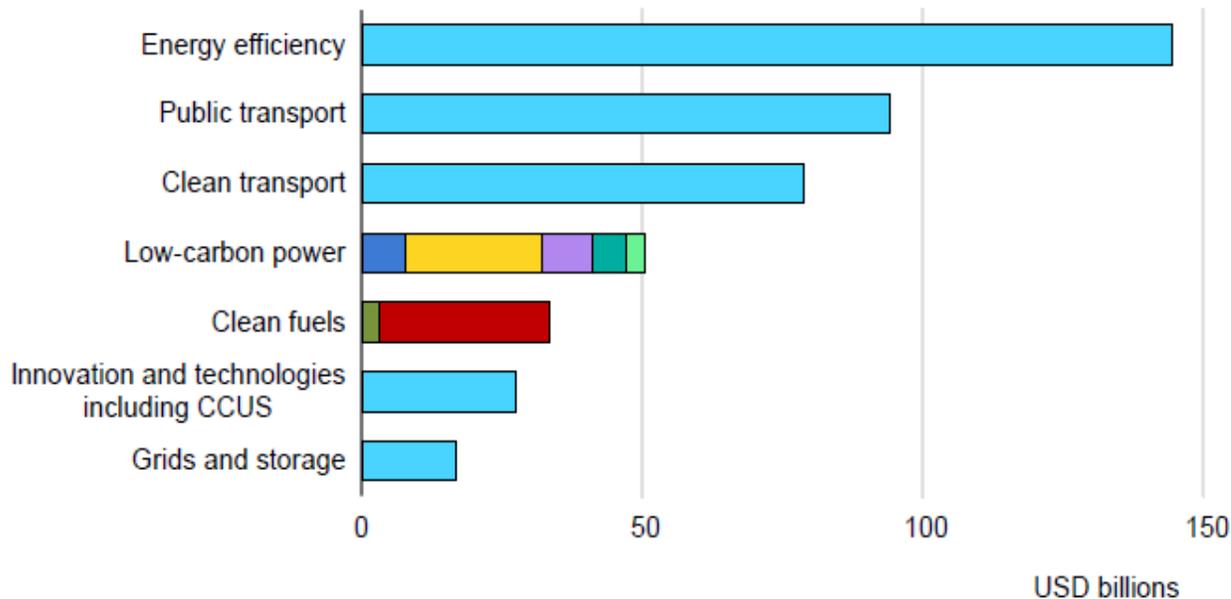
- Annual offshore wind installations increased from 1 GW in 2010 to an estimated 10.7 GW in 2021
- Offshore installations expected to treble by 2030 to 28 GW. Pickup comes in 2025 onwards



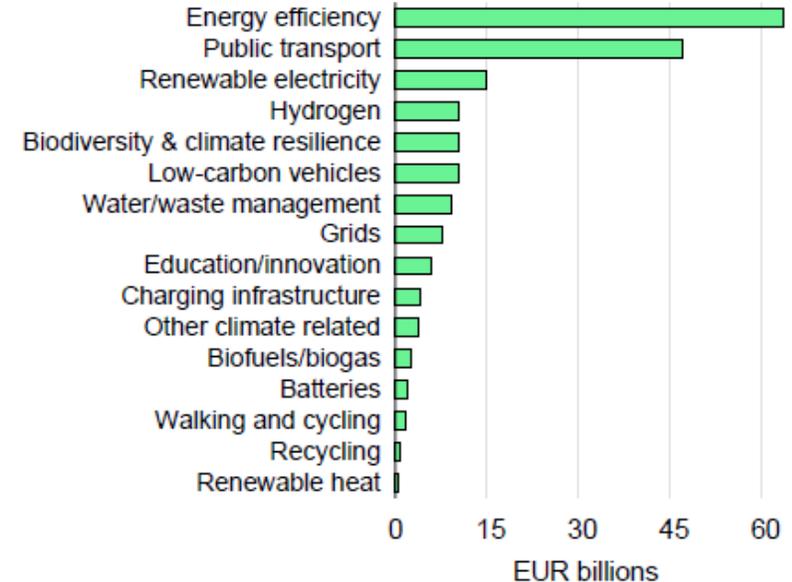
Efficiency investments starting to pick up, more needed

- Investment into energy efficiency is accelerating, a focus of government recovery packages
- Building renovation and building upgrades remain a critical focus
- Based on current government policies, the IEA estimates that energy efficiency spending needs to increase this decade from around \$250bn pa to around \$375bn pa, rising to \$550bn in the 2030s

Global government clean energy spending by sector and technology (October 2021)

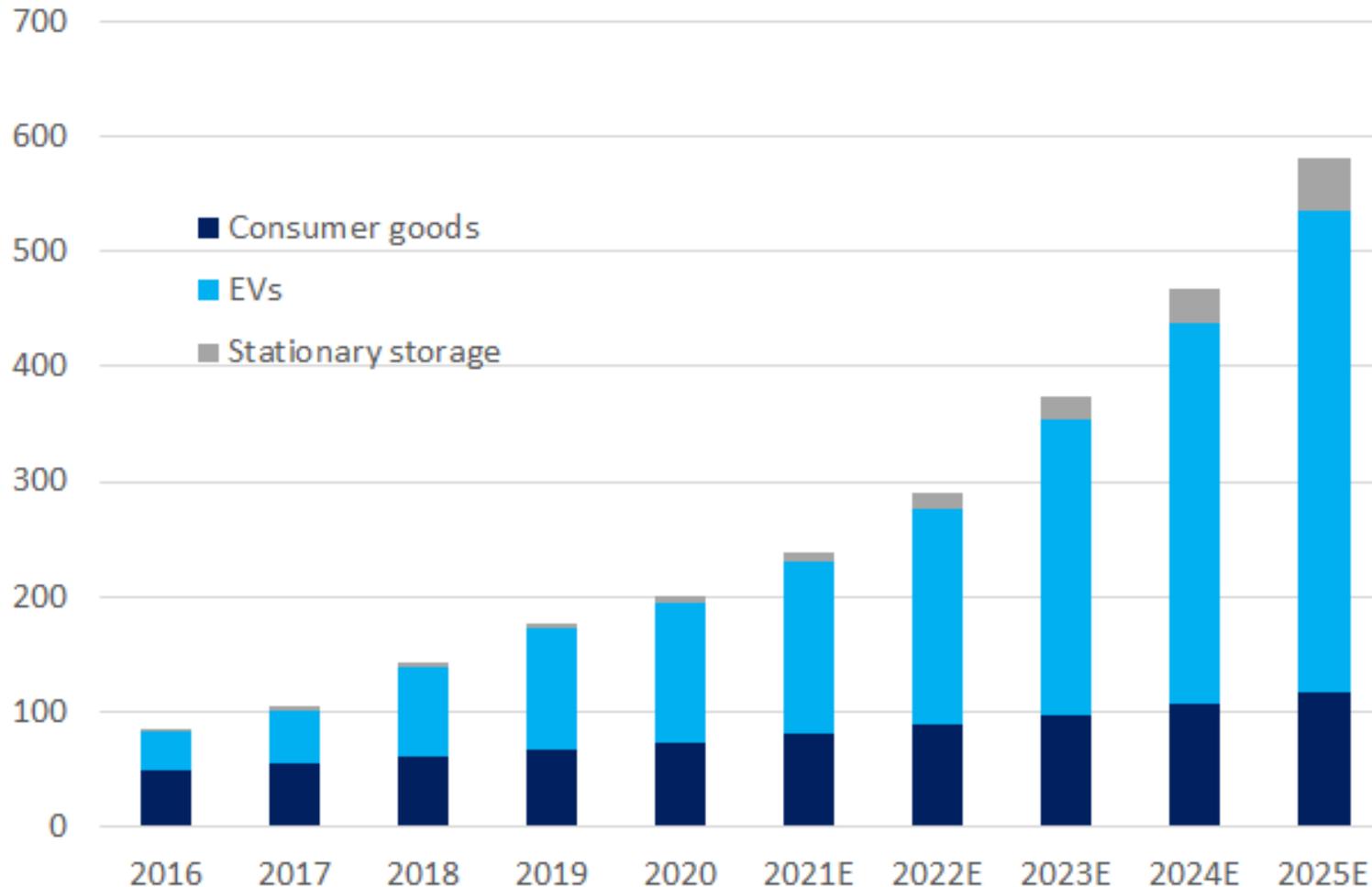


EU Recovery and Resilience Facility (RFF) fund allocation



Batteries: demand growing at CAGR of around 20%

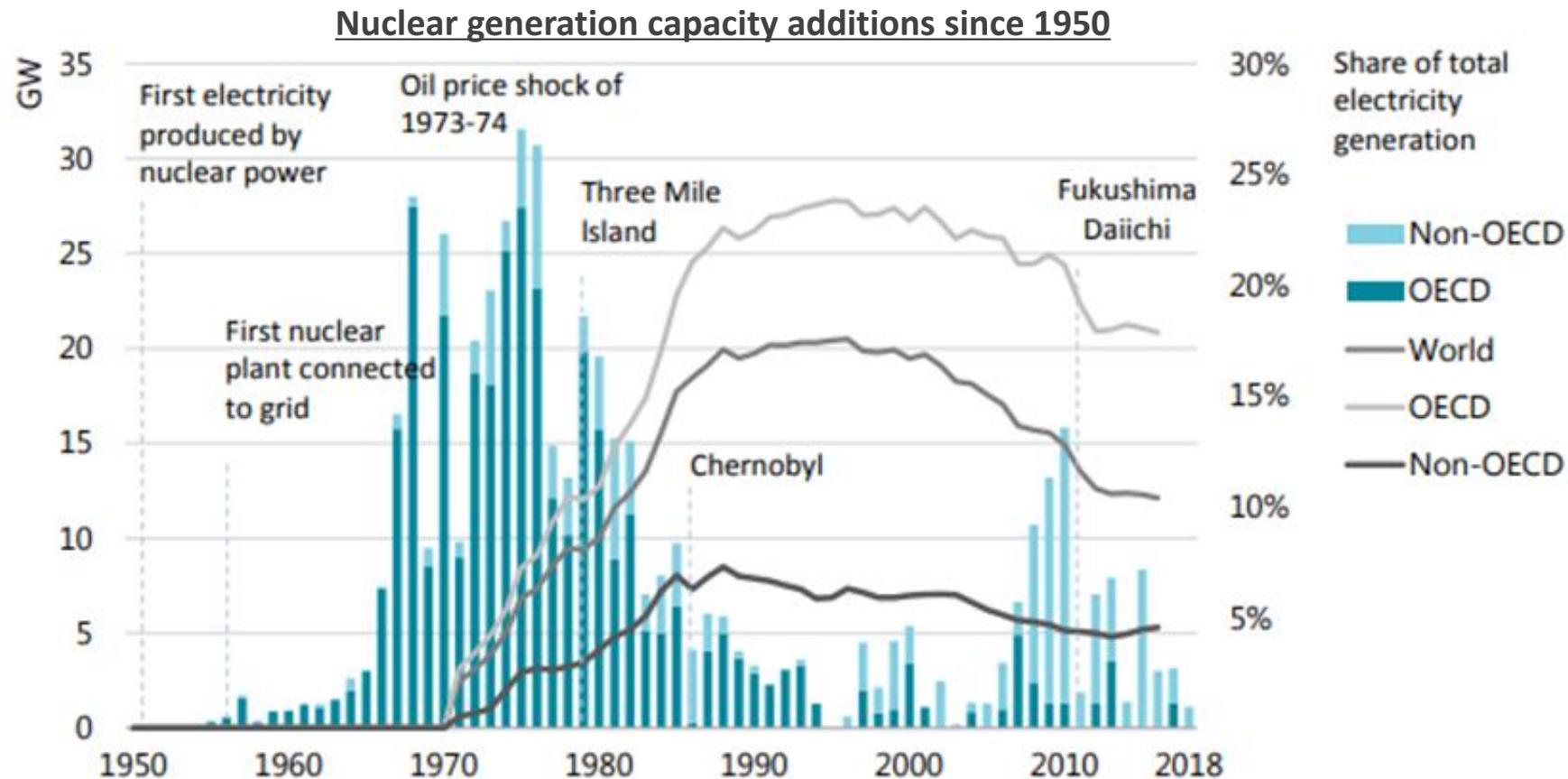
Global Lithium-ion battery demand 2016-25E (GWh)



- Lithium-ion battery demand is expected to have risen by around 20% in 2021, to c.240 GWh of new capacity
- Demand in 2025 is expected to increase to around 600 GWh, dominated by EV growth

Nuclear power: will struggle to grow meaningfully

- Nuclear power provides 11% of world electricity supply
- Plants built in the 1970/80s now near the end of their assumed lives. Some will be extended, but many retired
- New projects are proving too expensive and too capital intensive for the private sector to finance



How we invest in these themes

Guinness Sustainable Energy Fund

Characteristics of the Guinness Sustainable Energy Fund

Single sector	Companies engaged in the generation and storage of sustainable energy and the electrification and efficiency of energy demand. Strategy excludes companies engaged in the extraction of oil, natural gas and coal
High conviction	Equally weighted, concentrated portfolio (30 positions)
Fully invested	No cash management, FX hedging or derivatives
Unconstrained	Benchmark agnostic
Global	Diversified globally
Investment type	Listed equities (long-only), low turnover
Fund structure	Dublin OEIC (UCITS IV); daily dealing; no performance fees
Launch date	19 December 2007

Past performance should not be taken as an indicator of future performance. The value of investments and the income from them can fall as well as rise.

Our investing solution to the Sustainable Energy transition

- The Guinness Sustainable Energy Fund prioritises returns whilst delivering concentrated exposure to companies playing a key role in global de-carbonisation
- The Fund's holdings map most directly to four of the UN's sustainable development goals
- The Fund is classified as Article 9 for the purpose of the EU SFDR



Sustainable Energy Fund: portfolio by theme

Sustainable Energy Fund: portfolio by theme

Theme	Example holdings	Weighting (%)
1 Electrification of the energy mix	 	24.3%
2 Rise of the electric vehicle and auto efficiency	 	20.9%
3 Battery manufacturing		8.0%
4 Expansion of the wind industry	 	11.8%
5 Expansion of the solar industry		12.7%
6 Heating, lighting and power efficiency		10.7%
7 Geothermal and biomass	 	5.2%
8 Other (inc cash)		6.3%

Portfolio valuation characteristics

The Guinness Sustainable Energy portfolio compares to the MSCI World as follows:

- A premium P/E ratio in 2022/2023 of 25%
- A slightly higher EV/EBITDA multiple
- Lower dividend yield
- Stronger forecast EPS %pa growth
- Improving cashflow return metrics

As at 30 April 2022

	P/E			EV/EBITDA			Dividend Yield		EPS Growth (%pa)		CFROI*	
	2021	2022E	2023E	2021	2022E	2023E	2022E	2023E	2014-21	2021-23	2021E	2022E
Guinness Sustainable Energy Fund	23.5x	22.4x	18.2x	13.4x	12.8x	10.6x	1.4%	1.5%	5.1%	18.4%	6.2%	7.5%
MSCI World Index	18.6x	16.8x	15.6x	12.3x	11.2x	10.6x	2.0%	2.2%	6.7%	10.3%	8.6%	9.0%
<i>Fund Premium/(Discount)</i>	<i>26%</i>	<i>33%</i>	<i>17%</i>	<i>9%</i>	<i>14%</i>	<i>0%</i>						

*Portfolio = median CFROI; Index data = Credit Suisse MSCI World ETF median CFROI

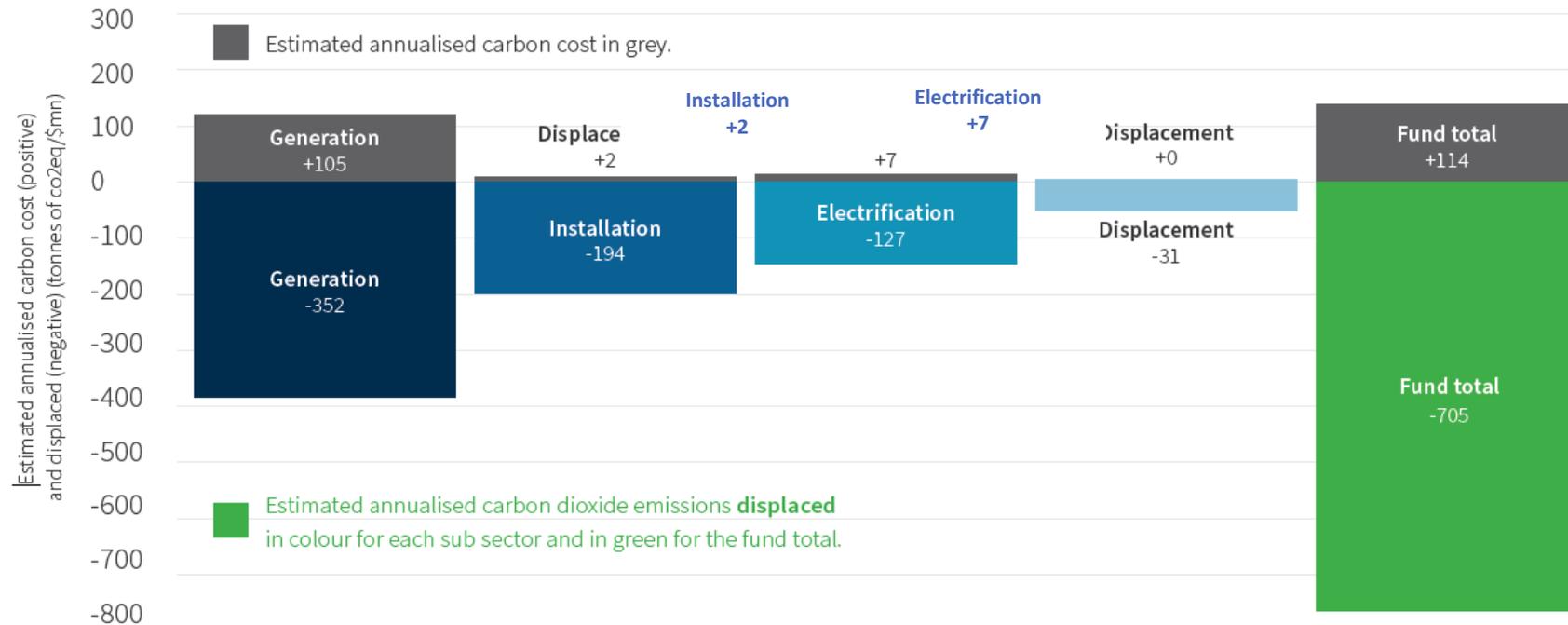
Portfolio holdings' impact – carbon dioxide emissions avoided

- In 2020, per US\$m of portfolio assets, we estimate that the annualised carbon:
 - cost was c.114 tCO₂e/\$m
 - displaced was c.705 tCO₂e/\$m

705 tonnes of CO₂ is equivalent to:

11,657	85	1,771,804	1,632
			
Tree seedlings grown for 10 years	Homes' energy use for one year	Miles driven by a passenger vehicle	Barrels of oil

Estimated annualised carbon cost vs carbon displaced (tonnes) per \$1m of AuM by sector



Note: these are unaudited figures, which rely on internal estimates

The energy transition

- There is a need for greater investment across the breadth of the energy market to build security of supply
- The Guinness Global Energy fund provides exposure to oil and gas companies
- The Guinness Sustainable Energy fund provides exposure to renewable energy and efficiency companies

Contact details

Sales, marketing and investor relations

Charlie Riddell	charlie.riddell@guinnessfunds.com	+44 (0) 20 7222 3473
Flurry Wright	flurry.wright@guinnessfunds.com	+44 (0) 20 7222 5703
Deborah Kay	deborah.kay@guinnessfunds.com	+44 (0) 20 7222 2037
Alex Hall	alex.hall@guinnessfunds.com	+44 (0) 20 7042 6525
Charlie Crole	charlie.crole@guinnessfunds.com	+44 (0) 20 7042 6526
Rupert Bonsor	rupert.bonsor@guinnessfunds.com	+44 (0) 20 7042 6529

Investment management team

Will Riley	will.riley@gafunds.com	+44 (0) 20 7222 3451
Jonathan Waghorn	jonathan.waghorn@gafunds.com	+44 (0) 20 7222 3457
Jamie Melrose	jamie.melrose@gafunds.com	+44 (0)20 7042 6510

Guinness Asset Management Ltd.

18 Smith Square, London SW1P 3HZ	info@guinnessfunds.com www.guinnessfunds.com	+44 (0) 20 7222 5703
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For your protection, calls to these numbers will be recorded

Appendix: definitions

Alpha is a measure of a fund's over or underperformance by comparison to its benchmark. It represents the return of the fund when the benchmark is assumed to have a return of zero, and thus indicates the extra value that the manager's activities have contributed.

Beta is a statistical estimate of a fund's volatility by comparison to that of its benchmark, i.e. how sensitive the fund is to movements in the section of the market that comprises the benchmark. A fund with a Beta close to 1 will move generally in line with the benchmark. Higher than 1 and the fund is more volatile than the benchmark.

Information Ratio An assessment of the degree to which a manager uses skill and knowledge to enhance returns, this is a versatile and useful risk-adjusted measure of actively-managed fund performance. It is calculated by deducting the returns of the fund's benchmark from the fund's overall returns, then dividing the result by its Tracking Error. In this way, we arrive at the value, per unit of extra risk assumed, that the manager's decisions have added to what the market would have delivered anyway.

Maximum Drawdown Represents the worst possible return over a period, e.g. buying at the highest price over the period and selling at the lowest.

Maximum Loss Represents the worst running return over a period, e.g. the longest running consecutive loss without making a gain

The **R-Squared** measure is an indication of how closely correlated a fund is to an index or a benchmark. It can be treated as a percentage, showing what proportion of a fund's movements can be attributed to those of the benchmark. Values for R-Squared range between 0 and 1, with 0 indicating no correlation at all, and 1, rarely, showing a perfect match.

Sharpe ratio is a commonly-used measure which calculates the level of a fund's return over and above the return of a notional risk-free investment, such as cash or Government bonds. The difference in returns is then divided by the fund's standard deviation - its volatility, or risk measurement. The resulting ratio is an indication of the amount of excess return generated per unit of risk.

Tracking Error this statistic measures the standard deviation of a fund's excess returns over the returns of an index or benchmark portfolio. As such, it can be an indication of "riskiness" in the manager's investment style. A Tracking Error below 2 suggests a passive approach, with a close fit between the fund and its benchmark. At 3 and above the correlation is progressively looser: the manager will be deploying a more active investment style, and taking bigger positions away from the benchmark's composition.

Volatility Standard deviation is a statistical measurement which, when applied to an investment fund, expresses its volatility, or risk. It shows how widely a range of returns varied from the fund's average return over a particular period. Low volatility reduces the risk of buying into an investment in the upper range of its deviation cycle, then seeing its value head towards the lower extreme.

ABOUT Us

- Founded in **2003**, along with US sister firm Guinness Atkinson Asset Management Inc.
- **\$6.2bn** AUM (Guinness Group assets)
- **50** employees, including 17 investment professionals
- **100%** employee owned
- Key Investment strategies:
 - Global Equity
 - Energy
 - Asia & Financials

Source: Guinness Global Investors, December 2021

Important information and risk factors

Issued by Guinness Asset Management Limited, authorised and regulated by the Financial Conduct Authority.

This report is primarily designed to inform you about recent developments in the energy markets invested in by the Guinness Global Energy Fund. It may also provide information about the Fund's portfolio, including recent activity and performance. It contains facts relating to the energy market and our own interpretation. Any investment decision should take account of the subjectivity of the comments contained in the report.

This document is provided for information only and all the information contained in it is believed to be reliable but may be inaccurate or incomplete; any opinions stated are honestly held at the time of writing, but are not guaranteed. The contents of the document should not therefore be relied upon. It should not be taken as a recommendation to make an investment in the Fund or to buy or sell individual securities, nor does it constitute an offer for sale.

Risk

the Guinness Global Energy Fund is an equity fund. Investors should be willing and able to assume the risks of equity investing. The value of an investment and the income from it can fall as well as rise as a result of market and currency movement, and you may not get back the amount originally invested. The Fund invests only in companies involved in the energy sector; it is therefore susceptible to the performance of that one sector, and can be volatile. Details on the risk factors are included in the Fund's documentation, available on our website.

Documentation

The documentation needed to make an investment, including the Prospectus, the Key Investor Information Document (KIID) and the Application Form, is available in English from www.guinnessfunds.com or free of charge from:-

- the Manager: Link Fund Manager Solutions (Ireland) Ltd (LFMSI), 2 Grand Canal Square, Grand Canal Harbour, Dublin 2, Ireland; or,
- the Promoter and Investment Manager: Guinness Asset Management Ltd, 18 Smith Square, London SW1P 3HZ.

LFMSI, as UCITS Man Co, has the right to terminate the arrangements made for the marketing of funds in accordance with the UCITS Directive.

Investor Rights

A summary of investor rights in English is available here: <https://www.linkgroup.eu/policy-statements/irish-management-company/>

Residency

In countries where the Fund is not registered for sale or in any other circumstances where its distribution is not authorised or is unlawful, the Fund should not be distributed to resident Retail Clients. **THIS INVESTMENT IS NOT FOR SALE TO U.S. PERSONS.**

Structure & regulation

The Fund is a sub-fund of Guinness Asset Management Funds PLC (the "Company"), an open-ended umbrella-type investment company, incorporated in Ireland and authorised and supervised by the Central Bank of Ireland, which operates under EU legislation. The Fund has been approved by the Financial Conduct Authority for sale in the UK. If you are in any doubt about the suitability of investing in this Fund, please consult your investment or other professional adviser.

Switzerland

This is an advertising document. The prospectus and KIID for Switzerland, the articles of association, and the annual and semi-annual reports can be obtained free of charge from the representative in Switzerland, Carnegie Fund Services S.A., 11, rue du Général-Dufour, 1204 Geneva, Switzerland, Tel. +41 22 705 11 77, www.carnegie-fund-services.ch. The paying agent is Banque Cantonale de Genève, 17 Quai de l'Île, 1204 Geneva, Switzerland.

Singapore

The Fund is not authorised or recognised by the Monetary Authority of Singapore ("MAS") and shares are not allowed to be offered to the retail public. The Fund is registered with the MAS as a Restricted Foreign Scheme. Shares of the Fund may only be offered to institutional and accredited investors (as defined in the Securities and Futures Act (Cap.289)) ('SFA') and this material is limited to the investors in those categories

Telephone calls will be recorded and monitored.